

ELEMENTARY TEACHERS' PERCEPTIONS OF TECHNOLOGY INTEGRATION IN  
ENGLISH AND LANGUAGE ARTS INSTRUCTION

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Doctor of Education

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by

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## **DEDICATION**

This dissertation is dedicated to beloved parents Claudia and Abraham Roach whose dreams I carry.

## ABSTRACT

Maynard, Chanelle S., *Elementary teachers' perceptions of technology integration in English and Language Arts instruction*. Doctor of Education (Literacy), August, 2020, Sam Houston State University, Huntsville, Texas.

The use of technology devices and applications continues to increase in schools. The purpose of this study was to examine elementary teachers' perceptions of technology integration in English and Language Arts instruction. A phenomenological research design (Moustakas, 1994; van Manen 2016) was used to determine teachers' shared experience of technology integration. Six teachers who were members of a district's technology learning group were selected using purposeful sampling. The data were collected using semi-structured interviews and from the teachers' posts on their school websites and Twitter accounts.

The interview data were analyzed using In Vivo Coding and Process Coding, and Axial Coding processes (Saldana, 2016). Process coding and analytic memos were used in the analysis of online data (Miles, Huberman, & Saldana, 2014). The online data consisted of text including tweets, and also photographs, graphics, and videos. Themes were derived from the significant statements of the individual teachers' composite data. These themes included access, technology as a tool, and collaboration.

Findings revealed teachers viewed technology integration in literacy favorably, citing its' positive impact on student learning and achievement. They believed it provided access to all students and teachers to new ways of learning, teaching, collaborating, and communicating. Technology integration occurred beyond the classroom as students and teachers connected with their peers around the world. Literacy skills were taught across content areas and integrated into projects. Teachers believed using technology was

essential for preparing students for future careers and life. Factors that encouraged their use of technology included the availability, support for diverse student groups, and professional development. Having insufficient time and resources were identified as barriers to technology integration. Teachers did not have a curriculum framework or consistency in technology integration practices, which has implications for current practices and future research. The model of using a cohort for professional development appeared effective in supporting teachers' technology integration.

**KEY WORDS:** Phenomenology, Literacy, Technology integration, Educational technology, Elementary teachers, Social media, Websites

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To my sister, Sandra, you were there every step of this journey. You encouraged me even when cancer appeared and our hopes faltered. I will always hold your hand as you have held mine. Your big sister looks up to you!

I was raised by a village of family members and loved ones and my achievements are theirs. I especially wish to thank my Auntie Flor who nurtured my love of reading and learning.

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I would like to show my appreciation to the teachers who participated in this study. You are doing amazing things. You are changing the way students learn and letting them fly. You were generous with your time, and I learned a lot from you which went way beyond this study. Your students are lucky to have you. I appreciate and thank you for your participation.

I wrote my dissertation during a time of great uncertainty and loss due to the global pandemic and social unrest. I believe education can be a beacon and provide hope in these dark times. Its power is transformative; it shines a light on possibilities for change and gives reasons to hope. My wish is for education for all, especially girls around the world, in a new and brighter future.

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## CHAPTER I

### Introduction

While observing my 18-month old nephew read *The Three Little Pigs* on the new eighth wonder of the world, a tablet, I experienced the beginnings of a mind shift about literacy. I had never held a tablet before that day. Joseph was engrossed in the storytelling: he turned the pages, shook the device to make the houses fall, scowled at the notorious wolf, and “read” the words along with the narrator. Ever the teacher, I asked him questions about the story, and he pointed to the pictures or gave one-word answers. I determined he understood the story and recognized some of the words, aided by the visual and auditory supports the application provided. I had read to him before, but this was different. He did not need me; the device allowed him to read the story independently. At that moment, I wondered what his learning experiences would entail when he arrived in kindergarten. How would his teachers teach reading? Would Joseph still use print books and pencils? I had an inkling in that moment of the changes the increasing integration of these newer technology devices might have on how children learned to read, and even write.

As the years past, I experience how the traditional print tools compete with interactive, engaging, and newer digital literacies. Some teachers are inundated with devices and applications which are constantly upgraded and replaced. What do teachers today think of the increased technology integration which is occurring in their classrooms and the changes to instruction and the construct of literacy itself? My wonderings and wanderings in this field started on an ordinary day, with an old tale and a new device. The tablet my nephew used, which fascinated both of us, is now virtually obsolete, and

the latest versions can be worn like watches. There was a shift from the novelty of the structure of the devices to their inclusion in instruction and learning (Schifter, Catherine C. & Stewart. Concetta, M., 2010). My fascination too was initially with the tablet until I saw the promise of its presence in the reading classroom. I cannot specify what it was about that moment which gave me a new perspective on teaching and literacy, but I sensed that a seismic shift was about to occur in literacy education. Today technology integration is an integral part of education systems.

### **Technology Integration**

The International Reading Association, now known as the International Literacy Association (ILA), released a position statement on technology integration a decade ago. It provided a context for the issues of the changing nature of literacy and its relationship with the technology. It also included a charge for teachers to embrace technology, at a time when portable digital devices were emerging:

To become fully literate in today's world, students must become proficient in the new literacies of 21<sup>st</sup>-century technologies. As a result, literacy educators have a responsibility to effectively integrate these new technologies into the curriculum, preparing students for the literacy future they deserve.

(International Reading Association, 2009)

This was a prediction of the influential role of technology integration would assume and how essential it would become for students' success in school and beyond. It also showed a recognition that literacy teachers would have an important role to play in the process.

It can be argued that all forms of technology in schools, in all content areas, involve elements of reading, writing, and communication. Hutchinson and Colwell (2015) emphasized the relationship between technology and literacy, as the ILA established, by acknowledging technology promotes literacy development. They made the connection that technology is beneficial for the development of skills needed both for the digital literacies and the traditional print. The term “technology” used on its own in this study is an umbrella term for the online and offline digital devices, applications, and platforms, and the multimodal, multiliteracies involving print with audio and visual media. It encompasses teachers' and students' use of these resources and it is related to their use of literacy skills to access and use them.

Technology in the classroom is not a new phenomenon. I remember the magical purple ink of mimeographs, floppy disks, and the tent-like desktops. I graduated before the explosion of the World Wide Web and Google. In my Audio-Visual methods class in college, I made overhead transparencies. Owning an electric typewriter and a compact disc player was the height of technological sophistication for students. It was all stationary and localized.

Cuban (1986) traced teachers' journeys with technology in the classroom, from the slate and chalk used in the nineteenth century to microcomputers. He considered technology to be media or visual supports used to support teachers' oral instruction. He recounted the emergence of the silent film in classrooms in the early 1900s and cited Thomas Edison's 1910 prediction that books would be replaced by film. A century later, books are still here, but today, a thousand can be stored in a handheld device.

In his historical overview, Cuban (Cuban, 1986) described the sequence of technology integration, which characterized the process of integration of the years which followed. A form of technology is implemented, a study of its effectiveness, then a comparison of the traditional forms of instruction versus the technology. Cuban considered the perspective of the teachers was missing from the studies and descriptions about the story of technology integration. This aspect is an area which this study addresses.

Teachers, central to technology integration, were sometimes characterized as being resistant to the technologies implemented in their classrooms (Cuban, 1986). This was counterbalanced by teachers' reports of the challenges of using the technologies. Decades later Ertmer (1999) would categorize these challenges as first and second-order barriers to technology integration. A hopeful Cuban however acknowledged the "potential for change" (p. 65) was "associated with teachers' beliefs" (p. 65). Teachers' assessment of the relevance of the technology to their instruction was related to their embracing of the films, radio, and television. This emphasizes the role of teachers' perspectives in research on technology integration; Ertmer, Ottenbreit-Leftwich, Sendurur & Sendurur (2012), and Spaulding (2013) would later report research showed teachers' perceptions of technology integration are important because it contributed to the effective use of technology in the classroom.

Cuban (1986) ended his review of the research on "teachers and machines" in the early 1980s. He wrote about the promise of a technological revolution in the school, with the emergence of the microcomputers. He predicted the computer would be used as a tool, there would be an increase in labs but overall, limited usage. Analyzing nearly a

century of technology integration, he concluded, the computer, “like its predecessors, will be tailored to fit the teachers’ perspective” (p. 99) and within the contexts and constraints of schools and classrooms. This was all before the emergence of the Internet, and Cuban probably did not envision the global dominance of digital technology.

There are social forces that are influencing the integration of technology in education today, just as they did in the early twentieth century (Cuban, 1986). Some researchers (Leu, Kinzer, Coiro, Castek, & Henry, 2017) identified these catalysts as globalization, which relies on information and communication technologies; the proliferation of the Internet in all areas of life, and policies which promote technology integration in education. Within this context, I believe educators are at metaphorical crossroads. (Leu et al., 2011) evoked the imagery of Robert Frost’s road to show where educators and the new literacies fostered by technological developments converge. The choice is to continue to define literacy and continue instruction with the traditions of static print, or educators can choose a new path. This new way is the acknowledgment that technology integration is important to prepare our students for this century and beyond. Teachers are essential conduits for students, whichever road is chosen. Researchers emphasized teachers’ beliefs and practices are central for technology integration (Hutchison & Reinking, 2011); (Kim, Kim, Lee, Spector, & DeMeester, 2013). Teacher perceptions are an appropriate starting point to determine where educators are, where they are going, and how they are progressing along the journey towards effective technology integration.

This may be central to how teachers approach the challenges which will arise with the shift to virtual teaching and learning in the era of the COVID-19 pandemic. There is

no blueprint for this time, and it can be predicted teachers' beliefs and perceptions about how to integrate technology will be an integral part of how they proceed in these unprecedented times in education and the global society.

### **Statement of the Problem**

Spaulding (2013) reported although billions of federal funds are spent equipping teachers with the tools needed to integrate technology, the research shows technology is used ineffectively and infrequently. Ertmer and Ottenbreit-Leftwich (2010) maintained instead technology integration has been "minimal or superficial" (p. 313). Hutchinson and Reinking's (2011) national study of literacy teachers' perceptions of technology use, revealed teachers had a limited view of technology use and described a low incidence of its integration into curriculum, despite a large body of research available about using technology in education ( Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). Perrotta (2013) explained teachers used technology primarily for administrative tasks like lesson preparation and data management, a finding which was similar to a much earlier study of K-12 teachers (Gorder, 2008). The availability of technology does not mean it is used to its potential, which is a concern, given the proliferation of technology in schools. Furthermore, as the ILA proposed in the early days of the expansion of new digital devices, students like my nephew need to be prepared to meet the requirements of a digitalized future. Teachers' low or ineffective application of technology in instruction is unacceptable.

Part of the problem may be technology appears to progress at a rapid pace, and seems to outrun educators' ability to keep pace. Researchers Ertmer and Ottenbreit-Leftwich (2010) explained one of the challenges teachers face is their learning about

educational technology is like asking them to “hit a moving target” (p. 260) as the field, devices, and the literacies they embody are constantly evolving. How can teachers use technology effectively and evaluate its influence on student achievement, if the skills and tools are become obsolete or replaced quickly? It may be the case students’ knowledge of digital technology may exceed their teachers’, as technology in the classroom, continues to increase (Leu et al., 2017). Schifter and Stewart (2010) described this phenomenon as a knowledge gap that exists between the “digital natives” (students) and “digital immigrants” (the teachers).

There is a shift in instructional approaches due to the changing role of the teacher. The classroom was dominated by an instructivist approach to learning, where the students were more passive actors in a teacher-centered environment (Schifter & Stewart, 2010). These authors explained in these classrooms, students are learning from the technology, in contrast to the constructivist pedagogy context where the students use the technology as a tool to construct their knowledge. This has repercussions for the teachers’ role. Leu and his colleagues (2017) concluded literacy teachers specifically would become facilitators, “orchestrators of learning contexts rather than dispensers of literacy skills” (p. 7) as the new literacies and technologies develop. Leu et al. proposed these changes have implications for teacher preparation. In their study of teachers’ perceptions of technology integration, however (Hutchison & Reinking, 2011) reported teachers identified limited professional development as a barrier to their implementation of technology.

The definition of what it means to be literate is changing due to the emergence of digital literacies (Leu et al., 2017). Those researchers theorized the concept of literacy

now includes the knowledge of technology with its multimodal forms. A challenge to educators is a state of flux in which literacy balances, due to the evolving technologies: “To be literate tomorrow will be defined by even newer technologies which have yet to appear” (p. 1). There is a question of teachers’ ability to ensure students like my nephew are adequately prepared for the literacy proficiencies they will be expected to demonstrate in the future. The New London Group (1996), in their writings about the growth of multiliteracies due to the digital explosion, questioned what the phenomenon would mean for literacy pedagogy. They wrote about expanding the concept of literacy from narrow text-based print concepts to multimodal forms. Mills (Mills, 2010) suggested ignoring what he named the “digital turn” (p. 250) ignores the fact that literacy in our globalized, connected society includes digital forms. This has implications for instruction, teacher training, and student achievement.

There is also a concern that failure to align classroom practice with technology advances increases the widening of the achievement and social gaps. Schifter and Stewart (2010) suggested technology creates a division of economics and class which now exists on a global level. Technology advances were seen a decade earlier as a “double-edged sword” (Labbo & Reinking, 1999, p.287) with the potential to both reduce and create inequality. Leu et al. (2017) reported this gap exists between rich and poor students because the latter are doubly disadvantaged. This is because students in lower socioeconomic groups are more likely to have less technology access at home, and in their schools, and there may be less push to implement technology in their classrooms, as it is not a tested subject. The researchers argued that the irony of the situation is the poorer students need technology more to progress beyond their economic and social

constraints and equip them for the future. In a Pew Research study on teacher's use of technology, teachers from rural schools and lower socioeconomic settings reported their students' inefficient access to digital resources at the schools and homes (Purcell, Heaps, Buchanan, & Friedrich, 2013).

Together and individually, these studies cited indicated the need for teachers to have knowledge and skills to integrate technology into the curriculum. Technology rich classrooms do not equate to the use of technology to its potential if teachers and students lack the strategies to use it effectively. Teachers' perceptions of what is happening can serve several purposes; they can provide data and insight about current practices as well as identify areas for teachers' professional development.

### **Purpose of the Study**

The purpose of the study is to determine the teachers' perceptions of technology integration. The study may provide information into current practices and identify areas for teachers' professional development. (Hutchison & Reinking, 2011) reported teachers' perceptions of technology integration influenced its inclusion in their instruction. Spaulding (2013) also reported research showed teachers' perceptions of technology are important, as they contributed to their use of technology in the classroom.

### **Research Questions**

The study is designed to answer the following questions:

- 1) What are elementary teachers' perceptions of technology integration in English and Language Arts instruction?
- 2) What first and second-order incentives or barriers support or limit teachers' integration of technology?

- 3) How do teachers implement ISTE educator and student technology standards in literacy instruction?

### **Significance of the Study**

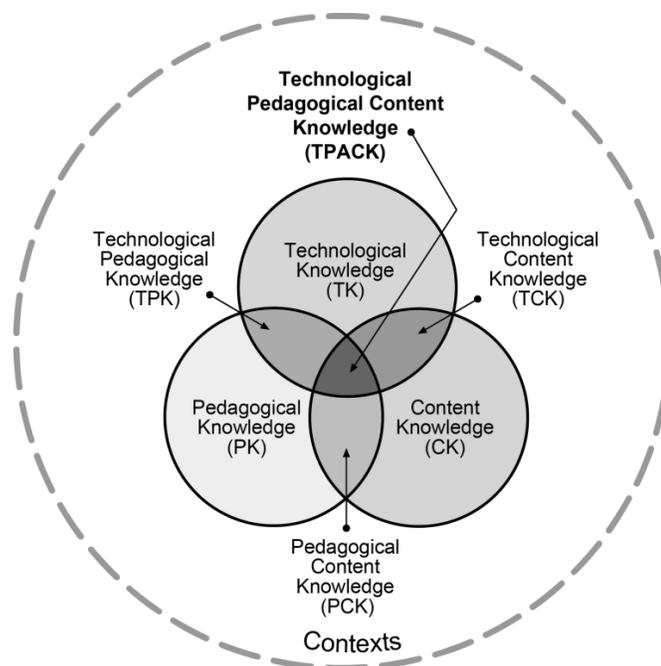
In my role as a literacy specialist and instruction coach, I provide professional development to teachers. Over the past five years, the focus has increasingly moved from the elements of the balanced literacy framework using traditional print and oral forms of literacy, to implementing technology in literacy instruction. All technology applications and devices involve forms of literacy. My experiences reveal there has been a rapid increase in the available devices and insufficient time for teachers to reflect on the effect of student learning across the curriculum. This study may provide information about the current technology integration practices in schools, the factors which promote or limit it, and identify areas for teachers' professional development.

### **Conceptual Framework**

Technological Pedagogical Content Knowledge (TPCK) (Mishra & Koehler, 2006a), now known as TPACK, the Technology, Pedagogy, and Content Knowledge framework (Koehler, Mishra, & Cain, 2013), is one of the conceptual frameworks used in this study. Shulman (Shulman, 1986) sought to develop a framework to examine teacher knowledge and how they transferred this knowledge to instruction. Central to the creation of the TPCK was Shulman's description of Pedagogical *Content Knowledge* (PCK) (Mishra & Koehler, 2006; Willemark, 2018). Shulman's conceptualization of teachers' pedagogical content knowledge was it is a combination of knowledge about a subject area with the instructional component, and the ways of representing that knowledge for transmission to students. It also embodies an understanding of the characteristics and

needs of the learner. He evoked the metaphor of Locke's "blank slate" the student brings to the process of learning, and in so doing emphasized the role of the teacher. In this study, the teachers' role and perceptions are considered integral to technology integration.

The technology component of the TPACK was added by Koehler and Mishra (Mishra & Koehler, 2006). Mishra and Koehler cited studies that recognized there was a need for a framework for technology integration. It would serve as a vehicle for the analysis and development of the integration process, both for instructional and research purposes. Mishra and Koehler surmised technology integration was related to the teachers' pedagogical practices and their content knowledge. The proliferation of digital technology in the classroom gave rise to the addition to Shulman's framework. Mishra and Koehler created a model, the TPACK, which showed a dynamic and interrelated structure of content, pedagogy, and technology shown in Figure 1.



*Figure 1.* The components of TPACK. Reproduced by permission of the publishers © 2012 by tpack.org.

There are seven components of the framework, pieces of which exist both individually and interrelated. The elements of Content knowledge (CK), pedagogical knowledge (PK), and pedagogical content knowledge (PCK) remained consistent with Shulman's ideas (Mishra & Koehler, 2006). Technological knowledge (TK) in this framework refers to the traditional technologies, but also the digital and online technologies, and the knowledge of the devices and skills required. The technological content knowledge (TCK) is the marriage of knowledge of a subject matter and knowing how it can be represented or is represented through technology. The devices and instructional strategies related to technology are represented by the technological pedagogical knowledge (TPK) component of the framework. The teacher is familiar with the technology as a tool but also knows how to use it in teaching and for management tasks such as taking attendance.

The TPACK, technological pedagogical content knowledge model is composed of all of these components (Mishra & Koehler, 2006). It is a model of technology integration that goes across different content areas and instructional strategies. It portrays technology as a tool, representation of content, and includes the accessibility and learning outcomes for students. It exists in a state of “dynamic equilibrium” (p. 1029) where each component of the framework is transactional and connected and should not be viewed in isolation. The dynamic aspect of the model refers to the continued emergence of new technologies, the understandings of their applications in education, and the interaction of the components of the model. I also envision gears instead of the static circles represented in the figure, to represent the movement of the components; the authors explained new technologies reconstruct the model.

Willemark (Willemark, 2018) conducted a review of the uses of the TPACK in studies between the period of 2011- 2016. She found over 600 articles chronicling its use, in schools as an evaluation instrument and research. Willemark characterized the model as an ideal for teachers to aspire to, and TPACK was used to measure teacher knowledge and teachers’ competence in teaching with digital technologies. It was used in different research design studies, and across different subject areas. In many studies teachers self-reported on competencies within the TPACK framework and gave their perspectives. TPACK was also used to develop instructional activities. It will be used in both contexts in this current study. Mishra and Koehler (2006) acknowledged the study of technology integration is not limited to one framework, due to the complex nature of the subject. Another model is used in this study to contextualize student learning as the TPACK framework is teacher-centered.

## **Theoretical Framework**

The study of technology requires multiple theoretical lenses. (Labbo & Reinking, 1999) stated technology is not a monolithic concept so it requires the “perspectives of multiple realities” (p. 478). They added this approach was valuable in studying research that connected technology and literacy instruction. Some researchers consider a teaching philosophy aligned with constructivism to be a “prerequisite for successful technology integration” (Mueller, Wood, Willoughby, Ross, & Specht, 2008).

Tracey and Morrow (Tracey & Morrow, 2017) described constructivism. One of the tenets of this theory is the diffusion of new learning into prior knowledge. In the context of technology integration, this can be the merging of the traditional concepts and tools of literacy with the emerging digital literacies, and the new skills and learning they require.

The perspective of social constructivism applies to technology integration. Tracey and Morrow (2017) cited Davison’s 2010 writings about Vygotsky, who developed the theory. Vygotsky determined a child’s learning is an internalized process that develops their social interactions. The foundation of these interactions is language – in all of its forms. It is the vehicle for all components of literacy. Vygotsky(Vygotsky, Cole, John-Steiner, Scribner, & Souberman, 1980) wrote about signs and words serving as the vehicle of their social interactions with others. Technology is comprised of digital literacies, and provides opportunities for social interaction, and communication, and has expanded Vygotsky’s conceptualization of these systems. Technology has added to and refined the concept of Vygotsky’s sign systems (Tracey & Morrow, 2017). Symbols now entail digital features like hypertext, emojis, and multimedia applications.

Technology presents sign symbols and social interactions which are now a part of the dynamic literacy definition. The range of multimodal supports available in the digital literacies provides the scaffolding that readers and writers use to comprehend, communicate, and access new learning. The Internet is the new global social community, one Vygotsky probably never imagined. Nevertheless, the Internet provides a different context for the social interactions Vygotsky studied. This is beyond the context Vygotsky envisioned when he wrote, “human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them” (Vygotsky et al., 1980, p. 88). The characteristics of learning through social interactions are still present in the technology-rich classroom, but they occur in both offline and online environments, and with the people in these spaces.

Vygotsky’s “zone of proximal development” is also relevant here (Vygotsky et al., 1980). A child cannot access or use the information on the internet and technologies if they are above their knowledge and skill levels.

A challenge of theories for technology is that when one conducts a study, the technologies may change before it is published, so rapid is the evolution (Leu et al. 2017).

### **Delimitations**

The delimitations, which are the aspects of this study I as the researcher control, relate to the teachers and their instructional practices. The study will involve elementary teachers from the district in which I work. I chose this district because of the availability of technology resources for teachers and students, and the expectation from the district and state that teachers use technology in their instruction. The study is delimited to

elementary literacy teachers who participate in a technology professional learning group. This is a delimitation because I could have chosen teachers who teach at middle and high school levels, and who were not involved in learning about technology, and who were content area teachers of Science, Technology, Engineering and Math (STEM) content areas only. Literacy teachers were chosen because as Hutchinson and Reinking (2011) explained literacy teachers have the responsibility of providing the foundational skills needed for reading, writing, and communicating, and increasingly these activities occur within the context of technology. Elementary teachers were involved because they lay the foundations for technology integration and the acquisition of early literacy skills.

### **Limitations**

The limitations of the study are related to its size, the location, the influence of my position, and other factors that may pose threats to the validity of the research. Maxwell (Maxwell, 1992) described the types of validity which exist in qualitative studies, and Onwuegbuzie and Leech (Onwuegbuzie & Leech, 2007) identified the internal and external threats against the credibility of the studies. They defined the internal threats as factors and characteristics within the setting or participants and the external threats as related to the extent of the generalizability of the findings. Maxwell described *descriptive validity* as the credibility of the reporting of the study itself and proposed this is central to all the other categories of validity as well as all phases of the study. *Generalizability* is also relevant to this study, as the small sample will limit the potential for the findings to apply to a broader population.

The threats to the validity of the study affect three stages- the study design and the collection of data, the analysis, and interpretation of the findings (Onwuegbuzie & Leech,

2007). In the design phase and data collection stage, a possible internal threat is an *observational bias*. This can occur if insufficient data is collected from the sample and later analyzed, due to inadequate or insufficient observation data. My personal beliefs about technology and literacy instruction may pose a *researcher bias* which Onwuegbuzie and Leech explain may be evident to the participants and affect their responses and behaviors during the study. This threat has the potential to affect both the internal and external validity of the study. There is also the threat during the data collection of *reactivity* where the participants may be influenced by their awareness of their participation in a research study, leading to a component of reactivity, the *Hawthorne effect*. This threat may be present as the teachers will be aware of my role as an instructional coach so I may think their instruction is being observed and evaluated. The participants may also feel obligated to participate in the study and provide certain answers as a result of my role. Altogether, this can limit the participants' demonstration of their authentic behaviors and responses during the research process.

As the sole data collector in the study, there is the possibility of the occurrence of *confirmation bias*, as my interpretation of the data collected may align with my perceptions of the phenomenon under study (Onwuegbuzie & Leech, 2007) which is technology integration. This threat is related to the *interpretative validity* which involves interpreting the data based on the participants' expressed interpretations of the phenomena, their perspectives, versus my perceptions as the researcher (Maxwell, 1992a).

### **Assumptions**

I assume the teachers integrate technology in their classrooms and are familiar with different devices and applications. I also assume technology is readily accessible to them and their students. I also assume, although there is a possibility the teachers will be influenced by my position and the study itself, they will be truthful about their practices and perceptions of technology integration.

### **Context of the Study**

During the course of this research study, the global education systems changed and ushered in a new period of teaching and learning. The coronavirus disease (COVID-19) which gave rise to a pandemic was reported in January 2020, about a month after the data collection began. The data collected reflects a different era compared with the ending of the study. In March 2020, *stay at home* orders were issued for Texas and other places around the world. Where possible, schools transitioned to online distance learning. The perspectives of the teachers in this study represent the school model that existed before this new digitalized period. The study was concluded in April 2020 which required adjustments to the data collection procedures which are described in Chapter III.

### **Organization of the Study**

This study is organized into five chapters. In Chapter 1, I described the purpose of the study of teachers' perceptions of technology integration, and the research questions. This chapter also includes the theoretical and conceptual frameworks which will guide the study. In Chapter II I reviewed the literature related to teachers' perceptions of technology integration, what technology integration looks like in the classroom, and the conditions which support or limit its implementation. I used the Comprehensive

Literature Review (CLR) framework developed by Onwuegbuzie and Frels (Onwuegbuzie & Frels, 2016). In Chapter III, I discussed the methodology, detailing the elements of the qualitative design of this study which is based on phenomenology. This includes sampling methods and data collection procedures. I also detailed the analysis procedures employed. I described the results of the study in Chapter IV and used the data to answer the research questions. In Chapter V, I discussed the research findings and their implications and proposed recommendations for future research.

## CHAPTER II

### Review of the Literature

#### Comprehensive Literature Review

The Comprehensive Literature Review (CLR) process (Onwuegbuzie & Frels, 2016) was used to organize this review of the literature. The methodology involves seven steps which can be recursive and represent three phrases. In the exploration phase, the researcher considers beliefs and topics of interest (Step 1); initiates the search (Step 2); stores and organizes the information derived searches (Step 3); develops and applies a selection/deselection criterion for the information (Step 4); and expands the search using five MODES (Step 5). These MODES are defined as: “**M**edia, **O**bservation(s), **D**ocuments, **E**xpert(s) in the field, and **S**econdary data” (p.39). The goal is to use “data” from a variety of these MODES instead of a single source and type of information. The *Interpretation phase* of the process involves the analysis and synthesis of the information, and the *Communication phase* is the presentation of the report, or in this case, the review of the literature.

**Literature exploration, organization, and selection.** The creation of the research question and topics reflect the completion of Step 1 of the CLR process, “Exploring Beliefs and Topics” (Onwuegbuzie & Frels, 2016). The purpose of the research is to determine elementary teachers’ perceptions of technology integration in literacy, what factors affect implementation, and how technology standards are implemented. The keywords from the topic and questions were used in “Step 2: Initiating the Search” (p.58). Table 1 shows the results of the searches related to teacher perceptions and technology integration. Onwuegbuzie and Frels recommended using an

audit trail of the searches and results. The sampling size refers to the number of article abstracts recommended to be representative of the total number available in the databases related to the keywords. This sampling theory and the numbers were derived from Onwuegbuzie & Frel's adaptation of Krejcie and Morgan's calculations. The table shows that of 443 articles, 298 were sampled.

Table 1

## Results of Literature Search

Search	Database	Key Words and Limiters	Number of hits	Sampling of abstracts
1	Education Source	Teacher perceptions (Title) AND Technology Integration (Title)	21	21
2	Education Source	Teacher Perceptions (All Txt) AND technology integration (All txt)	309	170
3	Education Source	Elementary teachers (All text fields) AND Technology Integration (Title)	51	45
4	ERIC	Elementary teachers (All text fields) AND technology integration (All text fields)	40	40
5	ERIC	Teacher perceptions (All text fields) AND technology integration (All text)	22	22

The third step of organizing the documents involved storage in a reference management program, which were Zotero and a Microsoft Excel spreadsheet. The selection and deselection is step four to the CLR. Onwuegbuzie and Frels (2016) recommended developing focus questions to guide the process. The questions used during the selection and deselection process were: *Are the studies based in the United States* and *Did the study involve elementary teachers*. Based on these general criteria, 64

articles were selected. Step 5 of the CLR requires the researcher to expand the initial search using “Media, Observations, Documents, Expert(s) and Secondary Data (p. 178). Also, to literature was selected during the initial searches, other literature was included based on recommendations, mining the references, and reading on the topic. I also contacted researchers, “Experts” for copies of their research using ResearchGate.

Step six is the analysis and synthesis of the information gathered (Onwuegbuzie & Frels, 2016). The abstracts were coded, and the themes were used to organize the literature review. I included an overview of technological integration and its relationship with literacy instruction. Next, I reviewed the literature related to components of literacy including reading and writing, and how technology is used in reading interventions. The literature shows the convergence of traditional and digital intervention practices. The focus of the study is on teachers’ perceptions of technology integration, and I examined the literature on the topic. Also central to this study is understanding what teachers perceive are the barriers and incentives which hinder or promote technology integration. The literature included in this review spans over a decade and reveals the role teacher beliefs and perceptions play in the identification of these variables. Professional development to equip teachers to integrate technology was a recurring theme in the literature, and I analyzed what this involves and the outcomes.

### **Technology Integration and Literacy Instruction**

Digital devices are used by students in and out of school. Students in elementary schools are using mobile resources increasingly as a 2015 national report on student usage of mobile technology (Pearson, 2015) revealed. The report showed growth specifically in younger students. Seventy-eight percent of elementary school students

reported using tablets and they wanted to be able to use digital devices more in the classroom. More than half of them had mobile phones, and generally, students used laptops, tablets, phones, and hybrid devices. Students reported positive attitudes towards learning with technology and acknowledged it changed they how learned and increased their enjoyment of learning and their performance. It is evident that technology is a part of students' everyday lives and they welcome its inclusion in schools.

Technology integration in literacy instruction is not a new concept, but perhaps the early researchers could not have imagined the rapid evolution of a digitalized world. Earlier studies are important to show the evolution of the research and practice of technology integration. They also laid the foundations for current practice. Labbo and Reinking (1999) recognized technology would affect both literacy research and instruction. They considered the emerging technologies as central to daily literacy activities and foresaw this would create new instructional demands. Labbo and Reinking recommended five goals for integration, based on their analysis of the research of that period. The first goal was to ensure the availability of technology to use in literacy instruction, especially as the lack of access was considered an equity issue. They warned that increasing technology while desirable was insufficient to ensure integration. Another goal was to use technology to enhance traditional literacy instruction but not to replace it. This included embracing digital genres and applications in conventional literacy instruction and expanding the concept of literacy.

Labbo and Reinking (1999) wrote of using technology to “transform” literacy instruction. They referenced the ISTE standards for integration and explored how the tenets of student-centered instruction, collaboration, inquiry, and real-world relevance

could be applied to literacy. Aligned with this vision was the goal of student empowerment and ensuring technology integration equipped the students with the skills they needed for the future. The goals may have appeared lofty, especially as the technology was not as ubiquitous as it is today.

Labbo and Reinking's (1999) goals intended for literacy educators and the policymakers. Hutchison and Reinking (2011) explained why literacy teachers are relevant to the study of technology integration. They proposed literacy teachers have the responsibility of providing the "foundational skills, strategies, and dispositions" (p. 312) students need for daily reading, writing, and communicating at school and home. Increasingly these literacy activities take place in the context of digital applications and online spaces. This underscores the importance of literacy teachers and how literacy is changing. Hutchinson and Reinking acknowledged the Common Core Standards for Language Arts reinforced the emphasis of reading and writing across the curriculum, including their digital forms. There is a clear expectation that literacy educators integrate technology.

Literacy educators have the challenge of balancing the traditional print literacies with their dynamic digital forms. An example of this is in the questions Hutchison (2015) proposed for these teachers to use to guide their technology integration:

1. What traditional literacy skills do I want to promote?
2. What digital and traditional literacy skills and dispositions do my students bring to the classroom?

3. What types of activities (e.g. social, reflective) and learning environment do I typically promote in my classroom to improve students' literacy learning?
4. What digital tools might enhance these skills and activities?

(pp. 29-31)

The questions suggest a reciprocal relationship and offer some insight into how traditional literacy instruction could be enhanced. This concept of the traditional and digital literacies working in tandem was similar to Labbo and Reinking's (1999) goals from a decade earlier when they envisioned a future of literacy and technology integration.

There is a question of whether this reciprocal relationship is an ideal rather than the reality of technology integration. The antithesis Dickens used to begin *The Tale of Two Cities* to describe the transition from the agricultural to the industrial age in Britain, could be used to describe the state of literacy instruction in this information age (Labbo, 2006). Labbo identified a similar conflict between the old and emerging digital literacies, "the best of times and the worst of times" (p. 200), and referenced the potential for a transformative effect on practice. A conflict in her view was that the old and newer literacies are pulling instruction in opposite directions. Teachers' perceptions of the current state of the integration of technology and literacies are important for understanding the results of the convergence of the literacies.

English and Language Arts was the subject with the greatest technology integration in a study of K-6 teachers in a Midwestern school district (Hsu, 2016). The participants described technology integration in reading, grammar, and writing activities.

Hsu's reporting focused on the tools and online applications and spaces, such as websites and iPads rather than the specific instructional strategies.

**Reading and technology.** A library of books can be stored on a digital device. Books are portable and interactive in ways they are not in print books. Students were found to overwhelmingly prefer digital textbooks for example because they were easier to transport (Pearson, 2015).

The use of technology for reading purposes is listed in the Common Core's descriptors for students being "College and Career Ready" (National Governors Association & Council of Chief School Officers, 2010, p.7). It is the expectation the students will be able to use technology to support all the elements of literacy. The use of technology as a supplemental tool rather than an integral part of the instruction is questioned by some researchers (Ertmer & Ottenbreit-Leftwich, 2010). They stated teachers should not view technology as a *supplemental* but an "essential" (p. 256) part of teaching and learning.

Ertmer and her colleagues provided examples of the technology-rich classroom (Ertmer et al., 2012). A caveat they provided was although the teachers were all using technology, its role and theirs differed from classroom to classroom. An example of technology being used in a supplemental role in their study was having students use it to present their learning. The researchers characterized other instructional activities as examples of "enrichment". For example, the students used the technology for literature circles and their teacher indicated this made the students excited to read. Students also were engaged in digital storytelling, responded to literature using different applications, shared their blogs, and conducted and presented research. Teachers saw themselves as

facilitators of the learning process. Ertmer and her colleagues also identified some practices as transforming instruction. In these classrooms, a project-based learning approach was used, students worked collaboratively and across content areas and classes, and used higher-order thinking skills.

Although this is a study on teacher perceptions, the students' reports on how they use technology are relevant. Researchers (Hutchison, Woodward, & Colwell, 2016) presented their findings on technology integration based on a study of 1,262 fourth and fifth-grade students. Students completed a survey and reported they used the internet mostly to search for information, rather than for performing higher-level activities such as collaborating and creating original products. Hutchison and her colleagues explained access to technology did not equal competence in using it effectively as the students demonstrated only moderate skills in conducting online searches. The other most common uses students described included: watching videos, creating images, submitting assignments, finding images, using multimedia text tools, reading digital texts, and listening to online content. Students indicated they learned more from using the Internet than reading a print book but found reading on the internet more difficult in comparison. This has implications for teachers' instructional practices. It suggests reading online requires additional skills in comparison to reading offline. The study showed reading today may involve students were reading multimodal texts across different devices for a variety of purposes using dynamic, digital platforms and applications.

The students' report of finding online reading more challenging (Hutchison et al., 2016) reflects other research about the differences between digital and offline literacies (Leu et al., 2011). Leu and his colleagues identified specific literacy activities that are

related to online reading. They established online reading often involved conducting research and required comprehension skills including synthesis, analysis, the ability to evaluate information and locate and communicate information. Some of these skills are required for reading and understanding traditional forms of texts. The researchers assert “online research and comprehension are not isomorphic with offline reading comprehension” (p.7). Online spaces were determined to have features that are supportive of readers who struggle.

In 1:1 technology programs each student is provided with a digital device. Pearson’s (2015) report on student mobile usage showed one in five grades 4-12 students attended schools where each student was provided a laptop or a tablet. A study that featured a 1:1 iPad program where each student in grades K-5 was provided with the device (Frazier & Trekles, 2018) showed some of the benefits and how the devices were used. Most of the teachers used the iPads primarily for literacy-related subjects such as phonics, writing, comprehension, and language arts. The teachers reported this technology also allowed them to differentiate their instruction and the availability provided more opportunities for students to engage with the technology.

Events such as “Global Read Aloud”(U.S. Department of Education, 2017), show how reading is no longer confined to one classroom. Students can participate in a global book club, and learn and connect with their peers around the world. More local venues like libraries and museums are now more readily available to support students’ literary pursuits.

Technology is also used to deliver literacy interventions (Cheung & Slavin, 2013; D’Agostino, Rodgers, Harmey, & Brownfield, 2016; Savage et al., 2010). Savage and his

colleagues (2010) investigated the effect of teachers' use of the ABRACADABRA (ABRA) digital intervention with first graders. They not only evaluated the program but showed how the teachers used it differently based on the stage of their technology integration progress. They identified three phases, *Entry*, *Adoption*, and *Adaption* phases, based on an integration model by Sandholtz, Ringstaff, and Dwyer.

There were two levels to the results (Savage et al., 2010). The program was effective for improving word reading, vocabulary, sentence comprehension, and phonological skills and the results for the gains were statistically significant. The second set of results revealed how the teachers implemented the technology ultimately affected learning outcomes, although they were all using the same program. A teacher in the "adaptation phase" used the ABRA program in learning centers, it was included in her instruction, and she reinforced the program content across the literacy activities in her classroom. The students in this group demonstrated significantly more growth than the other two groups. This contrasts with an *Entry-level* teacher who used the ABRA program separately from other literacy instruction. The teacher in the *Adoption level* phase had the students use the program in the computer lab and provided instruction and support for students. She did not, however, integrate the program into different areas of her instruction. The results suggest how differences in the levels of integration can affect learning outcomes. It also shows how technology can be used successfully in an intervention.

Technology is used for intervention in the classroom for modifying traditional programs such as Reading Recovery (D'Agostino et al., 2016). D'Agostino and his colleagues investigated the effect of using an iPad application versus magnetic letters as

part of the letter-learning component of Reading Recovery. The study involved 12 teachers and 50 first grade students. The results showed students who used the application showed higher scores in three of the alphabetic measures and achieved large effects. The difference between the groups on the other measures not related to alphabets was not significant. Pertinent to this proposed study, teachers reported how their beliefs about the efficacy and compatibility of the iPad application, and pedagogy influenced their use of technology. It was interesting to note the teachers expressed a preference for using the magnetic letters although the intervention showed using the iPad was effective.

Cheung and Slavin (2013) reviewed 20 studies that represented a population of 7000 students in grades 1-6, to determine the effect of using technology for reading intervention. Due to the small number of studies for each program, generalization is limited but the study does provide some insight into technology-based intervention. The programs were categorized as a small group intervention, supplemental and comprehensive. The small group intervention programs such as Read, Write, and Type had the largest effect sizes. The comprehensive programs such as READ 180 had the smallest.

The supports provided through technology, specifically for students with special needs are identified in the Common Core standards (National Governors Association & Council of Chief School Officers, 2010). The focus is on providing access to the general curriculum, for example by using text-to-speech software. It is acknowledged in the document intervention itself is beyond the scope of the standards. It appears teachers are

left to determine how best to use the technology to provide access to literacy instruction for all students.

**Writing and technology.** Early studies such as Karchmer's 2001 research revealed the early effects of using technology for writing. Teachers shared students were more motivated to write, for example when their work was displayed on teachers' webpages. This highlighted the social aspect of using the internet, as well as the role of motivation. It was evident from the study that technology integration during this period was teacher-led.

In a later study, Labbo (2006) outlined how the new literacies supported not only traditional reading and but also writing activities. She described the use of writing and drawing in early writing development, and acknowledged students were also beginning to represent symbols, and use pictures on the computers to communicate. As in reading, the message the students were composing could now also include animation and audio components instead of the stationary print on a paper. Labbo explained technology provided scaffolding for writers and provided both a *canvas* where the students drew and wrote and a *playground* where they collaborated with peers to compose messages. The word processing component could help alleviate some of the difficulties of writing with pencils and facilitate the writing process through composition to final drafts and make revising and editing easier. The students in this early study could send emails and Labbo hailed this as an engaging and authentic writing activity.

The anchor standards for writing in the Common Core (National Governors Association & Council of Chief School Officers, 2010) include a description of technology integration in writing. The standard Production and Distribution of Writing 6,

states students should use technology to “produce and publish writing” (p.18) and for collaborating and interacting. The teachers used the standards as a guide for planning their instruction and determined which technology could help the students achieve the goals (Ertmer et al., 2012). Ertmer and her colleagues described writing activities that had evolved beyond the earlier reports of word processing. The multimedia components of technology introduced another level of digital supports and enhancement. Some of the students read stories they wrote and shared them via video and developed online blogs which to they added their writing and illustrations. Several of the teachers emphasized the link to the real-world, authentic writing opportunities online technologies provided. Leu et al. (2011) who characterize online reading as inquiry and research, identify writing as part of those literacy activities.

A quasi-experimental study to determine if a one to one laptop program for fourth graders students would mediate some of the effects of the *fourth-grade slump* revealed and in addition, the effects on writing (Suhr, Hernandez, Grimes, & Warschauer, 2010). Suhr and colleagues investigated if the integration of technology would improve students’ ELA scores on the California state test over two years and if there were differences between the subsets on the tests. The laptops were mainly used for writing activities and for finding information on the Internet. Some of the writing activities involved the students writing reading responses and integrating reading and writing through multimedia presentations. After the first years, both the laptop and non-laptop group scores on the ELA test improved by almost 20%. The second-year the non-laptop group’s score declined while the laptop’s group's slight progress was not statistically significant. In the second year, the laptop group results were statistically significant for

the literary response and analysis subtest and the writing. This is hardly surprising as the laptops were mainly used for writing.

Applications such as video games provide opportunities for students to learn skills in engaging ways and using resources aligned with their interests (U.S. Department of Education, 2017). An example from the National Education Technology Plan (NETP) is of a teacher who attended a technology session at a National Writing Project meeting, implementing gaming into her instruction for her mostly English language learners. The teacher described her personal learning experience which included reading about teaching literacy using gaming and collaborating her peers through her blog, another digital tool. Teachers may be learning about technology and using it at the same time.

**Communication and technology.** In the Common Core standards, there is an expectation for students to use technology for communication (National Governors Association & Council of Chief School Officers, 2010). The ISTE standards for students (International Society for Technology in Education, 2017) also included an expectation that students will use different digital tools to communicate and to collaborate both on a local and global level. In the Hutchison and Reinking study (2011), they described the technology used for the purposes expressed in the standards that were less common than using technology for presentation and research purposes. For example, only 2% of the teachers considered integration as involving communicating on a global level. Technology can create a classroom without borders if students have access to digital resources. It provides students with a global audience and opportunities to collaborate beyond the school and local communities (U.S. Department of Education, 2017).

The use of technology for communication purposes showed promise in early research on technology integration. Karchmer-Klein & Layton (2006) described a literature-based collaborative Internet project (CIP) which represents how technology can provide literacy opportunities in a global classroom. The activity involved students reading the same children's literature and sharing ideas using the Internet. The creator, a second-grade teacher, developed projects aligned with the ISTE standards and state standards. The students read the books, participated in supporting activities such as literature circles and shared their projects online. Twenty-seven elementary teachers from the United States, Canada, and Australia completed the survey, and 17 were interviewed. The teachers reported the benefits of the activity were that it supported reading and writing instruction, students were able to make connections, and experience different perspectives, places, and cultures. Students wrote emails to each other, posted their work on the project websites. This process of learning through social interactions is one of the tenets of social constructivism (Tracey & Morrow, 2017). Literature and technology provided the scaffold for these types of learning to occur.

Ertmer and her colleagues (Ertmer et al., 2012) described students using technology for communication and collaboration. The students used teacher-created podcasts they revised, and eventually worked collaboratively to create their podcasts. This is a narrow application of technology, but the students learned a skill they could use to communicate beyond the classroom. The teacher in the study explained he was trying to connect the out of school with in-school literacies and use the digital devices the students already owned. The students created and shared digital stories and created public announcements about issues that mattered to them. This also represents a shift to a

student-centered approach. The teachers perceived technology as a vehicle to lead students beyond the confines of the subject and the classroom and provided additional avenues for students to demonstrate and share their learning.

Technology also provides another tool for language learners (U.S. Department of Education, 2017). In the *National Education Technology Plan* update, a fourth-grade bilingual teacher reported using projects to help her students develop their literacy skills. A project involved research, collaboration, writing, and creating comic strips and videos. The students learned literacy skills in the context of meaningful and authentic activities using digital resources.

### **Teachers' Perceptions of Technology Integration**

Teachers' perceptions of technology integration have been the focus of research studies to illuminate the current practices and determine the areas for professional development (Ertmer et al., 2012, 2012; Gorder, 2008; Hutchison & Reinking, 2011; Spaulding, 2013). Beliefs are not synonymous with perceptions, but there may be a reciprocal relationship. One interpretation is beliefs are acquired through perceptions and our perceptions may be informed by our beliefs (Smith, 2001). Smith wrote, "perception involves either the acquiring of beliefs or their reinforcement" (p.286). This construct is the basis of the discussion on beliefs and perceptions used in this study.

Teachers' perceptions of technology integration are important because they contribute to the effective use of technology in the classroom (Spaulding, 2013). This view is espoused by Ertmer et al. (2012) who described teachers' underlying beliefs as "critical" to technology integration. Ertmer and her colleagues explained access to technology was insufficient to ensure integration if the access was not accompanied by

teachers' who believed in its potential. Ertmer and her colleagues ( Ertmer et al., 2012) conducted a multiple case study of 12 award-winning teachers who were recognized for their use of technology. Nine of the participants were elementary teachers and taught all the Reading and the other subjects. One of the purposes of the study was to investigate the alignment between the teacher's beliefs their use of technology. Eleven of the 12 teachers' beliefs about technology use aligned with their practice. The teachers' use of technology was categorized as the technology used to enrich the curriculum, transform teaching and learning, and as a supplemental tool to teach skills.

Elementary teachers have been reported as more willing to use mobile learning than their middle and high school peers (Christensen & Knezek, 2017). Their study of teachers' willingness to use mobile learning involved 1414 teachers, 640 of whom were elementary school teachers. The elementary teachers outscored their peers on three factors which were considered influential on teacher beliefs. These factors were teachers' perceptions of the *possibilities*, *benefits*, and *preferences* of technology which consequently affected their use of technology. The elementary teachers did not outscore the other groups on the *external influences*' category. The researchers concluded this was because elementary teachers perhaps do not have the challenges of the proliferation of mobile technology. The students can bring their own devices to school. Other teachers (Frazier & Trekles, 2018) perceived one of the challenges of using technology in elementary school is having to use instructional time to teach digital citizenship skills. Teachers are laying the foundations for all content areas, but also for how students use technology in the upper school.

Hutchinson and Reinking (2011) conducted a national survey about literacy teachers' perceptions of technology integration in instruction. Their research questions addressed five areas of technology integration. Hutchinson and Reinking aimed to determine if the teachers had access to or support for integrating Information and Communication Technology (ICT) into instruction and if they considered ICT to be important in their instruction. The researchers also wanted to investigate how literacy teachers conceptualized technology integration, was it a minimal or comprehensive process, and what were the perceived benefits and obstacles. Lastly, Hutchinson and Reinking questioned what beliefs were associated with literacy teachers who reported low or high usage of technology and if certain factors predicted the degree of integration.

Hutchinson and Reinking (2011) used survey research of 1,321 teachers, represented 31 states. About two-thirds of the respondents were K-6 teachers. There does not appear to exist studies on this scale that focus solely on elementary literacy teachers. The results indicated while most teachers had internet access in the classroom (86%), one-third of them did not have the means, such as a digital projector to use it appropriately. Also, only one in eight of the teachers reported 1:1 laptop availability for students. The researchers considered these two digital tools were important for instruction. It is not enough to have the technology, the functionality for instruction is also important. Nearly half of the teachers (47%) had in-school support by technology personnel.

Teachers' beliefs and perceptions were integral to the use of technology in their classrooms ( Hutchinson & Reinking, 2011). The researchers explained most of the literacy teachers believed their instruction should include reading and writing based

technology. However, two-thirds of them saw the role of technology as supplemental, not central to general instruction, and consequently this affected and limited their practice.

The results showed a gap between teachers' beliefs about the importance of technology integration activities and their actual practice. (Hutchison & Reinking, 2011). The importance of instructional activities did not translate into how frequently the teachers used applications in their classrooms. Most activities which the teachers determined were of large or moderate importance to the successful use of technology, were used only to a small extent. These included using the computer for word processing, finding information online, with or without specific strategies. The activity accorded the highest rating was creating documents. This is probably not considered a complex activity. Indeed, results showed that the skills which the researchers identified as "21<sup>st</sup>-century skills for literacy" (p.322) were used infrequently. These skills included online collaboration, evaluation, and synthesis of online information. The teachers in the study identified these as being of moderate or low importance and were infrequently used.

The study suggests teachers' conceptualization of technology integration is most likely central to how and they use technology ( Hutchison & Reinking, 2011). Most teachers in the study (38%) characterized technology as a tool used by teachers and students for presenting information, conducting research ( 23%), and as supplementing offline literacy activities ( Hutchison & Reinking, 2011). These were the highest-ranked uses. The researchers again indicated these uses were not consistent with preparing students for the 21<sup>st</sup> century.

It was heartening that 86% of the literacy teachers believed technology integration had moderate to large benefits, but most of them (67%) believed this was in a

supplemental role ( Hutchison & Reinking, 2011). The greatest barriers to technology integration described as lack of time, support and training, and access. The last research question investigated which factors predicted if teachers would integrate practices. If teachers had positive perceptions of using technology in literacy instruction, they were more likely to have a positive outlook on their technology competency and perceive fewer barriers. This indicates the importance of teacher perception of integration. The researchers concluded teachers' own beliefs may not be a barrier to technology integration as they identified mostly external factors. An unexpected finding was professional development did not seem to be related to the integration. This was interpreted as the technology PD teachers received was not adequate for their needs.

The Hutchison and Reinking (2011) study, although the largest of its kind, did not specifically address literacy-related issues. Yes, teachers reported technology was supplemental to the print literacies, but not specifically how technology affected activities such as writing.

This research is nearly a decade old, so technology has evolved since then. It is also possible a survey research design limited the teachers' ability to elaborate on specific practices. The teachers did not appear to understand the importance of or the potential of digital literacies and their relationship to literacy instruction ( Hutchison & Reinking, 2011). This is not surprising as less than half of the teachers (46 %) felt they could teach skills related to online reading to a moderate extent. The study indicates an area for future research is examining literacy instruction specifically and using a design that allows teachers to elaborate on their practice and the factors which affect it.

Frazier and Trekles (2018) conducted a mixed-methods study on the implementation of this program over a year. A survey was administered at three different points during the school year and a focus also met at the beginning, middle, and end of the school year. This is useful because it tracked how the teachers' perceptions of technology evolved.

Through a survey and focus group, Frazier and Trekles (2018) gathered data on the implementation process. Initially, the teachers' perception was the program was beneficial and provided opportunities for differentiation and access. As the year progressed their perceptions shifted as they acknowledged barriers such as the functionality issues and the need for students to learn about digital citizenship. Dealing with the appropriate uses of the devices affected instruction. The teachers relayed the process of the implementation involved balancing the negative and positives of using technology in the classrooms. The teachers' confidence in using iPads increased as the year. The teachers still believed in the importance of using the technology but became more aware of the challenges involved as time progressed.

Some researchers believed the focus on teachers' beliefs on technology is too narrow because it is teachers' overall pedagogical beliefs that influence the integration or lack of it (Kim et al., 2013). Kim and her colleagues concluded what teachers fundamentally believe about learning and teaching is the basis for their use of technology in the classroom. Technology integration is a tool, not a destination.

Hsu (2016) supported the importance of viewing technology integration as aligned with the teacher's underlying pedagogical beliefs. In her study, she coded the participants into those who embraced constructivist (78%) versus teacher-centered beliefs

(22 %) in their technology integration practices. Hsu defined the difference as the former involved constructing knowledge through technology-related activities involving collaboration, problem-solving, using multiple tools, and online and offline spaces. This perspective is aligned with the ISTE standards for technology learning (International Society for Technology in Education, 2017). Kim and her colleagues (2013) had examined the relationship between teacher's pedagogical beliefs and technology integration and found a positive correlation. Like Hsu, they compared the teacher-centered versus student-centered approach to the use of technology and found teachers' beliefs were also more aligned with the latter. They envisioned these two approaches were on a continuum, and the focus was on the learning component not on the technology itself.

Conversely, in the teacher-centered approach to technology integration, the teacher is not the facilitator of the learning process, but the guardian, and the activities tend to be more low-level activities that form a supplemental to the teacher's instruction (Hsu, 2016). Regardless of the approach, both groups in Hsu's study (2015) had positive views of technology, 91% of the constructivist group and, 50% of the teacher-centered group.

There is a perception that this period in education characterized by "market-driven and technophilic education reform" (Lynch, 2015, p. 297). Lynch recommended caution and a way of assessing technology's impact on teaching and learning. Lynch used the concept of *software space* as an encompassing term for the devices and systems which comprise the technology used. He showed that technology does not exist in a vacuum at the center of other interconnected "spaces" but is comprised of policies,

systems, economic, and pedagogy. One result is, Lynch offers the viewpoint that the technology used in schools is promoted by entities beyond the school in a way are controlling what we access and how we interpret the information. He gave an example of how on e-readers, the text is highlighted, and the features may limit students' actual skills of making meaning for themselves. This a perspective that the features could be a distraction and limit the thinking students to do. His advice to researchers and instructors is to critically evaluate the software used as well as factors such as teacher assumptions about the effects of the technology.

The attitudes teachers have towards technology are reported to be significantly correlated to their technology integration (Kim et al.,2013; Tiffani Pittman & Gaines, 2015). Teachers' perceptions about technology integration are central to this study because they could show what is happening in the classroom, what needs to happen, and why it is not happening. It is important to identify teachers' pedagogical beliefs as they influence teacher practice.

### **Factors which Limit or Encourage Technology Integration**

Teachers' beliefs can influence their use of technology, but the context of their practice such as the school environment and culture ( Ertmer & Ottenbreit-Leftwich, 2010) also affect practice. Some factors may limit or promote technology integration. Ertmer (1999), examined *first-order* and *second-order* barriers to change in regards to technology integration and suggested strategies to address them. The first-order barriers are external factors such as a lack of resources and school factors, and the second-order barriers more intrinsic like beliefs and attitudes. Ertmer emphasized that it is probably inevitable that teachers will encounter obstacles when they try to integrate technology but

anticipating them allows teachers to address them. Ertmer explained that some first-order barriers can be removed actions such as purchasing equipment. In contrast, the second-order barrier may not be easily eliminated. They may not be visible and reflect pedagogical beliefs and may be more deeply embedded in the teacher. Teachers may not even be aware of these barriers and the role they play in their instruction and attitudes toward technology integration. Barriers are characterized as responsive to the evolutionary process of technology and may change, growing, or decreasing in influence.

The effect of perceived barriers may differ from teacher to teacher (Snoeyink & Ertmer, 2002). For example, in the second-order barriers may affect the teachers greatly than first-order ones. An example, Snoeyink, and Ertmer reported in their findings is one teacher was uncomfortable using technology so limited her use of the technology with her students. Second-order barriers can skew the teacher's perception of a barrier. If a teacher's skills are limited, they may perceive the technology equipment does not work properly. The researchers considered this a "masking" process where a teacher's perceptions were in a way creating the very barriers they were acknowledging.

Nearly two decades later, Pittman and Gaines ( Pittman & Gaines, 2015) cited a lack of technology resources as the main barrier to technology integration in their study of grade three to five teachers. The second-highest ranked barrier was time for the teachers to learn the technology and this was followed by time for teachers to implement the technology. Interestingly, one-third of third through fifth-grade teachers did not respond to the question about barriers to implementation. It could be they did not perceive any barriers, although less than 20% of them were characterized by high-level users of technology in their instruction. The researcher's criteria were based on student

and teacher use of technology practices. They provided a list of potential barriers to integration such as time limitations, lack of professional development, support, and resources. The questions itself was biased as it stated the integration process could be “challenging”. Participants were not asked to identify which factors contribute to the integration as this was not a research question, something which will be addressed in the current study. Programs that provide devices to students such as in a 1:1 model, may remove the “lack of resources barrier”. In Michigan for example, 20,000 laptops were provided for students through Michigan’s Freedom to Learn One to One Initiative (Lowther, Inan, Ross, & Strahl, 2012).

In contrast, in Hsu’s (2016) examination of the convergence teachers’ beliefs and practices, resources do not emerge as a barrier. The teachers chose students’ lack of skills as the main barrier to technology integration. This is a shift from a teacher-centric view of barriers to a student-centered perspective. It can be argued it is the teachers’ responsibility to teach these skills. This may pose a challenge. If the purpose of the instruction is to teach literacy skills, the goal of the instruction could be undermined by having to stop and teach students how to use tools and navigate sites. The teachers also cited their lack of training, support, and time restraints as a barrier.

Teachers in the Frazier and Trekles (2018) study identified factors which they perceived promoted or were barriers to technology integration. For example, the teachers reported the professional development provided was inadequate for their needs as they perceived their knowledge and skills were barely ahead of the students’. Teachers believed there was insufficient time given to the planning and the responses to the issues which arose during were reactionary, not anticipated, or planned.

The positives were the variety of applications and instructional strategies the technology-enabled, and opportunities for collaboration and differentiation (Frazier & Trekles, 2018). However, the teachers explained they were not permitted to choose their applications. They did not feel ownership of the integration process. There were also limitations of using the iPads in the study for assessment, the teachers had to rely on traditional paper-pencil procedures. The focus of the study appeared to be on the devices rather than specific instructional purposes and learning outcomes. Also, the researchers concluded the time teachers in elementary schools may have to spend on developing the students' skills and digital citizenship may distract the instructional content.

“Incentives” are the opposite of barriers; they are the factors that motivate or drive teachers to integrate technology. They can also be defined as first and second-order incentives (Snoeyink & Ertmer, 2002). The first-order incentives are the external factors, the second-order incentives as intrinsic. Snoeyink and Ertmer’s longitudinal case study of three veteran teachers showed some of these incentives. They assert the power of incentives, proposing the incentives can minimize or eradicate the barriers; “Once teachers perceive that using computers improves student learning, the barriers will come down” (p. 88). The first-order incentives were believing in the value of the use of technology for student learning and providing fun lessons. An example of second-order incentives were the teachers’ increased skills, becoming more comfortable with technology, and realizing the purpose and benefits of using technology. Snoeyink and Ertmer (2002) described a relationship between the two levels of incentives as being related, as the first order incentives can have a secondary effect that can produce a second-order incentive, and one precedes the other. For example, when a teacher realized

the benefits of her student technology, then this motivated her to learn more about technology.

The path model used in statistical analysis provides a lens for examining the variables which affect technology integration, and also shows how each independent and dependent variable the others in the model (Inan & Lowther, 2010). Inan and Lowther used path analysis to identify which factors influenced teachers' technology integration. The study involved 1,382 K -12 Tennessee teachers and data was collected using the Teacher Technology Questionnaire (TTQ). Although the sample was not specifically elementary literacy teachers, the findings have some relevance to this study. When all the variables in the model were controlled, teacher beliefs and the availability of the technology were the two which had direct and positive effects on integration. The researchers identified teacher beliefs as "essential" for integration. The highest factor was teacher readiness. The model revealed the variables which impacted teacher readiness were teacher characteristics (except age), their proficiency, and the school factors. These explained 62.4% of the variance and were significant. The variables which accounted for 50% of the teachers' beliefs about technology integration and were significant were the school, the availability of technology, and the teachers' computer skills. The more experienced and older teachers were, this had a negative effect on their technology proficiency. It is important to note the influence of the teachers' belief system was that it "mediated" some of the effects of the school and teacher variables. The focus on teacher readiness seems to underscore the importance of training.

The path model analysis was also used in a Florida study involving 732 teachers

(26% were elementary teachers) to investigate the factors which influenced integration (Ritzhaupt, Dawson, & Cavanaugh, 2012). They used the *Teacher Technology Survey* (TTS). A modification was made to the instrument to reflect the advances made in technology. This highlights an issue for both research and practice; the changes in technology may require continuous modifications to how it is implemented. As in the Inan and Lowther study, the longer the teaching experience, has a negative effect on technology use. This suggests veteran teachers are less likely to use technology.

Interestingly, school-level factors such as technical support and class characteristics did not influence the teachers' use of technology. This is hopeful, as these variables could be perceived as barriers, but teachers perceived they could overcome them. In this study, it was the teachers' use of technology that had the greatest impact on the technology used in instruction and on the variables in the model. The researchers did not include the teachers' beliefs in their model as a variable. They found a teacher's education level, professional development, experience with technology, and access positively influenced the teachers' use of technology. A finding was teachers used technology more in the lower grade levels. This was attributed to the fact the teachers have more time with their students.

### **Professional Development**

Ritzhaupt and his colleagues (Ritzhaupt et al., 2012) wrote of technology integration: "classroom technology integration is not a fixed target that can be reached uniformly and considered accomplished" (p. 247). There are however goals and expectations for its use professional development is central to the supporting teachers as they integrate technology (Leu & Kinzer, 2000; Zoch, Myers, & Belcher, 2017). Leu

and Kinzer acknowledged professional development may be a challenge, because of what they predicted would be the fluid nature of the very concept of literacy instruction. As a result, technology integration could change teacher preparation programs and the teacher-led lecture format of instruction.

In the *National Education Technology Plan* (U.S. Department of Education, 2017), the recommendation is for school leaders to have a “shared vision” (p.5) of what teaching and learning with technology entails and plan accordingly, and implement the vision. It was revealed in the report that there was a divide between how technology was used in learning, a passive approach versus where it was used creatively, and consequently more effective. There was a sense of urgency in the report for schools to implement measures to “accelerate and speed up adoption of effective approaches and technologies” (p.7). There are also guidelines specifically for teacher preparation which are also recommended for ongoing professional development. A sustained and comprehensive program of teaching and learning is recommended with an alignment of standards and frameworks. These are not specified but it is suggested technology should involve “creation, production, and problem-solving” (p. 35) for teachers and students and should be job-embedded.

There are other changes afoot which affect how teachers learn and teach with technology. Teachers may no longer be the “expert” in the class but learn along with the students. In fact, in a Pearson survey of students’ technology usage (Pearson, 2015), a majority of students in grades 4-12, reported being more knowledgeable than their teachers about technology. Sixty-two percent of elementary students agreed, 77% of high

school students. This raises questions about the professional development teachers are receiving if it is adequate to meet their students' needs and what does it entail?

The ISTE recommended the use of a coaching model and using professional learning communities to facilitate technology integration (Beglau et al., 2011). In this context, professional development is job-embedded. ISTE's position is that combining "technology, coaching, and community (social learning)" (p.3) is an effective approach for teacher learning. The ISTE acknowledged the rise in online learning communities and their potential for transforming how teachers learn and connect, even on a more global level. The services of a coach mean the instruction, for example through modeling, it can also occur in the teacher's actual classroom and be more aligned with both her needs and the students'. Also, through peer coaching, the teachers can collaborate and learn from their peers. The position is teachers are more likely to implement technology when they see it being successfully implemented.

The use of professional learning communities as a context for integrating technology also allows sustainability (Cifuentes, Maxwell, & Bulu, 2011). In their longitudinal study, teachers' scores for technology integration increased as they moved through stages of adoption from awareness of the technology to its application and more creative and generalized usage. The biggest changes in the adoption process occurred during the first year, which had a larger effect size of 1.31 for integration, but this tapered off as the project progressed. There was a transition from teacher-centered instruction to more student-centered. The community was composed of teachers, technology coaches, and administrative as well as university faculty in a supportive role. The activities included workshops, purchasing and sharing technology resources, needs assessments,

and lessons and peer observations. The participants also had an online learning community where they shared resources. In this model, the professional development is on-going and collaborative.

A study of elementary teachers found there were no significant differences for integration between the teachers who integrated technology and those who reported lower usage of technology in their instruction and the professional development they received (Pittman & Gaines, 2015). This is surprising considering a third of the respondents had not received professional development in the preceding 12 months. The authors attribute this to the quality of professional development, questioning if it aligned with the needs of the teachers.

An application of the TPACK model to professional development was Ciampa's (2016) study. Twenty-one elementary teachers, 52% of whom taught English Language Arts, participated. The focus was on content literacy. One of the first steps was a needs assessment which took place before the training. The workshop model used was based on TPACK- had four components: the first is the modeling of the technology in the content area which could be applied across subjects, followed by a discussion of the technology. Phase three focuses on the skills required to use the technology and in phase 4 the teachers applied the combination of the technology, content, and pedagogy to an activity they could use in their instruction. The facilitator used a variety of digital tools including, WebQuests, Blogger, Popplet, and Google education apps, to demonstrate the different phases of instruction. She modeled how to adopt a workshop model for technology in the classroom. These tools are applicable across content areas and all reading and writing skills are integral parts of all the activities. The teachers evaluated

the program after they had implemented the workshop model in their classrooms and reported their use of the training. The teachers reported positive effects on the students' participation and motivation. Sixty-three percent of the teachers indicated satisfaction with this format of professional development, 74% found that it was "relevant and informative" (p.305). The researcher suggested the creation of an online community, for example, could help in sustaining the learning the teachers received.

Technology provides a virtual environment where learners can create "specialized communities of practice"(U.S. Department of Education, 2017, p. 9). The learners and can both teachers and students, and it enables self-directed personalized learning.

Another model used to integrate technology and the new literacies was one that included in-service teachers receiving support from a university and practicing on students (Zoch et al., 2017). In their collective case study, Zoch and her colleagues referenced the TPACK as providing the framework important for technology integration due to its focus beyond the technology to the pedagogy and knowledge of the content. They argued teacher preparation should include a focus on the broader concept of new literacies combined with technology integration. In their study, 14 of the 19 participants were elementary educators who attended a graduate course on new literacies. For the last two weeks of their five-week course, the teachers worked an hour daily at a writing camp where they taught using the digital tools they had learned. In this model, the teacher-students practiced their instruction in the context of literacy instruction before taking it back to their classrooms. The team used multiple data collection measures including field notes and semi-structured interviews, observations, and teacher reflections during and after the course.

The teachers expressed a better understanding of literacy and technology (Zoch et al., 2017). For example, a teacher expanded her writing instruction to include other formats such as blogs and tools such as word-processors. The teachers used the applications they learned about in their course and obtained more technology for their students. The researchers characterized the outcomes as positive and attributed some of the elements of the course to this. Firstly, providing hands-on experience with the technology was important, as well as having the teachers see the effect of its use on students (through the writing camp). This also including grant writing to procure technology, new ways of using the tools they already had and having teachers read about how other teachers had successfully integrated technology. Zoch and his colleagues reported this made the teachers more willing to take risks and be more creative about integration. A barrier to integration was the testing requirements which limited their time to integrate technology. Although some of the teachers reflected on how the training changed their attitudes and actions, it may have been useful to have a pre-assessment. The researchers acknowledged they could not attest to the effect on teacher beliefs but that the teachers' use of the technology indicated they recognized its importance.

The teachers in the Frazier and Trekles (2018), around 80% of them, indicated professional development in the use of the iPads for the 1:1 program was provided. The teacher reported they felt the professional development provided was rushed and inadequate. One of the approaches the school used was to provide training weekly on early start days. The focus group data showed the teachers were frustrated even with the late start professional development which eventually veered away from being for the iPads to other school matters. The researchers attributed the growth in the teachers'

confidence and skills due more to their exploration of the iPads rather than the professional development provided. The provision of professional development for the teachers is not always sufficient to meet the teachers' learning needs. The training lasted for the school year, as it was considered important for continuous, not just a one-day workshop.

### **ISTE Standards for Educators and Students**

International Society for Technology in Education (ISTE) provided frameworks of standards for identifying the learning outcomes and skills needed for teachers and students to function successfully in an increasingly digital world. One set of standards is the *ISTE Standards for Educators* (ISTE, 2016a) and another is the *ISTE Standards for Students* (ISTE, 2016b). The full standards are shown in Appendix A.

The standards are named for the multifaceted roles the educators and students assume as they integrate, learn, and teach technology. The first teacher standard is *Learner*. This situates the teachers in a learner role, and the teacher learns from others to in turn help students learn (ISTE, 2016a). This strand has three parts, the teacher-learner sets goals, participates in learning networks, and aware of current research. The *Leader* strand positions the teacher as leading technology learning among the school community, advocating for access for all students, and evaluating and adopting new technology tools (ISTE, 2016a). The educator should promote digital citizenship and model using the technology in safe and ethical ways in the *Citizen* strand. It also includes creating a learning environment where students can explore and become fluent in using technology tools and resources.

The teacher as a *Collaborator* collaborates with colleagues and students, and experts in different fields through planning, learning and teaching experiences (ISTE,2016a). The teacher provides real-world activities for students, such as virtual experiences.

The *Designer* designs learning experiences that allow for the authentic use of technology, and supports the diversity of the students, and creates digital environments for students (ISTE, 2016a). The teacher as a *Facilitator* helps students meet the goals of the student standards. The learning opportunities which occur in different contexts are student-centered and they are responsible for their learning under the teacher's guidance,

Lastly, the *Analyst* uses data to inform instruction and help students achieve their goals (ISTE,2016a). The teacher allows the students to represent their learning in different ways using technology and uses different methods of assessment. This strand also involves communicating with the school's stakeholders.

The students' strands are named differently but there is are some similarities with the teachers' version. The first strand is *Empowered Learner* (ISTE, 2016b). This involves a cycle of the students choosing goals for technology use, choosing the appropriate technology, and reflecting on their use of it. The students are also expected to show competency as a *Digital Citizen* which addresses the legal and ethical use of technology in a local and global sphere. The students' ability to use technology for creative purposes and to contrast knowledge, is represented by the *Knowledge Constructor* standard. *Innovative Designer* standards refer to the students' application of problem-solving skills using digital tools and learning, but also using these elements to design innovations. The *Computational Thinker* standards also refer to students'

innovations and problem-solving, and their use of algorithms, data analysis, and automation. The students are expected to use technology to communicate effectively across different platforms and contexts, in ways that are aligned with their goals for technology use, as *Creative Communicators*. The students can create digital modes of communication or use existing applications in a variety of ways.

A student who is a *Global Collaborator* (ISTE, 2016b), works with local and global collaborators. Together they can problem-solve, create, learn about different cultures, work towards goals, the possibilities may be endless.

### **Summary**

In this chapter, I explained how I used the CLR process (Onwuegbuzie & Frels) to conduct my review of the literature. I reviewed the literature related to technology integration and the different aspects of literacy instruction. I also reviewed the literature related to teacher perceptions, the factors which limit or encourage teachers' use of technology, and described the ISTE standards frameworks. In Chapter III, I described the research design, the data collection, and analysis procedures.

## CHAPTER III

### Methodology

#### Overview of the Study

The purpose of the study is to examine elementary teachers' perceptions of technology integration in literacy instruction.

The research questions are:

- 1) What are elementary teachers' perceptions of technology integration in English and Language Arts instruction?
- 2) What first and second-order incentives or barriers support or limit teachers' integration of technology?
- 3) How do teachers implement ISTE teacher and student technology standards in literacy instruction?

#### Phase One

I initially conducted a pilot study, as an assignment for a research methods course. This study informed the research designs and procedures used in the current study. Phase one also included choosing the study population and sampling and obtaining the required permissions for the research.

**Pilot study.** I conducted a pilot study in the spring of 2018 which then informed the design of this study and the interview protocol used. The study was designed to answer the questions:

- 1) How do select elementary teachers perceive technology integration in their instruction?

- 2) Which factors do teachers believe encourage or limit their use of technology in their instruction?

A non-random, purposeful sample was selected from the school where I worked. Six English and Language Arts teachers participated. They were chosen based on their observed use of technology in class and posting activities on the school's social media platforms. A phenomenological design was also used for that study; the phenomenon under study was the teachers' shared experience of integrating technology. I used semi-structured interviews, which I modified for use in this study. I applied thematic analysis to the interview data, and three themes emerged: *Impact*, *Evolution*, and *Spaces*. The themes were used to compose a description of the teacher's shared experience of integrating technology using the teachers' significant statements.

The teachers were cognizant of the evolution of technology, tracing its development from their childhood, college, and present-day: "This was 1995; one of our assignments was to email. The concept of an email was a real revolutionary thing."

The concept of *Spaces* involved the participants' framing of technology experiences within the home/school spaces as well as online spaces. A participant emphasized the global classroom which was possible through online spaces: "because it is not just me in the classroom anymore, I've got 500 teachers who can be in the classroom with me."

The impact of technology was summarized as, "I think you are able to reach all learners now." Central to their experience of technology was the convergence or divergence, depending on one's perspective of print literacy and digital literacies. It was characterized as both a negative and positive influence of technology integration. A

positive impact was, “it evens the playing field” for students with disabilities by providing access and a learning scaffold. In contrast, by typing instead of printing, “they do pick up a pencil at school, but with so much technology, they don’t know how to write as well” and, “they don’t have to look up to talk to someone.”

The results of the pilot study influenced the current study in several ways. Firstly, the research questions were expanded. I added the questions of standards because the original study would have benefited from having a framework for categorizing the instructional activities for analysis and because a coherent curriculum for technology integration was not apparent. I also decided to choose a population whose shared experience also included similar training in technology. The interview protocol was refined by adding words or phrases to ensure they were addressing teachers' beliefs. Question #2 was changed from, *Explain the role of technology in the school* to *Explain your beliefs about the role of technology in the school and in literacy instruction*. Question 4 originally referred to general technology integration, whereas in this current study, it specifically referenced English and Language Arts. The more open-ended questions used in the pilot study led to data on other content areas. The analysis procedures were retained for this study.

**Study Design.** A qualitative phenomenological research design was used in this study. Moustakas (1994) described the goal of this research process is to “determine what the experience means” (p.13) to the person who had experienced it and describe it comprehensively; the research seeks to discover the *essences* of the experience. This approach is further defined as the exploration of a shared phenomenon by the participants; a search for the “common meaning ... of their lived experiences of a concept

or a phenomenon” (Creswell & Poth, 2018, p.75). The authors explained this approach is a suitable design when one of the goals of the study is to gain a more in-depth understanding of experience.

The first steps in the process are to, “*Determine if the research problem is best examined using a phenomenological approach*” and to “*Identify a phenomenon of interest to study, and describe it*” (Creswell & Poth, 2018, p. 79). The “phenomenon” in the context of this study is teachers’ shared experiences of technology integration. Technology integration is both a *concept* and a *lived experience*, two of the terms Creswell and Poth used to describe examples of phenomena. Indeed technology is ubiquitous across most areas of life in the “developed” world, leading to a state of being constantly “superconnected” (Chayko, 2017). Phenomenology can be used to examine participants’ perspectives (Johnson & Christensen, 2014) which is the focus of this study. Moustakas (2014) explained in phenomenology “perception is considered the primary source of knowledge” (p.52). It was determined as this current study involved gaining insight into teachers’ perspectives of the shared experience of integrating technology, this research design would be appropriate.

I assumed the role of being a reflexive researcher which also has implications for the credibility of the study throughout the data collection process. Reflexibility refers to the researcher’s awareness of personal factors such as experiences and perceptions which he brings to the research process and the relationships with the participants (Frels & Onwuegbuzie, 2012). Reflexivity may be considered is an integral part of the qualitative process; “the story of research relationships, both between the research and his or her data collection process is influential in coloring and contextualizing the written account

of the research story” (p. 1). Some of the methods documented by Frels and Onwuegbuzie were employed in this study. I kept a reflexive journal, which documents, “the inquirer’s own perceptions and changing insights” (Lincoln & Guba, 1982), and also daily procedures, decision points, and reflections. It was part of a journal that included my fieldnotes for both the interviews, online site visits. I dated each entry, documented each stage of the data collection and analysis, my overall dissertation progress. I added my reflections using notes, brief annotations, and graphics. The documents considered part of an audit trail that can be used to support the credibility of the study (Lincoln & Guba, 1982).

**Context of the study.** The “Maple Leaf” school district is in South East Texas and has an enrollment of around 42,000 students (Texas Education Agency, 2017). According to the 2016- 2017 *Texas Academic Performance Report*, a third of the students are economically disadvantaged and 10% of students are English learners. Nearly 20% of the students were classified as “At-Risk”. The largest ethnic groups are White (38%), and Hispanic 35%). Most of the teachers in the district (33%) have 11-20 years of teaching experience, and teachers have an average of 11 years of teaching experience. Less than 5% of teachers were classified as “beginning teachers”. Twenty-eight percent of the teachers have advanced degrees. The average class size is 15 students.

The district provides a range of technology devices for both students and teachers. There is an instructional technology department at the district level and IT teaching staff at each campus. All students have unique login credentials for digital devices and instructional applications. Each teacher has a website and is encouraged to contribute to

the school and district's social media feeds. The staff receives online and in-person professional development in instructional technology.

**Participants.** Purposeful sampling was used in this study. Instead of using randomization procedures, in qualitative studies, the researcher may choose a group of participants purposefully who may have a particular knowledge or experience about the phenomenon under study (Creswell & Poth, 2018). Moustakas (1994) explained it was essential for the participant to have that experience and be available for interviews and grant the researcher the necessary permissions.

The participants were elementary literacy teachers who were current or past members of the district's "Cosmic" (pseudonym) program. The Digital Learning department provides training to group members to enable them to extend their knowledge of technology integration. The teachers receive technology resources, coaching, digital integration lessons, and ideas. The teachers are expected to provide embedded PD on their respective campuses. They lead and collaborate in PD sessions on technology integration, model lessons, and provide technical support. Some of the participants have also represented the district at technology conferences. There are representatives from the K-12 campuses. This represents over 30 teachers participating each year.

In addition to their participation in the Cosmic program, participants were required to meet two additional criteria: they taught English and Language Arts for part of their day, and secondly, they taught students in grades K-5. Johnson and Christensen (2014) explained defining a selection criterion is typical of sampling in qualitative research.

Data saturation could be reached after six interviews to generate themes and interpret the data (Guest, Bunce, & Johnson, 2006), and up to about 12, depending on factors such as the homogeneity of the group. Guest and his colleagues explained this “magic number” (p.78) of six was suggested for in phenomenological studies by Janice Morse’s 1994 study. Another conclusion is the number of participants in a phenomenological study may be as few or 3-4 individuals (Creswell & Poth, 2018). Based on the recommendations of these studies, I determined a group of six participants would be appropriate for this study, although greater participation would have been welcomed. The participants had a shared experience within a technology group, with shared goals and procedures of integration. It was expected they have would in-depth knowledge of the phenomenon under study as it relates to the foundation and purpose of Cosmic. As stated, “the goal is always to locate information-rich individuals or cases” (Johnson & Christensen, 2014, p. 269) so the research questions could be answered.

The general demographics of the sample are provided in Table 2.

Table 2

*Demographics of Participants*

Participant	Grade	Subjects	Experience (yrs)	Cosmic
Teacher #1	3rd	All	16	2018-present
Teacher #2	5 <sup>th</sup>	All	20	2017-present
Teacher #3	2 <sup>nd</sup>	ELAR &SS	11	2018-present

(continued)

Participant	Grade	Subjects	Experience (yrs)	Cosmic
Teacher #4	4 <sup>th</sup>	ELAR	6	2018
Teacher #5	4 <sup>th</sup>	All	11	2019-present
Teacher#6	4 <sup>th</sup>	ELAR	12	2018-present

*Note. ELAR is English and Language Arts; SS is Social Studies; All refers to ELAR, math, science, and social studies.*

*Ethical Considerations for Sampling.* It is important to acknowledge I am employed in the same district as the participants as an instructional coach. I do not work at their campuses nor am I in any way affiliated with Cosmic. I did not know any of the participants before the study commenced nor contact them before obtaining permission from the district officials to proceed. I assigned them numbers as pseudonyms to preserve their anonymity based on the order of the interviews.

**Gaining Entry.** I applied for the Institutional Review Board (IRB) in September 2019 and gained approval in early October. I also applied to the district's Accountability and Research department for permission to conduct the research project in September. I noted information on the district's website indicated the process would take two to four weeks, but I received permission in early December. The director indicated part of the delay was due to obtaining permission from principals of all elementary schools for me to observe the participants. I was very concerned that contacting the participants at the of the semester would reduce participation in the study.

I was permitted to contact the coordinator of the Cosmic group to acquire the list of members for sampling purposes. The coordinator provided lists of participants for 2017 to present. There were 69 elementary teachers, representing 28 schools. I then cross-checked the lists for duplicates. I checked the school's websites to determine if teachers from the 2017-2019 school years were still employed as teachers in the district and to determine which subjects they taught. The other criterion was participants should teach ELAR. Twenty-four teachers met the criteria. None of the 24 had participated in the pilot study and they were unknown to me.

I mailed the study information and consent form (Appendix B) to the potential participants using their district mail. The mail was delivered to their mailboxes to be opened by the addressee only. Teachers were asked to contact me using my private email, to separate my role as a district employee, and my role as a researcher. I received four responses from teachers agreeing to participate by the end of the semester in December 2019. Two interviews were conducted during this time.

In January 2020, I sent a second round of invitations using the same procedures and documents. I also emailed the other two teachers who had contacted me in December, but only one responded and participated in the study. Seven more teachers responded to the second mail via email, and one sent a text message. Two of the respondents indicated they did not wish to participate; one sent an email to my private account, and the other returned her consent form. Another respondent although initially agreeing to participate, did not respond to my subsequent emails. The last participant emailed at the end of February and consented to participate. This amounted to a total of six participants.

## **Phase Two: Data Collection**

During this phase, the data was collected. In the initial design, the plan was to collect data from the participants using interviews, class observations, and their social media sites

**Interviews.** In phenomenological research, interviews are considered an appropriate tool for data collections. Moustakas (1994) described interviews as the method for collecting data, using open-ended questions about the phenomenon. Creswell & Poth (2018) explained, “*Collect data from the individuals who have experienced the phenomenon by using in-depth and multiple interviews*” (p. 79). Creswell and Poth explained although open-ended questions should be used, they suggested two questions which should be asked are, “What have you experienced in terms of the phenomenon? What contexts or situations have typically influenced or affected your experiences of the phenomenon?” (p. 79). Creswell and Poth proposed these questions anchor the shared experiences of the participants. The research questions one and two are aligned with these examples. They are designed to elicit the teachers’ perspectives of technology integration, and the factors which influence their practice. The use of interviews is appropriate to prompt the participants’ perspectives and experiences (Roulston, 2010).

I used a semi-structured interview protocol to collect the data (Appendix B). The protocol was adapted from one I had used in a pilot study on technology integration. The participants communicated with me to arrange the interviews via my email. One texted me about her decision to participate. I gave them the options of meeting in person or using the free video-conferencing application, Zoom. Gerber and her colleagues (2017) mentioned video chats used for asynchronous interviews as an emerging format. In an

account of using Skype (Hanna, 2012) which is similar to Zoom, Hanna described the benefits of this medium. Although he explained there could be technical glitches in using such tools, he considered that this type of application could be an effective alternative to in-person interviews. He listed the benefits as it is economical, the video feed is live and therefore the visual social cues which are lost during a telephone interview are retained, and it can be recorded. This medium also offers convenience and flexibility to the researcher and participants for location and time. Hanna's conclusions that online video interviews are comparable to in-person ones are supported by Kozinets (2010).

All six participants agreed to meet via Zoom. I recorded the first two interviews using the Zoom embedded recording feature and an iPad. Zoom requires a unique meeting code for the participant and requires a password for access to the Zoom account. I saved the files as audio not video due to the storage requirements. The cost of maintaining a Zoom subscription for the duration of the study was prohibitive, so I did not use it to record subsequent interviews. I used the Voice Memo application on the iPad. This device requires a Touch ID and a passcode to access. The data protection feature of the device is enabled which provides encryption for data stored in the device. When I stopped using the Zoom record features, I used the Voice Recorder on my mobile phone as my backup device. My phone also has a two-step authentication feature which requires a passcode and fingerprint. These devices were chosen because of the security features available to protect the participants' data.

I used a similar structure for the interviews. I began each interview with an introduction and provided general information about the study. I also expressed my appreciation for their participation and explained what they were consenting to by

agreeing to be in the study. I also mentioned the purpose of the recording, using it to transcribe the interviews and as part of my audit trail. After the interviews, I thanked the participants and explained the next steps. I described my process of collecting data from their social media sites and how I intended to protect their identities. I also explained the process of member checking, and that I would meet them in person to share the transcripts. I also requested they contact me if they had any questions about the research study.

I envisioned my role as being a neutral interviewer, but I nodded agreement, and said “yeah” and “wow” or gave thumbs up throughout the interviews, especially as the interviews progressed and I felt more comfortable. In a few of the interviews, I shared if I had seen an application in use, and my wonderings. The approach I subconsciously used in the interviews could be categorized as “Romantic” while remaining neutral. This is described (Roulston, 2010) as developing rapport with the interviewee and being forthcoming- adopting a conversational approach. Roulston explained this approach was used in researching perspectives and beliefs therefore I considered this appropriate for this study. Moustakas further explained in phenomenology where the researchers want to elicit comprehensive information about the experience, creating that type of comfortable environment is likely to elicit honest and detailed responses.

A second meeting took place upon the completion of the transcribing of the interviews, and coding. I shared the transcripts with the participants and explained the coding procedures and discussed the themes which were being generated. I also discussed any significant statements I determined from the data represented their experiences. I met with four participants in person in the community for the second contact, and two on

Zoom. The latter was due to the coronavirus shelter-in-place restrictions. The “share screen” feature in the program allowed me to share the transcripts and collected data with them from my computer.

***Teacher #1 Interview and meeting.*** This interview took place on December 5<sup>th</sup> on Zoom. I had received an email from the teacher in the morning, explaining she had just received the study letter. She agreed to meet that same day via Zoom after work. I had not expected such a quick response, so I started the meeting feeling unprepared, but also excited and grateful that this part of the journey was beginning. Teacher #1 arrived promptly, and we introduced ourselves. When I expressed my gratitude, she explained she had recently completed a graduate degree and understood the importance of research and supporting me. She was encouraging and probably detected my nervousness. Teacher #1 gave a quick overview of her teaching career and explained she was currently a third-grade teacher. The interview lasted 22 minutes, and the entire meeting, 31 minutes. I asked the interview questions as stated on the protocol and wrote notes. I repeated the questions at least once, although she only asked for clarification for the first question. Reading the nonverbal cues, I assumed she wanted me to repeat the question. Reflecting on this, I probably needed to give more wait time. I attribute this to my nervousness and being used to repeating things when speaking because of my accent.

Teacher #1 described using technology in her personal life, indicating a degree of comfort with it. She explained the importance of using technology in for cross-curricular studies, rather than within the confines of one subject. She viewed its use as essential to preparing students for the future. Her membership in Cosmic was described as a positive experience and she shared information about the use of digital applications in her

instruction. Although a supporter of technology integration, she also expressed concern about the addiction it could cause. I restated her responses and also asked two additional questions about how she shared her knowledge of technology with her peers. I also asked about the specifics of using technology for the various components of ELAR, as her examples were mainly about reading. I explained the next steps and the teacher asked me to keep her abreast of my progress.

The second meeting took place on February 12<sup>th</sup> at a local restaurant which was located near both of our schools, after work. The teacher explained she was on her way to work out so she would not stay and have a drink or eat. I gave her printouts of the interviews and social media data. She reviewed them and marveled at the length of the transcripts and some of the things she had said. She agreed they represented what she had communicated and permitted me to use excerpts from social media in my reporting. Although the social media and website data were public, I thought it a courtesy to ask the teachers if I could use it. We discussed our future career plans, and she left after 20 minutes. She was very encouraging and offered her continued support of the project.

***Teacher #2 Interview and meeting.*** The second interview took place on December 11<sup>th</sup>. Teacher#2 was the only participant to contact me via text messages. She explained she was at home with a sick child on the interview day but was happy to meet with me via Zoom. The interview started with her talking as if we had known each other all our lives. She gave me updates on her family and her day and worried jokingly about her appearance on the Zoom video. She wanted to know how I learned about her and decided to invite her to participate, which I explained. We laughed aloud and talked about

our careers. At various points during the interview, her younger children wandered in and waved hello.

Teacher #2's responses were detailed and she gave many specific examples of technology integration and her strong beliefs about how it should be used. She was very passionate about teaching in general. She shared anecdotes about students' access literacy by using technology in innovative ways. It was apparent she allowed her students the freedom to explore and to express their learning in diverse ways involving technology. I was more relaxed during this interview, so I asked more questions for clarification or elaboration.

She is a member of a Twitter technology group, which is a group within the larger Cosmic group. They use Twitter for PD and to connect with other educators. Teacher #2 spoke about gamification and trying to think of ways to incorporate it into her instruction to connect with students. It was apparent that connecting with her students and other educators was of paramount importance. She bemoaned what she perceived as the decrease in students wanting to read. Although a self-professed proponent of technology integration, there were moments when it seemed that there was a tug of war in her mind between the use of the traditional literacies versus the digital.

The follow-up meeting took place at the teacher's home. She texted on the morning of February 15<sup>th</sup>, which was a Saturday, and asked if I wanted to meet at her home later that day. I agreed, then she called about midday to say her family was out, except for her baby who was about to take a nap. Armed with the address and my printouts of the data, I arrived at her house. I was welcomed with a big hug and taken to the family room. The teacher explained she had been working on her plans for the

following week. She had an affectionate dog who was bribed with treats because he kept wanting me to play. We talked about the children and an upcoming family vacation before reviewing the data. She skimmed the documents providing a funny running commentary throughout. She expressed amazement that it was transcribed verbatim and told me to use whatever I needed. Afterward, we continued to talk about our families. Our meeting lasted about 30 minutes. The dog, who seemed very well known in the cul-de-sac as he was warmly greeted by the neighborhood children, chased a passerby so I ended up staying longer to ensure he was found.

***Teacher #3 Interview and meeting.*** This interview took place on January 7<sup>th</sup>, the second day of the Spring semester. The teacher had emailed me over the holidays, apologizing for the delay in responding and asking to meet. Her explanation of it being a busy time of year aligned with my concerns about sending the consent letters before the Christmas holiday. We met after school, at 5:00 on Zoom. She was prompt and very professional, and my first impression was that she was reserved because she did not know me. She was a second-grade teacher, so she taught the youngest students of all the participants, but she believed that it was just as important for them to learn about technology, as the older students. I found it interesting that a change in her classroom environment, the move to flexible seating, was the catalyst for her becoming involved in technology integration. She also spoke about the evolution of how students saw technology firstly as a toy but were realizing that it could be a tool for learning. The interview took 20 minutes and in contrast to the previous interviews, I did not ask additional questions.

Meeting in person was very different. We met at a cafe on March 2<sup>nd</sup>, at 4:30. I arrived first and Teacher #3 approached smiling, but perhaps unsure. She looked at the printouts of the data and commented on her expressions in the transcripts. We spoke at length about a new application, Pear Deck, that she had been using recently and explained it was accessible for students. She also mentioned a Google Initiative for the school district, where the focus was on teaching students to code. I asked her about Google Forms which she had mentioned in her interviews. She elaborated on gamifying this application to teach vocabulary for example. She spoke about the engagement she sees, and how applications with the game format like Kahoot motivated boys. Teacher #3 looked at all the data and coding and agreed it represented our discussions and my findings.

We stayed about an hour after that. The initial hesitation and formality evaporated and we talked about our careers, families, and mutual interests and the café's beverages. As we left, I promised to keep her updated on my progress.

***Teacher #4 Interview and meeting.*** Teacher #4 was one of the first teachers to respond to the second round of mailings. She explained she was unsure if she was appropriate for the study, but was willing to help. She was the only participant who was not a current member of Cosmic. We met via Zoom after work on January 16<sup>th</sup>. The teacher was smiling and friendly and laughed easily as the interview progressed. She described her home use of technology which was mainly for communication. She mentioned having pen pals around the world, which was interesting because it is not something I hear often nowadays. Throughout the interview, she spoke about technology integration being a vehicle to transport students beyond the physical space of a classroom

to interact with people around the world. The students too have pen pals and use the application Flipgrid to communicate with them. She spoke passionately about preparing students for the future, having them learn about global citizenship through connecting with other students around the world. She also described Skyping with a scientist; thus is bringing the world to the classroom. Her passion for teaching and connecting with others was inspiring, and I wanted the interview to continue after the 23 minutes.

We met on February 21<sup>st</sup> at a café. I got there first, and when Teacher #4 arrived, it was like meeting with an old friend. Over café beverages, we looked at the data and coding, and she was very complimentary and satisfied with the accuracy of the transcripts, and interested in the coding processes. We discussed some of the themes which were emerging from her data, such as the emphasis on global citizenship. For her, this also included learning about the environment. She uses projects in her classroom, which allows her to integrate different content areas, and gives students the freedom to explore. An hour went by quickly, and we could have sat there another hour talking about harnessing the power of technology for good and letting students lead the way.

***Teacher #5 interview and meeting.*** Teacher #5 was also a respondent to the second mailings. We met on February 11<sup>th</sup>, via Zoom. Teacher #5 was brisk in her manner; she answered quickly and clearly and provided detailed responses with examples. I wrote in my reflexive journal,

It was easy to start the conversation. The teacher was very detailed and provided examples without much prompting.

It suggested technology was something she used in her instruction with ease and confidence. This was one of the longer interviews, at 39 minutes. She emphasized the

importance of integrating technology to prepare students for their future lives. She also explained the positive impact of her membership in Cosmic. Her perception of herself through Cosmic and learning about new technology was that she is a student and she is still learning. She was adamant that her students see her as a learner every day, and know the process involved failures and successes, but most importantly, to never stop learning.

She also spoke at length of how she uses technology to provide access for students through differentiation. Using technology to communicate with parents was also important to her, and part of a home/school use technology she supports. Lastly, she described using social media to connect with other educators to learn and collaborate.

The original plan was for the second meeting with teachers was for them to occur in person. Our school district's Spring Break was the week of March 9<sup>th</sup> and I hoped to complete all data collection and transcribing and meet with teachers after the holiday. There was talk of a highly contagious virus on the horizon, affecting people far away, or so it seemed. On Tuesday, March 10<sup>th</sup>, the Houston Rodeo was canceled. Suddenly the coronavirus (COVID-19) was a real though invisible threat not in a distant land, but here in our backyards. Literally. When school reopened on March 16<sup>th</sup>, it was online, a new digital frontier that we were thrust into overnight. I waited an entire month before contacting Teacher #5 to arrange a meeting. It seemed insensitive and even trivial to want to talk about my dissertation during a global pandemic; it surreal to write that sentence but that was the reality. Also, as an instructional coach, I was aware of the challenges teachers were experiencing, and we were under a stay at home order. I contacted Teacher #5 via email and we agreed to meet on Zoom.

We met on April 20<sup>th</sup> at midday for half an hour. We spoke about how we were coping and our families. Teacher #5 was supportive, in encouraging me not to give up, but to keep working towards my goal. She reiterated this when she sent an email to me with a link to a digital resource later that day. We then discussed how teaching and learning had changed. She was working with the Cosmic team in providing webinars and training to the entire district via Zoom. She spoke about teacher frustrations and the efforts to provide support. Digital citizenship was an area of development for all, and she shared how class rules were different now in an online classroom. She used the analogy of walking in the sand on the beach and leaving footprints, to teach students about digital footprints and personal accountability.

We also discussed some digital resources available such a virtual field trips. Teacher #5 also gave me a quick PD on designing digital Escape Rooms and digital portfolios. She agreed the transcripts and data represented what we had discussed and the messages and the purpose she communicated in the interview and online. Zoom had a feature that enabled me to share my screen and consequently the transcripts of the data. We agreed to meet at a café in the future as we had planned. It was a positive and moving conversation.

***Teacher #6 interview and meeting.*** Teacher #6 contacted me at the end of February via email and explained she had recently found my research letter and wondered if it was too late to participate in the study. We met on March 4<sup>th</sup> at 5:00 on Zoom for 36 minutes. She apologized at the beginning of the meeting but I expressed my gratitude to her for participating. She explained that she was studying too, so she understood the importance of this work. She spoke confidently and in detail about her

beliefs and uses of technology. Every technology example she shared had students' learning needs as the central factor or catalyst for her using it; this suggested she was very purposeful about how she used technology. The teacher detailed how it helps support the learning for the different student groups. She believed technology was a good tool but always qualified her statements by adding, that it had to be used properly. I should have asked what this entailed. She uses a variety of technology tools for the different components of ELAR instruction. She was disheartened by the low use of technology on her campus, and the limited support of her efforts to provide PD. I restated her answers and also asked her to elaborate. This was reflective of my increased comfort in the interview process. She was the only teacher who worked at a Title 1 school and had some issues with having internet and home technology availability. The interview ended with her describing her participation in Twitter Chats and providing a PD to me on how to participate.

We met on Zoom on April 17 at 4:00. The teacher explained I may hear her children in the background, but it was quiet. We spoke about how the virus and the restrictions had affected our lives, especially in her case, teaching while having young children at home. I shared the Zoom screen with her to enable her to view the transcripts. She verified they reflected our discussions and her online posts.

She spoke excitedly about how technology use had changed at her campus. I recalled from her interview and viewing her social media posts, how limited the participation was in her technology labs. The teacher was pleased to report, although sad about the circumstances, how participation had grown exponentially. She now had daily Zoom meetings to offer support for technology instruction and PD to her colleagues.

Before distance learning, her maximum attendance was 3 teachers; now she has up to 20 teachers attending. I was elated for her; it was a combination of passion and purpose yielding the participation she had worked hard to increase. She explained the challenges using the same technologies with students due to them having limited technology. This was something she had mentioned in her interview and highlighted the chasm of inequality and access that the race to online schooling had further widened. We ended the meeting wishing each other well and hoping to meet in the future.

**Observations.** Observations are also used in this research design (Creswell & Poth, 2018). Denzin and Lincoln (2011) also reported qualitative researchers use interviewing and observations to obtain the participants' perspectives. I had hoped to visit some of the participants' classrooms to observe technology integration in action. I planned to use an observation protocol I developed to record field notes. Observations provide primary data (Yin, 2015). Yin advised also using a journal to document decisions and reflections related to the observation. He also emphasized specifying the focus of the observation such as the subjects and actions. I planned to observe in the classroom and not participate in the activities or interact with the students. I wanted to take photographs of the technology equipment and completed work.

When I received permission from the district's research department, the letter stated principals of four of the 28 elementary campuses had consented to the observations. The director explained I was to contact the principals directly when I was ready to observe and to let him know if I needed further support. None of the teachers who agreed to participate in the study worked at the four schools listed. The first teacher invited me to visit her classroom and I informed the director but did not receive any

further correspondence. I was unable to conduct any classroom observations as a result. This was disappointing and I contend conducting the observations would have strengthened the study design and data. I would argue however that collecting data from the participants' websites and social media accounts, in multiple media formats, including video, gave me comparable and perhaps more data than a one-time 30-minute observation would have yielded.

**Data Collection from Online Spaces.** I collected data from two online spaces. The term "online spaces" refers to online environments; Gerber and her colleagues (Gerber, Abrams, Curwood, & Magnifico, 2017) observed these spaces used for learning "are spread across several resources, websites, and social media" (p.3). In this study, I collected data from the teacher's websites and their Twitter accounts. This provided a total of three different data that could be used in the triangulation process. The overall purpose of this was to examine data of the teachers' use of technology for literacy instruction, and how they use the online platforms to support their instruction. Gerber and her colleagues explained, "online field sites offer researchers ample data" (p.104) and can be used with other data collection methods to provide supporting or contrasting data. One of the challenges is "the impermanence of the online data" (p. 104), so Gerber and her colleagues suggested capturing screen images of the data. I used Microsoft Word's Snip and Sketch tool to capture pictures of artifacts on both online sites. I developed a protocol for documenting the data collected in Figure 2.

Data (Screen Capture)	Memo	Process Coding
	<b>Date:</b> <b>Artifact and Context:</b> <b>Purpose:</b> <b>Reflection:</b>	

*Figure 2.* A protocol for online data.

The screen captures were of text, images, and screenshots of video data. Using screen capture is recommended for data that contains multiple forms of online data (Kozinets, 2010). Kozinets cautioned it can be time-consuming to clip individual images, but also acknowledged not doing this may lead to many pages of extraneous information and pages. The process was indeed arduous but it helped me organize, store, and code the data efficiently. In the memo section, I wrote the date when the artifact was posted if available- all tweets are dated. I described the artifact and the context. The “reflection section” was my analytic memo and observations about the data. The use of the memo was two-fold; to record my notes about the artifact as field notes and it was also a form of analysis of the artifact. Unless explicitly stated, I had to infer the purpose of the artifact and it’s the potential effect. This occurred within the context of considering what the artifact showed about the teacher’s experience of technology integration. Miles and his colleagues (Miles, Huberman, & Saldana, 2014) described using analytical memos to analyze visual data. They further explained it was a more holistic approach to record the impressions of the still image rather than the more technical aspects of color elements. I decided it was appropriate to not comment on the composition of the images but on what the artifact is and its function. The image alone is insufficient without the reflection and context because as Miles and his colleagues surmised, “Images don’t speak for

themselves” (p.98). Colwell and Hutchison (2018) also used screenshots in reporting their research on Twitter PLNs. Screenshots were also used in a study about the use of hashtags (Rosell-Aguilar, 2018), one of the Twitter features used in the data collection. An example from my collection of data Teacher # 3’s website is in Figure 3.

Data	Memo	Process Coding
 <p><b>Homework Menu</b> Week of: December 16-20</p>	<p><b>Date:</b> Week of December 16-20</p> <p><b>Artifacts and context:</b> <sup>4</sup>A hyperlink to a PDF of a homework menu for week. <sup>5</sup>The menu has class notices and ideas for reading, math, social studies homework. <sup>6</sup>It is a combination of a digital newsletter and homework activities. <sup>7</sup>The document has QR codes <sup>8</sup>which are linked to videos and questions for the students. <sup>9</sup>It also has a hyperlink to a form for parents. <sup>10</sup>It is an interactive digital menu.</p> <p><b>Purpose:</b> <sup>11</sup>To provide homework for students; <sup>12</sup>to provide information for parents.</p> <p><b>Reflection:</b> This offers more options than a print homework menu or newsletter. It is easily accessible- many parents have a phone they can use even if they may not have other devices. The links provide forms and notices the parents can also find (no more misplaced papers). The video and QR codes also allow access to additional multimedia resources.</p>	

Figure 3. Screen capture of an excerpt from the online data collection. This shows Teacher #3’s homework menu/newsletter for the week of December 16<sup>th</sup>, 2019.

*Netography* describes conducting ethnographic studies online involving online communities and related elements (Kozinets, 2010). Some of the research suggestions apply to this study. Kozinets emphasized the role of field notes when researching online spaces and agrees that it is important to document impressions and reflections about posting and artifacts. He assumed the “when, where, and who questions” related to the context would be recorded in the researcher’s field notes. I added context to my description of the artifact to answer those questions. The tweets on the teachers’ Twitter sites often contained the information which I used to describe the artifact and explain the when, why, and who questions, and also the why. I also included “purpose” on the

protocol. This was important for understanding how the teacher used the two sites for technology integration; this was relevant for all the research questions.

I only used public data. This means the websites and Twitter pages which were accessible without using the districts' login. This did not require additional permissions. To preserve confidentiality, I retracted all personal information from the captures and covered all the faces of the students and teachers using Microsoft Word's drawing features.

*Data collection from teacher websites.* There is a website for each school in the district that has links to the teachers' websites. Once I located participants' sites, I created a document with the protocol, and copied and pasted images of each posting or graphic feature on the site. I did not include the general district information, only the teachers' postings. I decided I would collect the data for a single day in the first semester of the current school year. I did not collect second-semester data because it would have been incomplete due to the timeline for this study. I was also aware posts may be removed or changed if I collected the data over a few days.

Some of the elements on the websites were similar. The template is the same across all district accounts, but the teachers can personalize it by using different graphics and links. There was variation between the sites, and some participants had more features than others. It is also possible some of the information was removed when it was no longer relevant. Each teacher had a welcome page which sometimes included a short bio of the teacher. When posted, it included a photograph and information about the teacher's career and interests. The Welcome page included the teacher's work contact details, conference times, and class schedules. Some teachers included links to their Twitter feed.

This showed the most current tweets and was accessible to the public, even if they did not have a Twitter account. The teachers also included hyperlinks to PDFs and videos of curriculum documents. There were homework menus, and reading and writing tips. The “Helpful Documents” links were copies of school documents related to routines and expectations, and information about incentive programs, and the school’s PTA. Several pages included an interactive digital calendar with postings of the school and class events and holidays. The “Wish List” was a list of school supplies the teacher was requesting.

A hyperlink to technology applications and websites the students used in class were also posted. A summary of the digital features on each teacher’s website is depicted in Table 3. A capture was taken of each of these elements during data collection and I clicked on all hyperlinks to describe the digital artifacts.

*Features on Teachers’ School Websites*

Teachers	#1	#2	#3	#4	#5	#6
Bio	✓	✓	×	✓	×	✓
Calendar	✓	×	×	✓	✓	✓
Contact Details	✓	✓	×	✓	✓	✓
Helpful Docs	✓	✓	×	✓	✓	✓
HW/ Projects	×	×	✓	×	✓	✓

(continued)

Teachers	#1	#2	#3	#4	#5	#6
News-letter	×	×	✓	×	✓	×
Photo Gallery	×	✓	×	×	×	×
Tech Links	×	✓	✓	✓	✓	✓
Twitter Feed	×	✓	✓	×	✓	✓
Wish List	×	×	×	×	✓	×

✓ *Feature was present and a screen capture recorded* × *Feature was not present.* HW=Homework

**Data collection from Twitter.** My third source of data was from the teachers' Twitter accounts. As a teacher in the district, I am aware teachers are strongly encouraged to create professional Twitter accounts. Each year the district hashtag is shared for the staff to use in their tweets, and some school staff also create hashtags related to the school motto or campus goals. The hashtags make it easy for users to connect and retweet to share the school community's tweets. I collected data about the hashtags. Research on the use of hashtags by educators showed they can be used by educators to create communities of practice and facilitate collaboration and professional development. (Rosell-Aguilar, 2018). Teachers use Twitter as a learning network and find resources and connections to other educators (Colwell & Hutchison, 2018).

In my process of bracketing my perspectives and experiences of social media, I disclose I have a school Twitter account. I did not follow any of the teachers' Twitter accounts or interact with them on Twitter before their interviews. I used my school account sparingly, and my belief about Twitter is that it is a digital marketplace for personal data. I have been very critical of its use for what I perceive as a platform to spread political propaganda and general misinformation. My perspectives continue to evolve to more positive stances throughout this experience.

I decided to collect data for the first semester only up to the date of the participants' interviews. This was to ensure the teachers did not add to the Twitter posts as an influence of the interview. The purpose was to collect data that could address any of the research questions, as the data could show examples of technology integration, the implementation of the standards, how teachers used this platform. I used the same protocol form as I used for the website data collection. I collected the data over two days for each site, due to the volume of data. I used the Microsoft Word Snip and Sketch tool to collect the images. I used the same procedure for all the teacher's accounts. The data consisted of tweets of class photos, GIFs, videos, and retweets. I watched each video and summarized it. I noted the use of emojis as these examples are visual data too, and described the hashtags used, recorded the mentions.

I realized I did not know the correct terminology for the components of Twitter so I used the Twitter Help Center glossary. For example, in my original notes, I wrote that the teachers "tagged" other users or accounts. I learned this is called a "mention" and made the changes. I documented retweets but wrote minimum notes on as they were not the participant's compositions. It was important to note the purpose of the retweet and the

teacher's responses. I believed that retweets signified the participants' agreement with the tweet's content, so it should be acknowledged. An excerpt from Teacher#4 which shows how I recorded the data from Twitter using the protocol for online data in Figure 4.

Data	Memo	Process Coding
	<p><b>Date:</b> 9/14/19</p> <p><b>Artifact and content:</b> <sup>167</sup>A tweet about a reading book. <sup>168</sup>The teacher used the mention of the author of a book her students are reading <sup>169</sup>and used the book's title as a hashtag. <sup>170</sup>She explained what literacy and critical thinking skills the book is building in her students. <sup>171</sup>She celebrates integrating the learning standards by reading the book.</p> <p><b>Purpose:</b> <sup>172</sup>To connect with an author; <sup>173</sup>to promote reading; <sup>174</sup>to share a class book; <sup>175</sup>to share skills and themes related to the book.</p> <p><b>Reflection:</b> One of the benefits of social media is allowing readers to connect with the authors and other readers through the mentions and hashtag. I read this book as a result of this tweet, and this can be the effect of tweets like this. If the author responds, how affirming for him and the readers.</p>	

Figure 4. An excerpt from Teacher #3's Twitter data.

I recorded the data starting with the most recent tweet. This mirrors how tweets are posted on Twitter. To understand the context of some of the tweets however, I had to read some of the previous posts. This was one of the drawbacks of listing them this way, but I thought it was important to mimic Twitter's sequence arrangement of the data.

### Phase Three- Data Analysis

In reflecting on the nature of phenomenology, van Manen (2016) wrote it is “in some sense, always descriptive and interpretive” (p. 29); the researcher both describes and interprets the data. This was particularly evident in the data collection using the online sites, as the description was also my interpretation of the artifacts. Yin (2015) listed five steps in the data analysis process in qualitative research. The first step *Compiling* is collecting and organizing all the pieces of data. I described collecting data

from three sources in detail in the previous section, using interviews and two different online sites. Next *Disassembling* in this research study was the coding process.

*Reassembling* refers to finding connections between the data, deriving common themes.

This is followed by *Interpreting* the data and *Concluding*. Yin also provided three overarching questions to reflect on throughout the five steps of the data analysis:

1. What are the distinctive features of my data?
2. How might the collected data relate to my original research questions?
3. Are there potentially new insights that have emerged?

(p. 191)

Yin (2015) described the general steps in qualitative data analysis. The guidelines for the data analysis of phenomenological research are similar and are a form of thematic analysis (Creswell & Poth, 2018). Phenomenological research is described as a “meaning-giving method of inquiry” (van Manen, 2016, p. 31). The process of analysis starts with the researcher acknowledging his own experiences of the phenomenon as a means of distinguishing them from the participants’ (Creswell & Poth, 2018). Creswell and Poth stated the next step is, “*Generate themes from the analysis of significant statements*” (p.79).

. Moustakas (1994) explained the process of *horizontalization* which is finding the statements relating to the phenomenon which describes it and could be labeled. The ones which are repetitive or provide insufficient information about the phenomenon are discarded. The *horizons* are left and the themes are then derived from these “clusters of meaning’ (Creswell & Poth, 2018, p.79).

The next step is to “*Develop textural and structural descriptions*” (Creswell and Poth, 2018, p. 79) and write descriptions of the participants’ experiences. The final stage is describing the “essence” of the experiences and presenting them (Moustakas, 1994). Although Creswell and Poth summarized a process, gleaned from Moustakas and other researchers, van Manen explained, “the phenomenological method cannot be fitted into a rule book, an interpretive schema, a set of steps, or a systematic set of procedures” (2016, p. 32). This is reflected in the fact that the analysis used in this study was a combination of the process described by Yin as well as those which are unique to phenomenology.

***My experience of the phenomenon.*** The phenomenon under study is technology integration in English and Language Arts instruction. As a literacy specialist and instructional coach, I use technology in instruction and coaching daily. I also modeled its use with pre-service teachers as an adjunct lecturer. I received training in integrating technology from the district and campus technology personnel, although I have never been a member of Cosmic. I also explore my technology applications and learn about them on the Internet. Many ideas come from colleagues, attending conferences and webinars, and also from students. I am very comfortable using technology. Students are motivated to use it, and my challenge is always having them explore it in a way that is engaging but also purposeful. I have professional media accounts which I rarely use, but when I do, I usually share other educators’ posts about literacy instruction. I use it as part of my coaching to praise teachers liking their posts and retweeting them. I also tweet instructional ideas and resources.

I use my website to post information for parents. I have sufficient devices- I have a district-issued iPad and laptop, and access to a projector in each classroom. I work

collaboratively with the teachers and the campus technician to create learning opportunities for students. My experience with technology integration has been very positive.

*Disassembling and first cycle coding.* I transcribed the interviews in verbatim using two coding approaches- In Vivo and Process Coding. I used In Vivo Coding which Saldana (2016) suggested is appropriate for first- cycle coding of interviews, and which I employed in the pilot study. This type of coding involves using words and phrases drawn from the participants' actual words. Using this coding format was also related to and helpful in identifying "significant statements" (Creswell & Poth, 2018, p. 79) which are an integral part of data analysis in phenomenology. I used the features of Microsoft Word and assigned each line or phrase with a new idea with a number. I created a textbox on the right side of the documents and wrote the codes there.

I also used the Process Coding, as Saldana (2016) suggested neither In Vivo or Process Coding has to be the sole analysis method used. Process Coding involves using gerunds as codes. I believe the use of verbs as codes was useful in capturing how technology is used, as it highlighted teacher and student actions. Also, it was useful in determining the application of the technology standards, which relates to the research questions.

There is no single method of analyzing online artifacts and the methods may evolve as the technology itself continues to change (Gerber et al., 2017). Gerber and her colleagues formulated questions to guide multimodal analysis of the digital artifacts from other studies, to guide researchers using these forms of data. They proposed the analysis of online data sources may combine more traditional qualitative research techniques and

newer, creative ones. This includes considering what artifacts are available, how the participants use them, what meanings are attached to them, and what do the participants reveal about the artifacts. I used Process Coding to code the written data collected in the protocol. The information collected using the online protocol enabled me to address the questions posed by Gerber and her colleagues. I described the artifact and its context and the purpose or function of each artifact.

Miles and his colleagues (Miles et al., 2014) described visual documentation as “more of a holistic venture than a systematic one”(p. 98 ) and the analysis of video content as “complex”. He advised the researcher can still use some of the traditional methods. Saldana (2016) referred to the analysis of visual data as a “slippery issue” (p. 57). One of the reasons for this could be the researcher is interpreting the artifact and making inferences. That is one of the reasons why I separated my reflection from the description in my memo. The activities of coding and composing the analytic memo writing are described as “concurrent” analysis in qualitative research (Saldana, 2016). For this reason, whereas I used two types of coding, for the interviews, I only used Process Coding for the memo. I coded each action in the tweet and media by assigned in a number and code which started with a gerund. This is shown in Figure 5.

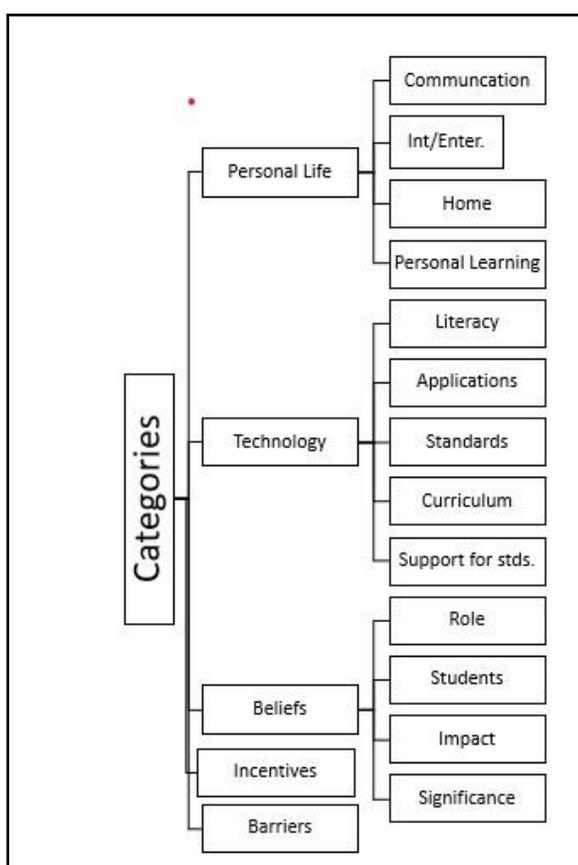
	<p><b>Date:</b> 12/10/2019</p> <p><b>Artifact and Context:</b> <sup>17</sup> A tweet and two photographs of presentation slides. <sup>18</sup> The teacher explained she was learning about different extensions and add-ons. <sup>19</sup> She explained it was difficult to concentrate due to the amount of information about free digital tools. <sup>20</sup> The teacher was attending a regional technology conference. <sup>21</sup> The photographs show the teacher was learning about Google tools. <sup>22</sup> The presenter provided her contact details on the slides <sup>23</sup> and a QR code to access the presentation. <sup>24</sup> The teacher used the conference and her technology group's hashtags, <sup>25</sup> and included the school and the district's digital learning department in her mentions.</p> <p><b>Purpose:</b> <sup>26</sup> To share professional learning experiences.</p> <p><b>Reflection:</b> This shows the teacher's enthusiasm for this professional learning experience. It provides feedback to the organizers and raises the awareness of the conference for the viewers. The sharing of the presenter's details and QR codes enables the followers to access the presentation.</p>	<p><sup>17</sup> TWEETING PHOTOGRAPHS OF A PRESENTATION</p> <p><sup>18</sup> LEARNING ABOUT EXTENSIONS AND ADD-ONS</p> <p><sup>19</sup> TWEETING ABOUT DIGITAL TOOLS</p> <p><sup>20</sup> ATTENDING A TECHNOLOGY CONFERENCE</p> <p><sup>21</sup> LEARNING ABOUT GOOGLE TOOLS</p> <p><sup>22</sup> SHARING PRESENTER'S DETAILS</p> <p><sup>23</sup> SHOWING QR CODES</p> <p><sup>24</sup> CONNECTING USING HASHTAGS</p> <p><sup>25</sup> MENTIONING THE SCHOOL AND DIGITAL DEPARTMENT</p> <p><sup>26</sup> SHARING PROFESSIONAL LEARNING EXPERIENCES</p>
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Figure 5. Using Process Coding with Twitter data. An excerpt from Teacher #6's Twitter data.

**Reassembling.** This refers to finding connections between the data and extracting the themes (Yin, 2015). At this stage in the analysis, I used Axial coding. Saldana (2016) categorized this as a second-cycle coding method, which is suitable for use after In Vivo and Process Coding. This involves developing categories and subcategories from the codes generated in the first cycle. I first reread all the data and identified broad categories and subcategories. I used a highlighter to sort the different categories. I changed the categories and the grouping of the categories as the process progressed. During this time, I started highlighting statements that were related to the categories on printouts of the coded data. I decided to use a Computer Assisted Qualitative Data Analysis Software, CAQDAS. I chose QDA Miner Lite to organize all the data and search and retrieve chunks of data more rapidly. CAQDAS is in research for these

purposes, as well as for the coding functions and creating graphic displays for the data (Miles et al., 2014).

I input the categories into the program and uploaded the interviews. A partial model of categories I generated is shown in Figure 6. This was an evolving model; as I reread the data, I had questions about my analysis. My categories remained the same and related to the interview questions, but I changed the subcategories. For example, my original subcategory “context” was changed to “significance”; and “application” was changed to “impact”.



*Figure 6.* Categories used in the analysis. The categories were input in the QDA Miner application.

I wrote definitions of the codes, and the program generated a codebook in the program. One of the functions of the codebook was it provided a reference for me to refine the categorizing of the data; maintaining a codebook is recommended in qualitative analysis (Saldana, 2016). An excerpt from my digital codebook is shown in Figure 7.

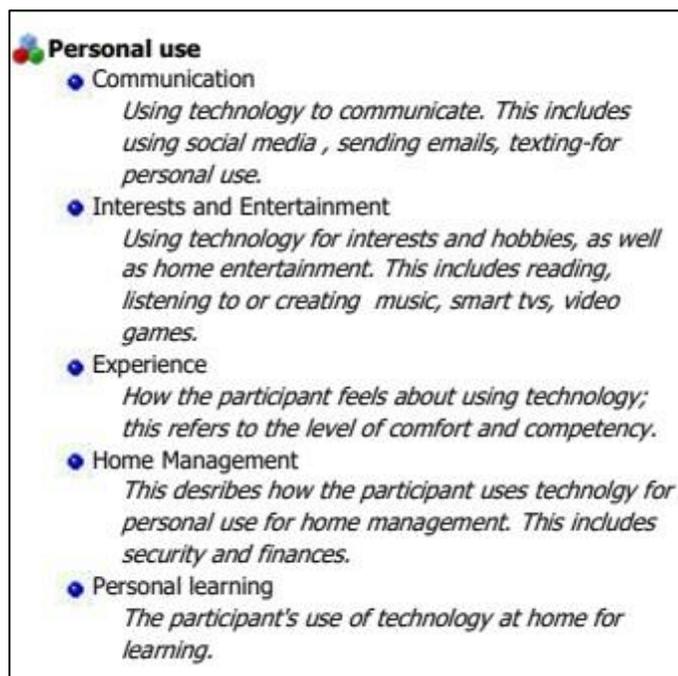


Figure 7. Excerpt from the codebook.

I then reread the interviews and used the categories to sort the data. I used the program's coding retrieval feature for each category to group the data from all six interviews. The program also arranged the data using the subcategories. The use of QDA Miner made it possible for me to conduct simple cross-case analysis, which is analyzing multiple cases together which can foster a deeper understanding of the data (Miles et al., 2014). The purpose of me analyzing the data in this way was to help determine commonalities (and differences) between the participants' perspectives of the shared experience of technology integration. I analyzed the data in this way too when reading through the print copies and making annotations, but using the program helped me to be

more systematic and accurate in making those connections within the data. I saved the data generated using Microsoft Excel and printed copies.

I then input the online data from social media and the participants' websites and completed the same procedures in the QDA Miner application. I added another subcategory- "Work Communication" under the Technology Integration category because the Process Coding revealed this was one of the participants' primary uses of online platforms. I separated the interviews and the online data due to formatting issues within the program. I also used the coding retrieval feature to organize and analyze the categories across all six participants' online data.

Yin's (2015) interpreting and the data and drawing conclusions phases follow the reassembling of the data. The analogy of jazz improvisation was used to describe how the qualitative researcher connects the pieces of the data and interprets it to create meaning (Denzin & Lincoln, 2005; like in jazz "many different things are going on at the same time: different voices, different perspectives, points of view" (p.5). It is not discordant. I started seeing the data merge and the themes emerge during this time from the different pieces of data. In phenomenology, meaning-making involves examining the significant statements which are words, or phrases, or sentences from the data that are related to the phenomenon under study(Johnson & Christensen, 2014) or horizons (Moustakas, 1994).

**Using significant statements to develop themes.** I selected the "significant statements" in each category. Although I am describing the process sequentially, highlighting the statements, and searching for themes from the data occurred concurrently throughout the analysis. Working with three sources of data, I considered a statement

“significant” if the teacher said it in the interview, and it was repeated or reflected in the other data sources. This was using the triangulation of the data.

I generated themes from the statements. There were several different themes from each participant’s data and I wondered how to connect them. Some of the themes, such as “collaboration” and “access” were common across the statements. The challenge for me at this point was connecting them to form a coherent description that described the participants’ experience of technology integration.

*Describing the essence of the phenomenon.* This involves describing participants’ experience of the phenomenon under study (Johnson & Christensen, 2014). Using metaphors is a useful approach for making inferences about a phenomenon, beyond simply describing it (Miles et al., 2014). Miles and his colleagues suggested searching for a metaphor used by a participant to describe their experiences and applying it to “examine the data” (p. 281). They further explained metaphors could be used to find patterns, provide richness, condense the data. Moustakas (1994) used examples of what he described as “textual descriptions” (p.132) which vividly portrayed different experiences. The researchers in his examples used metaphors and symbolism.

Teacher #5 described technology as being a *bridge*: “I think it could be a big bridge...that kinda bridges it together”. I determined the metaphor of the bridge could be used to connect the themes and used it to write a description of the participants’ experience of technology integration. In phenomenology, the goal is to “express, in rich rigorous and rich language phenomena and events” (van Manen, 2016, p. 53).

### **Establishing Trustworthiness and Credibility**

There were procedures I adhered to through the sampling, data collection, and analysis to maintain the trustworthiness and credibility of the research project. It is argued (Maxwell, 1992) eliminating threats to the validity of research through design is “less direct” and “less possible” (p. 296) in qualitative research. This is due to the inductive nature of the methods, and the goal in qualitative research is not the generalizability of findings. Particularly in this research design, the purpose is to discover the participants' experience of a phenomenon.

Onwuegbuzie and Leech (2006) also emphasized that the validity of a qualitative study is a relative concept and questioned if the term is, in fact, an “oxymoron”.

Onwuegbuzie and Leech explained a qualitative study should be evaluated for “truth value” and “credibility”. Terms such as “trustworthiness” and “credibility” are also used. Nevertheless, the “validity” of qualitative research can be categorized into different types: “descriptive validity” which refers to the researcher’s accurate report of their data; “interpretive validity” refers to the interpretation and representation of the participants' perspectives.

Maxwell’s (1992) concept of “descriptive validity” was the accurate reporting of data. I achieved this by transcribing the interviews verbatim. I also provided factual descriptions of the online data and designed my data collection protocol to separate the descriptions and my impressions and reflections. The visual record of the online data also attests to their authenticity. I met with the participants after completing the transcribing and the coding so they could verify the accuracy of the coding and my understanding of their experiences and perceptions was consistent with what they had communicated.

Using participants' own words such as in identifying the significant statements would help achieve greater authenticity and accuracy of my report.

Another factor in establishing credibility is determining the “generalizability” of the data and refers to the application of the findings to a wider population (Onwuegbuzie & Leech, 2007). Maxwell (1992) argued this is not a goal of qualitative research, but the researcher makes inferences about the populations studied. He also referenced interviews specifically, explaining they limit generalizability because they provide only provide a brief interaction and the researcher must make inferences. The use of the online sources which provided data represented four months of teacher practices and helped minimize this proposed shortcoming of interviews. The concept of *transferability* (Onwuegbuzie & Leech, 2007), is a more attainable goal in qualitative research. If sufficient details are provided about the research process and findings of the study, a reader can transfer them to other similar contexts. My documentation of all procedures can help improve the possibility of transferability.

Onwuegbuzie and Leech (2007) detailed several possible threats to validity in qualitative research which are related to Maxwell's conceptualizations. They have categorized them as challenges to the internal credibility, which are factors related to the trustworthiness of the reporting of the setting and participants, and external credibility, which addresses the generalizability of the research findings. The threats which are relevant to this study are described, and measures that were followed to address them.

The *Qualitative Legitimation Model* developed by Onwuegbuzie and Leech frames this discussion of the threats (Onwuegbuzie & Leech, 2007). The threats can occur at different stages of the research, from the initial design to the reporting and

analysis of data; the process is described as an iterative one, rather than linear. Not all are relevant to every study. Several of the descriptors are similar to Maxwell's (1992) concepts, such as *descriptive validity*, *theoretical validity*. There is also the *observational bias*, which can occur if insufficient data is collected from the participants that are representative, in the context of this study, of their perceptions and experiences. Maxwell observed the omission of information is also a factor, as the researcher determines how much of a participant's account is included.

Efforts to minimize this threat were employed in all stages of the study. Purpose sampling was used so the participants received additional professional development for technology integration and support for its implementation, so they were knowledgeable about the research topic. Their interviews were transcribed verbatim, and protocols were used for all forms of data collection. These measures were used to increase the credibility of the study.

A feature of phenomenology is the researcher's "bracketing" of his knowledge and experience associated with the phenomenon (Creswell & Poth, 2018). This involves acknowledging these factors and committing to set them aside to solely examine and report on the participants' perceptions of the phenomenon. I acknowledged this in the discussion of my role as a researcher, my connections to the district, and my experience of technology integration. If the bracketing does not occur the *researcher bias* is a possibility (Onwuegbuzie & Leech, 2007).

Denzin and Lincoln (2011) used the analogy of the qualitative researcher as the quilt-maker, stitching together the different perspectives, methods, and context; "slices of reality" (p.5). This can lead to a rich description of the data, but it is important to be

aware of the researcher's biases and influence. The *reactivity* threat can occur when the participants' responses and actions are influenced by their knowledge of their participation in a study, and researcher/observer's presence (Onwuegbuzie & Leech, 2007). I did not know the participants before this study so this minimized this threat. There was however the knowledge that they were representing the district and discussing one of its initiatives or programs. I found that while they were all positive about technology integration and the Cosmic program, the participants also were critical and candid when discussing the shortcomings, they perceived. I maintained the confidentiality of their participation and their anonymity. I did not perceive they were unduly influenced in their responses because they communicated both the positives and negatives.

Furthermore, I was a member of the online platforms but I positioned myself as an observer. I did not interact with the participants on Twitter for example during data collection, I only observed and recorded their data. I only used publicly available information that did not require a login for Twitter or their teacher websites. A researcher should be cognizant of their position in the online spaces the participants use (Gerber et al., 2017). Gerber and her colleagues suggested co-presence could influence both the researcher and the participant. They provided questions for researchers to consider when including online spaces in their collection. These could also help the minimize the reactivity threat if the researcher is aware and acts accordingly: what the interactions are, what are the ethics involved, and what is the effect of co-presence. An additional measure I took to reduce the threat of being a "copresence" was to not use Twitter data which was posted after the interviews. In this way, I was not influencing the participants' posts.

Also, I only used the posts from the first semester, and most of the interviews took place in the second semester.

Some other measures can be taken to improve the credibility of a qualitative study. *Triangulation* which involves the collection of different corroborating ( or conflicting) sources of data will be used (Onwuegbuzie & Leech, 2007; Yin, 2015). This helps to “secure an in-depth understanding of the phenomenon” (Denzin & Lincoln, 2011, p. 5). In this study, three different data collection methods were used to achieve this. Although I was unable to conduct the observations, I used two different sources of online data. Both showed how the teachers used technology and corroborated and extended the examples and ideas shared in the interviews and meetings. Both online sites also provided longitudinal data that provided a richer context of the data than the interviews; they showed applications of the teacher’s beliefs.

Onwuegbuzie and Leech (2007) recommend maintaining an *audit trail* using detailed documentation of processes throughout the stages of the study. Using audit trails may improve the trustworthiness of a study and also provides an archive that future researchers can use for further analysis ( Lincoln & Guba, 1982; Onwuegbuzie & Leech, 2007). Lincoln and Guba provided examples of the documentation to include in the audit trails. As recommended, I reported and stored the raw data, maintained field notes on the interviews and observations. I also collected screenshots of the participants’ online data. I also maintained a reflexive log. Lincoln and Guba explained this should contain the researcher's changing perceptions, daily procedures, ideas, and decisions about the methods, and general reflections.

To ensure the data collected and the interpretation is reflective of the participants' experiences and accounts, *member checking* (Onwuegbuzie & Leech, 2007; Roulston, 2010; Schwandt, Lincoln, & Guba, 2007) can be used. The interpretations should be “grounded in the language of the people studied and rely as much as possible on their own words and concepts” (Maxwell, 1992, p.289 ). I met with the participants who read the accounts and analyses to determine if they matched what they had communicated. I explained the coding process to the participants and the themes which were emerging. I shared the statements with them which I thought were significant to their experience of technology integration. The teachers agreed that they were and elaborated or clarified points.

I attended “peer debriefing” meetings with my committee chair which is also a measure to strengthen the credibility of the study (Frels & Onwuegbuzie, 2012; Guba & Lincoln, 1982). Guba and Lincoln proposed it keeps the researcher “honest” (p. 247). Peer debriefing involves meeting with someone who interviews the researcher about the study and helps them reflect on the process (Frels & Onwuegbuzie, 2012). Peer debriefing allows the researcher to receive advice about methodology, maintaining an audit trail, and discharge “personal feelings, anxieties, and stresses” (Guba & Lincoln, 1982, p.247) about the study. Frels and Onwuegbuzie explained the dissertation chair is suitable for the role of a debriefer due to their expertise and relationship with the researcher. I met with my chair biweekly via Zoom. I also shared my data with her, with personal details retracted, for her to verify my collection and data processes.

Other recommendations for maintaining the trustworthiness of the study are using a neutral space for interviews, and being clear about the purpose of the study and

intentions (Onwuegbuzie & Leech, 2007). We met via Zoom for the interviews which are a neutral online space. We also met in the community for some of the follow-up meetings. The only exception to this was meeting at Teacher #2's home. I did not change any of the data based on that meeting. Also, in the invitation/consent letter, the interviews, and meetings, I clearly explained the purposes of the research study.

Onwuegbuzie and Leech (2007) also referenced Eisner in their discussion of *referential adequacy* which refers to the maintenance of the raw data. For example, this can be the electronic recording of the interviews and maintaining field notes. They are important for the later analysis as well as checking for accuracy of practices such as transcribing. This is essential for ensuring a "rich and thick description"(p. 244).

Onwuegbuzie and Leech cited Beecher, and explain that to achieve this degree of description, interviews should be transcribed verbatim, and notes on observations should be detailed. This can also facilitate the transferability of the findings and add credibility to the reporting. I adhered to these measures in my collection and analyses of the data.

### **Summary**

The research design, data collection, and analysis procedures were described in this chapter. A phenomenological qualitative research design was used in this study. Participants were derived from purposeful sampling. They were members of a Cosmic program, which provides additional professional development and support in technology integration to a selected cohort of teachers. Their shared "phenomenon" is their experiences of technology integration in literacy instruction. I divided the procedures into three phases.

In Phase One, I explained how my pilot study about technology integration informed the current research. I also explained the study design and its appropriateness to address the research questions. I described my stance as a reflexive researcher and the context of the study. I recounted the sampling procedures and provided the demographics of the participants. I also discussed the ethical considerations involved in the sampling as I am also an employee of the district. The process of gaining entry and obtaining permission from the university's IRB and the district's research personnel were also described.

I outlined the data collection procedures in Phase Two. I used semi-structured interviews which I conducted on Zoom and collected data from the participants' websites and Twitter accounts. I was unable to conduct observations. I also shared the protocols used in data collection.

Phase three was the analysis of the data. I explained using a hybrid of manual methods, and electronic. I described my first and second cycle methods, for all data and the rationale. I also explained using elements of the traditional qualitative data analysis methods and those which are specific to phenomenology.

I concluded the chapter with a discussion of the procedures I employed to ensure the trustworthiness and credibility of the study.

## CHAPTER IV

### Results

The purpose of this phenomenological study is to examine elementary teachers' perceptions of technology integration in literacy instruction. Additionally, the study was designed to determine which barriers and incentives influenced their use of technology, and which ISTE student and teacher standards are implemented. Six teachers were selected using purposeful sampling. They were past or current members of the district's Cosmic group, which was a cohort of teachers who received additional training in implementing technology in instruction. The teachers taught 2<sup>nd</sup> through 5<sup>th</sup> grade.

The study took place from December 2019 to April 2020. The data were collected using semi-structured interviews and from the participants' school websites and Twitter accounts. Data from the online sites were from the first semester only, August through December 2019. I was unable to conduct the observations, which was part of the original research plan, due to the lack of participation from the campuses which could be accessed. The interviews were conducted online using Zoom, the video-conferencing application. I had follow-up meetings with participants, four of whom were held in person as part of a member checking procedures. Due to the restrictions caused by the coronavirus, the remaining two were conducted online using Zoom. The participants verified the transcripts and other data and discussed my initial conclusions. They all agreed that the data and my conclusions were representative of what they had communicated and posted on the online sites.

I used In Vivo and Process Coding methods for first cycle coding, and Axial coding for second cycle coding. I derived categories from the data and input them into a

QDA Miner program to organize the data, and to conduct a simple cross-case analysis across the six participants' data. I identified significant statements from the data and derived themes. I determined a metaphor from one of the participants' interviews that could be used to connect the themes and composed a description of the "essence" of the participants' experiences of technology integration.

In this chapter, the results of the data analysis are presented for each teacher participant and are summarized to answer the research questions. The themes generated from the participants' data are listed, and they are described using the significant statements from the interviews and excerpts from the memo which are based on the online data. The excerpts from my memo and reflexive journals are written in italics to distinguish them from the participants' own words from the interviews and online posts.

The research questions for the study are:

- 4) What are elementary teachers' perceptions of technology integration in English and Language Arts instruction?
- 5) What first and second-order incentives or barriers support or limit teachers' integration of technology?
- 6) How do teachers implement ISTE teacher and student technology standards in literacy instruction?

### **Teacher #1: Significant Statements and Themes**

Teacher #1 shared she uses "a lot of technology" in her personal life and she likes having the "newest technology". She teaches Grade 3, all subjects. She described herself as being a "strong advocate" for using technology in the classroom.

The themes which emerged from all of Teacher #1's data are shown in Table 4.

Table 5

*Teacher #1: Themes and Descriptions*

Themes	Description
Access	Access to technology; home access; providing access to literacy using technology; using technology to provide access to information and training.
Challenges	The challenges related to technology integration.
Change	The changes in society due to technology and their significance to teaching and learning.
Integration	Integrating technology in instruction and learning.

*Note. Themes derived from the participant's interview, website, and Twitter data.*

**Access: “They always have access to it in my classroom.”** Access to technology is multifaceted in this data. It involves the teacher having access to resources and training to implement the technology. It also refers to the students' and parents' access. For Teacher #1, the ideal learning situation is one where all students have individual digital devices; to have “every resource at their fingers”, they currently share Chromebooks. Teacher #1 explained, “They always have access to it in my classroom.” The students have access to many digital applications which the teacher described. They also use a variety of Google applications, online websites, and digital tools.

Teacher #1 described some of them throughout the interview,

We use STEMscopes. We also use a lot of our Google apps...everything Google.

It's so big. We use Wikipedia Wormhole, Wonderopolis. We do a lot with Wixie

and Kahoot.

The teacher also uses technology to provide access to the parents. This involves providing general information about school events and procedures, as well as instructional support and applications:

We use SeeSaw where the parents can see it. It is like Facebook for parents, and the kids can share their work. I do a lot with Bloomz ...I'll text parents through Bloomz and the kids can see it as well.

This reported use of technology is supported by the teacher's postings on her website. An excerpt from my memo data describes a hyperlink on the website:

*The teacher posted information for parents. This included a conference time and information about the Bloomz application.*

On another post, I recorded,

*The teacher provided links to online sites for students. The ones for literacy are Get Epic, Istation, Sheppard Software, and Starfall.*

The teacher's posted resources for parents also included an interactive calendar and a slideshow that had class routines, schedules, and academic supports. On Twitter, the teacher did not have posts that showed the students using technology. She mainly posted photographs of the students participating in general school activities. This provided window into the classroom and school for parents. An excerpt from my memo describes a typical post, dated 10/20/2019:

***Artifact and context:** A tweet of a photograph of students celebrating a storybook character day. The photograph shows a group photograph of the teachers and students holding books and dressed up as characters.*

My reflection on the teacher's Twitter, dated 8/12/2019. summarized her Twitter use:

*The teacher mostly uses Twitter to share photographs of school events. She posts infrequently, but the photographs she uses provide parents ...and the opportunity to see the students at work.*

Access also means using technology to provide support to students with special learning needs. Teacher #1 explained how it helped students who have dyslexia,

Also, my dyslexia kids use a program too on there that they can do talk to text so, when they talk it types for them. That has just helped so much because those dyslexia kids get so frustrated when they are trying to write...

The teacher's participation in the Cosmic technology group also gave her access to professional development, "there is so much cool stuff." She delivers professional development to the staff based on her new learning and shares the information digitally "so that teachers can access that."

Using technology in Teacher #1's classroom provides access to digital resources and information to parents and students.

**Challenges: "But it is still challenging for me..."** Although the teacher was a proponent of using technology, she confessed, "I do have some issues though." One such challenge is the students' addiction to using technology. She explained having to implement a day where they did not have access to technology and reported students had a negative response to this,

I have some issues though, some of my kiddos who are so addicted to technology at home and Minecraft, we have some behavioral issues...Some of my kids have

what we call a “no go day” where they can have no technology that day. When it is their no-go day, they sometimes have a little meltdown.

Another major challenge is motivating her peers to use technology. The teacher explained attending the Cosmic was a positive experience, and “I felt like everybody needs to go.” This was because “there is so much cool stuff” to learn and share about technology. As was expected in the Cosmic program she was given opportunities to provide PD to the staff on technology integration. The results were not promising:

I wish they would use it more, what I come back and say, this is cool you should use it. We have those teachers who really don’t want to do it. If the principal doesn’t tell them to use do it they won’t...

She considered her experiences of trying to motivate her colleagues to use technology as a challenge. Being aware teachers need to use technology but do not know how “That’s the hardest part.”

Limited funding for technology is an obstacle. The teacher explained this limited the ability of students to have one to one devices or replacements,

And when things get broken, they don’t get replaced because then we don’t have money. It just boils to not having the funds for it.

Using technology required differentiation, and Teacher #1 concluded “everyone is on a different level.” She was referring to reading levels, and the challenge of ensuring the students could read the online materials. This was especially challenging for students she deemed were “on the lower end” of the reading abilities continuum. This was a “limitation” in her classroom,

But it is still challenging for me to try to get all twenty of my students to

make sure they are on the right reading level on their device.

Teacher #1 remains a “firm believer” in technology integration despite the challenges.

**Change: “I think the times are changing now...”** Teacher#1 expressed that she was an advocate for the use of technology in instruction and believed the changing times merited its use. This was connected to a theme that emerged from the data, “change”. This referred to the changing role of the teacher, the changing society, changing resources, and changing instruction to prepare students for the future:

My personal beliefs are I am a strong advocate for it. I think the times are changing now compared to when I first started in education to now. I support it 100%. As a matter of fact, I would really love to have more technology in my classroom.

Teacher #1 explained her husband worked in construction and technology was being used more in that industry. She expressed this supported her view of students needing technology as a life skill:

He is in construction. They use everything on technology now. So, I feel if I don’t prepare my kids in the classroom for it, they are not going to survive in the real world.

She reiterated she feels using technology is preparing students for the changing world and the importance of preparing students,

And they have even used Siri, we ask her questions. I mean, it is just things I think would help them in the real world.

The role of the teacher in her view is changing; students may know more about technology than the teacher. She was both a teacher and a learner in the classroom:

I think it is important for my kids to not only learn how to use it but teach me how to use it, and learn new things from each other.

The changing resources used in literacy instruction were also reflected in the technology applications Teacher #1 used in her instruction. She referenced Skype and using Google applications: “We use a lot of Google apps”. She mentioned several online reading websites and applications, such as “Britannica” and “Pebble Go” and described how print resources increasingly linked to online resources:

They have a lot of ...at the end of those books, a lot of websites, so we pull those up. Even our Scholastic News that we read, there’s always a website that always has a link that shares with the kids.

How students and teachers approached research, for example, had changed due to technology. Teacher # 1 explained listening to a presenter talk about having kids research in these digital times:

..it’s so hard to find a book, read a book-the old school-how we learned to research is completely different.

Teacher #1 later referred to websites and applications, “Wikipedia Wormhole, Wonderopolis” which are used for research. She believes when the students started using technology, they were “asking questions and learning real things.”

**Integration: It kind of magically works together.** Teacher #1 shared her beliefs about her use of technology in literacy instruction. She described trying to connect books

to the technology. She recounted a book study where she used technology to connect with an author,

Any time I read a book I try to connect it to technology. Even when we did our book study with Patricia Polacco, the best thing about that was we would use our technology. We would listen to her videos on YouTube about her talking and making connections.

She referenced the reading resources the district had adopted recently all had links to websites and online resources that she incorporated into her lessons. In addition to having a classroom library, the students also had access to an online library, “Get Epic is our library that we used to read online books.” Later on in the interview, Teacher #1 discussed how powerful it was to be able to Skype to Australia, as part of a unit on nonfiction, “It was just so cool.” Now, instead of only reading a book about a topic, the students could connect with someone in the country they were learning about in real-time. She also feels using technology to support literacy instruction should be part of a cross-curricular instruction instead of regulated to reading only for example. This was because technology makes it possible to explore related activities:

I think it is important to do cross-curricular. When you are teaching something that is with technology, you can’t just say, oh we are only reading today, you can only read... You have to be like let’s dig deeper into that...It just comes with naturally being inquisitive and learning new things, and exploring.

The impact of using technology in her literacy instruction was viewed as a positive learning outcome. She explained the students’ reading levels had improved:

I can see so much growth in my kids. Even the reading levels...I think

that it really, really has increased at all levels. I think that it has made great improvements.

Technology integration is also used for other aspects of literacy instruction such as writing. Students “loved to type and do projects”; Teacher #1 explained the students love using technology for writing and are amazed,

They’re just like blown away that they can actually type a sentence and if it has the zig-zag line, to change their writing.

Using technology also helped her to integrate reading and writing: “drawing in the reading and writing together.” She emphasized her views on cross-curricular integration by explaining, social studies and science could also be integrated with literacy when using technology, because “it kinda magically works together.”

### **Teacher #2: Significant Statements and Themes**

Teacher #2 is a Grade 5 teacher who teaches all subjects. She described her technology use as mostly related to her work tasks, “most of my technology is at school.” Her personal use of technology also involves reading books and news and using some gaming and coding apps with her children. Her interview was very detailed, with her providing specific examples of her technology use in instruction. She also uses Twitter often and keeps her website updated. The themes derived from her data are listed in

Table 6.

Table 6

*Teacher #2: Themes and Descriptions*

Themes	Descriptions
Access	Access to technology for students, teachers, and parents; this also includes the availability of devices resources and PD.
Change	The changing times in society; changes to teaching and learning; changing from print and offline to online and multimodal instructional resources.
Student engagement	The effect of technology use on students' engagement and motivation.
Technology as a Tool	How technology is used and integrated into the classroom; its role in teaching and learning.

*Note. Themes derived from analysis of the participant's interview, website, and Twitter data.*

**Access: “Everything we do is in the palm of our hands.”** Access refers to the availability of technology, how it allows students with varying learning needs to access content and its availability to parents and teachers. Teacher #2 explained that with technology, “Everything we do is in the palm of our hands.” On her website, the teacher included links to digital learning resources for students. This included literacy sites like ABC YA and Khan Academy. She also included the login information to the district's

technology resources for kids. I noted in my journal, “*This provides a home/school connection.*”

Her stance on technology is clear, Teacher #2 repeated, “It is imperative that we use it” during the interview, and added a caveat, “even if we don’t know how to use it.” She did not believe students’ use of technology should be limited by teachers’ abilities, but rather students should be allowed to explore, and access technology:

I think it is important that we let kids explore educational technology and let them get their hands on it.

Teacher #2 explained she gives her students freedom to explore technology in her classroom, access to technology is synonymous with a great degree of student choice,

In my classroom, I do a lot of free choice. I let you have that freedom until you give me a reason to pull back on that freedom...I teach them a bunch of different apps; I teach them a bunch of websites and they can choose.

She then explained the multiple ways students can use technology to show their learning. The same sentiment expressed differently, but highlighting her strong belief in providing access for students, regardless of teacher knowledge,

Even if we are not comfortable with a brand-new app, let’s give it a try. I would make sure it is somehow educational.

On Teacher #2’s website, she explained her beliefs about the role of technology in education, in her welcome letter to parents. An excerpt from my memo,

*She also shared her beliefs about using technology; she explained she is unafraid to use it, and she uses it to promote a 21<sup>st</sup> century, student-centered learning environment.*

Providing access to professional development to support teachers' technology integration was also important to Teacher #2. Both teachers and students were learning about technology at the same time. She is an active member of the Cosmic technology group and numerous online groups.

I am part of Google blogs, like Education to the Core; I am part of the Create-Abilities Group. There are all teachers on Facebook; a bunch of different chat groups.

Teacher #2 is also a founding member of a Twitter teacher group that was formed from the larger Cosmic group. She explained they had presented at a conference, the purpose of the group, and how it provides opportunities for connection and collaboration:

We do a lot of cool stuff. We actually ... presented on how all these districts can do a tweet \_\_\_ group. I used Twitter to connect with other educators.

We share things, and we talk about crazy ideas; it makes us feel not so crazy.

Teacher #2's Twitter posts show she was deeply involved in the group and this corresponds with what she shared in the interview. For example, on October 26<sup>th</sup>, the teacher posted a series of photographs showing her and her colleagues who are members of her Twitter group presenting the technology conference. An excerpt from my memo based on the post,

*The teacher tweeted about being proud of presenting at a technology conference with members of her Twitter /technology group...She used mentions for the district Twitter group and school. She also used the conference hashtag and emojis.*

The use of hashtags and mentions allows Teacher #2 to connect with the different groups and her colleagues. These Twitter symbols also help to promote the conference and the digital learning and tools shown in the tweets and photographs. Another tweet from October 24th shows the teacher and her colleague attending a Cosmic meeting at the district. Teacher #2 used the word “wonderful” to describe the experience. She shared in the tweets they were learning about the application *Pear Deck*. The photographs show the group using different digital devices. She also tweeted invitations to the group’s events (10/24/19). When tweeting about a technology PD her Twitter group provided, she wrote, “This was a blast. So thankful for visionaries.” All of her tweets about providing or participating in technology PD were very positive.

Teacher#2 believed access to technology did not mean it was being used by her peers, despite the expectations of the campus and district leadership,

There are a few of us that really dig into using technology like it should be used in almost 2020.

Her emphasis on the year was to support her view using technology go learning should not be optional at this point, but what the students deserved to be successful. In her role as the campus representative in Cosmic, she provides some of the PD for teachers, and she reported the results were disappointing; “the attendance is not what I want it to be.”

Her expectation had been for the “seasoned teachers” to attend. She seemed to suggest the age of teachers might be a barrier to their participation. Nevertheless, she explained collaborating with the school’s technology teacher to meet their needs,

...we try to create a very welcoming environment for those who want to tiptoe

into technology... I was really wanting some of the seasoned teachers to come in and embrace technology with the rest of us.

Teacher #2 emphasized although she was “not young by any means”, she saw the importance of technology to the students so supported it.

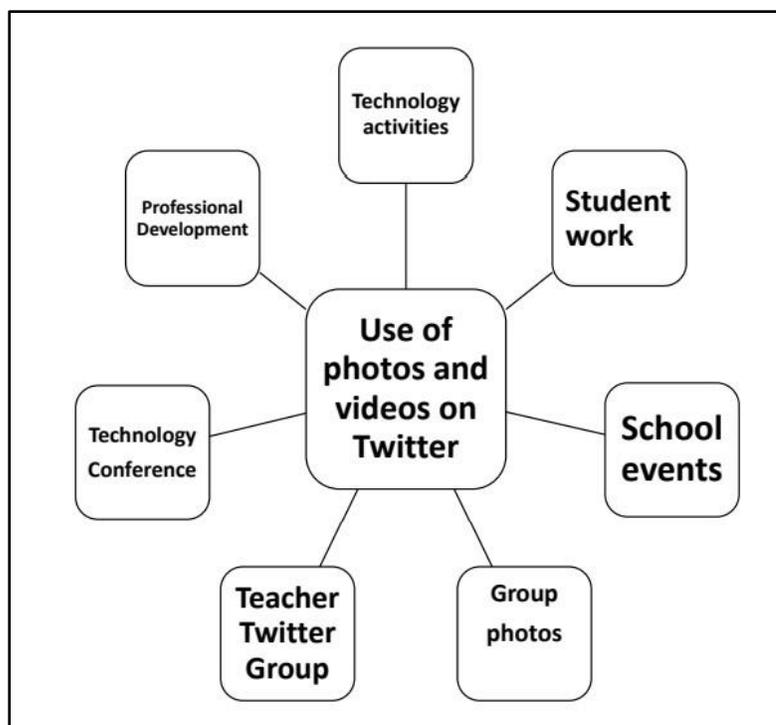
Parents were also included in Teacher #2’s efforts to provide technology access to the school community:

My newsletter for my classroom to the parents is online. I use Smore.com, it’s my interactive newsletter. It has videos I use, pictures. I can write them a letter, I can do invitations. That’s how I communicate weekly with my parents.

The teacher’s website supports the actions she described in the interview. There is a newsletter for parents that contains information about schedules, her contact information, and the Twitter information on her website. She also has photo galleries on her website which I noted in my reflections provided “*a window into the classroom*” and provided a “*virtual yearbook for students*”. In her introductory letter to parents posted on her website, she explained why she included the photo gallery. This is summarized in an excerpt from my memo:

*She also explains she posts students’ pictures because she wants parents to be able to “treasure” the experiences with the students although they are unable to be there.*

Teacher #2 uses Twitter frequently and also posted many photographs and videos of students engaged in different learning and social activities at school, hence providing further access for parents. A summary of the categories of the photos and videos posted is shown in Figure 8.



*Figure 8.* The categories of photos and videos posted on Teacher #2 Twitter feed.

Teacher #2 expressed in her interviews and it was evident on her Twitter and website her belief that it was important to have access to technology. This was for students, teachers, and parents. She was disappointed access did not mean acceptance, as she reported many teachers did not embrace technology.

**Change: “To change the way we’ve done things…”** Teacher #2 expressed technology was driving a change in the “times” and realized the prospect may seem daunting to some educators. She believed this change could lead to positive outcomes for students:

It is a lot for us that need to change the way we’ve done things for twenty years, but it is a breath of fresh air for the kids.

One of the teacher’s tweets on the first week of school, August 13<sup>th</sup>, 2019 highlighted how technology is changing routines. An excerpt from my memo,

*The photos are on the second day of school. in the tweet, the teacher explained using Flipgrid to have students introduce themselves.*

Technology is changing the way literacy skills are taught. Teacher #2 listed the skills students can learn and demonstrate using technology. She explained there were “umpteen gillion sites for apps” which educators could use. They were no longer limited to print and offline literacies only. For example,

In Language Arts, I think that the retelling of stories...they need to be able to say the characters, problem, and solution, and they can do that digitally.

She explained students could “play” on different sites, such as *Education.com* and *Storyboard.com* because “There’s a lot you can do with RELA.”

On her Twitter feed, Teacher #2 shared several ways students use technology in today which were changing instruction and content. For example, during a poetry lesson, the teacher combined writing poetry with music. An excerpt from my memo of the data which was posted on 11/19/19:

*A tweet and four photos of students using technology. The teacher explained in the tweet the students were using the Chrome Music Lab app to create music during their poetry unit. The photos show different students using the app to create rhythm tracks to add to poems.*

In my memo on her Twitter data from September 9<sup>th</sup>, I noted the teacher tweeted the students were using the video application Flipgrid to respond to novels. She used Flipgrid’s mention, which connects her class to the community of Flipgrid users on Twitter, and also shares the instructional idea. The teacher also used GIFs, animated pictures, in her tweets about literacy activities.

Another use of Twitter, which showed how technology was changing literacy instruction is how Teacher #2 used Twitter mentions. She used the mention as a way of connecting with authors while promoting the book and reading. On September 9, 2019, Teacher #2 tweeted a photograph of students related to a novel the students had read in class as this excerpt from my memo shows,

*... the students were having a day of activities related to the book. The pictures show students using objects and costumes to recreate the setting and events from the story. The teacher listed the description elements such as characters, themes, plot related to the book...the teacher used the author's mention and explained the students loved the book.*

Tweets such as these were used in multiple ways, the teacher shared photographs of school events, connected with the author, and also promoted the novel and instructional strategies.

On December 6, 2019, the teacher tweeted a photo of her students being *tech buddies*. The teacher explained in the tweet her 5<sup>th</sup>-grade students were partnering with Kindergarten students. This was an activity where the students were working on completing technology tasks with younger students. The activity new version of the book buddies' programs. In a September 13 tweet, the teacher tweeted the students were working with the kindergarten students on the program Starfall. This program supports early literacy development. An earlier tweet on September 9 also included photographs of students participating in the same program, an excerpt from my memo based on the post,

*She also tweeted and posted a photo of her class being tech buddies with kindergarten. The photos show the students working together using iPads.*

*Another shows the students reading from an iPad...The tech buddies' program seems to be empowering for the students. It is the students who are leading instruction.*

Some teachers are resistant to the changes technology brings to instruction.

Teacher #2 understands their reservations about using technology, which she attributes to the fear of what students could be exposed to on the Internet. It is her belief however students are equipped to deal with the inherent challenges:

Some teachers are afraid, they're scared of what their kids are going to come across. And I'm like, it's the Internet. The kids know what's out there...They've been around very inappropriate things their whole lives.

Teacher #2 believes the way to combat this is monitoring the students, and giving them a purpose, to "keep them engaged in what you want them to do." She explained, There's a lot of teachers that don't have the patience for that.

They don't have the monitoring. They feel like they have to be over the kid's shoulder when they are working on Chromebooks.

The teacher sets the parameters for her students' Internet use, and concludes, "I think it's a trust issue." This does not deter her from using technology; she has the students "sign that digital citizenship" form and ensures her instruction is meaningful to the students: "you have to go with what they love... but make sure it's safe."

**Student engagement: "The kids are more engaged."** Teacher#2 described how technology use in the classroom engages the student,

If they use it correctly, and they use it right, the engagement is 110%...But when I do use technology the kids are more engaged.

She explained how she gets the students' attention at the beginning of the lesson because she "wants them totally consumed on what I am teaching."

So, I generally start with either an audiobook, it has a visual, it's a digital puzzle, and have the kids have to use technology. I generally start with something small like a video, or digital storytelling puzzle...not like an escape room but they have to do a Google Form. And they have to read something online...

Realizing students' responses to technology, the teacher explained how she used it to capture students' interest during instruction. She described a learning activity where she used QR Codes to link to a video of herself explaining a concept. She explained,

That's kind of how I draw them in. I draw them in with something very small.

Then teach them a couple of ways they can show me what they know. Then I let them have the freedom...

The teacher attributed her good attendance record partly to the engagement students had with using technology. She also expressed she believed it contributed to her enjoyment of her job.

I know it takes a lot of energy...but it is a lot of fun, the kids love coming to class every day, my attendance is great. I love coming to work and using technology has been a huge part of that.

The teacher expressed technology integration was essential, partly because it was what students wanted and needed;

I want to give the kids what they deserve and what they need, what they want, which is getting their hands on Chromebooks and iPads and the Dash, the little coding robots.

Again, she reiterated her views about technology use and added the engagement factor,

I think it's imperative that we use it. I think it is important for the kids.

They love it.

The students enjoy using technology, and Teacher #2 concluded, "if you can't beat the kids, join them." She also expressed because of the engagement she was "more likely to see a finished product." She received feedback from a parent whose second-grade student used Minecraft to complete an integrated social studies project,

His mom said I have never seen him so interested in school, as I did with that assignment.

The teacher gave the student freedom and choice with using technology and the outcome was a positive one. She described her letting the student lead the instruction, connecting Minecraft, social studies, literacy, and technology:

He took the rein on that and showed the kids how to use it and design whatever it was, the setting that they were reading about.

This reflects Teacher #2's belief which was evident in the interview and on her online posts,

So you kinda have to go with what they love, and their interests before teaching them something.

The posts on Twitter show the students using technology in varied ways. Teacher #2 described the students' responses to activities involving technology and the students are seen smiling and engrossed in the activities. On December 3rd the photographs in the tweet showed the students working in small groups and using the application Flipgrid,

viewing a video on an iPad, and reading information on a Chromebook about weather and climate. The teacher tweeted it had been a “fantastic day”. On November 11th, Teacher #2 tweeted the students had, “so much fun”, using a music app to add rhythm tracks to their poems. The students worked on a Project-Based Learning (PBL) activity on sustainability which integrated literacy, technology, and science. A note from my memo based on the teacher’s tweet,

*The students appear to be reading and taking notes from devices-researching.*

*The teacher explained enjoying hearing students talk about their projects with enthusiasm.*

The photographs show the students smiling and working in pairs and engaging in different activities; the teacher described it in the tweet as “wonderful”. An earlier tweet from September 26th, showed the students participating in a video conference with an environmentalist. My reflection recorded in my memo,

*The connection with an actual person in the field can make the project more authentic and engaging.*

**Technology as a tool: Explore educational technology.** Teacher #2’s perception of technology was that it was a tool that could be used for teaching, learning, and communication. Throughout her interview, she listed various applications that could be used to teach different subjects, but specifically literacy. For example, for “digital storytelling”, she referred to Chatterpix, Flipgrid, and Seesaw. They all have an option for students to record videos, and Seesaw has the capability for the students to record voice, take pictures, draw, and write. She identified the different multimodal formats

technology provides and the skills the students can demonstrate, related to reading, writing, and communication:

They can write a play; they can write an advertisement. They can do a movie trailer. I mean they can draw a picture, there's lots of choice.

On Twitter, Teacher #2 showed students using different devices for literacy and other content areas. On September 13th, she posted a tweet that starts with the phrase, "Technology is our friend". The photographs show students using different technology devices for learning and corroborates with the teacher's description of technology use in her classroom. An excerpt from my memo,

*The photos show students all using technology devices-iPads and Chromebooks. She tweeted that technology is their friend and used mentions for Flipgrid, Seesaw, Istation, and Wixie which are technology applications. She tweeted the next step was to use digital breakouts and puzzles. She used the hashtag of the Cosmic technology group.*

This was another example too of Teacher #2 using hashtags and mentions for the applications to connect with other users and related tweets. As the teacher explained in her interview, using Twitter was a way of connecting to other educators and sharing resources.

In explaining it was "imperative" students used a variety to technology, the teacher gave other examples,

But I know videos are educational, as well and things the kids create. we have used everything from YouTube, Wixie."

It has to have an educational purpose, however. She used the example of gamification being an area of development for her. Gamification involves integrating the features of a video game into instruction and using the game itself.

I don't know how to nurture game playing unless it is an educational game playing. There are some gaming students are interested in that I try to make relevant in my classroom.

An example of a student using a popular game and linking it to content was using the video game Minecraft. Teacher #2 described having a student use Minecraft to complete a research project on Squanto. The student used the application to design the historical setting to show his understanding of the findings from his research on the topic. Using the technology also allowed the student to show his creativity and taught the teacher about an unfamiliar application. Teacher #2 believes there are conditions to using technology in this way. Fortnite is a popular game beloved by her students. She allowed the students to design characters "that look like Fortnite characters but that's about it." She explained why her integration stopped at that point:

Fortnite, this is a mission for killing. I don't know how to support that in my classroom.

She was concerned about the violence in the program. She is open to using a "wide range of things" in her classroom, but the condition is to "make sure it was safe."

An example of her being "open", is in letting students choose how they use technology for learning:

...I speak to what the district teaches me, but if a kid has an idea- like I have a kid who enjoys making Kahoot quizzes as his way of showing me he

understands the material. It works, so I think that you let the kids use what they know and what they think is entertaining.

Not all students liked using technology for reading, they preferred using a print book. Teacher #2 also supported those students

Well, a lot of my good readers will tell you they don't like reading online, even on Kindle. They like flipping the page.

Although Teacher #2 supporting technology integration, she admitted, "I see crappy results too." She was also concerned about her perceived effect of increased technology use on reading:

The love of reading has gone down. I still have excellent readers and then I still have poor readers... Then I have some kids who never read at all. Some of those, it is because of technology.

She also expressed other reasons included parents not modeling for students and also students "not finding a genre that pulls them in."

Teacher #2 taught all subjects- math, science, and social studies in addition to teaching ELA. As a result, in her interview, website, and Twitter, she also showed the students using technology in the content areas. She felt less confident about integrating technology in other subjects and sees this as an area for her development so she increased her use of technology:

There's a lot you can do with RELA. It is when you get into Math and Science that you struggle. I am finding that out so I am using science and social studies for my technology integration a lot.

On Twitter, Teacher #2 posted videos and photographs of students conducting science experiments. A typical post is shown in this excerpt from my memo of an August 21st tweet:

*A tweet of a gif of students. the teacher explained in the tweet the students were in science class and demonstrating their learning using their choice of tools or methods including Google Docs and Slides and print products such as posters.*

Teacher #2 also had links to digital content resources on her website. There were links to Khan Academy, A Plus Math, and Greg Tang Math.

### **Teacher #3: Significant Statements and Themes**

Teacher #3 is a second-grade teacher. She uses a lot of technology in her personal life, for entertainment, home management, “setting up our house to be a smart home.” She explained using “quite a bit which I think is typical”. She is very comfortable using technology in her personal life and was continuing to learn how to use it with her second graders. Throughout her interview. Teacher #3 spoke about making students feel comfortable with using technology although they had grown up with it. Her assessment of technology integration in the classroom was it is another “outlet” for using language,

Well, I think it gives them another outlet to use language in different ways...

I feel like it’s been all of the literacy things that I need to teach.

Implementing technology in the school was part of the campus improvement goal. On Teacher #3’s website, she posted a pamphlet about the school’s fundraising efforts and how the donations would be spent. An excerpt from my memo on the posting shows the money was to be spent on technology initiatives:

*Artifact and Context: There is a digital pamphlet on the website which explains*

*how donations will be spent. They will be spent primarily on supporting technology initiatives. This includes purchasing virtual googles. Also, the plan is to purchase Chromebooks or iPads for each child in a 1:1 program. It is also for purchasing Smartboards, site licenses, and to provide technology training for teachers.*

She used Twitter less frequently than the other participants, she posted weekly rather than daily. Most of her posts were tweets of student photographs which show them completing learning activities. She used mentions of the school district and Digital Learning department in her tweets, the latter if the photographs showed the students using technology. In one post, from August 19th, 2019, she used the mention of the author of a book the students were reading to connect and promote the novel.

She also posted photographs from her attendance at a regional conference with the Cosmic group. She used hashtags related to the topic of the learning activities, and also the district and school's hashtags.

Table 7 contains the significant statements and themes derived from her three data sources.

Table 7

*Teacher #3: Themes and Descriptions*

Themes	Descriptions
Access	Access to technology for students, teachers, and parents. This also includes access to PD.
Fear vs Comfort	Fear of using technology versus being comfortable to explore, learn, and teach using it.
Learning technology is a life skill	The significance of technology in everyday life and the future.
Technology as a tool	How technology is used and integrated; its role in teaching and learning and the factors which affect its use.

*Note. Themes derived from the analysis of the participant's interview, website, and Twitter data.*

**Access: “Turn it over to them.”** Access was a recurring theme across Teacher #3's data. She is committed to providing students access to technology because she believes it is essential learning. Parent access to school resources was also important and this was demonstrated in the postings on her website and Twitter. She included a link to her Twitter account on her website, which was public and showed viewers her most current tweets. Lastly, access to technology also included support in the form of PD for teachers.

Although the students have access to technology, having grown up in a digital environment, Teacher #3 explained access did not equate with her students knowing how to use technology and attributed this to the parents' support,

I can tell that parents might set up something for them on a device, give them the device so I kinda have to start at ground zero with some of them.

She further explained this may be because parents did most of the work for them, I realize some of them have parents who find a game for them and give them the device and when they are done take it back.

Instead of this model, the teacher is adamant the students should learn to use technology independently, and explained her phrase to the students is “figure it out”. She mentioned teaching the students to be independent several times during the interview:

So, the kids know me well enough to know that I am going to give the tools and I give them instructions, but I am not going to do it for them.

Access means each child having their own devices. Teacher #3 explained one of the advantages of this is students would be able to use the devices independently.

I would love for each kid to have their own device. So, if I have a lesson or just like if I am not able to answer some questions, where they would have a resource to go to and that they would be comfortable enough to do that but within the parameters of safe searching...

One of the barriers to accessing technology because of the age of the students is their ability to write. One way of meeting this challenge is to have student record themselves instead,

They're not good at writing, and some are not real good at typing. So, having them do some kind of writing response on the computer isn't always effective.

I let them write it, then they video record themselves which they love to do.

Teacher #3 believes the students needed to have access to different types of devices. This was due to what she perceived as the different skills the students needed to use different devices,

...ideally in a perfect world, I would like for each kid to be able to have a Chromebook, or laptop, and an iPad because they are so different in the things they can do and the skills that they need are so different.

Using digital devices also required learning related vocabulary. Teacher #3 identified this as a barrier to be overcome to access and use technology. She recounted the confusion of students not understanding the multiple meanings of a word like, “window”,

I noticed last year when I would say something like close a window, open a window, swipe it- they just stared at me.

Access to professional development was important for Teacher #3. She concluded she still wanted to learn how to “effectively use technology so it supports what I need to do” without being separate activity; “to make it part of our everyday lesson.” She acknowledged participating in the Cosmic group was a positive thing, because she collaborates with other educators “who feel the same things, and have comfort and expertise, and things I don’t.” On her campus, however, she shared, “I feel like I am still kind of on my own.” and concluded there was room for the district to do even more to support teachers’ technology integration.

On Twitter, Teacher #3 posted photographs of her attendance at a regional technology conference with the Cosmic team on the 12/20/19. She tweeted she was “super excited” about the experience and used the district and regional service center’s

hashtags and mentions. In the tweets, she explained she was learning about the application Pear Deck and AR (Augmented reality)

Providing parents and students access to technology resources beyond the school setting is something Teacher #3 used her website to achieve. She posted a weekly “Homework menu”, but it was more of a digital newsletter. They typically included homework options, but the rest of the interactive document had notices for parents and links to digital resources. In this excerpt from memo on the document data, ‘Week of December 16-20’ shows:

***Artifacts and Context:** A hyperlink to a PDF of a homework menu for the week. The menu has class notices and ideas for reading, math, and social studies homework. It is a combination of a digital newsletter and homework activities. The document has QR codes that are linked to videos and questions for the students. It also has a hyperlink to a form for parents.*

The teacher’s website also includes notices about school events, links to fundraising information, and interactive calendars and schedules. The teacher also posted a slideshow which was from the orientation night which had school routines and guidelines. It was a central place for parent and student information.

**Fear vs. comfort:** “A lot of them are not comfortable with it.” Throughout her interview, Teacher #3 referred to having her students feel comfortable with using technology. She expressed although her students had “grown up in a digital world”, they still had a level of discomfort with technology,

...they’re still young and I’ve noticed that a lot of them are not comfortable with it.

She explained she teaches students to “find and access and not be afraid to try things.” This is a recurrent theme throughout the interview. She explained the “dual-purpose” of her use of technology was,

...to expose them to lots of different programs and stuff and get them used to using technology and not being afraid of trying something new.

The teacher reiterated,

I need to give them lots of different tools and exposure so they get comfortable with it.

In most examples of discussing technology use, she surmised the goal was for students to feel comfortable. One of the reasons for this she later explained was for students to be able to use the devices independently.

The teacher illustrated having students explore an application independently, I gave them Google Slides, and they had a scavenger hunt thing to do on Google Slides and I gave them the very minimum of instruction.

...I gave them the undo button, and I said if anything, if you get stuck, we can just go back and reset it and everything will be fine. I don't want you to be afraid of trying anything.

Although Teacher #3 admitted this approach does not work for all the students, she is generally pleased with the results. The students are not only becoming more confident using the technology but some are surpassing her knowledge of some of the digital tools,

So now they are to the point where they are discovering new things and I don't even know, and they are teaching me things. And they get

really excited when they learn things on their own that they are teaching each other.

Teacher #3 believed this was a more effective approach to teaching with technology because the students,

...remember a lot more than they would if I just stood up there and told them how to do it.

Fear versus comfort was not only part of the students' journey, but the teachers'. Teacher #3 retraced her evolution to become more confident in using technology, "I think my own comfort with technology changed." She explained the catalyst was using Google products was because she felt it was more user-friendly and "you don't lose as much material", compared to the other programs. She also liked the safety features and ease of use. When she "got comfortable with that", she realized she could turn the control over to the students.

Another shift came in the form of a changing classroom environment. Flexible seating became popular in the district and was the beginning of her letting go of some control,

...that's a way of turning over control. As teachers, we are very regimented and very controlling of our environment and our routines, and our expectations.

Teacher #3 considered when she "started down that road" of having a more flexible learning space, she was able to turn over more control of the learning to the students, with positive outcomes. As she managed to "survive" and "manage" in her environment, she saw the students "become more comfortable and successful." It became

easier for her to “try these kinds of things”, referring to technology. Furthermore, the growing realization of the importance of technology in students’ future careers also influenced her and gave her a sense of urgency,

So, I think for me I want to start them down that path early so they can begin to build and get some comfort, and maybe start to get a better idea of which way they want to go with their careers.

Yet there was a sense of fear; “it’s a kind of that unknown that makes it scary”, not knowing what the students would need in the future yet having to prepare them for it.

**Learning technology as a life skill: “It’s a part of life.”** When asked about using technology instruction, Teacher #3 explained using technology was more than about literacy,

I don’t know if I use it a lot for a literacy kind of lesson, I use it more for, it’s part of life and they need to be comfortable with it.

Teacher #3 explained using technology had become an essential part of instruction,

I feel like you can’t do justice in the classroom if you are not using the technology the way it should be used so that the kids are seeing it not as a toy, and a time filler, but as a tool to extend their learning...

She acknowledged the perception of technology was changing and had implications for instruction,

I feel like we started out with technology being more of a time filler maybe and a babysitter, and not a tool or an instrument of instruction. I feel like that’s kind of changing now.

Teacher #3 emphasized further technology was changing very quickly and it was necessary to ensure students have the skills,

But it is changing so fast, and it's in every aspect of our life that I feel like I have to do that because I have to give them, going back to that comfort- that skill set to be able to use it, because it is everywhere now.

Not only was it important for students to learn using technology because of the current expansion of it, but also when considering their future. Teacher #3 described being unable to predict what jobs would be like for students, "I can't even imagine... what their jobs are going to be like" after they graduate. She predicted people would work from home for example,

I saw a statistic where in just a couple of years most of the kids who graduate from a college will have a job which doesn't go to a place, and sit at a desk because they have this technology at their hand to do their jobs wherever they go.

She did not know the future was three months after this interview, how quickly the digital future she imagined would arrive.

**Technology as a tool: "Not as a toy...but as a tool."** Teacher #3 used technology to teach various components of ELA:

But as far as like in literacy instruction, I use it to extend a lesson, open a lesson, and give them additional resources.

She also used it for assessment of student work,

I also use it on an accountability side where I have them upload assignments and stuff to SeeSaw or Google Classroom or Forms.

There were other uses and contexts for technology integration in the classroom. Teacher #3 used it for tutoring small groups, whole-class instruction, and learning centers. It was used for reading, but also writing, vocabulary development, and speaking. Multiple forms of digital applications were used with her second-grade students:

We use Google classroom, and I use it for the whole class but I also use it ...for my tutoring groups. I use Google Forms for, it's like a Fill in the Blank reading response. It is a kind of vocabulary builder for my tutoring groups...In the classroom we do centers, and they have one center where they are reading on Epic, and they use the iPads. Then they also have a center where they upload their writing work or something from their journal or some kind of response into SeeSaw. And then also Flipgrid so they can get used to speaking.

Also, in a change from the traditional teacher-centered approach to teaching, Teacher #3 acknowledged her role was changing. Using technology for instruction was not a one-way transaction, led by the teacher,

But I don't get up there and try to tell the kids that I know it all because I don't and they are teaching me as much as I am trying to teach them...

Central to the use of technology was how it represented in her view, so many components of literacy instruction and skills. She mentioned reading and writing earlier in the interview, but as it ended, she continued to make the connections,

... like when they are recording themselves, then they are using speech.

When they are listening to somebody else then they're all using the skills of listening and synthesizing. And then when they are writing, and when they have to put what they are writing into another format, that's another skill...

It's communication and social skills...

Teacher #3 ended that summary by repeating technology helps support literacy.

Teacher #3 posted many links to different digital tools the students could use at home on her website. She posted weekly interactive homework menus which had hyperlinks and QR codes to different websites and applications to support ELA. An excerpt from my memo on a posting for September 12<sup>th</sup>, 2019 is an example of this:

***Artifact and Context:** A hyperlink to a digital choice board...The activities combine literacy and technology. There is a link to Epic, an online reading program, and the class Google Classroom page. There is also a link to create word clouds on Wordart.com. and to Google Slides for Word Study. There is a grade level Symbaloo page with links to applications such PebbleGo, another online reading application.*

One of the PBL projects the students worked on that year was a school channel that consisted of students' videos providing learning tips to other students. This is an example of a student-led technology activity that is integrated across all content areas. The students were responsible for developing the content. I scanned the QR code to view the information and an excerpt from my memo dated 10/18/19 shows the components of the project:

***Artifacts and context:** The students will create a school channel modeled on Storyline Online, but using the application MyVRSpot. The students will create videos and use them to share learning tips for reading, writing, and science skills and strategies... QR code links to introductory videos.*

On her Twitter post, dated 12/12/19, Teacher #3 tweeted photographs of the culmination of the project. The photos showed parents, students, and teachers look at the projects. I described the photographs in my memo,

***Artifact and Context:** The boards have information about the learning tips and also, a QR code to the videos the students made...*

***Reflection:** The project is cross-curricular and had different opportunities to integrate both literacy and technology.*

The students also used technology to learn to code. On December 9th, Teacher #3 posted photographs of the activity,

***Artifact and context:** A tweet and two photographs of students using laptops and iPads. The teacher tweeted the students were participating in an introduction to the activity. They were shown using different coding applications.*

The teacher's Twitter feed had photographs of students using different forms of technology. During the interview the teacher emphasized she show the students resources but she expected them to "figure it out"; two of her posts corroborated her belief. Two posts on November 21st, showed the students working on iPads in small groups. She explained in the tweet the students were downloading and uploading the Chatterpix videos. Teacher #3 tweeted she was pushing the students beyond their "comfort zone" and although there were tears, the students did not give up and would continue the next day. The app allowed the students to integrate technology and literacy. In the other post, the students are shown as described in my memo,

***Artifact and context:** The photographs show the students reading from their books and recording themselves using the app on iPads.*

In another tweet from October 31st, Teacher #3 posted photographs of students using Duolingo, the language application; the teacher tweeted the students were, “using their literacy skills to gain a new language.”. She also explained, “the world got smaller” through the technology.

There were other examples of ways technology tools are changing how students learn language and literacy. For example, a tweet from September 26th showed students working in small groups at a listening station. The students are listening to a story:

*Artifact and context: In one photo students are using headphones and a Chromebook and are listening to a story and writing or drawing in response. The picture shows a four-way plug that allows multiple students to listen to the same story.*

This replaces cassettes and CD players for listening stations.

Teacher #3 shared her passion for getting students to use technology comfortably and independently to prepare them for the future.

#### **Teacher #4: Significant Statements and Themes**

Teacher #4 is a Grade 4 ELA and social studies teacher. She is the only participant who is not a current member of the Cosmic group. During her interview, she emphasized using technology beyond the confines of the classroom and but on a global level. She expressed that she uses technology to communicate with pen pals “around the world. She engaged her students in this activity too by having them connect with other students from different countries. Teacher #4 promoted using technology to have students and teachers collaborate. She described using different technology programs in her instruction and the significance of preparing students for their future jobs.

Teacher #4's website is mainly an information source for parents. She provides information about school events and procedures. She also posts links to documents and applications and websites. Although she is a frequent user of Twitter, the posts did not show the students' use of technology. The data from the sites showed how the teacher used it to share school information, her interests and pursuits, and also students' activities.

The themes generated from her data are in Table 8.

Table 8

*Teacher #4: Themes and Descriptions*

Themes	Descriptions
Access	Access to technology for students, teachers, and parents; reducing barriers for students using technology. This also includes access to PD.
Collaboration	Applications and activities which allow students and teachers to use technology collaboratively. This also includes using technology to communicate.
The Past and Future	The evolution of instruction using technology and predictions for the future.
Technology as a tool	How technology is used by students and the teacher in instruction and learning.

*Note. Themes derived from the analysis of the participant's interview, website, and Twitter data.*

**Access: “With a computer at their disposal...”** Access includes the availability of technology for the teacher and the students, and parents. Teacher #4 explained, “Unfortunately, it can be kinda difficult to reserve” the technology devices she needs. She has to share Chromebooks with other teachers.

It also includes gaining access to other people beyond the classroom through technology. Technology also provides differentiation and a scaffold for students with special learning needs. Access to professional development (PD) is also mentioned as important for technology integration.

Students who are reading below the grade levels benefit from using technology. Teacher #4 explained using technology reduces the barriers for these students:

But in terms of the importance in RELA, there are so many great ways to get kids who are not on their current grade level in terms of reading. There are so many sites that make that barrier go away for them so they can read books just like their peers are reading.

Teacher #4 explained the students felt regulated to reading “baby books” because of their lower reading levels. Students’ comprehension was often higher than their abilities to decode. Technology, however, was the equalizer:

...it kind of removes that barrier so they can- they are not limited by any disabilities they might have.

Participation in the district’s Cosmic technology groups provides the teacher access to new learning and resources. Teacher #4 explained, “Every time we went there, we learned something new.”

Her description of the process of transfer of knowledge summarized the purpose and goals of the group and the impact it could have on teaching and learning:

When you introduce something new to me, that gets me passionate about it. The passion goes from Cosmic to me, directly to the kids. And you see it in the classroom. So, that was just amazing to take away from Cosmic.

The topic the teacher spoke most passionately about during the interview was the impact of technology on providing students access to the world beyond their physical classroom. This was considered, “my favorite thing about technology”.

Technology had the power to transport students around the world and teach them about global citizenship. Teacher #4 stated, “I don’t know any other way you can do that, except through technology.”

She described using the video application Flipgrid, to connect with pen pals around the country and world. The students made “connections with people in Australia, in North Carolina, in Alaska, in Ireland.” The students learned “the world is bigger” than where they lived. She concluded that what the students learned in the process, “goes beyond just learning new technology”; beyond being “able to read” and collaborate. The students learned to respect people “who do not necessarily look and think like you do.”

The program involved using GridPals, a feature on Flipgrid. The students connect and exchange mascots, food, videos, messages, and packages of things that represent their home states or countries. In the videos, the students share and learn about each other’s lives. The teacher shared some students may not have the opportunity to travel but being able to do so “vicariously ...through your little mascot traveling the world.”

The teachers' website provided access to parents and students to online resources. These included schedules, documents and forms for the parents, and a PowerPoint of grade-level information. There were contact information and the teacher's Twitter link. There were documents specifically for literacy to support students' reading at home as this excerpt from my memo shows,

***Artifact and context:** There are JPEG and PDF documents of guidance for helping students read at home. These consist of questions for reading fiction and nonfiction books.*

Also, Teacher #4 has hyperlinks under a 'Useful Resources Tab' to websites and applications to support reading and writing at home. Her Twitter account was also used similarly. The teacher tweeted photographs and school events to give parents and the school community virtual access to the school and classroom. This is discussed further under the section of "Technology as a tool".

**Collaboration: "We get the opportunity to further collaborate."** Teacher #4 promoted collaboration between students and schools using technology; it gets students "beyond the four walls of the classroom. She identified different resources that students use which enables collaboration with their peers as well as with her.

...Google Classroom is a really good one too for collaboration for students to work on the same document.

The use of Google applications such as Slides and Google Docs also makes it easy for the students to share their work with the teacher and she could provide feedback.

If students were able to use a particular application collaboratively, Teacher #4

explained she was more likely to use it. This was one of the incentives for her using the Flipgrid application for her students to learn from students around the world as the students were able to ask “anyone in the world if you would like to collaborate with me”.

Collaboration also involved working with her peers as a member of the Cosmic technology group. Teacher #4 described attending the workshops and learning not only from the presenters but also from her peers, which she considered “one of the greatest things about going to teacher professional development.” She further explained,

Every time I would walk away with a program I had not heard of before.

She explained once being exposed to a new digital tool, her next thought would be, “how can I use this in the classroom?” She repeated later in the interview her appreciation to the district for providing the PD opportunities. She described even getting “the opportunity to further collaborate” in her break times, and “hearing amazing things” from her peers.

**The Past and future: “Toward a successful future.”** Teacher #4 believes technology will be a significant part of the students’ future, “it is the way the world is going.” She explained the skills students were developing would be essential for their future jobs.

These kids, the jobs they are going to have are going to be things we don’t know of now. Jobs that aren’t even invented yet. So, using it in education, I think just benefits them.

She described some of the skills the students were learning as they used technology. These included skills ranging from typing fluently, to “things that involve critical thinking in terms of technology.” She also highlighted how technology was

changing the way students showed their learning compared to in the past. Students now have at their disposal other ways “other than your typical marker and poster board.” On Twitter, the teacher still showed the students using these traditional methods rather than using technology. For example, on September 24th, she tweeted a series of photos showing students creating posters. The students were showing character interactions.

She reiterated the importance of students learning specific skills which she predicted would serve them well in the future. These skills included presenting for example. Her view was some adults lacked some of the skills the students were already mastering;

...to see kids right now that can put together wonderful presentations; it just makes me feel like they are on the right path toward a successful future.

She explained the goal was to get students “curious and fluent” in the skills they would need for future learning and careers.

The teacher and student roles were evolving, where the teacher acknowledged when using technology with the students, “a lot of times they are teaching it to me.” She welcomed the students “having a more active part of their education” and being able to “make choices of what they want to learn about.” She explained technology gave them this opportunity to be more independent and proactive. She used the analogy of a well to describe the students’ exploration of technology and its capabilities:

With a computer at their disposal, they would be able to more researching and digging into the well; okay let me figure out what I want to learn or how I want to learn it.

Comparing the past ways of teaching and learning illustrated how technology had changed the classroom. Teacher #4 believes the impact of technology was a positive one, Compared to when I went to school where everyone sat in straight rows facing the chalkboard, facing the teacher and once she taught, you put your head down and started writing, doing your assignment. I mean, things are so, so different now...and most of it I think for the better.

This is a contrast to her classroom she described where she is learning from the students. A classroom where she does not want the students to sit in rows, but to collaborate in the classroom and beyond, and take more responsibility for how and what they learn. Technology facilitates that shift from the past to the future.

**Technology as a tool: “How do I use this in the classroom?”** In the interview Teacher #4 described the different ways students used technology for learning, and how she used it for instruction. On her website and Twitter, the data showed the different ways she used it, but not the students.

She explained her main use of technology in the classroom was for reading instruction:

... one of the primary reasons that I use technology is for that reading, on sites like Epic, that make it really easy for the kids to follow along with books at their level... or match their comprehension.

She also used it for students to do “self-guided projects” and referenced Thinkling.com as a site that enabled students to “work at their own pace.”

She categorized technology as a great tool for research;

Well that’s a really good way for me to use technology as a research vessel versus

looking it up in library books or articles.”

She also mentioned ‘KidRex’ a research site for students and emphasized student choice in exploring what they wanted to learn. Google Doc and Google Slides were mentioned as applications students used with ease. They had the additional benefit of being “better for the environment” too.

There were other applications used which the teacher explained were more engaging for students. These included ClassDojo which was used to track incentives and Flipgrid, a video application was used to correspond with pen pals. She used different tools for assessment such as, “Quizlet, or Quizizz, Gimkit”.

Teacher #4 described a factor that encouraged her use of technology was the safety of the applications. She was more likely to use something “If I believe it can be done safely through technology.” Symbaloo, an application that is used to store hyperlinks to other sites or applications, was a tool she used to ‘store’ ones “I know are safe.”

There were links to additional technology applications and literacy websites on the teacher’s website. These included Storyline.com and Oxford Owl which was a reading website.

The students used the Flipgrid application and GridPals to collaborate with other students in different countries. Teacher #3 explained the activity was then integrated with other areas of literacy instruction. In addition to communication, the students researched their penpal’s country and wrote about it, or wrote letters to them. Also,

Yes, if you pull in books about that country, if you tie in summarizing what the the video was about, there’s a way to tie in absolutely everything.

One of the effects of learning this way using technology was the students' engagement, "they are so pumped up about that"; "they are so excited about it." The teacher concluded, "there are just so many ways of incorporating" technology into instruction in engaging ways. The student learns, "barbecue is a Texas thing" and that becomes a catalyst for further research.

Using a tool like Skype also adds another dimension to teaching and learning with technology. Teacher #4 got the idea from another Cosmic member. The students were researching conservation and the teacher was looking forward to having them meet virtually with a marine biologist. They were going to learn about the impact of plastic on the environment. The teacher's Twitter data also documented the students also used Skype to interview a BMX professional rider. An excerpt from my memo dated 10/16/2019:

*Artifact and context: The students were asking questions and revising their designs they were making for a track. The teacher tweeted this was an example of 'authentic learning'.*

Although the teacher is a proponent of technology as an instructional and learning tool, she expressed some misgivings about it and is aware of some of the limitations. She described the importance of being purposeful and analyzing technology before use. She acknowledged it was engaging and "fun" for students, but it could be a "novelty" and a "gimmick". In fact, she explained,

Sometimes the enthusiasm I think takes away from the efficiency of pencil and paper.

While seeing the benefits of technology use, the teacher explained there had to be a balance of fun and purpose. Furthermore, she had to consider, “do I really think this is the best use of my time?”

The teacher posted used her Twitter account regularly. The main purpose was to provide photographs and videos of student activities and school events. Teacher #4 also tweeted about her interests and career activities. The data shows how she used technology as a tool. She posted the school’s celebrations at Christmas, such as the adventures of Elf o on Shelf. There were tweets about special events such as assemblies, special days, and the first days of school. These included a school beautification project (11/1/19), parent conferences preparation (10/29/19), and a video of a Red Ribbon week assembly (10/25/19).

There were posts about the students learning literacy skills in integrated units. For example, she posted photographs of a unit on structures. An excerpt from my memo dated, December 3rd, documented,

*Artifacts and context:* She explained in the tweet the activity was at the end of an unit on structures, and this was a makerspace session. She integrated the makerspace activity with literacy.

She also used Twitter to connect with authors. On a tweet from September 14th, she used the author’s mention and used the book’s title as a hashtag. She explained the students were enjoying the book and the critical thinking skills which the students were using. An excerpt from my memo on the tweet, I described the purpose of using social media in this way:

*Purpose:* To connect with an author; to promote reading; to share a class novel;

*to share skills and themes related to the book.*

She posted personal tweets such as her application for a scholarship and supporting environmental causes. Teacher #4 used technology flexibility across different instructional contexts and aspired to give students more control of their learning.

### **Teacher #5: Significant Statements and Themes**

Teacher #5 teaches Grade 4, self-contained, which means she teaches all content areas. She reported using technology widely in her personal life for communication and research. She uses social media, including Facebook, Instagram, and Twitter.

Communicating with family members and friends who do not live locally is also important to Teacher #5. She also uses social media to follow persons and sites related to her hobbies and educators. She particularly values getting book recommendations and likes reading audiobooks.

Throughout the interview Teacher #5 referred to technology as a “great tool”, and gave many examples of how she used it with her students. She also chronicled her own learning experiences using technology. Using technology prepares students because they are learning things “we will have to do in the real world.” Teacher #5 described her daughter’s experience of applying to college and being asked to submit a digital portfolio. She explained it is important to start thinking and preparing students for the future beginning in elementary school, starting with something like a digital portfolio.

...so it was an eye-opener for me that you know, we really need to give kids the tools or they will be behind the game.

The teacher’s website was used to provide information to parents and students.

This excerpt from the memo summarized the parent information.

**Artifact and context:** A PDF of a parent letter. The letter provides information about the school and grade level procedures. These include arrival and dismissal procedures, schedules, birthday guidelines, absence policies, and homework. It has hyperlinks to newsletters.

Twitter data showed Teacher #5 tweeted almost daily. Her posts were documented one semester in her class, with posts about ELA, math, science, and social studies. She used hashtags and mentions to connect with the school community, the Cosmic group, and authors and fellow educators.

A summary of her post topics is shown in Figure 9.

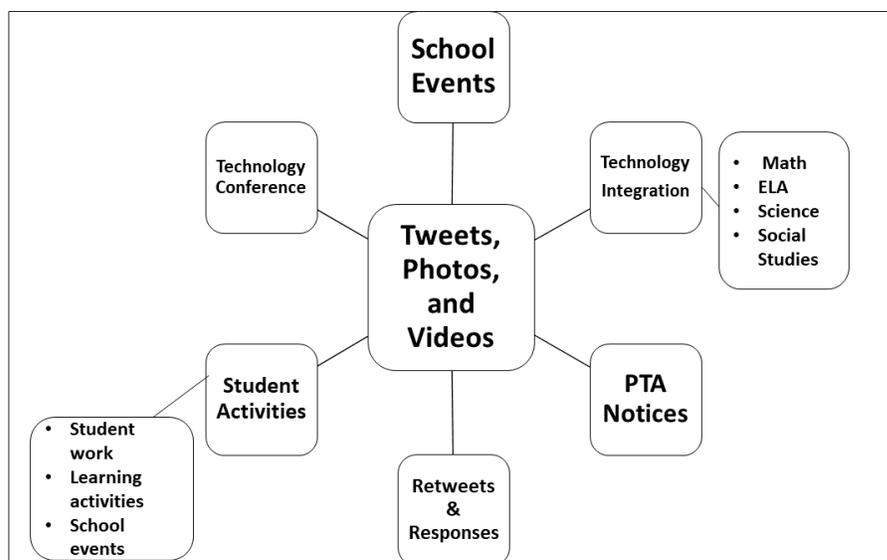


Figure 9. Types of data posted on Teacher #5's Twitter feed.

The themes derived from all three sources of the data are displayed in Table 9.

Table 9

*Teacher #5: Themes and Descriptions*

Themes	Descriptions
Access	Access to technology for students, teachers, and parents. This includes the availability of resources and access to professional development.
Teacher as a learner	The teacher's learning process using technology.
Technology as a tool	How technology is used and integrated; its role in teaching and learning and the factors which affect its use.

*Note. Themes derived from the analysis of the participant's interview, website, and Twitter data.*

**Access: “You can also adjust the levels.”** Access refers to the availability of technology. It includes the accessibility features of applications and providing access to school information and digital links to the school community. Teacher #5 believed there should a “one to one ratio” for technology access.

The impact of technology was seen as “equaling out the playing field for students” and was one of the incentives which influence the Teacher “5’s decision to use it. Some forms of technology had accessibility features “it just enables tools that I couldn’t do”. The multimodal format presents the learning in different ways which Teacher #5 believes is a “more effective” way for students to access the content.

Like on Google Classroom, I can you know, post videos. and give them other opportunities and other ways to try to learn things ...sometimes if they hear it in a song or they see it in a video, they are going to remember it better than if I’m just

putting to them on the board or giving it to them on a page.

Dyslexia was one of the learning disabilities that the teacher believed using technology alleviated some of its effects. She explained using “Learning Ally for my dyslexia students”, an audiobook app. Also,

I have students that have speech to text so they use the headphones with the microphone because of dysgraphia.

Using technology supported students’ writing. Teacher #5 explained instead of the students writing manually, they “could speak their stories” into devices with the feature and it would type it for them. The teacher acknowledged there was a debate about using such features because, it did the work for the students, but she explained she taught them how to edit and revise using the applications. She also referred to a student whose parents initially reported she was refusing to write. but who was now “using dad’s headphones at home to write stories”; the student successfully uses the text-to-speech feature. She further explained, “it gives them a way to express their thoughts, despite their disabilities.” Teacher #5 described technology as adding as a bridge or a ladder. It sits between the teacher thinking “the student doesn’t want to give an effort” and realizing they are “missing stones or steps in their ladder.

She used other applications, MyVRSpot Google Classroom to provide differentiated support to students “that have accommodations.” This took the form of the teacher recording instructions and assignments for the students. The teacher explained students were “embarrassed if they are pulled out” and it was obvious they needed extra assistance because of their reading. This capability to use the recordings in this way removed some of the stigmas and was helpful when she did not have extra support staff.

It provided independence and a level of anonymity. An example of what this was like recording her voice for students who needed the audio support,

...I found that I can still have my voice where it's not so robotic and it is still my voice but they're not having to ask me can you reread that, can you reread that, in front of the other students if it makes them feel uncomfortable.

Having access to technology did not mean the students automatically knew who to use it. Teacher #5 explained she had to teach the students explicitly how to use certain devices and applications before using it for instruction. It was more "efficient and effective" to deliver a minilesson then teach the content. A positive outcome was that when she provided the minilesson, "it doesn't have to be reintroduced or taught"; students learned the technology quickly.

The limited availability of technology devices was a concern for Teacher #5. She did not have a set of her own, but had to "borrow Chromebooks from my team members." Another factor that negatively affected her use of technology was the intermittent Internet service.

Although not a current issue, Teacher #5 described the challenge of students not having access to technology at home had been a problem for her in the past, and how she addressed this,

I haven't had the issue of students not being able to access technology at home but sometimes ... I have had students who couldn't access it at home. Didn't have the technology to use, so they would come into my room early to use it.

Teacher #5 also described using technology to provide access to parents. This involved sharing apps and school information. She described sending videos, notices, and corresponding using the application 'Remind', a messaging platform.

And parents message me back, hey can you, and ...is a walker today...is struggling with this, do you have any ideas? And we just use it for text messaging basically. The parents message me, I message the parents and it is a faster way...

She explained she could also send letters via the app, and she sends a weekly newsletter, "And they love it". The parents love the app and find it easier to access than an email, and it is faster to contact them and the teacher. Access was not equal to consent; some parents chose not to use the app. The instructions for using the app is posted on the teacher's website. Directions for the students to access their district logins and sites are also posted on the website. There have been times where students "were not allowed to use technology"; the teacher explained she addressed this by using "paper copies of everything."

In addition to newsletters, Teacher #5's website also had posts of 'Helpful Documents' for parents. She had separate tabs for all content areas taught. The contents were varied. The reading documents included graphic organizers, vocabulary charts, and genre notes. There were also links to online sites, I recorded in my memo, "Spelling City, Scholastic, PBS Kids, Ikeepbookmarks" to support ELA.

She used her website and social media "to let the community know what we are doing." Teacher #5 explained how she used Twitter to provide parents access to her classroom:

I also use Twitter to post what my class is doing, even my parents who don't

have Twitter accounts. my Twitter feed comes up on my webpage where parents that aren't on Twitter... can still see my tweets.

The teacher's Twitter confirmed she provided information for the school community. There were tweets of photographs and videos which permitted parents to see the different learning and social activities taking place at the school. Fundraising opportunities to support the PTA events were also posted. A typical tweet promote the PTA initiative, dated September 23rd, is summarized in this excerpt from my memo,

*Artifact and context: A retweet from the PTA. It includes a graphic of a garden that shows the event and date. The event is a garden day and includes the address link for the SignUpGenius application.*

**Teacher as a learner: "I'm a learner."** The teacher shared her experiences of learning about technology and sharing her journey with her students. The confidence to use technology was something that grew over time, as when the teacher joined the Cosmic group, "I was scared of all the new technology." Her early attempts to implement technology were not successful, "I was really, I mean disheartened when I'd come and try something and it would fail."

Modeling being a learner who tries and fails but never give up, is something the teacher finds valuable in sharing with her students. She explained, "I tell the students this all the time, you know, I'm a student."

I'm a learner. I'm going to try things. Like the first time I made a Quizlet, it was a flop because I had misdome something...it was like ... hey' I'm a learner I make mistakes, I learn from my mistake...I think it helps them to know you never quit learning.

Technology shows the students there is so much more to learn, and for them to see, “I’m not finished learning.” The teacher models she is continuing to learn and share her processes, helps students realize learning is not “so stop and start” but a continuous process. She believes it was “the technology that helped the students realize that.”

The experience of being a member of Cosmic was the factor that made Teacher #5 realize how much she had to learn; “it makes me look at things from several different perspectives.” It provided some insight into what she perceived as the “barrier” to teachers deciding to include technology in their instruction, “the fear of failure.” She reflected, “It changed me as a teacher.” After being initially scared about using it, it is pushing aside her fears and reservations, and trying to “think outside the box” to use it to address her students’ learning needs.

Being a member of Cosmic and also using social media helped Teacher #5 learn from other educators. Twitter, for example, was a “collaboration tool and a learning tool.” She provided some examples of how she commented on other educators’ tweets when she liked the ideas they shared and asked for more information. Conversely, she has had teachers contact her about the learning activities she has shared. A teacher from Dallas for example asked her about a writing adoption program the district was using and communicated back and forth about it. The students also loved being included in her tweets, “they like it”

The Twitter posts showed the teacher’s participation in the Cosmic group and some of the opportunities for PD it provided. She used the group’s mention and hashtags for most of her tweets. This had the multiple purposes of promoting the group and connecting with the members to share ideas and resources; it also lets the members and

others see how her learning is applied in the classroom. On December 10th, the teacher posted a photograph of a speaker/author at a digital learning conference she attended as a member of the Cosmic group. An excerpt from my memo shows how she felt about the experience,

*Artifact and context: ...The teacher tweeted she was excited about attending the conference, the speaker, and the speaker's book. She used the mentions of the region and the author and used the conference hashtag.*

On October 24<sup>th</sup>, Teacher #5 posted a series of photographs and a GIF from the Cosmic group's meeting. She tweeted the group was collaborating and learning about technology tools to take back to their respective campuses. The photographs showed the group sitting in a meeting and use different digital devices. She also tweeted research articles. For example, she shared an article about the science of reading on September 21st, which I noted in my memo, "includes a link to the original article." On September 9th, the teacher posted the ClassroomScreen application in use. She tweeted her thanks to the Cosmic group and the district's digital learning department for introducing her to the application.

**Technology as a tool: "I think technology is a great learning tool."** Teacher #5 described technology as a tool: "I think technology is a great tool". She also explained the students' understanding of technology was evolving,

...I think they're also realizing that it is a learning tool which is an important realization for even the 4<sup>th</sup> graders.

She believed technology was ‘very important in literacy instruction’ and allowed the teacher “to differentiate her teaching.” The goal, however, was not to rely solely on technology but to find a balance,

...I also think it should be integrated. I don’t believe it should be all technology, and I don’t believe it should be all paper and pencil. I think it needs to be a nice integration to truly get the benefit.

She started her discussion of the teaching of having the students read the poem, “The Road Less Taken”. The students read the poem, through the use of technology, they for example connected with someone on YouTube who had made a video of symbolic representation of the poem. At another station, the students interacted with a digital version of the poem; the teacher explained, “it gives the students ...different stimuli.”

The teacher’s Twitter posts show this balance of technology and paper-pencil activities or offline she was trying to achieve. On a tweet dated September 12th, photographs show students writing on desks. She explained in the tweet, the students enjoyed using markers to “to practice adding details to boring sentences.” Tweets of photographs, showed students editing their writing (9/5/19); reading (9/20/19), and creating posters (10/31/19);

Tweets provided evidence of how the teacher implemented technology activities in literary activities and across the curriculum. For example, on September 27th, the teacher tweeted an activity which showed the students learning about themes, as described in this memo,

***Artifact and context:** A tweet shows two photographs of three students working on desktop computers. There is a photo of a cartoon character on the screen. The*

*teacher explains in the tweet the students are using Google Classroom and VR application to and they are identifying themes in songs.*

Although Teacher #5 shared how she used many applications, she believes students should only use a few at a time. Her preference was to have students “utilizing a few programs” rather than “trying to remember how to use all the different programs.” She chose purpose over a focus on the technology itself. Also, although she provided direct instruction on using technology, “sometimes they’ll problem solve and try to figure it out” independently.

Technology was integrated across the different components of literacy instruction and learning. Within the framework of the Reading Workshop, students used technology at work stations. It was used in a variety of ways. On an average day, students might be “typing a rough draft and sharing it with a peer.” They used applications like ‘Kahoot’ and Quizlet for grammar activities, “on part of speech identifying a noun, a verb, adjective etcetera.”

Twitter posts showed several photographs and videos of the students using some of the applications in the classroom. For example, on November 22nd, the students were using Quizlet, as described in my memo,

***Artifact and context:** A 13-second video clip of students using Chromebooks in teams to play a game in the classroom. The teacher explained in her tweet the the students reviewing text features using Quizlet.*

On other occasions, the teacher used *Freckle*, a multisubject platform that allows instructors to differentiate activities. She linked it to their “small group reading book” and was able to “adjust the article to their reading level.” Although the technology was used

in the classroom to make content accessible to students with disabilities, the teacher also used programs like Freckle and ReadWorks, to extend her students who were reading on a higher level, for example, “if I have a student on a sixth-grade level” in Grade 4.

Providing choice through technology was also important, as in shown in the use of Epic, a digital library,

And they sometimes use Epic where they have free choice to read literature as their independent reading but they do it through technology instead of a paper copy of the book.

Students also have the option to use print or technology as the teacher uses an assignment menu. Students learn and demonstrate their literacy skills through projects and used a variety of different platforms. This excerpt from the interviews shows how writing is incorporated,

I do, we use it for writing as far as projects... the kids have a menu so that...they always will have choices to do it either digitally, or they can do it on paper. So, we've used Google Slides to present their research projects...we used Board Builder through Discovery Education for our research writing assignment. They've written essays or poems and then shared that with peers.

In discussing the impact of technology on students, Teacher #5 identified collaboration and student engagement as positive outcomes. She remarked, “student engagement I think is so much higher when you give them that ability to be in technology” and explained the students’ response is the “thing that drives me to use technology.” She described the students’ response to using technology,

I think that it is engaging to them and they want to learn, and they want to

learn the technology...sometimes when I have a student that is maybe, you know not as enthusiastic about learning, I have to bring in something that is technology based, and all of a sudden you see that enthusiasm grow. They want to do it... Students were more engaged; "They would almost cry when I have to stop a Quizlet activity". It was more effective to use technology to teach at times, I can teach vocabulary until I am blue in the face, but if I put my phone up and to that Hedbanz app in a small group, they all fight for a turn to participate. If I do a Quizlet, I mean, it is game on.

Some applications such as Quizlet, a formative assessment app, "is more collaborative where you can actually put in teams of four to five. Students were motivated to write even outside school hours,

I actually have though some students who have enjoyed that so much they're actually, writing and collaborating outside the classroom on a story that's not related to school. They just think it's really cool... to know someone else is on your paper and they're not even at your house.

On the teacher's Twitter, there are several videos of students using the applications and media shows their excitement and level of engagement. In a tweet from November 11th, the teacher tweeted the students were enjoying using Quizlet to learn about conjunctions and posted a video of the students. I described the students' actions in from a tweet posted November 22nd, in this excerpt from my memo, "*The students were jumping up and down*" as they working in teams to use the Quizlet app to learn about text features. In another video and tweet from that same day, I noted in the memo after viewing the video,

*Artifact and context: ...They are competing in a game. The students appear excited and are talking loudly. Some are jumping around in response to answers.*

A tweet dated October 22nd showed the student reading informational on a desktop and sharing the information. Teacher #5 tweeted the students were using the Board Builder App which can work as a digital graphic organizer, to teach each other about the migration of birds. The students appeared to be recording notes to share about the research on the boards.

Most of the videos are recordings of the students, apparently filmed by the teacher. A tweet dated September is different as it shows a student-produced video project. They created a video to advertise an advertisement for the school's Readathon. It integrated technology, drama, reading, and writing. As noted in my memo, "*the students' names are included in the credits*" and the goal was to "*promote a fundraising event*" and "*share a student video.*"

A negative aspect of technology use was what the teacher perceived as the students not learning the digital citizenship concepts in tandem with using technology. Teacher #5 explained the difference to the students between using technology in "an academic versus a social setting". She also explained to students about using language in the classroom compared with using it on the playground, and that respect for the teacher. There is an awareness of being unable to control all of the students' access to technology.

A tweet from September 6th documents a part of the teacher's effort to promote digital citizenship. The photograph shows a poster in her classroom on the storage boxes

for digital devices that the students signed. It is an agreement of guidelines for caring for devices and practices appropriate digital citizenship.

The Twitter feed also had numerous examples of students using technology in the content areas such as math and science. On September 19th, Teacher #5 posted photographs of students using Chromebooks and working in groups. An excerpt from my memo explained the teacher tweeted the students were “*problem-solving and using division to break the code*”. Subsequent tweets reveal the students were doing a digital breakout, where the students solve answers to solve puzzles, to free some ‘elves’. This was typical of the posts about math which showed the students using games or puzzles to solve math problems.

The students participated in a virtual field trip as part of a cross-curricular project. Teacher #5 explained in a series of tweets the different activities the students participated in which also included having a guest speaker from the zoo (11/18/19) and tweeting questions to a polar bear protection group (11/14/19). An excerpt from my memo describes the tweet and photograph (11/14/19),

***Artifact and context:** The tweet explains the students were participating in a virtual field trip to the Tundra during their lunchtime. The photograph shows students in the classroom having lunch and looking at a large screen. The teacher used mentions of Discovery Education...*

There are also tweets about science experiments, for example, (9/4/19) and (8/22/19) and activities (8/23/19). Teacher #5 typically posted a series of photographs of the students conducting experiments and used the tweet to describe the activity. She also used videos. In the tweet posted on August 23rd, the video showed students reviewing

science lab rules using Quizlet. My memo notes referred to the students' enthusiasm.

*"One says, I got this!"*. The teacher used hashtags, *collaborators*, and *communication*.

### **Teacher #6: Significant statements and Themes**

Teacher #6 teaches ELA and social studies in Grade 4. She uses the technology frequently in her personal life especially Google applications and social media. Twitter was only used for work.

Throughout the interview, she proposed technology is a "good tool" and described how important it is for providing access for students of different abilities. She welcomed the collaboration opportunities and student engagement she believed technology provided. There were conditions for its use which she proposed were necessary to harness its potential for learning and teaching.

In the interview, Teacher #6 explained how she uses Twitter, "to share the things we're doing in class so that other people can learn from us." She also explained it allows her to learn from others, and to also "retweet good ideas" she saw on Twitter. While there were photographs and videos of students, the teacher's Twitter is as she stated mostly about her professional development and connecting with other educators.

The teacher's website is used mainly to post information for parents and links to digital apps and websites, and assignments.

The themes derived from her data are shown in Table 10.

Table 10

*Teacher #6: Themes and Descriptions*

Themes	Descriptions
Access	Access to technology resources for students, teachers, and parents.  This includes the scaffold it provides to students with different learning abilities.
Student Response and Impact	This is the impact of technology integration on student learning and behavior, and their response to technology.
Technology as a tool	How technology is used and integrated; its role in teaching and learning, and the factors that affect its use.

*Note. Themes derived from the analysis of the participant's interview, website, and Twitter data.*

**Access: “We have limited access to it.”** Access to technology includes the availability of resources for students and teachers. It also includes the features which enable students with a range of learning needs to access the content and included provides access to PD for teachers.

Teacher #6 expressed early in the interview that she liked that technology provides “online books kids can access”, and the “online textbooks” which are increasingly available. The multimodal nature of digital content provides support for students who have reading difficulties, or read on a “lower level”,

I like that it allows kids that can't read as much to do audio. They can hear stuff read to them.

Teacher#6 gave examples of using technology with students who have special education needs. She remarked, “it helps them kinds keep up”; and it helps her to “include everybody” in her instruction. The process the student used, who was reading about two years below grade level,

And so he used an iPad to scan something into Kurzweil and it would read it to him and then he could participate in the discussion. Or we had the online textbook...and he would be able to participate and not be left out...

When asked what led to her interest in technology, she explained it was seeing students’ needs. It started with realizing students had a lack of “access” to different experiences and even language. She wanted to determine what the children needed and it made her “break out of my area a little bit.” She discussed working at a school where many of her students received English as a Second Language (ESL) services, and she described having “a lot of ESL kids” who needed support. She explained,

I researched different ways to get them to -I started off with slides and showing them pictures of what this word means...

This initial strategy motivated her to wonder, “what else can we do” and “the more I learn, the more I want to know more about it.” For all her students, she lamented they had “limited access” to technology, but she believed students could “reach more information” and learn more through working online. When she had technology, she used to ensure these students could get the language supports they needed.

Social media can provide access to authors. On September 9th, the teacher used an author’s mention to connect with her. She mentioned her students had been reading

one of her books “as our first read aloud this year” and the students were enjoying it. I described the purpose in my memo notes,

*Purpose: To promote a book; to connect with an author; to share a book the students are reading.*

There should be conditions for using technology. Teacher #6 remarked on several occasions it was a good tool and she was “mostly pro-technology” but “if used correctly.” When she elaborated on what this may entail, she expressed striving to find balance on it being a “tool then also not as a crutch.” Although she recommended using it for digital texts, she believed this could be negative in literacy,

...kids will abuse the fact that they could listen to book online, and won't actually, read as much.

It was unclear if she did not equate reading online and offline, or if it was a matter of students not attending to the text while listening to the audio.

The availability of devices and other resources was a factor in technology access. Teacher #6 believed all students should “bring their own devices”. The students and her school did not have sufficient or the type of devices she needed for instruction. She had to share 10 Chromebooks between 24 -40 students when she combined classes.

...we have Chromebooks but we do a lot of QR codes and scanning, but I don't have the devices for that, so having their own devices would be helpful and there's a couple of tools I wish to use but I am not able to...

Another factor was some students had limited access to a range of technology at home. In the teacher's class survey, more than half of her class only had access to a

parent's phone. She had to print assignments for them, and it also limited what she could assign for homework.

...some of the access is on their mom's phone so not really. A lot of them do. So then I had to find a way. I'd print off my vocabulary words or whatever they're supposed to study. I don't do any computer homework. It's not fair.

Being a member of Cosmic has afforded opportunities for professional development. Teacher #6 mentioned using the interactive presentation application, Pear Deck, "I just learned about that at my Cosmic meeting last week." I enjoyed collaborating and learning from the other educators in the group, "I learn from them. I like it."

Technology also provided more opportunities to connect with the parents. Teacher #6 explained, technology made it "fast to connect" with parents. She described how she used the ClassDojo app,

I email the parents on Dojo. And I can upload real fast, like here's my spelling words, here's the words, or a link to like Quizlet for the vocabulary so they can see access to that.

On her website, Teacher #6 provides numerous resources for both students and their parents. There are resources for reading such as a PDF of questions the parents can ask when reading with the students. There are differentiated spelling homework and word study activities. She also has her contact details and class schedules. Her Twitter feed is also included on the website for easy access. There is a tab to the Symbaloo application which has links to a collection of websites and applications the teacher has curated. An excerpt from my memo describes it:

**Reflection:** *The site offers a range of applications to support literacy instructional technology. The teacher can personalize sites such as Vocabulary City and Quizlet. The apps have different purposes that address different learning targets. This provides easy access for parents and students if they have technology at home because it is all centralized.*

The access to technology has not been met with enthusiasm and engagement by the teacher's peers. She attributed this to the "fear" of the technology. It was her goal to change this and improve involvement,

A lot of people here don't use as much technology...And I am trying to get more people. Like people do it, but people are scared of using technology Or they are not aware of how to use it.

Her response was to use ideas from her Cosmic group to provide PD on the campus. She created a Tuesday technology group after school and chose a new topic to address each week. The response was disappointing, "only a few come up every time." Teacher #6 concluded it was because "I think they're scared." The lack of participation had a positive effect on Teacher #6; "it motivates me to learn more, to like share more."

A series of tweets from Teacher #6's Twitter feed shows the photographs from the technology lab. On a post-dated December 12th, there is a photo of colleagues and the teacher explained in her tweet there were two attendees. On another tweet dated November 19th, an excerpt from my memo confirms what Teacher #6 said about the attendance,

**Artifact and context:** *A group is attending a technology lab which the teacher provided. She indicated this was the most people who had ever attended. She*

*thanked the participants and used their mentions...she used a crying emoji to show she was sad when no one had attended a previous meeting.*

During another meeting, there was one attendee, based on a November 6th tweet. At the Teacher's post-interview meeting, she explained how moving to distance learning as a result of the coronavirus COVID-19 restrictions had changed the trajectory of teachers' use of technology at her campus. She reported she had daily technology labs for her teachers, using Zoom. Her daily attendance ranged from 6-20 participations; her average before online learning was one attendee.

**Student Response and Impact: “It engages kids a lot”.** “Engagement” was identified as an outcome of using technology in the classroom and also “collaboration”. The teacher mentioned engagement several times when discussed student work. For example, she described using “Quizziz for a lot of my quizzes”. It helps her to grade student work more easily, “and is engaging for them.”

Technology provides opportunities for students and teachers alike to collaborate on activities and projects. The teacher discussed this multiple times during the interview. Teacher #6 particularly likes for students to collaborate to complete writing activities.

...as far as writing, I like the collaboration stuff that at least Google has. I like how kids can collaborate together on a document, or a file, or something.

The teacher repeated her support of technology because of the opportunities for engagement and collaboration later in the interview. She described students working “on the same slide or document”. She commented,

I like the collaboration part. I like the engagement depending on what it is. A lot of kids are engaged in what we do because it is exciting and fun. It's not

boring like sit down and talk.

Later in the interview, she repeated her beliefs students were more engaged but elaborated it also meant they were more productive,

They are more engaged. They collaborate more, not everybody, but most of the ones who like to use it will collaborate more... I feel in general if they become more -, they are more engaged, they like it a lot more, they're more likely to do stuff.

On a November 22th, she tweeted and included a group of photographs,

*Artifacts and context: The photographs each show a group of five students giving a presentation... They have a Chromebook and are using it as part of the presentation.*

The photographs showed these students were collaborating but also smiling and enjoying the experience. The teacher explained in the tweet the students were petitioning the principal to form a club. The teacher used the hashtag from one of the Twitter chats she participates in, and this shares the idea and activity with other educators who participate.

She emphasized students had fun using technology, but they were learning, “stuff I don’t even know.” It was also extending the students beyond the lesson goals. Although the students enjoyed using the technology, “some kids don’t want to be online all the time”, so she tried to find a balance of “paper and online” instead.

Teacher #6 used technology as a “behavior like reward system”, to motivate students and to let them get support. She explained there was also a negative impact, “some kids rely too much on it.” Some students use shortcuts such as spellcheck

frequently and did not feel like they needed to learn how to spell. Also, some students use the Internet and commit plagiarism. Overall, she believed, the impact of using technology on students is “mostly positive.”

Teacher #6 also saw the benefits of using technology to collaborate with her peers. She described the benefits and impact her participation in the Cosmic had on her, “I learn more; like I learned a lot.” She also explained,

And then also I can collaborate with other teachers that do a lot more than I do. Or do different things than I do so I can ask for advice from them about different things and different tools that they learn...But it's exciting for me because then I come back and share with the kids what I learn...I get to collaborate with people who actually know a lot more technology and I can learn from them. I like it.

She also found the experience to be “overwhelming” and made her consider how much more overwhelming it could be for teachers who were not using technology.

There are multiple posts about Teacher #6's involvement in Cosmic on Twitter. On December 10th, the teacher posted a series of photographs that showed her attendance, with her Cosmic colleagues at a regional technology conference. She tweeted about being excited and overwhelmed by the variety of digital tools available: “I had to rein in my brain...what great ideas.” She also referenced the different instructional strategies, such as digital breakouts she was learning about at the conference.

Using Twitter also gave Teacher #6 opportunities to collaborate and “communicate with people that I've not met before.” She also described participating in

Twitter chats. She connected with people from all over the country if not world, but using hashtags related to the chat e.g. #CelebrateEd. She explained the benefits,

And so you can talk about different stuff and get different ideas and share so sometimes I'm like yes, I feel the same way kind of thing. But I use that just to like to collaborate with people I've never met before. I get good ideas, share ideas, get validation.

The teacher's Twitter feed showed a series of tweets of her participation in Twitter chats. On a tweet dated November 6th, she responded to a Twitter chat prompts about her favorite subjects to teach using the hashtag #kiddeserveit. The data from Twitter shows the teacher participated in different Twitter chats over the semester. An excerpt from my memo from the August 8th,

***Artifact and context:** A tweet that includes a GI of a cartoon character taking notes. It represents the teacher reading other tweets in a Twitter chat...*

***Purpose:** To participate in a Twitter chat; to share ideas/teaching philosophy; to connect with other educators; to reflect on practice; to share goals.*

During our second meeting, Teacher #6 discussed her participation in Twitter chats. She explained she had gained over 500 followers by participating in Twitter chats and she was learning and sharing ideas.

**Technology as a tool: “I think that it’s a really good tool”.** Technology is considered a “good tool” by Teacher #6. During the interview, she described how she used it to support different aspects of literacy instruction and social studies. She used Quizlet and Flippety which could be used to make digital flashcards, for her vocabulary lessons. The students used Google Slides for their projects. Students also used video, for

example using puppets “to show their knowledge of social studies.” The teacher described an example of students using technology to show their learning:

I even have them like read this chapter, here’s your rubric and your notes, and they can represent it however they wanted.

Padlet, which is an application that allows collaboration and responses on digital boards and documents, is used for reading. The teacher has the students read posts,

I’ve used Padlet to go over like reading passages and then write their thoughts as they go instead of the actual sticky notes.

The annotations and reflections are saved in the program, and other students can view and comment or post their ideas.

Quizziz was considered suitable for assessment and it engaged the students. One of the features Teacher #6 believed the students really like was the “instant feedback” technology provides. She also used Google Forms for assessment, Google docs “for a lot of things”, and she also did digital breakouts. She explained using Google Sites, to make a social studies digital breakout, which requires the students to solve puzzles and complete challenges. She explained taking a lesson “which is really boring”, and making it more interactive and engaging, using Jigsaw Planet and Google Drawing. The students solved clues to create the Come and Take it Flag.

Spelling tests were administered using technology too. Teacher #6 explained her process which allowed her to differentiate and also have student work at their own pace,

I use Google Form and I record it with my voice... on my iPad and I just upload it to Google Drive...they put the form in after listening to it so they can self-pace, listen to it ten times if they want...

The ease of grading is a factor that encouraged the teacher's use of technology and she referred to this several times during the interviews. She explained, "it is fast grading." Consequently, she did not "have to spend a hundred years grading."

It was her goal to have the students use Twitter. Teacher #6 had used it with other students in the past, but felt "this class can take it a little bit further." She was going to create a Twitter account "they're going to control". She was planning to use Twitter to teach the students, "digital citizenship, and how to post to social media positively." It was important to her that students have the chance to "share what we are doing from a kid's perspective."

The teacher rarely posted any photographs or videos on her Twitter feed of students using technology. This may be because she is working on developing one for the students. There were however tweets of the students doing other activities. One of the tweets was of the students completing a cross-curricular unit. The series of posts around September 27th, show the students creating a bakery at the school. The students are completing various tasks, but one is using a Chromebook and typing, and the students seemed to apply different skills from math, reading, and writing at the 'bakery'.

A tweet from August 8th was of photographs of the students using the application Mentimeter. This program is an interactive platform that allows for presentation and collaboration. In the tweet, the students typed in words to create a word cloud, as recorded in my memo,

*Artifact and Context: One photograph shows the students standing in front of the display screen which shows their word cloud. The other shows students working in groups and looking at the screen. The words they chose were in*

*different colors, the most popular were kindness, encouraging, and helpful.*

The teacher used hashtags and mentions on all her posts. This enables her to connect with the school and district as well as a member of her Twitter chats.

The teacher recounted an anecdote of using technology to connect with her first Dutch student. In using the technology and showing pictures, ‘they can kinda connect to it’. She explained she used technology “like a translator”.

I had a student who spoke Dutch one time, and I don’t speak Dutch, her and I were like sharing iPads, and I would like talk into it and share with her, and she would talk back... I would type up the picture I was trying to say so she can understand it.

Although she was an advocate of technology integration, Teacher #6 believed there should be conditions for its use. When asked how students should be allowed to use it, her response was mixed. While she believed “it is a good tool for them to have free rein with”; she qualified her statement later, students should have “free rein with monitoring”, and “a little limitation”. It helped her students to know “I could look up their history and monitor what they are doing.”

### **Research Question 1**

*What are elementary teachers’ perceptions of technology integration in English and Language Arts instruction?*

The teachers all expressed positive views about technology integration in literacy instruction. Teacher #1 characterized herself as a “firm believer in it”, and a “strong advocate”; Teacher #5 stated technology was “very important in literacy instruction.” Teacher #2 believed, “it is imperative that we use it” and “there’s a lot you can do with

RELA.” Teacher #6 also saw its benefits as a tool, “especially for literacy.” Technology helped students access content and demonstrate their learning in new ways, but it had an impact on English and Language Arts teachers too, Teacher #5 reflected, “it changed me as a teacher.”

The teacher participants acknowledged the world had changed, and this was partly due to technological advances. Consequently, instruction had moved beyond as Teacher #4 explained. students “sitting in straight rows facing the chalkboard.” Teacher #2 agreed, and proposed what students need is access to different technology tools, which means transforming the way teachers have taught “for twenty years.” The teachers reported technology had changed the resources students used in literacy learning; Teacher #2 observed, “Everything we do is in the palm of our hands.” All teachers described a plethora of digital devices and applications which students used in their classrooms. Students still have access to print resources, but these are increasingly supplemented or replaced by digital books and online texts. Literacy content is also provided through videos and digital games.

Teachers gave other examples to support their belief technology had changed their literacy instruction and resources. Students participated in online classrooms where they accessed and shared their writing (Teacher # 5). They used programs like Flipgrid for fluency practice and communicating with other students around the world (Teacher #4). They had access to online libraries like Epic, Britannia, Pebble-Go using e-books which had multimodal features with visual and audio supports. Teachers reported students had more choice and independence with online and digital texts. Questions could

be answered immediately using applications like Suri (Teacher #1). The students could do most things online, with ease and having what appears to be infinite choices.

Teacher #3 summarized her students' experiences with technology by explaining, "it just gives them another outlet to use language in different ways." The teachers used technology for all components of English and Language Arts instruction while merging traditional instructional activities. Teacher #1 gave the example of how the way students conduct research has changed; "how we learned to research is completely different." She described using Skype to speak to persons in Australia for research while completing a nonfiction unit. Similarly, learning about another country in Teacher #4's class involved not only reading about that country but communicating through applications like Flipgrid with actual people from that country. Students created presentations and completed projects, using reading and writing in an integrated way. Teacher #4 concluded technology enables her to teach "all of the literacy things I need to teach." It integrates communication, reading, writing, social skills, creativity, and critical thinking skills.

In addition to using technology for reading and research, teachers believed technology was effective for teaching vocabulary. Teacher #6 reported using vocabulary games, which students found engaging. She also used it for spelling activities which allowed her to record voice in the applications for differentiation. Applications like Mentimeter, which allows collaboration, was used for students to create digital word clouds. In literacy lessons, technology could be used to introduce and extend lessons, too, and provide additional resources to support the learning (Teacher #3). The technology was used in literacy stations, for reading and writing activities. Teacher #5's example

described students using multiple forms of digital applications to have students study poetry at learning stations.

Using technology for writing for reported by all teachers. They discussed using students' use of word processing programs for writing. Applications allowed students to compose, share their writing easily, collaborate, use spell check, and other editing features, and students were found to be more motivated to write. Teacher #5 described her students as being so engaged in writing; they were "collaborating outside the classroom" to compose stories. Photographs on Teacher #5's Twitter showed students excitedly using quiz applications like Quizizz to learn grammar in new ways.

Teachers believed technology could be used for literacy assessment and used game applications such as Kahoot and Quizlet for this purpose. Most teachers had an online space, such as Google Classroom and Padlet, where students could submit completed assignments, participate in virtual discussions, and access content. Teacher #2 summarized what other teachers also reported, that technology gave students multiple ways to show their learning, "there's a lot of choices." Teacher #6 remarked on the ease of using digital assessments, because "it grades it for me". She also reported students found these assessments to be engaging and they could complete them individually or in groups. Students also welcomed the immediate feedback or response digital assessments provided.

Differentiation was identified by all teachers as an important and transformative use of technology. A recurrent theme throughout all the data was the access technology used in literacy provided for different groups of students. Technology "makes the barrier go away" for students with special needs Teacher # 4 believes; it can make content more

accessible. She explained technology applications and devices had “so many great ways” of helping students who were not reading on their grade level. It was significant for students to be able to read books on the same levels as their peers, with the visual and audio supports embedded in the digital apps. Teachers were often able to adjust the levels of reading resources. Teacher #1 acknowledged integrating technology supported her students’ reading and writing and reduced some of the frustrations and challenges of her students who had dyslexia; “it has helped them so much.” Teacher #6 described it helped the students with special needs “keep up” with their peers. She explained how having online material with multiple formats helped students read and not feel “left out”; she surmised it using technology in instruction helps her to “include everybody.” Technology reduced some of the embarrassment and shame students experienced when they had to be “pulled out” for remedial instruction.

Teacher #5 shared that the speech to text features available helped students who were reluctant or unable to write true to having special learning needs. She explained, for those students, using technology “gave them a way to express their thoughts despite their disabilities.” The same was true for students who had dysgraphia.

Teachers believed technology also provided language support for students who received ESL services. Teacher #6 explained the visual and audio supports technology provides facilitated their vocabulary learning and language development. Students also used applications such as Duolingo to learn other languages and cultures as Teacher #3’s Twitter photographs showed. She explained this made the world smaller and nearer.

The teachers concluded technology integration prepared students for the future. Teacher #1 explained what the students were learning “will help them in the real world.”

Teacher #4 believed using technology puts students on the right path “toward a successful future.”, but educators were preparing students “for jobs that aren’t even invented yet.” Teacher #3 explained teachers needed to start students on the path “early” to be prepared for their future careers. Teachers gave examples of technology being used in the colleges and the workforce and how this influenced their decisions to use technology.

Students were more engaged and likely to produce more work when technology was used in literacy instruction. Teacher # 2 concluded, “they love it” and described how she used technology to “draw them in” to her instruction. She explained it boosted her attendance and participation and had a positive effect on behavior. Having more choice and freedom was motivating. Teacher # 5 explained “it also gives the students different stimuli” due to the multimodal forms of text and made the students realize how much there was to learn; it was an ongoing process, not “stop and start.” There was something for everyone. Students were “really excited (Teacher #3) about learning independently and with and from each other using the different devices and applications. It enabled teachers to connect instruction with students’ interests. Teachers surmised using gamification motivated students (Teacher #2); students loved video games such as Minecraft and Fortnite and found ways of including game elements in literacy.

Teachers also reported integrating technology in their instruction also gave students, educators, and parents more opportunities for collaboration and communication. All teachers used their Twitter and websites to share school information and specific links to uploaded reading and writing resources, and links to literacy websites and apps. Teacher #6 explained, “they can all be working on the same thing” on the same

documents, and students also were motivated and fascinated by this and even continued projects beyond the school. Parents viewed the classroom through videos and photographs on Twitter and homework was accessed through online resources on the teachers' websites. Students and teachers were able to connect with authors, professionals in the field, and work collaboratively with their peers locally and globally. The teachers used tweets, hashtags, and mentions to connect directly with authors for example, and learning communities who were using the same technology websites and applications.

Some teachers believed confining the concept of technology integration to literacy only was limiting. Teacher #3 remarked using it “goes beyond just learning technology and being able to read”, but teaches “global citizenship”. Although she used technology for literacy instruction, she expressed her reason for using it was not only for literacy but “it’s part of life.” Teacher #5 also believed “I think it needs to be integrated”; she believed there should be a balance, both “paper and pencil” and technology to “truly get the benefit.” All teachers showed students working on projects which integrated all content areas, as using technology allowed integration across the curriculum. For example. Teacher #4’s students corresponded with pen pals around the world using a technology application and integrated this with reading, writing, social studies, and research. Students attended virtual field trips related to topics they were researching in integrated units and skyped with scientists. Teacher #6’s students set up a café, Teacher #2’s students used makerspace activities to recreate objects related to settings, other students made advertisements, video channels: all activities involved literacy and

technology, but took literacy beyond workshop or block models. Teachers believed this was an authentic way to use literacy and technology.

Not all educators believed using technology in literacy instruction was always effective; Teacher #5 acknowledged there was debate about the efficacy of its use. For example, she shared some people believed using the speech to text features in some programs limits students' writing skills. Teacher #6 explained, for example, "a lot of them rely too much on spellcheck" and that had a "negative impact." There were concerns students would rely too much on technology for reading too as the students could have stories read to them. Also, not all students liked reading e-books or online, as Teacher #2 explained.

There was consensus technology should be used with conditions, Teacher #6 insisted it was only a "really good tool" if used correctly. There was a belief there should be a balance between the online and offline literacies. Teacher #2 shared some of her students "don't like reading online", a student wanted to still "smell books" instead. She also shared the "love of reading had gone down" partly because of the time students spent on technology. Teacher #4 also recommended a balance, explaining in the literacy classroom, there should be a balance of "paper and pencil" and technology. She said it was important to consider if using either format was "the best use of my time"; one had to be purposeful in their use of technology.

## **Research Question #2**

*What first and second-order incentives or barriers support or limit teachers' integration of technology?*

Some factors encourage (incentives) and others limit (barriers) teachers' technology integration practices (Ertmer, 1999; Snoeyink & Ertmer, 2002). "First-order" refers to factors that are external such as school-related influences. The "second-order" factors are those that are intrinsic and related to the teacher's personal beliefs and attitudes toward using technology.

The incentives which supported the teachers' use of technology were related to availability, having support from leadership, professional development opportunities, and the perceived positive impact on students. The realization that the world was rapidly changing due to technological advances and the effects of this on the workforce and society were catalysts for technology integration.

One of the first order incentives which encouraged teachers' use of technology was the availability of the resources. Teacher #1 explained, "they always have access to it in my classroom." Teachers had mostly Chromebooks and iPads but had access to numerous digital applications provided by the district.

The students' response to using technology was also an incentive for teachers. The teachers reported students were generally positive about technology integration and excited about using the different programs and websites; Teacher #5 explained, "The thing that drives me to use technology is student engagement." All teachers shared her conclusions and described how technology motivated students and led to a greater output of work, "they're more likely to do more stuff" (Teacher #6). Students found it to be "exciting and fun" (Teacher #6). Technology was also thought to support student achievement, Teacher #1 concluded it helped her students' reading to increase "at all levels."

Student enthusiasm and learning outcomes for using technology were partly attributed to what Teacher #5 referred to as “leveling the playing field.” All teachers reported the impact of technology on making content and output more accessible for students as an incentive. Using technology removed learning “barriers” (Teacher #4) for some students who had special learning needs, and teachers believed this was a significant reason to use technology. This specifically included students who had dyslexia or dysgraphia. Teacher #1 highlighted the features of programs that helped her students who had dyslexia and dysgraphia in reading and writing; Teacher #5 described how the use of technology supported her students’ writing due to multiple ways they could access and show content, “it enables tools that I couldn’t do”.

Using technology also reduces the embarrassment students feel because of the disparities in their abilities and the need to receive extra support. Teacher #5 explained students feeling “embarrassed when they’re pulled out”, and having to ask for help. Technology allowed for personalized learning using audio and visual supports, which the students could use with some anonymity; and “not be left out”- Teacher #6. Another group of students who benefit is students who were ESL; Teacher #6 was motivated to use technology because “it got me to include everybody.” The possibilities for inclusion and support which using technology in the classroom provided were important for teachers.

The ease of using technology was also a factor. Teacher #3 explained, “Teacher “it makes it easier to be a teacher”. Teacher #6 gave the example of being able to upload work for the students quickly to share with parents and students. It facilitated quick

grading and provided immediate feedback to students. Teachers were able to use technology to differentiate instruction and student work efficiently.

The opportunities for collaboration were also considered an important incentive to use technology. (Teacher #6); technology allowed students to work together on projects and the same documents, “I like the collaboration part.” This was on a local and global level, with students, educators, other professionals.

Teachers could connect and communicate with parents quickly and efficiently using technology. They used their websites and Twitter primarily for sharing information with parents. Teacher #6, “I also like that I can connect some stuff for parents, quickly and communicate directly with them.” Teachers used text, videos, photographs across multiple digital platforms to connect with parents and the broader school community.

The technology was changing the world and consequently schools, and the teachers felt this created an urgency and necessity for integrating technology; “It’s like we need to start now”- Teacher #3. Teacher #3 acknowledged “it’s in every aspect of life... it is everywhere now” so it behooved the teachers to implement it. Teacher #4 used technology to help prepare students for a “successful future” through having students being “curious and fluent” about and in using technology, “now”. Teachers are therefore charged with preparing the “21<sup>st</sup>-century learner” as Teacher #1 concluded, for a digitalized future; “I think it’s been great. I can see so much growth in my kids.”

The availability of professional development opportunities about using technology in instruction encouraged teachers’ use of technology. All teachers expressed being members of Cosmic, the district’s technology group was beneficial; Teacher #5 described it as a “huge impact”, “I get to collaborate with... people who actually know a

lot more technology, and I can learn from them.” They learned strategies and about new applications, and collaborated with other members of the group. They attended and presented at conferences, and Twitter was viewed as a tool for learning and collaboration. Teacher #4 summarized the impact, “Every time we went there, we learned something new.” Teacher #3 described taking the technology back to the classroom and applying her new learning. The teachers all used Twitter to connect with their technology group and the other educators, and often shared their use of digital resources on this platform.

Professional development also was related to support from the school and district leadership; “They encourage us” (Teacher #2). Teacher #1 recalled the turning point for the district was about six years ago, “We talked in the district just about going more into technology.” and this marked the beginning of her journey. This was reflected in the training provided for technology learning, the availability of resources, and the expectation for staff to maintain their websites and Twitter accounts. The district paid for the teachers to attend technology conferences. The teachers posted photographs of their attendance on their social media pages. Also, as Teacher #3 showed on her website, her school’s fundraising efforts were to support the purchase of digital devices, site licenses for applications, and teacher training in technology instruction. Principals also permitted teachers to deliver professional development to the staff, “I come back and share it with my staff “(Teacher #1) and to create technology labs to offer support and training to their colleagues.

Changes in the curriculum promoted the increased use of technology. ‘Genius Hour’ for example which is based on students’ interests and integrates different content areas, facilitated technology use. Teacher #1 remarked, “Genius Hour for us has been the

push.” Teaching #3 documented Project Based Learning activities on her Twitter and website, which showed students integrating technology across the curriculum. Also, the learning spaces had changed as students and teachers connected with other digital users beyond the classroom.

The second-order incentives were varied. This included the enjoyment of using technology, Teacher #6 expressed using technology because “I enjoy it.” Teacher #3 agreed and added she was interested in technology and this motivated her to use it. Teachers felt comfortable using technology in their personal lives, so felt comfortable using it at school too. Teacher #5 explained wanting to make sure all students could learn motivated her. She gave the example of technology inspiring her “thinking outside the box” and finding tools that could help her students. She believed like her peers, “there’s a lot of technology support that would enhance” students’ learning and her teaching. Teacher #6 explained, “the more I learn, the more I want to learn more about it.” This also drove the teachers' desire to participate in Cosmic and to share their learning with others. It was evident not only in the interviews but on their Twitter and websites teachers had positive attitudes toward learning. They identified themselves as learners and explained they were learning about technology with and from their students. Teachers expressed awareness and commitment that what motivated them to use technology ultimately was they believed this what the students need to be successful.

The barriers to teachers’ use of technology were time and the availability of resources. Another barrier was students not wanting to use technology for reading and being unable to access technology outside of the school. Teachers also found it

challenging to differentiate instruction to meet the students' needs due to their varying levels of technical knowledge.

A first-order barrier was the limited availability of resources. The teachers advocated for having 1:1 availability or permitting students to bring their own devices to school: Teacher #6 concluded, "I guess the biggest thing is just resources, I don't have a one to one." Teacher #2 suggested, "we should just shut up and let them bring their own device." Schools had the technology, but because students shared them, "it could be kinda difficult to reserve those," -Teacher #4. Also, in some cases, as Teacher #6 explained, over half of her students only had access "on their mom's phone." at home. This meant very limited access to technology outside of school. She explained in her post-interview meeting, this limited the ability for teachers to use technology with their students during distance learning. Access to the technology resources was also limited when parents did not grant permission for their children to use it at school.

The issues of limited availability were exacerbated, as Teacher #5 recounted by the slow "WIFI-speed" or having intermittent internet connection. Also limiting, was the type of technology available. For example, teachers had Chromebooks but there were tools such as the capability to scan QR codes which were not possible. Teacher #5 explained, "there's a couple of tools I wish I could use, but... they don't have the devices." The availability of technology was affected by limited funding; Teacher #1 explained funding was a barrier because "not having enough money is a big problem" which adversely affected their access to technology resources in the school.

Time was also a barrier to technology integration. Teacher #6 remarked, "Time limits everything. But that limits teaching in general." Part of the concept of time being a

barrier was integrating it efficiently, Teacher #3 reflected, “so it supports what I need to do without being a separate thing.” Teachers needed sufficient time to integrate technology into their instruction rather than teaching with it as something separate from the other content areas. Teacher #5 explained she had to “spend time” during literacy instruction to deliver mini lessons on specific technology skills. This took away from her time to teach the actual literacy content.

Differentiation posed a challenge to teachers and limited the efficacy of using technology. Teacher #3 explained it was a myth to believe that because students had grown up with technology that meant they knew how to use it. She believed students had to be taught to problem solve and to use the devices and applications independently. Teacher #1 explained it was difficult to ensure the online resources were at the “right reading level on their device.”

Having the ability to monitor students’ use of technology was a factor that teachers believed limited their colleagues’ use of technology in their instruction. This was connected to some teachers’ fear of using technology, Teacher #2 explained “some teachers are afraid”, as they worried using technology may expose students to “inappropriate things”.

The teachers were disheartened by what they saw as low use of technology in their schools. Even when they offered technology PD for teachers, the attendance was low. Teacher #1 expressed this was true of even communicating about technology integration, “when you send an email most of the time, it doesn’t get read, and it doesn’t get shared.” Teacher #5 concluded, “our biggest barrier to including technology is the

fear of failure.” Whatever the reason, Teacher #1 concluded simply, “we have those teachers who don’t want to” use technology despite the district’s expectation.

The teachers did not express the intrinsic factors that limited their use of technology. They were very motivated to use it and wanted to learn more about using it more effectively. Teacher #3 summarized the challenge they all faced, “I have to find a way to make it fit authentically, and with a purpose.”

### **Research Question # 3**

*How do teachers implement ISTE teacher and student technology standards in literacy instruction?*

Teacher’s self-reported examples of using integrating technology in their classrooms and data collected from their websites and Twitter show how they implement the standards in their literacy instruction. The subheadings from ISTE Standards for Educators (ISTE Standards for Educators, 2017). This section is a summary of the data already discussed individually for each teacher.

#### **Educator Standards.**

**1.Learner: a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.** Throughout the interviews, all teachers described how they implemented technology in their introduction. They reflected on their instructional practices, described student response, the impact of technology integration, and their students' learning, and resource needs. They also discussed their informal goals for extending their knowledge of technology integration which were generally about learning more about specific applications.

**1. Learner: b. Pursue professional interests by creating and actively participating in local and global learning networks.** The teachers were all current or former members of Cosmic, which is a technology group dedicated to digital learning. The teachers also were members of technology learning communities on Twitter. They used the hashtags and mentions to connect with technology groups based on different technology platforms. Teacher #2 and #6 were the members of a Twitter group of educators who delivered professional development on Twitter, local campuses, and at a conference. Teacher #6 also participated in Twitter chats with other educators. Teacher #4 used GridPals a feature of Flipgrid to connect with educators and students globally. Teachers used Twitter to share and promote learning opportunities for their followers. They highlighted PD offered at the district and regional levels and encouraged their peers to participate. Teachers often shared photos of themselves learning about new technology and how they applied them in the classroom.

**1. Learner: c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.** Teachers did not discuss how they use research to guide their instruction. They did however implement their activities from the technology workshops and conferences they attended.

**2. Leader: a. Shape, advance, and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.** Teachers shared their vision for technology learning on their websites and Twitter, at the campus and district levels, and regional conferences. Teachers expressed their goals for technology integration during their interviews and reported building students' capacity to use technology independently and effectively for learning. Teachers created technology labs

on their campuses to deliver professional development to their colleagues. All teachers used their websites to share technology resources with the school community. Some teachers also used Twitter for this purpose, to share photographs and videos of students using technology and using mentions and hashtags of digital applications to communicate with the school community.

**2. Leader: b. Advocate for equitable access to educational technology, digital content, and learning opportunities to meet the diverse needs of all students.** In the interviews, teachers promoted the technology as having the power to meet the diverse needs of their students. They gave examples of how technology could support students who had special education needs including dyslexia and dysgraphia, as well as student reading below the desired reading levels for various reasons. They also acknowledged technology could also be used to extend students performing above the required learning benchmarks. Another group who benefited from using technology were ESL students who were learning English. Teacher #6, in particular, was also cognizant of the limited availability of technology for students from lower socio-economic groups and shared her efforts to remediate the disparities.

**2. Leader: c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.** Teachers modeled technology integration on their campuses. Those who participated in regional conferences also shared their experiences of technology integration. The photographs and videos on their Twitter accounts also showed how they implemented various forms of familiar and new technology in their instruction.

**3. Citizen: a. Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.** The design of the lessons emphasized digital citizenship. Teacher #4 explained how her students were taught digital citizenship by communicating with their online pen pals around the world. Teacher #2 emphasized the importance of ensuring the students' access was safe through monitoring and having the expectations. Teacher #6 was in the process of creating a Twitter account for the students to manage to teach them about digital citizenship.

**3. Citizen: a-d**

This standard related to digital citizenship and training students to manage their data. This also included learning about intellectual property rights. The teachers reported in their interviews they strove to promote choice and exploration in their classrooms with technology. They provided oversight but nurtured students' curiosity and creativity. This was evidenced in the projects the teachers described as well as in the photographs and videos posted on Twitter. Teachers integrated video games into their instruction, designed Project-Based Learning opportunities, and promoted collaborative learning opportunities. Teachers also created learning opportunities for students to conduct video conferences. Teachers did not mention teaching students about intellectual rights and property as detailed in the standards.

**4. Collaborator: a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.** This was shown in the teacher's technology lab on campus, as well as their monthly meetings with the Cosmic group. Teachers were also granted other times during campus PDs to share technology

ideas. They also collaborated with other educators on Twitter. Collaboration was identified as one of their goals of technology integration in their classrooms.

**4. Collaborator: b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.** Students sometimes knew more technology than teachers about technology. Teachers explained teaching using technology changed their roles, it was a transactional process. They were teaching and learning from students simultaneously, and students were learning from each other. Teachers also discussed having the students problem-solving technology issues although the extent of this is unknown.

**4. Collaborator: c. Use collaborative tools to expand students' authentic, real world learning experiences by engaging virtually with experts, teams and students, locally and globally.** Most of the technology tools teachers used with students allowed for collaboration. For example, all the Google applications, and others such as Kahoot and Quizlet, allow students and teachers to collaborate. The use of video conference tools such as Skype, also allowed students and teachers to connect with experts in the field. One of the teachers designed the mascot project which involved students collaborating with students around the world. Students participated in virtual field trips and used Skype to connect with people from countries they were learning about. At one of the schools. the students create a video channel to share learning strategies.

**4. Collaborator: d. Demonstrate cultural competency when communicating with students, parents, and colleagues and interact with them as co-collaborators in student learning.** This involves including students, parents, and colleagues in students' learning journey. Teachers shared details about the specific digital applications they use

to communicate with parents. Their websites served this purpose too, and Twitter. Teachers used print, videos, and photographs to involve parents and the school community. Teachers posted information about school events, routines, schedules, and instructional resources using different formats including photographs and videos.

**5. Designer: a. Use technology to create, adapt, and personalize learning experiences that foster independent learning and accommodate learner differences and needs.** The teachers reported using the different types of technology applications to meet the diverse learning needs of their students. These included students with special learning needs due to disabilities, and for students receiving ESL services. Teachers expressed aligning their instruction with students' interests integrating their interests in gaming, music, sports, technology, and literacy instruction. Students were also allowed to choose different applications to access content and to demonstrate their learning.

**5. Designer: b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active deep learning.** Teachers used technology across different content areas. They did not refer specifically to which content areas standards they were supporting. The standards also refer to using technology to maximize deep learning. Teachers spoke about technology enabling engagement and collaboration, and access, the measures used to evaluate the learning were not mentioned beyond the technology applications. Some of the teachers mentioned developing digital portfolios. Teacher #5 tweeted a photograph on Twitter of her students participating in a virtual field trip and learning about polar bears. This activity could be aligned with ELA, science, and social studies standards.

**5. Designer: c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.** Teachers mentioned using Google Classroom, but it is unclear if the activities meet this criterion outlined in this standard.

**6. Facilitator: a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.** Teachers expressed their goals for students which were broadly related to having students collaborate and become independent users of technology. The process for developing formal learning goals for students was not discussed or noted in the data.

**6. Facilitator: b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces, or in the field.** Teachers appeared to have guidelines and expectations for the use of technology in online learning environments and in the classroom. Teacher #5 for example had a poster of an agreement signed by students for how they learned which was posted on Twitter. Documentation of these guidelines and how they were developed are unknown. Photographs and videos show the students using technology in presentations. On Teacher #2's websites, she posted guidelines for a PBL activity that involved the use of technology. The guidelines were explicit and she provided video examples for the parents and students. These standards also include hands-on activities like makerspace. Teacher #4 shared photographs on Twitter of students completing a literacy nonfiction unit on structures and the culminating activity was of students creating different structures then using writing about it using informational text features.

**6. Facilitator: c. Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.** The teachers created learning opportunities which allowed students to problem solve and find solutions. For example, data from Teacher #2's Twitter showed she facilitated a PBL learning about sustainability. They used technology to conduct research as well as create a PSA. Teacher #3's students were creating a school channel that involved the students creating videos of learning tips, researching the processes, and learning about videography. Students create presentations and also complete coding. Teacher #4's student collaborated with BMX riders via Skype and designed tracks. The degree of integration of technology in the design is unclear. Students used technology to solve math problems and science experiments, which was seen in data from Twitter. This was beyond the scope of this study which focused only on literacy instruction.

**6. Facilitator: d. Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.** Teachers spoke about nurturing creativity, and some evidence of this can be seen in the PBL projects the students created. The extent of their own creative expression using technology is unclear, beyond their website designs.

**7. Analyst: a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.** The teachers used assessment applications for students to share their learning. They reported students were engaged, collaborative, and competitive. Students also used the range of Google Tools and other platforms such as Padlet and Flipgrid to show their work. The reflection processes were not collected in the data.

**7. Analyst: b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.** Teachers described using a variety of platforms for assessments such as Kahoot, Quizziz, and Quizlet. They also used tools such as Google Forms to create digital breakouts. Students responded positively to the instant feedback technology provides.

**7. Analyst: c. Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self-direction.** It was not reported how teachers communicate the progress to the students and parents, and how they used it to inform their instruction.

#### **ISTE standards for students.**

The focus of the study is on teachers' perceptions of technology integration. Most of the data on students' behaviors is therefore based on the teachers' perceptions and reporting. I was unable to conduct in-person observations, which limits the data in this regard. I relied on the photos and videos the teachers posted of the classroom activities and learning behaviors from the teachers' websites and Twitter posts. The headings are from ISTE Standards for students (ISTE, 2016b).

***1. Empowered learning.*** This relates to students choosing their learning goals, evaluating, collecting information from different digital resources, and exploring real-world problems. The teachers reported they gave the students choice in their classroom, for example in the different ways to show their learning. The PBL learning activities are evidence of the students using technology and other resources for real-world situations. Teacher #3 shared in her interviews she challenged her second graders to problem solve

and develop their confidence and competence using technology. Students made presentations; and created digital products. Teacher #2's students used Flipgrid to share their learning goals with parents during conferences. Teachers shared anecdotes of students for example using features of their video games to complete literacy projects. Some students also worked as Tech buddies with the younger students.

**2. Digital citizen.** This refers to students using technology responsibly and safely. There is no confirmation from the data students understanding the tenets of what it means to be a good digital citizen, but the teachers communicated this was an area of instruction. What is available in the teacher's commitment to helping students develop related skills and awareness.

**3. Knowledge constructor.** Students used digital tools for learning. Teachers' reported students using technology to conduct research, create learning videos, PSAs, and complete reading and writing tasks. Students created music tracks for poems and worked on created digital portfolios. Students completed PBL projects which required them to learn about different topics in integrated curriculum units. The standard also includes having students evaluate digital products and their accuracy and credibility. One of the teachers mentioned teaching students about sites like Wikipedia of this purpose. Most of the websites and applications were chosen for safety by the teacher. A site like Symbaloo which the teachers used consisted of safe links chosen by the teachers.

**4. Innovative Designer.** Students use technology in innovative ways to create digital creations and other products. Teachers described students' activities making videos and presentations using different digital tools. Students Skyped with BMX professional riders and worked on projects to create tracks. Teacher #5 shared a video on

Twitter which showed students created advertisements for advertising a school fundraising event. The credits showed the students' names. This is an example of a student-led, creative activity. Students participated in coding activities, created music, and a video channel.

**5. Computational Thinker.** Students use technology for problem-solving and for computation data analysis, and working with automation. Students using coding but that seems to be the extent of them using technology in this way except in Math. While there is Twitter photographic data which shows the students solving digital breakouts in Math, that is beyond the scope of this study.

**6. Creative Communicator.** This refers to using different digital tools for communication and presentation. Students created a channel at Teacher #3's school as part of a project. Teacher #2 gave examples of students choosing tools to show their learning and communicating. Teacher #6 posted a photograph of students making a digital proposal to the principal about a club. These are examples of the application of this standard. Students used a variety of applications, such as communication and presentation. They worked independently and collaboratively.

**7. Global Communicator.** Students work collaboratively with others locally and on a global level. Teacher #4's students had digital pen pals and tracked their school mascot's journey around the world. They learned about different countries and exchanged aspects of Texas with the pen pals. Teacher #3 shared photos on Twitter of the students using a digital application to learn a new language and remarked this made the world smaller, more accessible. Students also Skyped with professionals in the field such as scientists and BMX riders.

## **Summary**

The purpose of the study was to determine elementary teachers' perceptions of technology integration in English and Language Arts instruction. I reported the findings from each teacher- participant's composite data collected the interviews, websites, and Twitter. I presented the findings based on the themes derived from the data and the significant statements which were derived from during analysis for each teacher. I answered the research questions by summarizing the findings already presented.

In Chapter V I will discuss and review the study and findings and the implications for educators. I will also propose directions for future research on technology integration.

## CHAPTER V

### Discussion, Implications, and Recommendations

In Chapter IV, I presented the findings from my analyses of the data. The data sources were semi-structured interviews, the participants' school websites, and Twitter accounts. The individual results were reported for each teacher using the themes which were derived from their composite data. The significant statements from the interviews which were related to each theme were presented, and excerpts from my memo writing which were based on the online data were also included. The research questions were answered using the summaries of the data already presented.

In Chapter V, I present my interpretation of the 'essence' of the teachers' shared experience. This is the final step in a phenomenological study (Moustakas, 1994), in this context, it is to present the teachers' shared experiences of technology integration in literacy instruction. I discuss the findings based on the research questions and the literature, and also within the context of the conceptual framework. Next, I summarize the implications for educators in regards to technology integration and provide recommendations for future research. I summarize the conclusions of the study and provide a summary of the chapter.

#### Overview

The purpose of this qualitative study was to examine elementary teachers' perceptions of technology integration in literacy instruction. The research design used was phenomenology, to study teachers' shared experiences of technology integration. The use of technology is increasing in schools, but there was evidence it was not been used successfully (Spaulding, 2013). Researchers proposed teachers' beliefs are central

to effective technology integration in the classroom (Hutchison & Reinking, 2011; Kim, Kim, Lee, Spector, & DeMeester, 2013). Literacy teachers are pertinent to the study of technology (Labbo & Reinking, 1999; Hutchison & Reinking, 2011) because they set the foundation for the skills students are using in increasingly digitalized activities and spaces across all content areas.

Important to the success or failure of technology integration are the barriers and incentives which are perceived to support or limit the process (Ertmer, 1999; Snoeyink & Ertmer, 2002). The seminal works of Ertmer and her colleagues identified both the external school factors and the more intrinsic variables which influenced teachers' practices. It was an additional focus of this study to examine which factors teachers believed influenced their use of technology. The inclusion of online spaces for data collection is an evolving field in research (Gerber, Abrams, Curwood, & Magnifico, 2017). I used two online data collection sites in this study. There are technology standards from ISTE for both educators and students which can be used to guide the integration of technology. I explored how the activities the teachers reported and the online data were representative of these standards.

### **The Essence of the Experience**

The culminating stage of a phenomenological research study involves creating a synthesis of data, to provide the "essences of the experience" (Moustakas, 1994 p.143). Moustakas provided examples in which the description of the participants' experiences was interwoven with symbolism and metaphors. Using metaphors takes the qualitative researcher beyond simply describing a phenomenon, and can be drawn from the participants' data (Miles, Huberman, & Saldana, 2014). Teacher #5 described technology

as a bridge, and I determined the metaphor of a bridge could be used to conceptualize teachers' perceptions of the phenomenon of technology integration.

Technology integration is a bridge, and teachers, students, and parents- the entire society, are all on a journey, with no horizon in sight. No one knows the full extent of the technology's reach or where it could take us. It is a journey of learning and relearning. The bridge changes the directions and destination frequently. The possibilities for using technology appear infinite and are constantly evolving; participants cannot imagine the future they are preparing the students for, yet they just keep moving forward into the unknown.

The bridge spans and connects the past, the present, and the future. Technology links the instructional strategies and tools of the past, with those of the present, and is preparing students for the future. The teachers envision their roles as the facilitator, no longer gatekeepers of all knowledge and access, but maintaining the flow of movement as students encounter the bridge. They usher students forward, allowing them to be free to explore, choose how they want to learn, and how to show what they have learned using the digital resources at their disposal.

The bridge of technology integration provides access. Access to content. Access to language. Access to future jobs. Local access. Global access. Access to new ways of learning. Access to multimodal resources. Access in the hands of students and teachers. Access to literacy removes barriers. Access creates writers of students who had things to share but who were unable to write to communicate, to express their thoughts and needs. Access gives a visual to words students do not understand. A teacher described it as

providing access to language and meaning. Another explained it helps her include everyone.

The bridge provides access to the other side, to the unknown, against the backdrop of constant change. The most seismic change came in the form of a pandemic. The unknown stokes fears in educators. The bridge is unavoidable, but teachers can choose to stop moving. Teachers can stand still and look backward as students surge forward curious and engaged. Educators feel a loss of control and a dread of what students may encounter.

There is no clear path forward on the bridge, just a lot of movement in different directions. It is unclear where the journey ends. Everyone is choosing a different path, without a clear map. Many questions remain. How do educators know if the students are progressing? What is being lost on the journey? What are the true gains?

The teachers believed their journey on the bridge was transforming their teaching, their thinking, their students, their reading, writing, and communication, and learning: It “most of it I think for the better”- Teacher #4.

## **Discussion of Findings**

### **Research Questions and Literature.**

*Research question 1: What are elementary teachers’ perceptions of technology integration in English and Language Arts instruction?*

The teachers were unanimously positive about technology integration in literacy. This was hardly surprising as they were all members of a group that promoted technology integration. The significance of this is as Spaulding (2013) concluded, teacher’s beliefs influenced the effectiveness of their use of technology. Teacher #1 used the word

‘advocate’ to characterize her views and her participation in the integration process. This is a multilayered word and reflective of the combined experiences of the teachers. They support the use of technology, but the word suggests there are challenges to overcome with its integration, which the teachers indicated there were. It also suggested technology integration was something they had to actively promote. This was true as their efforts to share their skills with their peers were often rebuffed. All of these elements are representative of the experiences of the teachers. Another strong endorsement which Teacher #2 repeated was it is “imperative” educators use technology in their instruction.

The teachers believe they are preparing students for the future, for their careers and life itself. They gave examples from their own lives of people who were finding technology was influencing the types of jobs available, or how technology was changing their jobs. Teachers also reported it has a positive effect on student learning and motivation. Research suggests the factors that influenced teachers’ beliefs and subsequent use of technology were their perceptions of the possibilities and benefits of using technology with students (Christensen & Knezek, 2017). They needed to understand the purpose not only have access to technology.

The teachers’ views that technology integration is important for preparing students for their future careers and life are supported by in the literature. Societal influences such as globalization and increased access to the Internet are some of the catalysts that drive technology integration in schools (Leu et al., 2017). Educators are at a crossroads for deciding if to integrate technology or not (Leu et al., 2011). The cost of not integrating technology was believed to have socio-economic repercussions for students

(Schifter & Stewart, 2010) and could widen the learning and economic gaps (Leu. et al, 2017). It appears the teachers' sense of urgency was not unreasonable.

In the classroom, this translated to teachers' reported use of technology for every aspect of literacy instruction. Reading- students read online books and had digital libraries. Students did book talks and responded to books using applications like Flipgrid and Padlet. They read for different purposes, like research and independent reading, collaborated on projects, and as tech buddies with younger students. Teachers connected with authors on Twitter and used hashtags to promote books. The data from Twitter was very useful in corroborating what teachers reported about reading and technology, and also provided a more comprehensive picture of the teachers' experiences. It was possible to see through the videos and photographs how enthusiastic and engaged students were.

Teachers can choose what they post carefully to tell a particular description, and this is a caution when interpreting the data. Nevertheless, they chose artifacts that showed students reading, and talking about reading with enthusiasm. Technology brought books to life; the students took virtual field trips and participated in video conferences with persons in other countries. They found videos of a favorite author on YouTube and made connections. The teachers explained integrating technology was transforming reading with great learning outcomes, and they were still learning new ways to use it.

These activities correspond with and add to the body of research about using technology for reading. Students used online libraries and enjoyed them (Pearson, 2015), they responded to literature using different applications (Ertmer et al., 2012). In this study, the students used applications like Flipgrid and Padlet to respond to literature, and Teacher #3's students are shown on Twitter using Chatterpix for this purpose. Global

Read Aloud (U.S. Department of Education, 2017), involved students participating in a global book club. This was similar to Teacher #4's students' collaboration with students in several countries using GridPals.

Hutchison, Woodward, & Colwell, 2016) solicited students' perceptions of technology integration, and students identified many of the activities mentioned by the teachers in this study such as using videos, multimodal digital resources to read, and completing assignments, and research. Their study also showed however that using the technology for research did not mean the students were proficient. This is important to consider, as access and engagement using technology may not be synonymous with effectiveness. Teachers talked about assessment tools but we did not discuss to a great extent how they measured the work the students produced using their digital tools.

The teachers reported other educators believed technology could have a negative impact on students' reading abilities. Teacher #5 explained, "the love of reading has gone down" for some students. On reflection, I should have asked her to elaborate more. She did attribute this to other factors in addition to technology. Also, Teacher #6 believed students "abuse the fact they could listen to books online" and consequently "did not read as much." The statement appears contradictory and may call into question what the teacher's definition of reading involves. This was also a statement I should have asked the teacher to clarify. Teachers also reported the expanse of the internet made it challenging to ensure reading online was always at their students' reading levels. Although the teachers were overwhelmingly positive about technology integration in literacy, these examples show they also had some doubts or questions about its efficacy.

Lynch (2015) voiced similar concerns about digital texts. His stance was the interactive features of these resources could be distracting and reduce the cognitive effort the students use to think and read. There was also a concern by researchers and findings which suggested online reading required additional skills (Hutchison et al., 2016). This finding was similar to Leu and his colleagues (2011), who revealed that although reading online provided features that supported students who needed help with reading, online and offline reading and comprehension were not “isomorphic”. They required different skills, although there was some overlap between the two learning environments. The research suggests teachers have to evaluate the digital resources they use for reading to ensure they are truly enhancing reading not hindering students’ progress. It is also important to teach any additional skills students may need to access digital reading resources.

The teachers believed using technology was also effective in teaching writing. Their experience was that it motivated students and allowed them to collaborate. Students used word processing programs with visual and audio supports. They benefited from features such as speech-to-text and spell-check. Students were fascinated by the collaboration features and even worked on independent writing projects outside of school. The imagery of the bridge that Teacher #5 used, was illustrating a writing breakthrough; she explained it is possible to assume students do not want to do something, or perhaps cannot but technology can provide the bridge to enable them to write. The student in question used the features and was now even writing stories at home. Using technology changed the trajectory of the student’s writing experience.

Teachers reported some students with dysgraphia found the audio and editing features of word processing programs provided support for their writing.

The research on the effects of using technology to teach writing has been around for some time. An early study by Karchmer (2001) reported teachers found using technology motivated students to write. Labbo (2006), similar to the idea of the bridge, explained technology provided a scaffold for writers. By 2012, Ertmer and her colleagues were beginning to see writing move beyond the word processing activities to having writing integrated into blogs, presentations, multimedia writing projects. In that study (Ertmer et al., 2012) the teachers concluded using technology allowed them to connect writing to more real-world, and perhaps more meaningful writing opportunities. This research is nearly a decade old, but what it shows is the basic digital features to support students' writing have been available for some time. Yet, teachers in this current study reported some of their peers were reluctant to use technology in fear of stunting the students' writing abilities by causing an overreliance on technology for editing and spelling.

Advocacy also relates to providing access. A dominant theme throughout the data is connected to the bridge anecdote; student access. Teachers asserted repeatedly how using technology made learning accessible to all students. Students with special learning needs such as dyslexia, students who were learning languages, and students who were performing above benchmarks too, all benefit. It is considered valuable for students who need to show their learning in different ways, and benefit from having varied stimuli that technology programs can offer. The audio and visual supports features on applications and online resources, and the ability to change the reading levels of digital content make

it possible for students to read and understand the texts and language more easily. It gives students access to books that are above their reading levels, but they can now access them and not be markedly different from their peers. Teachers also reported these students can participate in discussions more and read more independently. This is very affirming for them.

Teachers believed in connecting learning to students' interests using technology. The gamification of activities was used for both instruction and assessment. Grammar and vocabulary games were common. Some video games are considered suitable for providing engaging ways for students to learn based on their interests (U.S. Department of Education, 2017).

Part of being an advocate was also dealing with factors like, having students who did like reading online, and teachers were frank about this. They gave students the freedom to read offline and emphasized there needed to be a balance between as Teacher #4 explained it, a balance of "paper and pencil," and technology. Also, sometimes the enthusiasm for using the technology reduced the effectiveness of the instruction compared with using pencil and paper. The content was as important as the technology. The teachers always made a point of detailing the literacy and other skills the students were learning, when they mentioned students' technology use.

The focus of the study was specifically on English and Language Arts instruction and teachers who taught this subject. However, one of the perspectives which emerged from the data was the concept of literacy used in the study, and also positioning technology within the concept of literacy limited the understanding of both. While there was still discrete English and Language Arts instruction, reading and writing occurred

across all content areas in the classroom. A lot of the instruction the teachers described, for example, PBL, the café the students created, and Skyping with someone in Australia while learning about nonfiction illustrated a different approach to instruction. Ertmer and her colleagues (2012), also reported students used PBL activities and collaborated with other students. They also saw the integration of literacy and technology across content areas. Teachers in this study shared similar beliefs, Teacher #5, believes technology should be integrated “to truly get the benefit.” Most of the data on Twitter showed students using technology and literacy in ways that were beyond the traditional literacy block activities. They were shown making advertisements, composing music for poetry, making a pitch to the principal, creating a video channel; it looked more like how literacy occurs in real life.

The application of literacy learning in more meaningful contexts is documented in research. Ertmer and her colleagues (Ertmer et al., 2012) mentioned using project-based learning activities and students were working collaboratively, and learning across different subject areas. This was in contrast to another study about teachers’ perspectives of technology integration and suggests progress has been made, Hutchison and Reinking, (2011) showed although teachers believed in the importance of technology integration and using it for what they termed “21st-century skills for literacy” (p. 322), there was a discrepancy between belief and practice. In this current study, the teachers’ three sources of data supported what teachers’ self-reported technology use and beliefs.

What was missing from all the data was a cohesive curriculum. Teachers were often implementing the latest technology application, they learned about on the Internet or from the PDs, but they were all using it for different purposes in varied ways.

Technology seemed to be used in a rather thoughtfully but not in a systematic way that shows progression. Engagement and access for all students were reported as measures of student performance, but how the teachers measure the efficacy of technology use was not obvious. Furthermore, technology use was not used regularly in some schools because of limited resources. One teacher questioned if using technology was always the best use of instructional time, but the barometer to use to determine this was not apparent.

It seemed teachers were measuring literacy skills using technology, and they used a lot of digital games. The ISTE standards suggest there are other skills the students are probably acquiring that teachers may not assess but may be important, for example, digital citizenship. As Teacher #4 observed, communicating and learning about other cultures through video conferencing, teaches students valuable lessons that go well beyond learning to read; it teaches them about life and people.

Overall, the teachers believe technology integration was transforming their literacy instruction in positive ways. It engaged students and provided them with access, and was changing them as educators and learners.

***Research question 2: What first and second-order incentives or barriers support or limit teachers' integration of technology?*** The first-order incentives are the availability of technology resources. All the teachers have access to technology devices and applications although they have to share them. Having support from the district and campus leadership is important, and this is related to having access to professional development opportunities for instructional technology. Teachers' participation in Cosmic is an example of this. The changes in society which are driven by technological advances also influence the teachers and gives them a belief that using technology was

essential for students or they will be ill-prepared for the future. The students' positive response and their perceived student learning achievement were also factors that motivated them to use it. This was especially true of students who had special learning needs, which inspires teachers to try to find digital tools that could make learning more accessible for these students.

Technology also makes it easier for teachers to assess and grade student work and often provide immediate feedback to students. Teachers love the collaboration which the applications afford and the multiple avenues for communication. They can connect with the school community- parents, colleagues, and educators locally and across the globe.

Their intrinsic motivations, the second-order incentives, were fewer than the external ones. Teachers enjoy using technology and feel comfortable with it. They believe technology enhances instruction and learning, and it is essential. Central to these things is a desire to keep learning to be a better teacher. The teachers' online data is the documentation of their beliefs and motivations. This ranges from the tweets about their desire and enthusiasm for learning, to their connections with other educators.

The findings of this study corresponded with earlier research which identified factors that influenced teachers' use of technology. Inan and Lowther (2010) identified the availability of resources as the main incentive in their study, and teachers' technology skills. Opportunities for professional development and teacher's experiences with using technology were also influential (Ritzhaupt & al., 2012), which supports the teachers' view of their participation in Cosmic. Frazier and Trekles (2018) reported teachers' main incentives were having a variety of technology resources, and the opportunities provided for collaboration and differentiation.

The main external barrier to technology integration the teachers reported was time. The limited availability of resources was also cited, and having to share them. This was related to funding issues that limited the purchase and replacement of technology resources. The WIFI services were sometimes unreliable and disrupted technology use. Teachers expressed the challenges of not being able to differentiate the web content and align it with students' reading levels were also barriers to technology integration.

Time was a factor identified in the research. In Hsu's (2016) study, the teachers identified time restraints, limited training, a lack of support as factors as barriers. They also cited the students' skills as a barrier. In contrast, in this research, the teachers did not see the students' lack of skills as a barrier, but an opportunity. Frazier & Trekles (2018) explained teachers reported having insufficient time for planning, the inadequacy of the resources.

There were no personal qualities that teachers believed were barriers to their technology use. It was expected teachers who were in a technology group would naturally want to use it. They did speak however about, as Teacher #1 concluded, "our biggest barrier to including technology is the fear of failure." The teachers traced their journey from fear and reluctance of using technology, to being campus technology leaders. They also attributed their colleagues' limited technology use to fear: fear of student safety online, their lack of knowledge about the devices, and applications. Teacher #6 acknowledged she was motivated to learn more to be able to support these teachers.

### **Research question 3.**

*How do teachers implement the ISTE teacher and student technology standards in literacy instruction?* The teachers and students' activities related to technology

integration were reviewed within the context of the ISTE standards. The educator standards are arranged by the seven different roles the teachers assume as they use technology in their classrooms. The first is ‘Learner’, which is how teachers continue to learn to use technology “to improve student learning” (ISTE, 2016). The teachers’ participation in the Cosmic group is evidence of this. They reported on the opportunities to collaborate and learn new strategies and applications. Their Twitter posts documented their attendance at technology conferences and other similar events and the application of their new ideas. Teachers also acknowledged they were learning from the students. They shared their failures and successes with their students to model the learning process.

The “Leader” guides the technology integration in the school community, empowers students, and advocates for “equitable access to educational technology” in this role. Students were given what teacher #6 described as “free rein” to explore and learn from technology. The teachers also emphasized one of the uses for technology was to support students with special learning needs. Teachers provided professional development at district and regional conferences and led technology labs and other learning events on their campus. The goal of Cosmic is to embed professional development and develop teacher-leaders in technology. During different interviews and post-interviews, they tried to introduce me to new applications, Twitter chats, and encouraged me to join their Twitter groups. It appears this came naturally to them; their enthusiasm and advocacy for ensuring not only students but teachers and parents have access to technology were evident.

ISTE recommended a model of coaching and embedded PD which is similar to the Cosmic structure (Beglau et al., 2011). Beglau and her colleagues acknowledged

there was an increase in online learning communities. The teachers in this study used Twitter and other online spaces for this purpose. Beglau and her colleagues reported these online communities had the potential to change how teachers learn and connect. It is evidenced in this current study that teachers were using the online spaces and connecting with educators around the country and world. The use of hashtags and mentions and Twitter also facilitated this connection.

Teachers were disheartened by the response of some of their colleagues. Teacher #1 referred to it as the “hardest part” of the experience with technology, and Teacher #3 recalled feeling that she was “on my own a little bit.” Attendance at the technology labs was discouraging and their emails were often ignored. Then came the COVID-19, and the schools were online. It ushered in an era of distance learning overnight. Teachers no longer had the option in this district, as Teacher #2 expressed before to “tiptoe into technology.” Teachers were given about 48 hours to begin to provide distance learning opportunities and work from home. Teacher #3 was prophetic when she said in the future people would be able to do their jobs remotely, “a job that doesn’t go to a place.” The digitalized future is now. Teachers #5 and #6 whom I met virtually during the lockdown, reported a significant uptake in attendance at the technology events and in requests for their expertise. They were able to meet and exceed their goals of providing job-embedded PD and having teachers embrace technology integration.

Standard 3 of *ISTE Standards for Educators* (ISTE, 2016) describes the teacher as a “citizen”. The educator is a model of appropriate conduct in online spaces and also creates a culture that reflects these ideals. The teachers were united in expressing the importance of digital citizenship. They modeled this on their online sites, maintaining

professionalism and respect for their viewers. They also shared their eagerness to have students explore technology to satisfy their curiosity and creativity. What this looked like in each classroom was unclear. The teachers did not seem to follow a particular curriculum or set of guidelines. Perhaps having something like this would have helped mitigate the fears of their peers who were worried about internet safety. One of the challenges of distance learning was students were thrust into online learning, some of them without the prerequisite training in digital citizenship. For example, elementary students were provided with emails for the first time. They had not received the training before on how to use emails. Unleashing the full force of digital learning on students without the preparation could be unsafe and ineffective. Yes, they used technology before this time, but the learning aspect was more controlled by the teachers. Teacher #6 is in the process of developing a Twitter account to specifically teach students about digital citizenship, for students to learn “to post to social media positively.”

Teacher #5, in her post-interview meeting, compared the shift to online learning, to the beginning of a new school year. Similarly, to setting up class expectations at that time, she created a new set of class rules for the students based on their online “classroom” on Zoom. She explained the concept of leaving a digital footprint to the students as walking on the beach and leaving footprints there.

The “Collaborator” standard relates to teachers working with the school community, and others on a local and global level. Teachers discussed the opportunities for collaboration technology provided for educators, but also the students and parents. Their online website and Twitter accounts are evidence of teachers’ attempts to collaborate with parents, and they explained using apps such as Remind and Bloomz, and

Seesaw are ways to communicate quickly with parents. The Twitter accounts and websites were public so the parents have open access. The limitation is when parents choose not to use any of the digital resources or permit students to participate. Students can also collaborate with teachers and students even beyond the school, and correspond with persons in different countries.

‘Designer’ involves creating learning experiences and environments where students could learn and apply technology (ISTE, 2016). This refers to differentiating activities for students and also creating digital environments. The teachers showed in their interviews and on their online photographs and videos, that they strove to create a learning environment where students do what Teacher #1 explained comes naturally for them, “being inquisitive and learning new things and exploring.” Teachers also use technology to differentiate for their different learning groups. It was remarkable that even in second grade, Teacher #3 is committed to ensuring students are independent and fearless using technology: “I am going to give the tools... but I am not going to do it for them.”. Her charge to the students was always, “figure it out.” Her students are discovering new things that “I don’t even know and teaching me things.”

Due to the pandemic, all teachers were forced to create the “innovative learning environments” (ISTE, 2016) referenced in the standard. Although students in other contexts had attended online schools, it had never been done on such a comprehensive scale and globally. Also, one would imagine, the designers of those online schools, had more than two days to shift an entire educational system online. Some teachers in the district may have had some training for using technology to support in-person, more traditional contexts, but certainly not to teach it online on a full-time basis. In her post-

interview meeting, Teacher #5 discussed making instructional videos and meeting with students virtually via Zoom as the new online version of the school day.

Teacher #4 recalled one memory from her school days was sitting in straight rows where students sat passively and simply did what the teacher asked. Other teachers contrasted this student and teacher dynamic: Teacher #2's students "take the rein" and teach her and the other students, and Teacher #1's "whole 21st-century learner" actually teaches her "how to use it [technology] and learn new things from each other." This corresponds with the "Facilitator" role described in the standards, who allows students to be accountable for their learning, show creativity, use technology for communication, and use technology across different contexts online and offline. The teachers' model for using technology allows students to use their interests and wonders to guide instruction, Teacher #6 described it as "free rein with monitoring." The teachers' self-reporting and the online data appear to confirm the teachers assumed the role of a facilitator. Teacher #2 explained, "you kinda have to go with what they love, and their interests."

"Analyst" relates to educators using data to inform their instruction and a variety of assessment tools and formats (ISTE, 2016). The teachers used digital tools for assessment and gave students the option of showing their work in different ways. Teacher #2 especially allowed students to use their interests such as video games. Teachers shared anecdotal information about student progress, but it was not evident that they used data to guide their choices of technology resources. This is an area in which could have been explored more deeply in the interviews. The teachers likely used the content area standards to guide their instruction, but it is unclear if they were aware of technology standards or if there was any consistency.

*ISTE Standards for Students* consist of seven strands of skills, knowledge, actions which guide students' use of technology (ISTE, 2016b). I was unable to conduct observations of the students at work, but it is possible to get some data from the teachers' interviews and online sites of their experiences of technology integration. The data collected was inconsistent. There were some aspects of the standards which could not be addressed because I did not ask the teachers specifically about the students' performance, but concentrated on their actions and perspectives as this was the focus of the overall study. The pertinent data I collected although limited can provide some insight into students' experiences.

The standard *Empowered Learner* refers to students assuming responsibility for their learning. The teachers reported giving students choices of accessing content and showing their learning, Teacher #2 explained, "they use a wide variety of choice in my room." This was evident in the collective data. Except for the video games used by Teacher #2's students, it appeared the teachers create the bank of digital tools the students choose from, it was a controlled choice. It is unclear if the students participated in goal setting and evaluation of their progress, which is another part of the standard. The interview questions and data collection did not address this.

The student strives to embody the principles of a *Digital Citizen* (ISTE, 2016b). This is similar to the expectations for educators, following legal and ethical guidelines for online activities. The teachers emphasized the importance of teaching this standard, but the degree of students' compliance is not fully known. Teacher #5 however explained although her students loved using technology they were "not learning the digital citizenship part of it." She was teaching them about it and to "remember you need to

protect yourself.” Teacher #6 was also concerned by the “plagiarism off the internet when we research.” She is working on teaching digital citizenship to the students by having a Twitter account for them to manage with her oversight.

The third standard is *Knowledge Constructor*. This standard ask students to choose resources and use their knowledge to learn and create artifacts and experiences for themselves and their peers (ISTE, 2016b). There was evidence from Twitter and the teachers’ interviews of students progressing in the activities described in this standard. Students used multiple applications to learn content, create new products, and share their learning. Working on units and PBL activities seem to be appropriate vehicles for meeting the benchmarks of this standard. For example, Teacher #2 posted a series of photographs on Twitter that depicted her students' PBL unit on sustainability. The activities included having a video conference with a conservation expert and researching the topic. They also researched using recycled materials and created some new products, and lastly, created a Public Service Announcement (PSA) about the topic. This activity was similar to other projects completed by students. It included the integration of technology across different content areas, literacy, student-led activities, collaboration, and choosing their final product. It also has a real-world application which is also a requirement of the standard.

Students using technology in the design process is the *Innovator Designer* standard (ISTE, 2016b). The sustainability project was multifaceted and is also evidence of this category. It is not obvious how much of the project and the design process is not orchestrated by the teachers, and how much of it is the students’ ingenuity. However, the students are doing the actual work.

Standard 5 is *Computational Thinker* involves using technology for data collection, analysis, modeling, and problem-solving, and automation related activities. The evidence for this was limited. Teacher #3's students completed coding activities. This does not mean the other students were not participating in these types of activities, but it was not apparent in the data.

Students are also expected to be *Creative Communicators* using different technology applications and for varied purposes (ISTE, 2016b). There were multiple examples of students using technology in different ways. They used print resources, graphics, videos, music, to create and share their ideas. Students made a PSA, created a digital channel, made video pitches, created presentations.

*Global Collaborator* requires collaboration using digital tools, and even on a global level (ISTE, 2016b). Collaboration is a recurring theme in all the data. Many digital tools have features that allow users to collaborate. The district uses Google applications, and it allows users to share every product they create. They can work on the same product synchronously which the teacher reported this motivated the students. Students had video conferences with professionals in the field, other students around the country, and the world, and teachers reported they were very engaged.

### **Discussion of Findings: The Conceptual Frameworks**

The conceptual framework used in the study is the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006; Koehler et al., 2013). The framework interweaves what Koehler and his colleagues (2013) refer to as the "heart of good teaching with technology" (p. 14) which are the teachers' content knowledge, pedagogical practices, and technology. Separating these components, in

theory, is possible, but Mishra and Koehler (2006) observed considering any of them in isolation is a “disservice to good teaching” (p.1030). As described in Chapter I, the framework is depicted as a three Venn diagram that shows the dynamic, interconnected nature of these three components and how they are combined into six components (Koehler, Mishra, & Cain, 2013).

TPACK is at the intersection of six interacting knowledge components (Mishra, Koehler, & Cain, 2013) which are used to contextualize this research’s findings. It is helpful to the purposes of this discussion to look at the six components which make up the overall model. The framework could be used in research to examine technology integration, help guide decisions about data collection and analysis, and aid in the interpretation of the findings. (Mishra& Koehler).

*Content Knowledge* in TPACK refers to the knowledge of the subject, in this study, English and Language Arts (Koehler et al., 2013). The teachers described the literacy knowledge skills taught or required for different instructional activities. This suggests they were knowledgeable about the subject. For example, Teacher #2 described the skills younger students should use for analyzing and showing their understanding of fiction texts, such as retelling, identifying the story’s problem and solution. She was making the point, “they can do that digitally”, “There are lessons in there”, meaning the technology could be used to teach these skills. This was representative of the teachers’ analysis of what needs to be taught. The other knowledge and skills teachers referenced were related to reading, writing, comprehension, developing vocabulary, spelling, conducting research, and communicating.

These skills were often integrated, as shown in the PBL activities and the cross-curricular units of study. This component is the foundation of the instruction or the starting point; knowing what to teach.

*Pedagogical Knowledge* refers to the ‘how’ of teaching (Koehler et al., 2013). It includes and is guided by the purpose of instruction, teaching strategies and procedures, and knowledge of how students learn, and how to assess the learning. The teachers in the study employed different types of instructional strategies and several approaches to instruction. Designing learning opportunities that required collaboration seem popular as do student-led activities. Instruction also involves the real-world application of literacy skills and making connections with persons in the field.

For example, Teacher #5 designed a lesson that was documented in Twitter photographs, which involved the students participating in a virtual trip to the tundra. The lesson involved teaching the students to conduct research that incorporated reading, writing, and communicating. In a subsequent post, the teacher tweeted a question about polar bears to a conservation group, as part of the student work. Teacher #5 designs lessons that challenge her to “think outside the box.”

Teacher #4’s project following the school’s mascot around the world also reflects a changing approach to teaching literacy skills. She explained when students communicate with the online pen-pals, she extends it by using “books from that country”, and also “you could tie in summarizing what their video was about.” They also write about Texas by documenting the mascot’s journey. This is very different from instruction which involves having students write in response to prompts or reading about polar bears versus reading and going on virtual field trips. Teacher #2 explained the guiding

principle for instruction was starting with “what they love and their interests before teaching them something.” The teachers appear to be very thoughtful in their design of lessons and choice of instructional activities.

These two components of the TPACK framework and the *Pedagogical Content Knowledge* (PCK) which follows do not refer to or involve technology, but there were few examples in the data, which did not involve the use of technology by the teachers or students. It may be pedagogy now includes digital technologies, not as a supplemental but integrated component of instruction.

*Pedagogical Content Knowledge* (PCK) involves using different instructional strategies and activities to teach specific content (Koehler et al., 2013). It is a challenge finding examples from the data which do not show integrated activities which include technology. An example acquired from Teacher #4’s Twitter account and represented by tweets and a series of photographs does not include digital technology but is still integrated. The teacher was teaching nonfiction texts, but this activity included a makerspace activity too. The students created structures after completing their unit on the topic. This involved research, and learning about nonfiction texts. The next step was for students to write about it and incorporate nonfiction text features. In this one unit, there are many different ways of teaching writing, reading, communicating which are embedded in the lesson design- pedagogy and content.

Technology Knowledge (TK) and the remaining components of the TPACK refer specifically to technology. The original concept encompassed “books, chalk, and blackboard” (Mishra & Koehler, 2006, p. 1027) as well as the digital literacies. The theorists acknowledged in most current work the technologies referred are “newer and

digital” (Koehler et al., 2013, p.13). TK is described as being in a perpetual “state of flux” (Koehler et al. 2013, p.15). This is due to the constantly evolving newer and brighter versions of the last technology tool. It refers to the knowledge of technology – how to operate it, knowing what the parts are and how to manipulate them, creating products, and adapting to the changes.

It was apparent from data teachers were very knowledgeable about technology. They used a plethora of devices and applications across different content areas and learning contexts, and for different purposes. They agreed that the more they learned, the more they need to know. Teacher #1 expressed not knowing how to use technology effectively so that it supported her instruction “without being a separate thing.” Teacher #2 is learning about gamification; “I don’t know anything about Minecraft”, but her student took the rein and “showed the kids.” It may be the teachers do not need to have all the TK; the students may know more; the teacher can facilitate. Teacher #6 learns a lot from collaborating with other educators on Twitter and other online sites.

*Technological Content Knowledge (TCK)* involves understanding the relationship between content and technology; teachers need to know how technology can impact the content (Mishra & Koehler, 2013). It appeared that every aspect of literacy content could be enhanced by the use of technology. Teacher #1’s data is representative of the other teachers’ experiences of TCK. Examining the reading data only, the multimodal nature of digital resources and applications make it possible for students to access content like never before. She concluded the impact is it improves students’ reading abilities. The reading data shows students can access online books. Online libraries like Epic allow teachers to differentiate the reading levels. The books have audio support for the students

who need it, videos, and highlighted text. Reading the same books offline would not have those features and this shows how technology can change the content.

Another example is reading a print book; Teacher #1 read a Patricia Polacco book found videos on YouTube of her which students viewed and made connections. To extend the content even further, the Teacher then Skyped with someone in Australia because it was related to what the children were reading. She stated, “I have seen so much growth in my kids” when discussing the impact of technology on the students.

The sixth component of TPACK is *Technological Pedagogical Knowledge* and refers to how to use technology in instruction and learning (Mishra & Koehler, 2006; Koehler et al., 2013). Teacher #2 shared it was possible to use technology for different purposes throughout the lesson, to start the lesson, to “draw kids in” for practice, and assessment. All the teachers discovered technology made some of the learning barriers go away for many students who struggle to read and write. Teacher #5 referred to technology as the bridge between thinking a student cannot do something, to the other side where the student can do it with the digital supports. It can be transformative. Teachers seemed very aware of how using the technology could change the way students access content, but were also learning from the students. Teacher #1 explained her students were “blown away” by how technology could change how they learn to write for example. Fluency, linked to reader’s theater and repeated reading, was still important, but technology gave a new way of teaching it. Teacher #3’s students used Chatterpix for fluency practice which enables the students to hear themselves read.

TPACK is situated at the intersection of these six components of the overall model. The theorists explained it requires a deep understanding and application of the

“interactions among content, pedagogy and technology knowledge” (Koehler et al. 2013, p.16). The outer circle of the model which shows a three Venn diagram, has a dotted line, to show TPACK does not exist in isolation but in different contexts. The teachers’ data show their instruction and knowledge are aligned with these components of the TPACK. They would admit they have more to learn, they do not regard themselves as experts but rather learning along with the students. Teacher #2 summarized it, “I am using it with them a lot of the times, they are teaching it to me.”

It was a challenge to find data that was not integrated for example to represent the Pedagogical Knowledge. How the teachers teach writing now, is probably going to include technology- used by the teacher or students. Mishra and Koehler (2006) explained the components of the model exist in “dynamic equilibrium” (p.1029) and admit that the components are interwoven. As technology becomes even more available, the lines around each circle in the Venn model may have to be dotted too because they are blurred. Also, the theorists proposed that it is the content that impacts the teacher decisions regarding their choice of pedagogy and technology. I would contend the driving force behind the model, and hence what might be missing is the role of teacher beliefs. The other teachers at the campuses had access to technology and probably the same content but did not integrate technology consistently. Being a member of the Cosmic group was a factor in their use of technology, but they all appeared to share the belief expressed by Teacher #1, “I think it is imperative that we use it.”

### **Implications**

I completed my data collection on March 4th. A week later, the entire school systems across the world changed. The future teachers had mentioned in the interviews

always referred to when the students graduated from high school or college, at least seven years in the future. One teacher even predicted jobs would no longer involve going to a place. Suddenly the future was now. The COVID-19 pandemic arrived. The Zoom faculty meetings on Monday and online distance learning began the next day. It was as if Pandora's box had opened. Everyone, regardless of their knowledge of technology, the students' access to technology, having a curriculum, or all students having access to technology, everyone began teaching online. The times are surreal and uncertain. This is the context of the implications of the study.

All teacher-participants had access to technology devices and applications and used them for literacy instruction. What was missing was a curriculum framework for integrating technology. The second-grade students were using the same applications as the fifth graders. The teachers use technology and they appear to use it in innovative and engaging ways, but a curriculum would help with ensuring progression and consistency. If there is a focus on the skills, and not on the applications, it may not be an issue when the technology changes, as it was likely to do.

The technology teachers in schools may have a curriculum because Texas has technology standards. Most of the students' use of technology however happens in the classroom. The teachers provide minilessons in technology before having students apply it in a content area. This takes away from instructional time.

Having a curriculum or a guideline of focus skills for each grade level would be helpful. There are hundreds of digital applications that are suddenly available for teachers to use. Many designers are sharing applications for free. There is training provided by the districts to support technology instruction, but there are many applications to choose from

to try. If there were skill-based guidelines it may help teachers choose what is best for their students.

There is an urgency to this call for a curriculum or learning plan for technology integration. Technology changed due to the COVID-19 pandemic, certainly the availability of unfamiliar applications and new instructional purposes and procedures. For schools participating in distance learning at a moment's notice at the onset of the COVID-19 pandemic, it was unlikely plans were available to guide instruction. With an uncertain future that may involve at the minimum a hybrid model of online and offline schooling, the onus is on district managers to create viable plans to guide educators' use of technology. The challenge is this has never done before on this scale.

The teachers provided anecdotal evidence of the impact of technology on student achievement. There were consensus students were highly engaged and likely to complete their work. Technology was often used for assessment. Rubrics would probably be useful in guiding student work completed on the different applications. Also, if a student had difficulty with the technical aspects of the assignment, the results may not reflect their true ability related to the content. Also, teachers should consider what the application is measuring. A game could be engaging and fun but may ask for a basic recall, when the teachers may want the students to demonstrate higher-level skills which may require analysis and inference.

The use of digital portfolios may help to document student performance. If students are using technology to complete assignments, there should be a way of saving the work for accountability and some consistency in assessment. The current move to distance learning due to COVID-19 also poses challenges for assessment; digital

portfolios may be a way of documenting students' participation and progress. The digital format allows for the use of multimedia forms of documentation.

The teachers expressed concern that many of their peers were not using technology. Now they are, but if a teacher's skills were minimal and now, they are using technology for instruction, the learning outcomes may not be great. Technology resources and support are available, but there seems to be a disconnect, which the teachers attributed to fear, lack of training, or not believing in the efficacy or benefits of technology integration. The teachers reported many of their peers are now asking for support and participating in technology labs. This is good news. Going forward, it is incumbent on the leadership to create buy-in or clear expectations of technology integration in instruction: what it should look like in teaching and instruction, with an emphasis on the vertical alignment of skills.

While it is true more teachers are using technology for distance learning, this does not necessarily mean they all believe in its efficacy. It also does not mean technology is being used to its potential. This is an area for support for teachers as this digitalized era of schooling progresses.

What can happen if there is no coordination of technology integration, is some students will be disadvantaged. Students are already at a disadvantage if they were attending schools where not all students were receiving the same access to technology, through innovative ways of teaching and learning. This COVID-19 pandemic revealed across school districts, the disparities which existed between different groups of students. Thousands of students do not have access to technology at home. There is research from over a decade sounding the alarm about these inequalities related to technology that

exists between socioeconomic groups (Labbo & Reinking, 1999; Leu et al., 2017). Leu and his colleagues warned of students being doubly disadvantaged; the learning gap can be further exacerbated by the technology gap. This added to the challenges of teachers adapting to this new era of virtual schools with little preparation can be disastrous for students.

Perhaps districts can establish a system of loaning devices to students. The other is an issue is some of these students may not have access to Internet services. There can activities like technology clubs. One of the teachers opened her classroom early each day so her students who did not have technology at home could have access at school.

Teachers' ideal classrooms involved students having 1:1 technology access, perhaps bringing their devices to school. The challenge to this is if devices need to be updated or replaced frequently. If not one to one, school leadership should consider increasing the availability of devices for students when they return to the classroom.

Digital citizenship should be a priority for students and the information should be shared with parents. This was one of the teachers' concerns. Now the students are online more than ever, their safety and ability to analyze the credibility of online content is paramount.

Teachers used their websites to share technology applications and websites with parents. This can be something all parents can have access to. Teachers can provide workshops for them so they could learn how to support the students' use of technology.

The Cosmic group model appears to be very successful in motivating the teachers to implement technology and use it in creative ways. One of the participants believes everyone should receive the same training. This is a cohort model with embedded PD on

the home campuses should be something the district continues, but consider inviting more participants each year.

### **Recommendations for Future Research**

The study examined teachers' perceptions of technology integration in elementary schools. It would be useful if this study is replicated, to recruit teachers from the lower grades in elementary schools, as well as the middle and high schools. It can provide some data for comparisons. The experience of technology integration may be different for teachers of much younger and older students. Also, students can participate in future studies to determine their perceptions of technology integration.

The ISTE standards were used in this study, but teachers were not asked specifically asked about implementing them. I would recommend including direct questions about how teachers use the standards or alternative guidelines to implement technology in their instruction. This could provide data for teachers on how to interpret and apply the standards.

Twitter and the teachers' website provided valuable longitudinal data on technology integration. Further studies of using teachers' online sites to document teacher instruction and student work are recommended. Also, the teachers in the study used online sites for professional development. Examination of how educators use online spaces for this purpose merits further study.

The COVID-19 pandemic has evoked a major shift in learning and teaching and highlighted the strengths and disparities which exist within the school systems. Research on different aspects of the experience, including distance learning and its impact on students and teachers, would be valuable.

**Conclusion**

The elementary teachers' perceptions of technology integration in English and Language Arts were positive. They believe technology provides students access to content in new and engaging ways. It can remove the learning barriers for students who have different learning needs so they can read, write, and communicate more effectively. There are multimodal resources and experiences for students, which provides them with multiple ways to show their learning and make connections beyond the classroom. The availability of technology and professional development are incentives that motivate teachers to use technology. Limited resources and insufficient time limit their use of it. The teachers' data showed they implemented the ISTE standards in the instruction. The teachers believe it is imperative to give students access to technology to prepare them for future careers and an increasingly digitalized world.

**Summary**

In this chapter, I used a metaphor from the data to describe the essence of the teachers' shared experience of technology integration. I summarized findings related to each research question and the related literature. I discussed the findings based on the conceptual framework and summarized the implications of the research findings. I provided recommendations for future studies and conclusions.

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## APPENDIX A

# ISTE STANDARDS

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## FOR EDUCATORS

### *Empowered Professional*

#### 1. Learner

Educators continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning. Educators:

- a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.
- b. Pursue professional interests by creating and actively participating in local and global learning networks.
- c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.

#### 2. Leader

Educators seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning. Educators:

- a. Shape, advance and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.
- b. Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.
- c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.

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#### 3. Citizen

Educators inspire students to positively contribute to and responsibly participate in the digital world. Educators:

- a. Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.
- b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.
- c. Mentor students in the safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.
- d. Model and promote management of personal data and digital identity and protect student data privacy.



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#### 4. Innovative Designer

Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions. Students:

- a. know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
- b. select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
- c. develop, test and refine prototypes as part of a cyclical design process.
- d. exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

#### 5. Computational Thinker

Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students:

- a. formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
- b. collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
- c. break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
- d. understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

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#### 6. Creative Communicator

Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals. Students:

- a. choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
- b. create original works or responsibly repurpose or remix digital resources into new creations.
- c. communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
- d. publish or present content that customizes the message and medium for their intended audiences.

#### 7. Global Collaborator

Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally. Students:

- a. use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
- b. use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.
- c. contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
- d. explore local and global issues and use collaborative technologies to work with others to investigate solutions.

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## APPENDIX B

### Letter of Consent

Dear Teacher,

I am a doctoral candidate in Literacy at Sam Houston State University. I am conducting a study under the direction of Dr. Melinda Miller to determine elementary teachers' perspectives of technology integration in literacy instruction. I am asking you to participate in an interview, and to be observed in your classroom. I will also view your public online sites if available. The results will be reported in a dissertation that I will complete as a requirement of my graduate program.

You will be asked to describe your experiences and opinions about technology integration. You will also be asked about your years of teaching experience, subjects and grade levels taught, and your highest degree obtained. The interview will take about 30-45 minutes and will be audio-recorded. The classroom observation of you using technology in your instruction will last 30 minutes and will not be audio or video recorded. To qualify for this study, you must be a past or current member of the [REDACTED] program and teach English and Language Arts in grades K-5.

Your participation in this study is voluntary. If you decide to participate, your responses will be anonymous - that is, recorded without any identifying information that is linked to you. If you have any questions regarding this study, please contact me at [REDACTED]@gmail.com. You can also contact my dissertation chairperson, Dr. Melinda Miller at [REDACTED]@shsu.edu. If you have any questions regarding your rights as a participant in this study, or to report research-related problems, you may call the Institutional Review Board at SHSU for information, at (936) 294-4875, or

irb@shsu.edu.

- I Agree to participate in this study.
- I Do Not Agree to participate in this study.

Thank you for your time!

Respectfully yours,

*Chanelle Maynard*

**APPENDIX C**

## Interview Protocol

Date: \_\_\_\_\_ Duration: \_\_\_\_\_

Participant #: \_\_\_\_\_

Years of Teaching Experience \_\_\_\_ Grade level: \_\_\_\_\_

Subjects taught: \_\_\_\_\_

- 1) Describe your personal use of technology.
- 2) Explain your beliefs about the role of technology in the school and in literacy instruction.
- 3) Tell me how you think students should be allowed to use technology in the classroom.
- 4) Explain how you use technology devices and/or programs for teaching English and Language Arts in your classroom.
- 5) Tell some of the things which encourage the use of technology in your teaching.
- 6) Tell me about factors which you believe limit your use of technology in your instruction.
- 7) What do you think the impact of technology is on student learning?

## APPENDIX D

IRB-2019-298 - Initial: Limited IRB Determination

Date: Oct 5, 2019 3:46 PM CDT

TO: Chanelle Maynard Melinda Miller

FROM: SHSU IRB

PROJECT TITLE: Elementary Teachers' Perceptions of Technology Integration in English and Language Arts Instruction

PROTOCOL #: IRB-2019-298

SUBMISSION TYPE: Initial

ACTION: Exempt - Limited IRB

DECISION DATE: October 4, 2019

Greetings,

On October 4, 2019, the Sam Houston State University Institutional Review Board (IRB) determined the proposal titled Elementary Teachers' Perceptions of Technology Integration in English and Language Arts Instruction to be Exempt with Limited IRB Review pursuant to 45 CFR 46. This determination is limited to the activities described in the Initial application, and extends to the performance of these activities at each respective site identified in the Initial application. Exempt determinations will stand for the life of the project unless a modification results in a new determination.

### **Modifying your approved protocol:**

No changes may be made to your study without first receiving IRB modification approval. Log into [URL], select your study, and add a new submission type (Modification).

### **Study Closure:**

Once research enrollment and all data collection are complete, the investigator is responsible for study closure. Log into [URL], select your study, and add a new submission type (Closure) to complete this action.

### **Reporting Incidents:**

Adverse reactions include, but are not limited to, bodily harm, psychological trauma, and the release of potentially damaging personal information. If any unanticipated adverse reaction should occur while conducting your research, please login to Cayuse, select this study, and add a new submission type. This submission type will be an adverse event and will look similar to your initial submission process.

**Reminders to PIs:** Based on the risks, this project does not require renewal. However, the following are reminders of the PI's responsibilities that must be met for IRB-2019-298 Elementary Teachers' Perceptions of Technology Integration in English and Language Arts Instruction.

1. When this project is finished or terminated, a **Closure submission** is required.
2. Changes to the approved protocol require prior board approval ( **NOTE:** see the directive

above related to **Modifications**).

3. Human subjects training is required to be kept current at [citiprogram.org](http://citiprogram.org) by renewing training every 5 years.

Please note that all research records should be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact the Sharla Miles at 936-294-4875 or [irb@shsu.edu](mailto:irb@shsu.edu). Please include your protocol number in all correspondence with this committee.

Sincerely,

Donna M. Desforges, Ph.D.  
Chair, Committee for the Protection of Human Subjects  
PHSC-IRB

**VITA**  
**CHANELLE MAYNARD**

**Education**

Sam Houston State University, Ed.D. Projected: August 2020

*Principal Certification Leadership Program*, Lamar University, Beaumont, Texas, 2015.

Master of Education *Advanced Literacy Instruction*, Concordia University, Austin, Texas, 2011.

Master of Science, *Child Health Multidisciplinary Therapy*, University of Southampton, Southampton, United Kingdom, 1999.

Bachelor of Arts, *Special Education*, Kean University, New Jersey, 1994.

**Texas Teacher Certifications and Qualifications**

Instructional Leadership Development (ILD) Certificate - Lamar University

Principal, EC-12

Reading Specialist, EC-12

Elementary Reading, Grades 4-8

Special Education, EC-12

English as a Second Language (Supplemental) EC -12

**Professional Experience**

Adjunct Instructor - Sam Houston State University, Huntsville, Texas, 2019

Academic Lead Teacher – Literacy, Bear Branch Elementary School, Texas, 2011-Present

Special Education Teacher, Bear Branch Elementary School, Kingwood, Texas, 2008-2010

Teacher, Ealing Council, London, United Kingdom, 1998-2007

Reading Specialist, Department of Education, Montserrat 1995-1996

### **Peer Reviewed Conference Presentations**

Landreth, S., & Maynard, C.S. (2020, October). *Struggling Readers...or Middle School Leaders. Fostering fluency and confidence through Engaging and Authentic Intervention*. Accepted for presentation at the International Literacy Association (ILA) Conference, Columbus, Ohio.

Maynard, C.S. (2020, February). *Literacy Reboot: Technology Integration and the new English and Language Arts TEKS*. Presentation at the Texas Association for Literacy Education (TALE) Conference, University of Texas Permian Basin, Odessa, Texas.

Maynard, C.S., & Seay, S. (2019, March). *Oh, the Places They'll Go: Integrating Technology in Literacy Instruction*. Presentation at the Texas Association for Literacy Education (TALE) Conference, Baylor University, Waco, Texas.

Maynard, C.S. (2018, February). *Writing outside the lines*. Presentation at the Texas Association for Literacy Education (TALE) Conference, West Texas A& M University, Canyon, Texas.

Young, C., Stokes, F., & Maynard, C. (2017, November). *Adding depth to readers theater*. Presentation at the Association of Literacy Educators and Researchers (ALER) Conference, St. Petersburg, Florida.

Maynard, C.S. (2017, October). *Dinosaurs and zombies: Using student interests to design intervention activities*. Presentation at the Joan Prouty Conference, Sam Houston State University, Huntsville, Texas.

Region 4/ Maynard, C. S. (2014, June). *Writing across the curriculum*. Presentation at the Humble ISD Summer Professional Development program, Kingwood, Texas.

Region 4 / Maynard, C. (2014, June). *Questioning to increase rigor and relevance*. Presentation at the Humble ISD Summer Professional Development program, Kingwood, Texas.

Maynard, C. (2012, July). *Teaching comprehension strategies to special education Students: Access, instruction and resources*. Presentation at the Access to the General Curriculum (AGC) Institute, Region 4, Houston, Texas.

### **Manuscripts**

Maynard, C.S., & Young, C. (2018). *The results of using a traits-based rubric on the writing achievement of third grade students*. Manuscript submitted for publication.

### **Professional Membership**

*International Literacy Association (ILA)*

*National Council of Teachers of English (NCTE)*

*Texas Association for Literacy Education (TALE)*