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Perspectives of Teachers on the Use of Technology Within the Preschool Experience

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This is to certify that the doctoral study by

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Walden University
2023

Abstract

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EdS, Walden University, 2022

MS, University of North Dakota, 2016

BA, Butler University, 1984

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Due to the increased use of technology in people's lives, digital media literacy has become increasingly more important in young children's early experiences. When used appropriately, children discover how to use digital media in ways that enhance their learning, preparing them for the positive benefits of technology use across their lifetime. The problem investigated in this study is that preschool teachers reported they did not use technology within the preschool experience. The purpose of this study was to explore teachers' perspectives on technology use within the preschool experience. The conceptual framework for this qualitative study was developmentally appropriate practice. The research question addressed how teachers describe their use of technology within the preschool experience. Nine participants were purposefully selected from licensed early childhood programs that represented diverse settings. Data were collected through semi-structured interviews with nine teachers. Data were analyzed using inductive coding. Results revealed that most teachers use technology within the preschool experience, though teacher philosophy and access to technology influenced the degree to which technology was used. Most teachers expressed how they integrated technology into children's play, which enhanced and extended children's engagement in culturally and contextually relevant experiences. This study has implications for positive social change through increased access to technology, and additional professional development opportunities.

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Dedication

I dedicate this journey to my family, who never stopped believing in me, even when I wanted to give up. To William for his unwavering confidence in my ability to achieve this dream, and for the many nights and weekends he unselfishly reminded me that studying was a priority, even when it meant our time was limited together. To my brother, John, whose intelligence and educational success inspired me more than he knows. To my mother, Jocelyn, and father, Marvin, who taught me to value higher education, and to persist, even when faced with seemingly insurmountable challenges. Daddy, I only wish you were here to celebrate this journey with your "pumpkin."

I also dedicate this journey to those who doubt their intellectual capabilities and stamina to pursue their dreams, especially later in life. Believe in yourself. I encourage you to make a leap of faith. Take the first step, and then the next one. Be persistent but give yourself grace when life happens – as it will. You *can* do it!

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Chapter 1: Introduction to the Study

Preschool teachers' meaningful and appropriate use of technology enhances whole child development and promotes skills like digital media literacy (Lauricella et al., 2020). In their newly released position statement on developmentally appropriate practice, the National Association for the Education of Young Children (NAEYC; 2022) promotes the intentional and responsible use of technology and interactive media as a tool used to support learning for children over the age of 2. Despite the benefits that technology affords children's engagement in culturally and contextually relevant play-based experiences when intentionally used, teachers are reluctant to use technology because of their philosophical beliefs, while others do not have access to technology.

Integrating technology within the preschool experience requires that teachers do so in developmentally appropriate ways. I used NAEYC's (2022) Developmentally Appropriate Practice (DAP) as the conceptual framework to understand how teachers use technology within the preschool experience. Understanding how teachers use technology within the preschool experience might help to create learning pathways for teachers who are reluctant to use technology due to philosophical reasons. Findings from this study may lead to funding for state-funded programs that lack access to technology and targeted professional development related to the benefits of technology within the preschool experience.

Chapter 1 provides insight into the topic of this study, the problem, the purpose, and the potential social change implications of this research. I also describe the

conceptual framework used to guide this study and address the limitations of this study. Finally, I will present potential social change implications and contributions to the field, related to the findings of this study.

Background

Digital media literacy has become a fundamental skill needed for young children's success in school (Lauricella et al., 2020). Due to the increased use of technology in people's everyday lives, young children must learn how to use technology in meaningful and productive ways. Learning these skills at an early age provides digital media literacy that influences children's future learning experiences in school and beyond (Lauricella et al., 2020). When technology is intentionally integrated into children's preschool experience, it becomes an instructional tool for teachers to enhance literacy comprehension, evaluation, creativity, inquiry, and exploration (Lauricella et al., 2020).

Preschool experiences that include technology and interactive digital media positively influence early math skills, physical-perceptual and motor development, scientific inquiry, early literacy learning, and pro-social development. A study conducted by Shoshani et al. (2022) discovered that 3.5-year-old children who played an interactive game using a pro-social game app, showed a statistically significant increase in helping behaviors like sharing, comforting, and offering encouragement, as opposed to those who either played a game with violent content or neutral game content. Another study found that children were more likely to participate and sustain their engagement in physical activities including an obstacle course when music and image technology were used (Lee et al., 2021). Using individual hand-held tablets with unique user logins and QR codes

directing children to engage in hands-on activities in their learning environment, Mowafi and Abumuhfouz (2021) found an increase in children's counting, quantifying, and connecting numerals to quantities scores, when compared to the control group.

Preschool teachers are not using technology that could provide children with valuable and beneficial experiences. This lack of technology use is limiting their exposure to it. This study was needed because preschool-aged children in the targeted location of this study are not gaining the digital media skills required for school success. Furthermore, my findings may have implications for the discipline and positive social change such as explicit and targeted professional development interventions that increase the number of children who experience technology in the preschool learning environment, and equity gaps that may exist when children do not learn how to use technology in meaningfully and appropriate ways.

Problem Statement

The problem under investigation in this research study is that preschool teachers reported they do not use technology within the preschool experience. NAEYC's (2022) DAP was used to understand how teachers use technology within children's preschool experience. Technology has increasingly become relevant to daily living in our society, and therefore significant to preschool experiences (Rideout & Robb, 2020). The problem under investigation is current and relevant because technology can be an instructional tool used to strengthen whole child development, including digital media literacy (Lauricella et al., 2020; NAEYC, 2022). The foundations of digital media literacy begin in the early years, as young as three years of age (NAEYC, 2022). When used

appropriately, technology and interactive digital media support the development of the whole child (Paciga & Donohue, 2017). Creative experiences with technology and interactive digital media in the presence of responsive adults, can promote preschool aged children's dispositions for learning, such as confidence, curiosity, collaboration, perseverance, resilience, and reflection (Jack & Higgins, 2019).

Though there is a wide range of research pointing to the benefits technology affords within the preschool experience, there are teachers that report having strong feelings about why they do not use technology, illuminating the problem that informs this study. Teachers stated that philosophically they felt technology use in the preschool classroom does not align with their hands-on pedagogy.

Kewalramani and Havu-Nuutinen (2019) discovered that using an iPad for parent communication and their own research when creating science experiences for children, was helpful, however including children in the scientific research did not align with their hands-on philosophy. A study of eight countries, including the United States, found that early childhood teachers preferred traditional, hands-on experiences with materials other than technology and outdoor play because they viewed technology as interfering with play-based learning (Slutsky, et al., 2021). Additional evidence in recent literature supporting the gap in practice will be presented in Chapter 2.

Purpose of the Study

The purpose of this study was to explore teachers' perspectives about technology use in preschools. Through a basic qualitative approach, the intent of my study was to explore how teachers use technology within the preschool experience. To address the

purpose of this study, I conducted nine semi-structured interviews to gather teachers' perspectives on their use of technology in the preschool experience.

Research Questions

This study addressed the following research question:

RQ - How do teachers describe their use of technology within the preschool experience?

Conceptual Framework for the Study

The phenomenon that grounds this study is the exploration of teachers' use technology within the preschool experience. The purposeful integration of technology to extend children's learning and build essential skills like digital media literacy ensures children are prepared for school and beyond. The conceptual lens that framed this study is NAEYC's (2022) DAP. The key elements of DAP related to this study include the recommendations for technology use with children over the age of 2, and the theoretical underpinnings of teaching to early childhood learning including constructivism and sociocultural theories. NAEYC's DAP leans on the research and theories of child development including those of Dewey, Piaget, and Vygotsky. Fundamental to DAP is the role relationship-based exploration plays in children's co-construction of knowledge and meaning-making, within the context of children's cultural and linguistic backgrounds (NAEYC, 2022).

Preschool teachers need to consider a child's family and home culture, including their values, beliefs, and important people in their lives, to effectively use digital media for learning in the classroom. Understanding these factors is crucial to their pedagogical

approach. This has implications to preschool teachers' planning of digital media use for learning because children's prior experiences with digital media use may vary widely, depending on factors including equitable access to digital media or adult perspectives of digital media use on play and learning (NAEYC, 2022).

Fundamental to DAP is the nature of children's development. Development in one domain influences development in another domain (NAEYC, 2022). Through social interactions with others, children experience a dynamic process of growth and learning. During play, children progress from their current level of understanding to that which is developing and towards independence and finally proficiency. Vygotsky described this time in a child's development as the zone of proximal development (ZPD). When a child is in their ZPD, they are ready to move to the next level of understanding but can only do so with the support of someone who possesses that level of knowledge (Palincsar, 1998). The concept of scaffolding during social interactions with others is derived from the notion that children acquire greater understanding when they are engaged with others during their explorations. This has implications for digital technology use in the classroom. Teachers' integration of technology within the classroom must include a social component to be beneficial to children's learning.

Because DAP describes the importance of technology use in the preschool experience and outlines its appropriate use to promote digital media literacy, DAP is the most appropriate conceptual framework to illuminate the study question which is to explore teachers' use of technology within the preschool experience. Chapter 2 will address in greater detail the key elements of NAEYC's (2022) DAP.

Nature of the Study

The purpose of this study was to explore teachers' perspectives about technology use in preschools. This research study was a basic qualitative study using semi-structured interviews, field notes and a reflexive journal to illuminate the research questions. This design was best suited for my study because I sought to understand the perspectives of teachers on their use of technology within the preschool experience. Seeking to understand the multiple ways teachers might use technology in the learning environment requires a researcher to learn first-hand the thoughts and perceived experiences that relate to the phenomenon of this study (Creswell, 1998; Creswell & Creswell, 2018).

Using purposeful sampling, nine teachers from different preschool settings (home daycare, center-based childcare, Head Start, and Great Start Readiness Programs (GSRP) were selected to share their perspectives on how technology is used within the preschool experience. Criteria for participant selection included teachers who work with preschool aged children and who were not enrolled in the early childhood graduate program where the researcher teaches.

I conducted digitally recorded, semi-structured virtual interviews with each participant, one-on-one using Zoom. I used follow-up questions and probes to facilitate deeper conversations that uncovered rich, nuanced data related to the research question (Rubin & Rubin, 2012). Zoom interviews were recorded to ensure details of the conversations were captured. I developed open-ended interview questions that encouraged participants to share in depth, nuanced information about the ways they use technology within the preschool experience. Narrative data obtained from video recorded

interviews were transcribed. I used a two-cycle coding process to look for emerging themes, which served as initial a priori codes (Saldana, 2016). Through an extensive, reflexive, and iterative intercoder agreement process, additional codes emerged and were applied to the data. During dialogic and reflexive data analysis, relationships between categories and the conceptual framework naturally emerged, which illuminated answers to the study's research question. Using a dialogic and reflexive approach to coding and data analysis strengthened the trustworthiness of study findings, as did the intercoder agreement process (Cheung & Tai, 2021; Ravitch & Carl, 2016).

To strengthen transparency, I recorded researcher notes as memos in a reflexive journal, noting variations that occurred during the study, and documenting any researcher bias that may have been present (Creswell, 1998; Creswell & Creswell, 2018). Chapter 3 will reveal more information about the data collection process and analysis.

Definitions

Below are definitions of key concepts and constructs sed in this study:

Adverse Childhood Experiences (ACES) – experiences young children may have been exposed to such as abuse, neglect, food and housing insecurity or attachment disorders, which can negatively impact the trajectory of a child's healthy growth and development (Jackson et al., 2019).

Active learning – children's exploration of the people and objects around them that facilitate co-construction of knowledge within a sociocultural context (NAEYC, 2022).

Center-based childcare – A childcare program serving young children under the age of eight, which is either governmental or non-governmental, not located in a primary or secondary school setting (Michigan Department of Licensing and Regulatory Affairs, 2018).

DAP – a guiding document developed by early childhood experts and informed by research which influenced the creation of the position statement on DAP by the NAEYC. DAP defines high quality, research-informed practices for teachers of children, birth through age eight (Copple & Bredekamp, 2009). The NAEYC's DAP statement has gone through four revisions, with its most recent revision completed in 2022. NAEYC's (2022) current version of DAP serves as the framework for this study.

Digital media – a generalized term referring to computers, laptops, tablets, interactive white boards, smartphones, cameras, audio and video recorders, software applications, internet, television, gaming devices, e-books and virtual communication software or applications (Paciga & Donohue, 2017).

Executive function (EF) – a set of higher order cognitive processing skills that develop rapidly in the preschool years which include inhibitory control, delayed gratification, working memory and cognitive flexibility (Diamond, 2013).

GSRP Program – A government funded pre-K program in Michigan, serving children ages of 4 and 5. GSRP programs may exist within a childcare center, Head Start program, or in a school (Michigan Department of Education, 2021).

Guided play – young children's self-directed active play, which includes teachers' intentional scaffolding of learning (NAEYC, 2022).

Home daycare – A family or group daycare program in a person's home, which is licensed by the state (Michigan Department of Licensing and Regulatory Affairs, 2018).

Overlapping - the developmental concept that young children's development in one domain, influences development in another domain (NAEYC, 2022).

Preschoolers – a group name for children between the ages of 3 and 5 years old (Copple & Bredekamp, 2009).

Pedagogy – the instructional strategies teachers use to individualize and promote growth and learning (NAEYC, 2022).

Technoference - a term used for the background noise of televisions (Barr et al., 2018).

Tools of the mind (ToM)- skills relate to the process of cognitive development such as observing and understanding the different perspectives others have (Konok et al., 2021).

TPACK – a decision-making framework describing the three types of knowledge teachers must possess for effective instruction- T = technology, P = pedagogical, C = content, K = knowledge (Koehler et al., 2009).

Zone of proximal development (ZPD) – a theory proposed by Vygotsky that describes the period when a child is unable to achieve the next skill or knowledge level without the scaffolding from a capable other (Palincsar, 1998).

Assumptions

It was assumed that the study participants would accurately report the setting they taught in, and whether they were currently completing their early childhood graduate

degree where the researcher teaches. These were identified in the selection criteria. Narrowing the participant sample based on the selection criteria helped to ensure the study data accurately reflected the aim of the study (Ravitch & Carl, 2016). A second assumption was that participants would honestly portray their lived experiences using technology and digital media with preschoolers. The integrity of participant responses was essential to the integrity of study findings. To strengthen study findings, I used member checks and recordings of the interviews, to verify the accuracy of participant responses, prior to the coding process (Ravitch & Carl, 2016). Member checks provided participants the opportunity to check for accurate interpretation of the expression of their lived experiences (Lincoln & Guba, 1986).

Scope and Delimitations

The aspects of the research problem addressed in this study included the exploration of preschool teachers' use of technology within the preschool experience. The boundaries for those participating in this study included preschool teachers from private childcare centers, state funded GSRP, Tribal preschools, home childcare centers, early childhood special education preschools, and federally funded Head Start programs, who live in a midwestern region of the United States. Interviewing participants from different early childhood settings added different perspectives to my study, strengthening its trustworthiness (Lincoln & Guba, 1986).

Selection of participants for this study came from communities in the Midwestern United States. Participants did not participate in the study if they did not sign an informed consent form. Participants were interviewed virtually, using Zoom. Interviews were

digitally recorded through Zoom and stored securely on my computer. Interviews were transcribed, and member checks used to validate the integrity of participant responses. Triangulation was used in the coding process, and rich-text narratives illuminated the lived experiences of participants as they related to the study phenomenon (Lincoln & Guba, 1986). Intercoder agreement was used to strengthen the results of data analysis.

Unlike quantitative research, where researchers aim to generalize findings from one data source to replicate with another, qualitative researchers seek to understand how participants experience a specified phenomenon based on their unique context, rather than transferability (Creswell & Creswell, 2018). This study aimed to gain deep rich and contextualized information about the ways teachers use technology in their preschool settings.

Limitations

The limitations of this study related to the participant sample size and the location of those participants, and the qualitative design relative to transferability. This study was limited to eight to 10 participants within a region of the same geographical midwestern state. The nine participants from this study do not represent all teachers that use technology with preschool aged children, nor do they represent any region beyond the study's identified geographic area. Additionally, transferability is limited because of the nature of the qualitative design. To address this limitation, however, I obtained contextually rich data from preschool teachers in the target area, which may represent the ideas of other teachers in similar settings.

Significance

Incorporating technology into preschool education is beneficial for children's overall development, and it enhances their digital media literacy, which are crucial factors for their success in school and life (Lauricella et al., 2020; NAEYC, 2022). Technology use can be both detrimental and beneficial for children's growth and development (Barr et al., 2018; Paciga & Donohue, 2017). This study adds to the current literature addressing how teachers use technology within the preschool experience. This study supports interventions that lead to increased access to developmentally appropriate technology for all early childhood programs, including state funded GSRP, and targeted professional development leading to teachers' understanding of the varied ways technology can be integrated into preschool to extend and enhance contextually and culturally relevant experiences. Positive social change could result when there is an increase in the number of children exposed to meaningful and appropriate technological experiences which elevate whole child development, including digital media literacy.

Summary

This chapter presented the study's topic, the need to conduct the research, and possible social change implications. A gap in practice related to teachers' use of technology within the preschool experience was identified. Background information was presented, as was the conceptual framework of NAEYC's (2022) DAP, which guided this study.

Chapter 2 will present literature on child development as it relates to the potential risks and opportunities technology experiences present for young children's growth and

development. Also, the literature review will address how teachers use various pedagogical influences when using technology; these will include DAP, the Fred Rogers Approach, and TPACK. Chapter 3 will reveal the methodology used for this study.

Chapter 2: Literature Review

Introduction

The problem under investigation in this research study is that preschool teachers report they do not use technology within the preschool experience. Using technology and digital media with young children can benefit children's learning, but it can also have adverse effects if teachers use it inappropriately. The purpose of this study was to explore teachers' perspectives about technology use in preschools. The literature review provides a synthesis of the study's conceptual framework, the research goals and related concepts and variables. The literature review will present research findings about technology use on child growth and development and the benefits it affords within the preschool experience. The literature review will address the gap in practice on technology use within the preschool experience.

This qualitative study aimed to understand the phenomena of preschool teachers' use of technology with the preschool experience. The following question guided the study: How do teachers use technology with the preschool experience?

Literature Search Strategy

The literature review for this study was conducted using the research databases within the Walden University Library. I examined peer-reviewed journal articles, white papers, books, and position statements within the past 5 years. The search engines and databases I used included Academic Search Complete, Education Source, ERIC, Google Scholar, ProQuest, and Sage Journals.

The keywords and phrases I used to search for relevant resources included: *early childhood education, preschool, digital media, technology, early childhood pedagogy, early childhood instructional strategies, early childhood teaching strategies, developmentally appropriate practice, DAP, DAP and digital media, active learning, DAP,* and *technology,* I frequently used a combination of words to refine my searches.

Conceptual Framework

For this study I chose the conceptual framework of NAEYC's (2022) DAP. DAP is a pedagogical framework used by early childhood educators to inform all aspects of their teaching. DAP is grounded in nine principles of child development and learning based on extensive theory and research (NAEYC, 2022). Together, the nine principles guide teachers' pedagogical decision-making in the early childhood classroom. Because of its emphasis on principles of child development and learning that influence teaching practices in the early childhood classroom, DAP was an appropriate framework to explore teachers' use of technology with the preschool experience The study framework will specifically focus on the principles of DAP.

DAP Principle #1: Environmental and Biological Influences on Development

One of the principles of DAP is the interplay between biological and environmental influences on young children's growth and development. Young children's development depends on multiple environmental factors including the early relationships they form with important others in their world, adult responsiveness, culturally affirming experiences, sleep, nutrition, stress, and trauma (NAEYC, 2022). Through the dynamic growth and learning process, the architecture of the brain grows when a child engages in

culturally affirming, responsive interactions with others. In contrast, when a child lacks meaningful and responsive interactions with others or endures prolonged toxic stress due to trauma, the child's developing brain suffers (National Scientific Council on the Developing Child, 2020).

DAP Principle #2: Interconnected Development

DAP promotes the theory that learning across and within developmental domains is interconnected. Described as *overlapping,* young children's development in one domain, such as a child becoming mobile, influences development in another domain, such as the child who is mobile can crawl to an object and explore its attributes, enhancing cognitive and physical development as well as approaches to learning (NAEYC, 2022). Teachers who realize that growth in one domain influences and is influenced by other domains assume pedagogies that enable integrated learning across the curriculum. For example, when teachers take children outside on a nature walk, bringing digital media to record observations might foster learning in the domains of cognition (reflecting on photos taken of insects), social-emotional (waiting one's turn to use the iPad to record a video), early literacy (using photos taken to create a story) or science (recording one's hypothesis about the tadpole they just observed).

DAP Principle #3: Play and Development

Central to DAP is the concept that play is the optimal vehicle for young children's learning. NAEYC (2022) describes joyful play as being "the glue that connects integrated learning across content areas" (p. 33). When children are engaged in playful learning, they are intrinsically motivated to explore their curiosities and find answers to their

questions with the intentional support of their teacher. Playful learning is enjoyable and therefore sustains children's engagement in meaningful experiences that promote learning across multiple domains (NAEYC, 2022). Recent research identifies two types of play; they are free play (self-directed play) and guided play. Unlike free play, guided play includes teachers' intentional scaffolding of learning within children's active learning. Studies show that children learned more vocabulary and spatial skills in guided play versus free play (Toub et al., 2018).

Integrating digital media within children's play has the potential to extend and sustain their engagement. Fantozzi (2021) found an increase in children's participation in story making when given access to an iPad with a story making app. Children were seen playing independently with their peers, creating a story that they had complete control over making.

DAP Principle #4: Culture and Context Cause Developmental Variations

Although children's development occurs in a predictable pattern, variations occur that influence individual differences. Children's cultural and linguistic contexts as well as their prior experiences and abilities affect their patterns of growth and development (NAEYC, 2022). DAP proposes that early childhood educators consider the complex backgrounds of children so they can provide the proper support for children's full participation in the early childhood classroom. Building strong relationships with families and regularly observing and documenting children's progress are essential in the individualization of learning (NAEYC, 2022).

DAP Principle #5: Learning Requires Active Engagement

One of the fundamental principles of DAP is the concept that learning requires children's active engagement with the people and the world around them (NAEYC, 2022). Examples of a child's active engagement might be using technology or digital media to take food orders in the dramatic play area or a child taking a photo and sharing what they did during worktime with their peers. In contrast, passive learning might be sitting at desks and naming objects on digital flashcards or listening to a teacher on a video, describe the life cycle of a frog.

Children's interactions with others and with the objects in their environment are impacted by cultural and family norms. For example, families might not allow their child to use any technology or digital media at home, or they may not have access to technology or digital media. Knowing children's home experiences gives teachers a glimpse into how best to promote technology and digital media use in the classroom that respects children's home values.

DAP Principle #9: Technology Use Can be Beneficial to Learning

The last principle of DAP is that technology, when used appropriately and intentionally, may enhance learning and development (NAEYC, 2022). Integrated within the learning environment, technology offers opportunities to bridge children's home environment to the school learning environment, and to deepen children's experiences. Using the guidelines set forth by DAP and the joint position statement from NAEYC and Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College (2012), teachers should feel confident using technology to enhance learning.

Research Application of Developmentally Appropriate Practice (DAP)

DAP has been applied to earlier research on teaching pedagogy in early childhood education. According to Mohamed and Al-Qaryouti (2016), DAP was an appropriate framework to investigate preschool teachers' pedagogical beliefs and their influence on teaching practices. Mohamed and Al-Qaryouti (2016) found that the more experience teachers had, the stronger their beliefs were about the principles of DAP, which resulted in the higher frequency of DAP as a pedagogical tool in the classroom. Additionally, a recent study by Barnes (2022) used DAP as their conceptual framework to explore the National Board of Certified Teachers' perspectives on DAP and how they inform practices in the classroom. This was an appropriate framework for this study because it aimed to explore the phenomenon of teachers' use of technology.

This research study uses DAP as its framework because of the alignment it has to a complex and large body of research which characterizes teacher behaviors that most optimally promote learning and development. Using the principles of DAP as a framework will illuminate how preschool teachers use DAP to guide their pedagogical decision-making when using technology and digital media.

Literature Review Related to Key Concepts and Variables

Researchers found that preschool teachers use screen tablets and interactive applications to promote children's collaborative storytelling (Abderrahim & Plana, 2021), shared reading (Neumann, 2020), vocabulary development (Dore et al., 2019), alphabet knowledge (Elimelech & Aram, 2019), comprehension (Moon et al., 2020), categorizing, numeric and quantifying skills (Mowafi & Abumuhfouz, 2021), and to foster social

interactions (Shoshani et al., 2022). A body of research shows how technology and digital media may enhance learning and align with theories of whole child development if it is integrated within an active, socially rich, play-based environment (Lafton, 2021). How teachers use technology and digital media in the classroom may impact children's growth and development either positively, or negatively, depending on the pedagogical strategies teachers employ when using technology and digital media with young children (Barr, 2019).

Technology and Digital Media Use on Young Children's Development

Understanding the impact technology and digital media may have on children's development will reveal why it is important for teachers to intentionally plan how they will use digital media in preschool settings. Next, a review of the literature related to the potential risks and opportunities of technology and digital media use on children's healthy growth and development will be presented.

The findings from researchers' studies point to the potential risks technology and digital media use has on young children's development of EF (Cliff et al., 2016), cognition (Dale et al., 2020), language (Essex et al., 2022), psychosocial health (Tamana et al., 2019), and physical and sensorimotor skills (Jackson et al., 2020). Reasons for the potential risks are proposed in the literature.

The use of technology and digital media may inhibit responsive interactions between a child, an adult, and their peers, which may have detrimental effects on healthy growth and learning (Bochicchio et al., 2022). Responsive relationships and interactions with others play a critical role in language development, EF, and psychosocial

development (McNeill et al., 2019). The foundations of early literacy are built on children's emerging communication skills. For example, as children experience the back and forth of responsive interactions with others, they are beginning to understand that communication is a back-and-forth exchange between themselves and another (Bochicchio et al., 2022). If technology and digital media inhibit interactions between a child and others, they are missing important experiences that precede early literacy learning.

A body of research also points to the negative implications that persistent, high levels of technology and digital media use (more than 2 hours per day) have on children's development, with some bringing up concerns about the content, features and pace of programs affecting delayed gratification, inhibitory control, attention, cognitive flexibility, processing, working memory, and social and private speech (Suggate & Martzog, 2020). Additional concerns have been raised about the sedentary nature of technology and digital media use on physical and psychosocial health (Hauck & Felzer-Kim, 2019).

One of the aspects of this study was the connections made when technology was integrated into children's experiences, which extended children's play, leading to development, including EF. EF is a set of higher order cognitive processing skills that develop rapidly in the preschool years but begin forming during the infant years (Corkin et al., 2021). EF plays a key role in school readiness (McNeill et al., 2019). EF skills are described on a range from cool to hot, depending on the intensity of emotional reaction a child demonstrates to external stimuli (Rideout & Robb, 2020). Hot skills are related to

pro-social skills and involve intense emotional reactions to stimuli, whereas cool skills are cognitively related, and emotionally neutral - meaning that children will not react with emotion (Corkin et al., 2021, p. 2). Hot skills include delayed gratification and inhibitory control (Rideout & Robb, 2020). Children's competency in hot skills helps them focus on cognitive tasks, thus playing an integral role in children's cognitive development (Rideout & Robb, 2020). Cool skills enable cognitive development and include working memory, response to distractions and cognitive flexibility (Li et al., 2018). Cognitive flexibility enables children to shift perspectives and attention from one task to another while minimizing distractions and drawing on their working memory to connect and integrate thoughts and ideas, needed to construct new knowledge.

The developing brain experiences a critical period of growth between the ages of 3 and 6 years old (Diamond, 2013). During the early years, the architecture of the brain is formed through interactive experiences with important and responsive adults in the child's world (National Scientific Council on the Developing Child, 2020). As children experience serve and return interactions with adults in the context of self-directed exploration and play, the synapses of a child's brain fire, creating neural connections that build the structure of the brain (National Scientific Council on the Developing Child, 2011).

Understanding what the literature reveals about the role technology and digital media plays in young children's emerging EF was an important aspect of this study's aim, which was to understand how teachers use technology in the preschool experience. Next,

I will address the literature related to the potential risks of technology and digital media use on young children's development of hot and cool EF skills.

Inhibitory control allows children to delay gratification and manage their emotional and physical reactions when rewards they desire, require them to wait (Corkin et al., 2021). When a child controls their impulses, they are more apt to display greater attention to a task. When children focus on a concept, task or skill, their learning is strengthened. Researchers suggest a connection between the development of hot skills and technology and digital media use (McArthur et al., 2020), which has significant importance to this study.

McNeill et al., (2019) conducted a longitudinal study of 3 to 5-year-old children (*N = 185*) who attended preschool in Australia to determine the relationship between the development of EF and psychosocial development, and traditional (TV) versus contemporary technology and digital media (electronic apps) exposure. An assessment of EF occurred as a baseline prior to the intervention, and data were subsequently collected twelve months later.

The results of the study indicated an association between high doses of program viewing and increases in externalizing behaviors twelve months later (McNeill et al., 2019). In contrast, the study sample of preschoolers who experienced high doses of an interactive, age-appropriate app, demonstrated lower inhibition scores twelve months later (McNeill et al., 2019). Researchers suggested that program viewing may have a greater negative impact on children's (hot) EF than contemporary apps do (McNeill et al., 2019). McArthur et al., (2020) found comparable results in their study.

One of the three aims of McArthur et al.'s (2020) study was to determine what, if any association there was between patterns of screen media use and children's behavior and learning outcomes between the ages of 24 months to 60 months. Parents were recruited to self-report data related to their child's behavior and screen media use at three points in their child's development - 24 months, 36 months, and 60 months (McArthur et al., 2020). The researchers found that high persistent screen media use was associated with significantly higher levels of externalizing behaviors by the last data collection period (McArthur et al., 2020). Another study conducted by Tamana et al., (2019), aimed to determine if there was an association between 5-year-old children's screen time use and their externalizing behavior. Using the Child Behavior Checklist (CBCL), a positive correlation was found with parents' reported screen time. Tamana et al., (2019) defined screen time use as 2 hours per day for 5 years or 1 hour per day for 3 years. Using multiple logistic regression, Tamana et al., (2019) found that there was an increase in externalizing behaviors for children whose screen media use exceeded more than two hours per day. Additionally, researchers from the current study indicated that children who viewed screens more than 2 hours per day were 5.9 times more likely to show inattention than those of the same age who viewed screens for 30 minutes or less (Tamana et al., (2019). Tamana et al. (2019) also found that children who viewed screen media more than 2 hours per day had an increased risk of ADHD by 7.7-fold (Tamana et al., 2019).

Another concern brought up by researchers in the literature is the negative impact technology and digital media may have on children who have experienced adverse

childhood experiences (ACES), like abuse, neglect, food and housing insecurity or attachment disorders. ACES can negatively impact the trajectory of a child's healthy growth and development (Jackson et al., 2020). ACES causes children to experience stress (Jackson et al., 2019). When the body experiences stress, it responds by signaling the stress response system, which responds by releasing the hormone, cortisol. Cortisol brings balance back to the body's biological system (National Scientific Council on the Developing Child, 2020). If a child experiences prolonged stress due to trauma, then the body's stress response system remains heightened, causing it to continually release cortisol into the system. When a person's system is continually flooded with cortisol, it can be toxic and harmful to the developing brain and other biological systems (National Scientific Council on the Developing Child, 2020).

Jackson et al., (2020) conducted a quantitative study on the potential association between children's frequency of daily screen media use and each participant's ACES exposure. Jackson et al., (2020) categorized technology and digital media use as light (less than 2 hours per day), moderate (2 to 3 hours per day), or heavy (more than 4 hours per day). Jackson et al. (2020) found that youth with 4 or more ACES were 3 times more likely to engage in heavy technology and digital media use (Jackson et al., 2020). Because heavy use of technology and digital media may negatively impact children's development of (hot) EF skills, the researchers from this and other similar studies (Grajewski & Dragan, 2020), illuminate the importance of teachers' appropriate pedagogical planning for technology and digital media use in the preschool classroom.

Working memory and cognitive flexibility are both skills that advance cognition (Diamond, 2013). Dependent in part on the development of hot skills like attention and inhibitory control, working memory and cognitive flexibility enable children to use the mental representations to comprehend new situations, skills, or concepts (Rhodes et al., 2019). Researchers posit that programming that includes fantastical characters or is fast paced (such as cartoons) or has built in interactive features unrelated to the storyline (in e-books), negatively impacts children's inhibitory control, working memory and cognitive flexibility (Rhodes et al., 2019).

Rhodes et al., (2019) conducted a pre-post study to determine the effects of watching a cartoon on EF in 5- and 6-year-old children, with a sample of 80. Using a pre-post design, Rhodes et al., (2019) found a positive association between viewing a cartoon and a child's diminished working memory, cognitive flexibility, and planning. The potential reasons for the findings suggested that children's processing skills were overloaded from the fast-paced nature of a cartoon, and that the fantastical characters challenged children because they could not connect what they knew about animate beings to the characters in the programming (Rhodes et al., 2019). Another researcher found different results when the programming was moderately paced.

Huber et al., (2018) found an improvement in working memory of 96, 2- to 3-year-old children who engaged in an *interactive* educational app (EduApp) (Huber et al., 2018). The app was moderately paced and did not include cartoon-like fantastical characters. The same study found no significant difference in working memory when children *viewed* an educational app (EduTV), suggesting that the active nature of an

interactive educational app (EduApp) had a positive effect on working memory, but simply viewing an educational app (EduTV), had neutral effects on working memory (Huber et al., 2018). Huber et al.'s (2018) study findings align with the notion that children's active engagement in learning, including engagement with technology and digital media content, is critical to children's healthy growth and development (NAEYC, 2022).

Fundamental to the development of EF and all domains of development is the co-construction of knowledge that occurs in children's active play with their peers and adults (Copple & Bredekamp, 2009). Children's use of technology and digital media may inhibit the social interactions necessary for meaning making, which could impact development. Next, I will present a review of literature related to the potential impact of technology and digital media on interactions between children, their peers, and adults.

One of the underlying principles of DAP is that children learn in the context of social interactions with their peers and adults (NAEYC, 2022). Aligning itself with social constructivism, NAEYC (2022) supported the theories of Vygotsky which found that children's social interactions with peers and adults are essential to their continued growth and development. Coined, ZPD, Vygotsky suggested that children reach a time in their development when they are unable to perform a skill without the scaffolding support from a capable other (Abderrahim & Plana, 2021). My review of literature cautions people's use of technology and digital media with young children because it could impede the social interactions needed for children's proficiency in skills, concepts, and knowledge that they are not yet performing on their own (Stockdale et al., 2022).

For example, Konok et al., (2021) conducted a cross-sectional study aimed at determining if preschool children's mobile technology screen use was positively associated with ToM skills. ToM skills relate to the process of cognitive development such as observing and understanding the different perspectives others have and identifying falsehoods (Konok et al., 2021). ToM skills require well-developed social-emotional skills – a result of social interactions with others. The results of Konok et al.'s (2021) study found that preschool children who used mobile technology devices demonstrated lower ToM skills than those who did not. Konok et al., (2021) suggested that the lack of social interactions during children's mobile technology use during their research study could explain their findings. This theory aligns with other researchers' findings on the negative impact technology and digital media has on young children's socio-cognitive, social-emotional, and language development (Bochicchio et al., 2022).

Bochicchio et al., (2022) researched the effects of technology and digital media tools versus traditional physical materials on preschool aged children's private speech during an activity. Vygotsky's (1978) concept of egocentric speech, links children's inhibitory control to their internalized self-talk. More recently called private speech, children use internalized self-talk to regulate their reactions to challenging situations and is also attributed to language development (Bochicchio et al., 2022). Bochicchio et al., (2022) study revealed there was a decrease in private speech when children used technology and digital media to complete an activity, as opposed to completing the same activity using traditional physical materials. The results of this study shed light on the multiple implications technology and digital media use may have on preschool children's

development, suggesting teachers must pedagogically plan with intention to avoid unintended consequences of technology and digital media use in the classroom.

Despite the negative effects technology and digital media may have on children's social interactions with others, researchers from multiple studies highlight the opportunities digital media affords, when used appropriately (Przybylski & Weinstein, 2019). In the next section, I will present a review of the literature on the opportunities digital media has on preschool children's engagement in activities that promote development.

There are benefits to using technology and digital media to motivate preschool children's engagement in motor activities that build dynamic balance, hopping and jumping skills (Lee et al., 2021), and to foster pro-social skills such as empathy, sharing and collaboration (Shoshani et al., 2022). Evidence of early literacy learning like alphabet knowledge, vocabulary, and phonological awareness (Dore et al., 2019), storytelling (Fantozzi et al., 2018), and comprehension (Altund, 2021) are evident in the current literature, reinforcing the opportunities technology and digital media has on early literacy learning. There are opportunities for early math learning (Ng, 2021), scientific investigation (Awang et al., 2020), and working memory (Yang et al., 2020) when technology and digital media is carefully assessed and used appropriately in socially engaging contexts (Sung & Chen, 2018).

Using interactive screens and developmentally appropriate apps can benefit early literacy learning in preschool aged children. For example, Sung and Chen (2018) conducted an experiment with 5 and 6-year-old children (N = 24) using multimedia and

printed books to determine if and what differences in child engagement in reading and story comprehension occurred with and without adult scaffolding. Three conditions were applied to the study sample as they engaged in three story book readings. One condition was participation in an interactive storytelling game with adult scaffolding; another condition was participation in an interactive storytelling game without adult scaffolding; and the last condition was participation in an interactive storytelling game (Sung & Chen, 2018). Sung and Chen (2018) found no statistical significance between the three applied conditions and children's retelling two of the three stories; however, for one story, there was a statistical significance found between increased accuracy in story retelling when adult support was present in both the printed and media versions of the interactive storytelling game (Sung & Chen, 2018). Two explanations for these findings were discussed by the researchers in this study.

Sung and Chen (2018) proposed that the design of the interactive storytelling application used in their study included interactive features such as zoom shots and animations intentionally related to the storyline. The researchers posited that these interactive features aided children's understanding of the story line because they did not distract them because the features related to the story line. This explanation is in line with other researchers who found that interactive features related to the story line within educational apps act like the scaffolding of an adult during shared reading, promoting children's comprehension and engagement (Moon et al., 2020).

Sung and Chen (2018) also suggested that their research findings could also be explained by the cautious number of animations and interactive features in the design of

the app so as not to distract or overload children's processing of the story line (Sung & Chen, 2018). The intentional design considerations for Sung and Chen's (2018) app used in the study is important to mention, as additional studies link children's processing difficulties due to cognitive overload to technology and digital media content with loud bells, whistles, animations, and fast paced programming (Bus et al., 2015). This can lead to diminished comprehension. If the content design of technology and digital media is thoughtfully created, then children's learning can be enhanced through the intentional integration of technology and digital media across the curriculum.

An experimental two-part study conducted by Shoshani et al., (2022) compared preschool aged children's pro-social behaviors after viewing an interactive touch-screen game focused on real-life situations that would engage children's empathy and helping behaviors versus violent or neutral content. Researchers found that children's helping skills increased after interacting with the interactive touch-screen game that contained real-life scenarios, in comparison to the violent games viewed (Shoshani et al., 2022). Shoshani et al.'s (2022) research findings align with other researchers who reinforce the importance of developmentally appropriate practice in the design of content and interactive features of an educational app (Altund, 2021). Additional studies point to positive learning outcomes when children are actively engaged with others when using technology and digital media.

Next, I will present literature related to technology and digital media use for learning by preschool aged children in the context of active, inquiry-based experiences that include social interactions. Technology and digital media offer a myriad of

opportunities for young children to explore their indoor and outdoor worlds using interactive technology and digital media such as tablets and open-ended apps in the social context of peers and adults (Kirkorian et al., 2019). Researchers argue that interactive tablets and open-ended apps within social contexts can promote and extend children's play (Hatzigianni et al., 2018), introduce and reinforce scientific inquiry (Fridberg et al., 2018), inspire and promote concepts of drawing (Kirkorian et al., 2019), enable creative representation (Lowrie & Larkin, 2020), nurture peer and adult collaboration (Yelland, 2018), promote language and communication, (Furman et al., 2019), reinforce cognition and problem-solving skills (McGlynn-Stewart et al., 2020), motivate outdoor physical activity, and encourage environmental education (McGlynn-Stewart et al., 2020). The literature on interactive technology and digital media confirms what constructivist theorist, Vygotsky (1978) claims that children's active exploration and subsequent meaning-making require social interactions between the child, adults, and their peers within their ZPD.

For example, Fridberg et al., (2018) examined preschool children's verbal communication during science activities as they explore the various phases of water, using timelapse photography and Slowmation- a video technique created to describe a scientific process or concept. Fridberg et al. (2018) built on the research of Pramling and Carlsson (2008) who claimed there are multiple means of sense-making that a child engages in to understand emerging current ideas, skills, and concepts. Fridberg et al. (2018) introduced four different means of demonstrating scientific concepts – through group discussions, stimulated recall in groups, production of a Slowmation to represent

the concept, and an experiment using time-lapse photography. Fridberg et al. (2018) found that communication types, process, and reflective communication – were apparent between children when they collaboratively engaged in the video producing app feature called Slowmation on a tablet. Fridberg et al. (2018) also found that the most communication amongst children occurred during the stimulated recall (with an adult) which included the time lapse photographs.

The type of communication during the stimulated recall with time lapse photography was primarily reflection scaffolded by an adult who helped them synthesize scientific concepts occurring during the children's investigations (Fridberg et al., 2018). This study reinforces the importance of social interactions in the recall and oral recall of lived experiences (Fridberg et al., 2018). These findings align with other researchers' findings, revealing the instrumental role social scaffolding plays in promoting learning during young children's engagement with open-ended technology and digital media tools and apps (Awang et al., 2020).

Researchers from present studies point to the opportunities technology and digital media has in early childhood curricula to augment traditional tools and activities. When used appropriately, technology and digital media can enhance children's understanding of the scientific inquiry process both indoors and outdoors, can be a meaningful tool to promote collaborative investigations or documentation of discoveries in nature (McGlynn-Stewart et al., 2020). A three-year study of five- to six-year-old children's use of iPads and open-ended apps in the outdoor environment found promising opportunities for technology and digital media use outdoors.

McGlynn-Stewart et al. (2020) found that as children and teachers became more proficient and confident with the tablet and apps used in the study, children's play experiences deepened. For example, McGlynn-Stewart et al. (2020) found that children's socio-dramatic play, nature-based explorations, discoveries, and documentation of nature-based processes were strengthened when using an interactive tablet and open-ended app. Additionally, McGlynn-Stewart et al. (2020) found an increase in children's peer collaboration as well. For example, children used tablets to make dance videos, and then view and critique their dance videos to revise and improve on their dancing and subsequent video quality (McGlynn-Stewart et al., 2020). Other children used the tablets to take photos of nature and processes that occur in nature, reflecting on what they observed and subsequently compiling books (McGlynn-Stewart et al., 2020). Researchers from this study provided examples of pedagogical opportunities and considerations when preschool teachers plan technology and digital media use for learning. Next, I will discuss the key pedagogical guidelines and frameworks influencing early childhood teachers' approaches to technology and digital media use for learning.

Pedagogical Approaches to Technology and Digital Media Use in Preschool Settings

The literature points to three overarching pedagogical approaches influencing the use of technology and digital media in the preschool classroom; those include Koehler et al.'s (2009) Technological Pedagogical Content Knowledge (TPACK), The Fred Rogers Approach (NAEYC & Fred Rogers Center for Children's Media at Saint Vincent College, 2012), and the principles of DAP (NAEYC, 2022). Fundamental theories of early childhood teaching and learning are at the center of each pedagogical approach, though

all three approaches are slightly different in their scope. Next, I will share the literature on the three different approaches, revealing the lens by which this study will adopt.

Koehler et al. (2009) proposed the TPACK framework for the integration of technology in the classroom. Koehler et al. (2009) proposed the inclusion of technology in the former PCK framework (Blackwell et al., 2016; Brown, 2022; Harris et al., 2017). The TPACK framework focuses on the inclusion of technology for education and includes three components of knowledge for decision-making when using technology in the classroom (Koehler et al., 2009). The three components include technological knowledge (TK), content knowledge (CT) and pedagogical knowledge (PK) (Koehler et al., 2009). Due to the dynamic nature of teaching and learning, each of the knowledge components overlap, becoming TPACK. My literature search revealed that Koehler et al.'s (2009) TPACK model was used as a research framework for studies specifically related to early childhood education, including Blackwell et al.'s (2016) study and Park and Hargis's study (2018).

Enhancements to the TPACK model have recently been proposed. TPACK provides a framework that incorporates the interplay between each of the components of the model, empowering teachers to consider how each of those components relate to and within one another, when making pedagogical decisions (Harris et al., 2017). Since Koehler et al.'s (2009) enhanced PCK with technology (TPACK), Porras-Hernandez and Salinas-Amescua (2013) proposed a revised TPACK model to account for the ecological influences of child and teacher background on the context of technology and digital media use for learning (Blackwell et al., 2016; Harris et al., 2017). Factors such as

teacher knowledge, classroom resources, teacher-child interactions, and community and schoolwide support for technology use and potential professional development required for teachers' use of technology for learning influenced the creation of Porras-Hernandez and Salinas-Amescua's (2013) enhanced TPACK model (Blackwell et al., 2016).

Porras-Hernandez and Salinas-Amescua (2013) proposed their revised version of TPACK be broken down into three different hierarchical ecological levels of context. The distinct levels are intended for teachers to more appropriately plan how each child will respond to technology and digital media use based on ecological influences. The three different ecological levels identified by Porras-Hernandez and Salinas-Amescua (2013) include the macro level (global social, economic, governmental, or political circumstances), meso level (district and school leadership and community priorities), and micro level (classroom environment). Porras-Hernandez and Salinas-Amescua's (2013) revised version of Koehler et al.'s (2009) TPACK model offers applicability to early childhood educators' pedagogical planning for technology and digital media use in the classroom, and it also aligns with principles of DAP, though not all.

The Fred Rogers Approach, established by the NAEYC & Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College (2012) proposed standards for technology and digital media use with young children, which can be used by parents, teachers, and media developers. Three principles of quality characterize the Fred Rogers Approach. First, the well-being and safety of young children should be the central consideration to any technology and digital media experience. Second, the uniqueness of every child, the context for which teaching and learning occur, and the content of the

technology and digital media all coalesce to influence technology and digital media experiences. The last principle of the Fred Rogers Approach is that media creators, parents and teachers must use the most recent research and evidence in the decision-making process of technology and digital media use with young children (NAEYC, & Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College, 2012).

The Fred Rogers Approach was used as a framework in early childhood research studies including Awang et al. (2020), and Paciga and Donohue (2017). The Fred Rogers Approach led to the NAEYC & Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College's (2012) joint position statement, which draws on the principles of quality in the Fred Rogers Approach and Copple and Bredekamp's (2009) earlier version of NAEYC's (2022) DAP position statement.

Although the TPACK Framework and the Fred Rogers Approach have been used in studies about technology and digital media use with early childhood educators, the principles of NAEYC's (2022) DAP aligns most consistently with the multiple factors preschool teachers must consider when making pedagogical decisions to use technology and digital media in the classroom.

DAP proposes principles to guide early childhood teachers' teaching approaches. DAP's principles acknowledge the complexity and overlap of teaching and learning theories which influence how teachers nurture development with young children. While DAP is based on research and evidence-based practices, the position statement more broadly encourages teachers to consider the cultural and linguistic uniqueness of each

child and family within the context of those they engage with in their community and in the classroom environment (NAEYC, 2022). Other considerations teachers must use for planning teaching is children's unique temperament and approaches to learning, their prior experiences, the relationships they have at home, in the community and in the classroom, and the multiple instructional tools required to meet the diverse learning needs of young children (NAEYC, 2022). The current version of DAP is based on nine principles of child development that make up the backbone of DAP; these principles account for the multiple contextually and dynamic considerations impacting teaching and learning which high quality early childhood educators must use when planning activities that foster learning (NAEYC, 2022). The nine principles of DAP will guide this study.

Summary and Conclusions

A review of the literature related to the topics of technology and digital media, preschool teaching and learning and DAP revealed the following themes: technology and digital media and risks to young children's development, technology and digital media to enhance preschool children's learning including digital media literacy, TPACK as a pedagogical framework, the Fred Rogers Approach as a pedagogical approach and the principles of DAP as a guiding framework, for technology use in early childhood education.

Researchers support the use of technology and digital media for preschool aged children's learning, but caution that it may negatively impact children's development of EF, language, and physical capabilities, if teachers do not plan its use carefully (Paciga & Donohue, 2017). Researchers present theories and principles of child development in the

literature, that help teachers make sound pedagogical decisions, including those principles that inform DAP (Rideout & Robb, 2020). Because children develop during social engagement with others in the context of active exploration, teachers must contextually plan technology and digital media use that aligns with children's approaches to learning (Stockdale et al., 2022). The use of passive media such as television and program viewing on a tablet is not a pedagogically sound approach for technology and digital media use in the classroom (Barr et al., 2018). Instead, using interactive apps on tablets that require collaboration between children to do or make something like a dance video is a meaningful way to motivate student engagement in meaningful learning activities involving technology and digital media (Shoshani et al., 2022). Adult scaffolding was found in the literature to be an important aspect of learning to nudge children to the next learning level (Dore et al., 2019). Knowing the importance of scaffolding during young children's technology and digital media use has implications for teachers and how they choose technology and digital media tools, apps, and pedagogies to enhance the activities children engage in, which promote learning.

A review of the literature exposed that preschool teachers have options to guide their pedagogical decision-making when using technology and digital media in the classroom. Three approaches, models and guiding principles stood out in the literature; these include TPACK (Koehler et al., 2009), The Fred Rogers Approach (NAEYC & Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College, 2012), and the principles of DAP (NAEYC, 2022). Each approach is shown to be effective in early childhood education, however the strength and breadth of DAP is most appropriate

for preschool teachers' pedagogical decision-making when using technology and digital media for learning because contextual factors like children and teachers' cultural, linguistic, and unique backgrounds are interwoven within the principles of child development that inform DAP (NAEYC, 2022).

Researchers addressed how technology and digital media may be used for learning in urban and suburban preschool programs, but to my knowledge, there is no literature that specifically addresses preschool teachers' pedagogical decision-making when using technology. This study addresses the gap in understanding how preschool teachers use technology within the preschool experience.

Chapter 2 presented a discussion of the literature related to the aim of this study, as well as the study's conceptual framework. In Chapter 3, I will present the study design and rationale, the methodology and the role of the researcher, the procedures for participant recruitment, participation and data collection, the plan for data analysis, the ethical procedures employed in the study and how I strengthened the trustworthiness of my study.

Chapter 3: Research Method

The purpose of this study is to explore teachers' perspectives about technology use in preschools. In this chapter, I will review the role of the researcher, methodology, research design and rationale. I will discuss issues of trustworthiness and ethical procedures. Also included in this chapter will be a description of participant recruitment, participation, and data collection. Finally, I will present the data analysis plan.

Research Design and Rationale

There is one research question that guided this study; the research question was: How do teachers describe their use of technology within the preschool experience?

The phenomenon investigated in this qualitative study was understanding how preschool teachers use technology within the preschool experience. Although technology and digital media can be integrated into the preschool classroom to motivate children's engagement in learning activities, how teachers use technology can be beneficial or detrimental to the trajectory of children's development (Bochicchio et al., 2022). The principles of DAP provide guidelines for teachers based on theories and principles of child development that apply to all aspects of instructional approaches to enhance children's development, including the integration of technology and digital media in meaningful ways.

This research study was a basic qualitative study using semi-structured interviews, field notes and a reflexive journal to illuminate the research questions. A qualitative research design was best suited for this study because I sought to understand how teachers use technology within the preschool experience. Seeking to understand the

multiple ways preschool teachers might use technology within children's learning experiences, requires a researcher to learn first-hand the thoughts and perceived experiences that relate to this study's phenomenon (Creswell & Creswell, 2018).

I considered other qualitative approaches such as case study, grounded theory study or an ethnographic study, however all three were ruled out. The aim of ethnography is to explore patterns of behavior, customs, and ways of living related to a particular social group or system (Creswell, 1998). My study was not aiming to explore cultural norms or ways of living based on a certain social group or system; therefore, this qualitative tradition was ruled out (Creswell, 1998). The purpose of a grounded theory study is to unveil a theory related to a phenomenon (Creswell, 1998). A grounded theory study was not suited for my study, as the aim of my study was to explore the perspectives of multiple preschool teachers' use of a set of principles to inform their instructional decisions, and not to determine a theory (Creswell & Creswell, 2018). Finally, a case study design was considered, but ruled out because my study was not aiming to conduct an in-depth investigation of a bounded system and the lived experiences of those within its setting, but to understand the complex thoughts, feelings and influences on teachers' instructional decision-making related to technology and digital media use in the classroom (Creswell & Creswell, 2018).

I did not consider quantitative research design as it was not suited to answering my research question. The purpose of a quantitative research design is to numerically represent findings related to a hypothesis (Creswell & Creswell, 2018). Because my study sought to understand study participants' use of technology related to the central

phenomena, the research design required rich, nuanced data to accurately reflect the complex influences on the decision-making process. A basic qualitative research design was decided to be best suited for this study.

Role of the Researcher

As the sole researcher of this study, I was responsible for the study design and its execution, participant recruitment and participation, the development of interview protocols and data collection, data analysis and the presentation of study findings. I was also responsible for the evaluation of the study, study recommendations and implications, and conclusion. The study participants were preschool teachers in communities located in a state in the Midwestern United States. My current professional role is that of a full-time early childhood graduate instructor of early childhood education on a term position with a university in the state the study is taking place. In my role, I teach virtually, and therefore my students are from within and beyond the state this study is being conducted.

I did not supervise any early childhood teachers in their employment settings. The students currently enrolled in the graduate program I teach were excluded from this study. Although former graduate students who I have taught were not excluded as potential participants in my study, I had no influence over their employment status nor was there a concern about perceived influence on grades since they have all graduated. I kept a reflexive journal to capture any potential bias that could have come up based on my previous relationship with any former graduate students I have taught (Ravitch & Carl, 2016).

As an early childhood professional of over 26 years, I possess my own personal and professional beliefs about technology and digital media with young children and the importance of DAP in high quality early childhood programming. Because I have diverse experiences with high quality early childhood programs in states beyond where my study will be conducted, I acknowledge the potential biases I may have had when comparing current and prior experiences. To minimize the influence of these experiences on researcher bias, I recorded thoughts, opinions and feelings to participant information shared with me throughout the study using a reflexive journal (Ravitch & Carl, 2016). Using a reflexive journal to record my feelings, reactions and thoughts to participant comments enabled me to identify potential bias that could have led to inaccurate interpretations of the data (Rubin & Rubin, 2012).

I did not conduct my research within my work setting or during my workday as an instructor in a university in a region of the state where the study was conducted. Although this study is required for a terminal degree and for a tenure-track position where I currently teach, my position as a term instructor is not affected by this study. I have full support of my university colleagues and department dean as I work towards the completion of this study in partial fulfillment of my terminal degree.

Methodology

Participant Selection

The targeted population for participant selection was eight to 10 preschool teachers in varied settings from a pool of licensed early childhood programs in a region of the Midwestern United States. Including participants from diverse settings that serve

preschool aged children strengthened my understanding of the ways teachers use technology in the preschool setting. Upon approval from Walden University's Institutional Review Board (IRB) Approval # 02-02-23-0751047, I sent an email invitation to preschool teachers in the targeted area, and posted an invitation on social media, explaining the purpose of the study and the criteria for participation. Interested participants were asked to email a response to the researcher, indicating their interest in volunteering for the study.

The sampling method for this study was purposeful sampling (Creswell, 1998). Purposeful sampling aligns with qualitative studies because study participants are selected based on their similar experiences related to the study phenomenon (Creswell, 1998). For this study, the shared phenomenon was participants' teaching of preschool aged children. Purposeful sampling allowed me to gain contextualized and nuanced data from one-on-one conversations with study participants, which gave me a deep understanding of the thoughts and processes of teachers' use of technology in the preschool experience (Creswell & Creswell, 2018). A participant sample of eight to 10 people was purposefully selected from the interested parties who responded through email, indicating they met the study criteria.

Upon final selection of participants for the study, I sent an email communication explaining the purpose of the study, an explanation of participant confidentiality, and a copy of the informed consent. Participants were asked to read the informed consent, and if they agreed to the study, to respond to the email by stating, "I agree." The informed consent document was attached to the email.

Had there been fewer than eight people who indicated their consent, I planned to purposefully select another participant who expressed interest in the survey. This did not occur.

Instrumentation

Digitally recorded semi-structured interviews, field notes and a reflexive journal provided data intended that illuminated the study phenomenon. I developed an interview protocol (Appendix B) based on a responsive interview model, described by Rubin and Rubin (2012). The goal of the interview protocol was to enable me to gain in-depth information from participants about their experiences using technology within the preschool experience.

I referred to interview protocols from other studies like mine when designing my questions, however those found would not answer my research question. Although interview questions found in the literature were instructive and influenced the questions I created, I decided the best way to answer the research question was to create my own interview protocol. Content validity was established through the alignment of all interview questions to the research question and conceptual framework guiding this study. Questions were designed as main questions, follow-up questions and probes (Rubin & Rubin, 2012). An expert qualitative researcher reviewed the interview protocol and provided feedback. Revisions were made to the interview protocol based on the expert review, which further aligned questions to the research question.

A reflexive journal was used throughout my study to record my personal thoughts, feelings, and reactions to participant data (Rubin & Rubin, 2012). Qualitative research

involves both the participants and the researcher in a complex process of inquiry and meaning making related to a natural phenomenon (Creswell, 1998). Recording my reactions and thoughts about participants' responses to questions captured any potential bias that could have influenced my analysis and interpretation of data (Creswell, 1998; Creswell & Creswell, 2018). The reflexive journal was consulted during data analysis to ensure bias was not affecting the interpretation of participants' accounts of technology use with young children. Next, I will discuss the study's procedures for participant recruitment, participation, and data collection.

Procedures for Recruitment, Participation, and Data Collection

Once IRB approval was obtained, I recruited participants by sending an email invitation to all licensed programs serving preschool-aged children in the region of the Midwestern State where the study will be conducted. I also designed a social media post describing the study and inviting volunteers to send an email of interest, if they met the study criteria. The social media post was placed on my personal Facebook account. A due date was indicated for all volunteers who were interested in participating in the study.

After the due date, 13 people were purposefully selected to represent a variety of preschool settings. Choosing more than eight to 10 people was intentionally done to maximize the chance that the proposed number of eight to 10 participants would result. The email explained the purpose of the study, participant confidentiality, and an informed consent was attached. Participants were instructed to thoroughly read the informed consent, and then respond to the email by stating "I consent" if they agreed to the study. All thirteen people responded to the email that they consented to the study. An email was

sent to all thirteen people, inviting them to register for a virtual interview, using my Calendly. Participant ID numbers were assigned and communicated to all participants, when asked to register for an interview. Instructions indicated that if proposed interview times were not convenient for them, that they should email me to set up a mutually convenient interview time. When establishing a time that meets the needs of the participants, I requested that participants select a time when the interview could take place in a setting free of distractions, which ensured their confidentiality (Ravitch & Carl, 2016). Of the 13 people who were sent an invitation to schedule an interview, nine people registered and attended the interview.

Data were collected through semi-structured interviews, field notes and a reflexive journal. The interview protocol was designed by me and aligned with the research question guiding this study. An expert in qualitative research reviewed and gave feedback to the interview protocol. Revisions were made that strengthened the alignment of the interview questions to the research question. The length of the interviews was between 45 minutes to one hour, which aligned with recommendations found in the literature (Rubin & Rubin, 2012). Virtual interviews were conducted through Zoom, and audio recorded. The recorded interview was password protected and labelled with a confidential name (P1, P2, P3…), and stored on my personal computer (Rubin & Rubin, 2012).

At the completion of the interview, I conducted a participant debriefing by inviting participants to share their feedback, concerns, or questions about any aspect of the interview experience. Doing so invited participants to share any concerns they had

that might have influenced study data (Ravitch & Carl, 2016). I thanked each participant for their participation and reminded them of the participant confidentiality protocols.

Data Analysis Plan

The data collection methods which included semi-structured interviews, field notes and reflexive journal, were directly tied to the research question. Data collected were aligned to the research question, which was to understand how preschool teachers describe their use of technology within the preschool experience. Questions found in the researcher-created interview protocol were created to illuminate the research question.

The types and procedures for coding included a two-cycle coding method, employing open, descriptive and pattern coding. Interviews were transcribed and organized in a password protected file on my personal computer. Once the transcription and organization were complete, I immersed myself in a thorough review of the transcribed interviews, to gain a general sense of the data corpus (Saldana, 2016). I recorded my initial notes in the margins during this "sketching activity," which elicited initial thoughts about a priori codes, which aligned to the research question and conceptual framework (Creswell, 1998, p. 141).

I completed the first cycle coding primarily using open and descriptive coding, applying the initial a priori codes (Saldana, 2016). I used descriptive coding method in my first cycle coding as it aligned best with the research question (Saldana, 2016). Intercoder agreement was used throughout the data analysis process. Independently, the researcher and second coder applied the initial a priori codes to transcripts, and then engaged in a reflexive dialogue to compare coding and refining the codes by either

adding additional codes or defining more explicitly, the original codes I produced. Codes were recorded on a spreadsheet, which is password protected and stored on my personal computer. A total of five conversations took place between the researcher and second coder during a recursive, iterative, and reflexive coding process. The coding process was fluid and iterative, and first cycle coding naturally moved to second cycle coding, where categories began to emerge (Creswell & Creswell, 2018). Pattern coding was applied when the second cycle coding took place, which illuminated patterns in the data which presented themes connected to the research question (Saldana, 2016).

Creswell (1998) described the type of analysis used in this qualitative study as a circular process of engaging with data in a non-linear, spiral type fashion, keeping in mind the research question to guide analysis, segmenting of data and subsequent coding. During data analysis, I moved back and forth and in between transcripts, field notes and the reflexive journal, while frequently reviewing the conceptual framework for this study, and the research question. The findings are presented in a narrative report in Chapter 4 (Creswell & Creswell, 2018).

I did not use software for data management; instead, I used a password protected spread sheet to organize and store coded information on my personal computer, which is password protected. Discrepant cases were considered when developing themes and reported in Chapter 4. It was important that my study findings characterized the full extent of the data related to my research question, including when the data presented contrasting perspectives. Being transparent with discrepant cases also strengthens the

trustworthiness of my study – a critical element of any qualitative study (Stahl & King, 2020).

Trustworthiness

The aim of a qualitative study is to provide an in-depth characterization of the thoughts, processes and lived experiences of study participants as they relate to the study phenomenon and research question (Creswell & Creswell, 2018). Unlike quantitative studies, the aim of qualitative research is not to generalize study findings for replication, but instead to present the experiences, thoughts, and perspectives of eight to 10 participants (Creswell & Creswell, 2018). Instead of seeking validity as is the goal in quantitative research, qualitative research aims to gain the trust from readers as it relates to study findings (Stahl & King, 2020).

Lincoln and Guba (1986) described four strategies that strengthen the trustworthiness of qualitative studies; those include credibility, transferability, and dependability and confirmability (Morse, 2015). This study included the following strategies: triangulation, member checks, intercoder agreement, peer review and debriefing, variation in participant selection, thick descriptions, audit trails, and reflexivity. Next, I will explain how I will use these processes to strengthen the trustworthiness of my study findings.

Credibility

Credibility was established through a peer review process. Colleagues who are expert qualitative researchers conducted a peer review of the interview protocol, conducted intercoder reliability, and participated in a peer debriefing. Using multiple

sources of data and additional people to analyze the data strengthened the study's credibility.

I also used member checks in my study. The nature of qualitative research involves the researcher and their interactions and interpretation with and of the data (Creswell & Creswell, 2018). It is not as simple as a summary of the participants' transcribed interviews. Member checks can present a challenge if participants disagree with the accuracy of the findings, placing a researcher in an awkward position (Morse, 2015). Despite the potential challenges member checks may have presented, it was incumbent of me to include participants in reviewing study findings to strengthen the credibility of the study (Creswell & Creswell, 2018).

For this study, I asked participants to provide feedback on the accuracy of the study findings. Once the preliminary results were determined, I emailed the narrative results which included the three major themes, including participant quotes to support those themes. Feedback from all participants affirmed the accuracy of the preliminary study results (Creswell & Creswell, 2018). Had feedback from a participant questioned the accuracy of the findings, I would have evaluated whether the feedback was consistent with other participants' feedback or not. If the feedback had not been consistent with other participants, I would have maintained transparency by recording as such, in my field notes. If the feedback were consistent with other participants, I would have reviewed the feedback and re-evaluated the findings, adjusting as deemed appropriate to the credibility of the study. As mentioned before, all participants confirmed the accuracy of the preliminary findings.

Throughout the study I kept a reflexive journal to document any potential bias that might arise. Minimizing researcher bias is critical to the quality and credibility of all qualitative research (Morse, 2015). Included in the reflexive journal was documentation about my thoughts and reactions to participant interviews and my interpretation of the data during my analysis. Maintaining a reflexive journal creates transparency on any potential biases that could influence study findings; this strategy strengthened the credibility of my study findings (Creswell & Creswell, 2018). It is incumbent on all researchers that research findings are as free of bias as possible, and that transparency of any potential bias is shared.

Finally, I participated in a peer debriefing of my study findings. I purposely selected a peer who participated in other aspects of reviewing my study, as they had familiarity with the study. The peer debriefing gave me an opportunity to reflect on my study and its findings with an experienced qualitative researcher, strengthening the internal validity of my study (Creswell & Creswell, 2018; Morse, 2015).

Transferability

Unlike quantitative research where researchers aim to generalize findings from one data source to replicate with another, qualitative research seeks to understand how a case experiences a specified phenomenon based on their unique context (Creswell & Creswell, 2018). Qualitative research is thereby not focused on replicating findings. Instead, providing detailed (thick) descriptions of participant's context, and selecting participants from different settings allows readers to identify contextual similarities and subsequent findings that may be useful to them (Guba & Lincoln, 1989).

For this study I present data with thick rich contextual information such as participants' setting and unique characteristics of that setting, so that readers may find similarities that could warrant transferability. Including participants from multiple settings also strengthens transferability and increases this study's trustworthiness.

Dependability

Lincoln and Guba (1986) posited that using an audit trail strengthens the dependability of a study because it makes the inquiry process public and therefore others can inspect it. Using a field log allowed me to record study activities, including steps performed in the data analysis, decisions regarding methodology that influenced findings, which created an audit trail (Lincoln & Guba, 1986). Using a reflexive journal to record my insights, reflections, and responses to elements of the study and to note concerns, reactions, and feelings I experienced throughout the study offers transparency and illuminates any potential biases that could have affected the integrity of the study (Lincoln & Guba, 1986). I used both strategies to strengthen the dependability of this study.

Confirmability

Confirmability is like objectivity in quantitative research. Reflexivity is one of the key strategies that strengthens confirmability. I used a reflexive journal throughout the study to make transparent any biases that could be deemed as biased, causing study findings to be perceived as subjective (Creswell & Creswell, 2018). I also conducted a peer debrief and engaged a peer in the process of intercoder reliability to ensure the data were being interpreted objectively (Lincoln & Guba, 1986). Finally, participating in a

peer debrief of the study ensured that any potential bias did not influence the study findings (Creswell, 1998).

Intercoder Reliability

Intercoder agreement is the corroboration of codes that have emerged from data (Creswell & Creswell, 2018). During the first and second cycle coding, I cross-checked my coding with the second coder during frequent reflexive dialogues (Creswell & Creswell, 2018). Any inconsistencies in coding were discussed during our conversations, which resulted in more refined definitions of codes, and the addition of more codes to best represent the data.

If a researcher is not trusted to present data accurately, then the research findings must be questioned to its authenticity (Creswell & Creswell, 2018). Employing multiple processes like the ones I used for my study will increase others' trust in me to present an accurate and honest interpretation of the data, thereby strengthening the trustworthiness of my study (Creswell & Creswell, 2018).

Ethical Procedures

Treatment of Human Participants

The most important aspect of qualitative research is beneficence – the notion that researchers do no harm to participants; those researchers protect the welfare of the study participants (Ravitch & Carl, 2016). Before conducting this study, I obtained formal approval from Walden University's IRB. The IRB approval code is # 02-02-23-0751047.

Ethical practices have informed every aspect of decision-making in the design and implementation of this study. Prior to participants interviews, I obtained an informed

consent from all participants. The informed consent described what the expectations of them were, including time commitments, and how those expectations will be conducted (Ravitch & Carl, 2016). Additionally, the informed consent described any potential risks the participant could experience, how participant data would be collected, stored, and destroyed, and how the findings would be reported (Ravitch & Carl, 2016). Finally, the informed consent reminded participants of the study's purpose, methods, and benefits (Ravitch & Carl, 2016). Participants were asked to respond to the email, by stating, "I consent," indicating they have read and agree to the study activities.

Due to the substantial number of potential participants from the pool who have graduated from the university I teach in, I chose to include former graduates of the program, but to exclude students who were enrolled as an early childhood graduate student in the university I teach, during the time of the study. Excluding current students in the program I teach decreased any potential or perceived power dynamics (Ravitch & Carl, 2016). I also purposely did not offer incentives for participation in my study, so as not to be perceived as trying to influence participants in any way. Finally, I maintained the confidentiality of all participants by removing identification information. I assigned each participant an identifier (e.g., P1 (person 1), P2 (person 2).

Treatment of Data

All data (digital and documents) are stored in a password protected file on my computer and will be retained for five years beyond completion of my study (Crozier, 2021).

Summary

Chapter 3 presented the purpose of this basic qualitative study, and the research question. The purpose of this study was to explore teachers' perspectives about technology use in preschools. A qualitative approach was deemed most appropriate for this study because I aimed to explore participants' perspectives of technology use within the preschool experience.

Using semi-structured interviews, field notes and a reflexive journal were most appropriate for this study because I sought to gain an in-depth understanding of the multiple influences on teachers' decision-making process. Including strategies like peer debriefing, intercoder agreement, member checks, thick rich descriptions, triangulation, audit trail, reflexive journal, field notes and transparency in reporting discrepant cases strengthen the trustworthiness of this study.

Finally, protecting the welfare of participants was one of my top priorities. Careful handling of all documents and digitally recorded information such as removing identifying information and using password protection of all data will protect the confidentiality of participants.

Chapter 4: Results

The purpose of this study was to explore teachers' perspectives about technology use in preschools. Through semi-structured interviews conducted on Zoom, data were collected from nine preschool teachers. Field notes and a reflexive journal were kept throughout the study to record decision-making and reflections that could be perceived as researcher bias during data analysis. Data provided insight into teachers' perspectives on their use of technology within the preschool environment. The following question guided the study:

RQ: How do teachers use technology within the preschool experience?

In this chapter, I will provide an overview of the study design and summarize the study findings. A description of the study setting, including participant demographics will be followed by an explanation of the data collection procedures, including the number of participants and how data were collected. Next, I will explain how and when data were collected and provide a description of the data analysis process, including evidence of trustworthiness. Finally, I will present the results of my research using data to support each identified theme. The conclusion of this chapter will summarize key research findings.

Setting

The setting for this basic qualitative study using semi-structured audio-recorded interviews was a single state in the Midwestern United States, during the second half of the school year, beginning in January 2023. Participants were preschool teachers who worked in a variety of licensed early childhood settings, including state-and federally

funded preschools, private centered-based childcare programs, early childhood special education programs in public schools, Tribal programs, and home daycares. There were no participants who were attending the higher education institution where I work, which was an exclusionary criterion for participant selection. The nine semi structured interviews were conducted in my home office, where no one was around, and participants chose to speak with me in a location that they felt was private. There were no organizational conditions that affected participant participation during the time of this study, nor were there any personal or organizational conditions that influenced the analysis or interpretation of the data. Data were collected through audio-recorded, semi structured interviews through Zoom, using the interview protocol I developed for this study (Appendix B). Participants were asked questions related to their perspectives on technology use within the preschool experience. After the recordings were transcribed, I began the coding and analysis process.

The participants in this study were preschool teachers in a variety of early childhood settings, who use technology within the preschool experience. Participant demographic data are displayed in Table 1. All nine study participants taught in a licensed early childhood program in the state that this study took place. One participant taught in a Head Start program, one participant taught in Tribal program, one participant taught in a family home daycare, and another taught in a group home daycare. One participant taught in a school-based, state-funded GSRP Montessori program, and two participants taught in school-based, state-funded (GSRP) preschools. One participant taught in a school- based early childhood special education (ECSE) classroom, and one participant taught in a

private center-based childcare program (Table 1). To ensure confidentiality of participants' identities, I replaced their real names with pseudonyms (Table 1).

Table 1

Participant Demographics

Participant ID	Setting
P1	Family home daycare
P2	School-based early childhood special education (ECSE)
P3	School-based state-funded GSRP Montessori preschool
P4	Federally funded preschool (Head Start)
P5	School-based state-funded GSRP preschool
P6	Tribal preschool
P7	Private childcare center
P8	State-funded preschool (GSRP)
P9	Group home daycare

Data Collection

A total of nine preschool teachers participated in audio recorded, semi-structured interviews over Zoom. All participants taught in licensed early childhood programs with preschool aged children. Participants were purposefully chosen from a variety of early childhood settings to gain diverse perspectives on teachers' use of technology within the preschool experience.

Before I began data collection, I gained IRB approval. Once I received IRB approval, I began the data collection process. To recruit participants, I used social media and email to alert potential participants of the purpose of the study, the participant criteria, and to invite those interested to send an email stating their interest in participating in the study. Thirteen people who met the study criteria responded that they were interested in participating in the study. When contacted by email of their selection to

participate in the study with instructions to read the attached informed consent and respond through email, "I consent," 11 of 13 people responded. The remaining two people were sent a follow up email, however neither of them responded.

Next, I sent an invitation through email to the eleven participants who consented to the study, to schedule a Zoom interview using Calendly. The email with the Calendly link invited participants to select a time that was convenient for them and were told that if none of the available times were convenient, to contact me through email, to schedule a time that was better suited to their availability. All eleven participants signed up for an interview, through Calendly. Participants were given the freedom to choose from which location they wanted to complete their interview from.

Nine of the eleven participants logged in for their scheduled Zoom interview. The two participants who did not log in were contacted by email to reschedule their interviews, however a response was not received. I conducted all nine interviews in the privacy of my home office, where no one was around. Each participant participated in one audio-recorded, Zoom interview that lasted between 45 to 60 minutes. I used the interview protocol (Appendix B) that I developed to remind participants of the purpose of the study, the research question, and the processes for which they agreed to in the informed consent. At the beginning of the Zoom call, before I began the interview, I reminded participants that their participation was fully voluntary, and that at any time they could choose not to participate, at which time the interview would conclude, and any data collected from them would not be used during the analysis and interpretation of findings. Before beginning the questions, I asked participants if they had any questions,

and if they consented to be recorded. Then I confirmed what type of setting they taught in.

I used the interview protocol (Appendix B) to ask each participant the same questions and relied on the probing questions from the interview protocol, as deemed appropriate to gain deeper understanding of participant responses. The interviews lasted between 45 and 60 minutes. During the interview, notes were recorded on each person's interview protocol form to capture participant data most accurately. Immediately after each interview, I recorded reflections from the interview in my field journal. At the end of each interview, I asked each participant if there was anything that took place during the interview that they felt would influence my interpretation of their data. I thanked participants for their time and participation in the study and let them know that they would receive a link to a social media post summarizing the results of my study, through email.

The recording feature of Zoom was used to record the interview, and no interruptions took place during any of the interviews. Each recorded interview was clear. As initially planned, I used the Zoom transcription service to transcribe the first two interviews, but when comparing the audio recording to the accuracy of the Zoom transcription, there were significant discrepancies. I chose instead to upload audio recordings captured in Zoom, to Rev Max (rev.com). I verified the accuracy of the transcription by reading each transcript and comparing it to the audio recording. Any variations between the transcript and the audio recording were corrected prior to the data analysis. Printed copies of the transcripts and other data are stored in a binder in a locked

cabinet in my home office. All audio recordings and other data are saved on my personal computer which is password protected. No one has access to the locked cabinet, or my password protected personal computer. All study related data stored in a locked cabinet in my home office or on my password protected computer will be destroyed after five years beyond completion of my study.

I interviewed nine preschool teachers. Data collection, analysis, and coding took place between February 2023 and March 2023 (Table 3). There were two variations in the data collection plan. The first one was to clarify that the Zoom interview would be audio-recorded but done using the video feature; this was stated differently in the originally approved plan. A request for change in procedures to Walden University's IRB was made on 2/10/2023, and an approval of the requested change was received by IRB on 2/13/2023. The second variation to the study plan was that originally the plan was to transcribe interviews using Zoom. Two interviews were transcribed through Zoom and there were discrepancies between the transcript and the audio recorded interview. I subsequently chose to use Rev Max to transcribe all interviews.

There was one unusual circumstance that took place during data collection, which was a revision of the Participant ID numbers. Participant ID numbers were assigned at the time participants scheduled their interviews. Two people did not attend their interviews. For clarity in data analysis, ID numbers were reassigned so they were all consecutive numbers (Table 2). All documents referencing participant ID numbers were revised to the reassigned ID numbers.

Table 2

Reassigned Participant IDs

Original ID	Reassigned ID
• P1	• P1
• P3	• P2
• P4	• P3
• P7	• P4
• P8	• P5
• P9	• P6
• P10	• P7
• P12	• P8
• P13	• P9

Table 3

Data Analysis and Coding Process Timeline

Date	Steps taken
2/24/2023	• Conducted P6 interview
2/25/2023	• Conducted P5 interview • Completed the transcriptions through Zoom for two interviews. • Reviewed for accuracy, the two Zoom transcriptions.
2/26/2023	• Conducted P1 interview. • Conducted P2 interview
2/27/2023	• Conducted P3 interview
2/28/2023	• Conducted P7 interview. • Completed full transcriptions of the two previously transcribed interviews in Rev Max (Rev.com). • Compared accuracy for two full transcriptions between Zoom and Rev Max (rev.com)

3/1/2023	• Completed full transcriptions and verified accuracy for two interviews
3/2/2023	• Completed full transcription and verified accuracy for one more interview
3/3/2023	• Conducted P4 interview
3/4/2023	• Conducted P8 interview
3/5/2023	• Conducted P9 interview
3/8/2023	• Submitted audio and transcription through email, for review by Chair. • Received approval of transcription process by Chair through email. • Received approval from Chair through email, to use second coder. • Completed full transcription and verified accuracy for remaining interviews.
3/9/2023	• Completed coding of two interviews • Created *a priori* codes
3/13/2023	• Completed second coder training and established intercoder agreement plan
3/15/2023	• Meeting with second coder to compare coding for two complete transcripts. • Participated in reflexive dialogue with second coder. • Revised coding frame
3/19/2023	• Independently reviewed and coded prior two transcripts using revised coding frame. • Independently coded an additional three full transcripts

3/20/2023	• Met with second coder to compare coding of first two transcripts, based on revised coding frame. • Met with second coder to compare coding for three more complete transcripts. • Participated in reflexive dialogue with second coder
3/22/203	• Independently coded an additional two full transcripts
3/23/2023	• Met with second coder to compare coding for two more complete transcripts. • Participated in reflexive dialogue with second coder
3/26/2023	• Independently coded the final two full transcripts
3/27/2023	• Met with second coder to compare coding for final two complete transcripts. • Participated in reflexive dialogue with second coder. • Debriefed the intercoder agreement process. • Debriefed on potential patterns emerging in the data
3/29/2023	• Submitted coding samples to Chair through email. • Gained approval from the Chair to move forward with data analysis.
6/12/2023	• Participated in a peer debrief of study findings.
6/14/2023	• Member checks – preliminary results emailed to members for feedback on accuracy.
6/22/2023	• Member checks completed with 100% accuracy

Data Analysis

I analyzed the data collected from the interviews using a two-cycle coding process. Initially, open coding and descriptive coding were used to familiarize myself with the data prior to and during the first cycle coding. I swiftly moved to pattern coding as I read and re-read the transcripts. Saldana (2016) stated that patterns "become more trustworthy evidence for our findings since patterns demonstrate habits of life, salience, and importance in people's daily lives (p. 6). Pattern coding was appropriate to this this study because the study purpose was to understand how teachers use technology within the preschool experience.

The decision to segment and code larger units of data were made to ensure coded data conveyed cohesive ideas. The contextual complexity of preschool teachers' varied approaches, decision-making, and subsequent use of technology with the preschool experience necessitated the coding of larger units. O'Connor and Joffe (2020) suggest that this approach to coding larger segments of data versus shorter ones minimizes the chances that data is not misrepresented as fragmented thoughts, as opposed to cohesive ideas.

After I conducted one-on-one interviews with participants, I uploaded the audio-recorded transcript from Zoom to my personal computer which is password protected. I planned to use Zoom to transcribe all interviews, but after reviewing two transcripts for accuracy, I chose to use Rev Max (rev.com) to transcribe all interviews. I uploaded each audio file to Rev Max (rev.com) for transcription and verified the accuracy of the

transcripts by reading the transcript and comparing them to the audio file. I removed all identifiable information, printed the transcripts, and began my analysis. First, I immersed myself in the data by reading and re-reading the transcripts, the field notes, and the reflexive journal. I recorded notes in the margins, while beginning to consider how the data aligned to my conceptual framework and the research question guiding my study.

After multiple times reading and reflecting on participant data and consideration of the study's conceptual framework and research question, I found it appropriate to create *a priori* codes. O'Connor and Joffe (2020) suggested that if researchers are transparent and flexible, that using coding frames can be beneficial to the interpretation of themes associated with the "building blocks" (codes) which represent participant data (p. 2). Saldana (2016) warned that researchers should "[…] do some very deep thinking about what identity means before you start applying its related codes to your data" (p. 72). Saldana's advice was taken seriously, but after considerable reflection on researcher identity, I felt confident in my ability to move inductively through the data while remaining reflexive to the potential need for additional codes to represent the data more accurately. Seven codes were initially identified (Table 4), based on participant data. Table 4 includes a sample of the initial codes based on participant data, including supporting excerpts.

Table 4

Initial Coding Frame

Code	Participant	Excerpt
Social engagement within the experience promotes learning.	P2	"[…]my favorite is when they start with the camera on the iPads; they'll

		record each other and take pictures and things like that."
Environmental influences on the experience.	P2	"One of the things we have been using a lot this year is our Como Board - we've seen a slide show on it for our morning meeting now. Like the announcements […] we have another set for our large group time. The kids are interacting with that, finding letters, finding shapes, finding the numbers, writing on it as another writing surface so that they are not just stuck with paper and pencil."
Interconnected learning.	P1	"Before I went to Florida - we had a book about Manny, the manatee, and we have a stuffed animal. We were talking about what I am going to do when I go down there. We showed videos of people snorkeling with them and kayaking. […] at the marina] they have a live cam, so we can go and watch the live cams of the manatees […] we will talk about how they eat."
Play as a vehicle for learning.	P2	"And I think that's great [because] that's the kind of tool [coding mice] that you can learn a lot from […] but really, you're just learning what to do and you're playing with it the way you want to play with it."
Influence of culture and context on learning.	P1	"When we are doing […] gun safety, "Eddie Eagle" is on You Tube."
Active engagement is essential to learning.	P1	"We talk about it [gun safety] beforehand […] and then we watch it. And we might repeat it a couple times.

	P1	Sometimes even though we are in our work zone, we might leave it play so they can hear it as they're working […] suddenly, the [video will say] *stop, don't touch!* They will stop, and they won't touch [anything] […] they'll pretend […] We'll take paper gun and hide them throughout the daycare because guns are everywhere. And then they [the kids] must find them and come and tell me…"
Technology use is a useful tool to promote learning.		"Live cams are great."

Next, I selected and conducted a training with the second coder who has firsthand experience in qualitative analysis, is an early childhood professional, and was familiar with this study's conceptual framework. Choosing the right coder was important to me. I purposely chose a second coder whose expertise is in early childhood education, and who has conducted qualitative research. Cheung and Tai (2021) suggested that a coder's experiences and expertise influence the coding process. This concept proved correct as evidenced in the way the coding process unfolded.

During the second coder's training, I discussed the purpose of my study, the single research question guiding the study, and reviewed the conceptual framework. I provided a printed copy of the transcripts with all identifiable information deleted and shared with them the initial coding frame. During our in-depth discussion, I addressed the process of intercoder agreement; specifically, how we would conduct our independent review of participant data and then compare our coding to evaluate for consistency. I discussed how we would segment data, that we would use simultaneous coding when appropriate, and

what we would do when there was a discrepancy in coding. The second coder and I initially independently coded two transcripts, using the initial coding frame, and then we compared the consistency of our coding. Data were segmented into larger units, which were tied to participant responses to the interview questions. Experts in qualitative analysis point to the benefits of segmenting data into larger units to preserve contextualization (Campbell et al., 2013; O'Connor & Joffe, 2020). I used simultaneous coding when more than one code applied to a passage, as suggested by Saldana (2016).

During our first meeting to compare the two transcripts we initially coded, we reached a 90% intercoder agreement, using the initial identified codes. As a result of lengthy and reflexive conversation about the discrepancies between our coding, we clarified the meaning of the initial codes, and 100% agreement was reached. For example, I often omitted the code, *environmental influences on the experience*, where the second coder applied it. After an in depth and reflexive conversation, I realized that the code included the materials in the environment that afforded children's opportunity to engage in an experience using technology. Going back to the transcripts with the second coder, I reviewed the data and applied the code based on the clarity I gained from our reflexive conversation. During our conversation, we also both agreed that there was data in both transcripts that could not be represented by the initial codes identified, resulting in the addition of seven new codes (Table 5). The second coder and I went back and independently re-coded both interview transcripts looking for the new codes established. We then independently coded the remaining seven transcripts.

Although I planned to conduct two distinct coding cycles, I found that the reflexive and comparative nature of coding followed by conversations with the second coder, naturally led to deeper more complex coding decisions, and greater agreement between the second coder and I. Creswell (1998) described the type of analysis used in this qualitative study as a circular process of engaging with data in a non-linear, spiral type fashion, keeping in mind the research question to guide analysis, segmenting of data and subsequent coding. During the analysis of data, I and the second coder moved back and forth in between interview data, looking for missing codes and noting emerging patterns and themes that represented participant data. Throughout the coding process, the second coder and I met five times over three weeks, to compare assigned codes, to discuss any discrepancies that arose between our coding, and to refine, or add additional codes as needed. Each time a new code was identified, me and the second coder independently went back through all the transcripts to apply the new codes. In all, there were eighteen codes (Table 5) that represented participant data. As previously mentioned, larger units of data were coded so that context was not lost. Table 5 presents the revised coding frame with excerpts from participant interviews, related to the codes.

Table 5

Revised Coding Frame

Code	Participant	Excerpt
Social engagement within the experience promotes learning.	P7	"One of my favorite ones to do (from the National geographic website) is when we do the letter "N", we do [the word] narwhal […] we show them [a narwhal] [on the National Geographic

		website], we talk about a narwhal, and we have a picture of one that we show them, and then we show them narwhals in the ocean breaking the ice with their horns […] and then I say, " now that you've seen this crazy animal - a narwhal, what kind of a creature can you make? So, pick two animals in your head and let us put them together."
	P8	"The kids were pretending to go to the beach. On the Beam Projector, there is a game or a setting that is a pool side with people floating around on floaties. I pulled that up and then the kids were playing around and pretending they were at the pool. They were bringing a bunch of different things to the rug that they would have at the beach or the pool, and they had a picnic."
Environmental influences on the experience.	P9	"They [the children] wanted to write their own books and draw pictures. It was one of those things where they are like, "And then, I can read it. I can read it to people," and we're like, "Yeah! You can read it. You can be like the author, and you can go up and read it," and I don't know that would've happened if I didn't have that video for them to watch with the author reading it."
	P8	"A lot of the time we have enough [tablets] for each kid to

		have one but since we are collaborating with another classroom more, we do open that up to her kids as well. And there are not enough for everyone, so they have paired up and watched each other play and stud like that too."
Interconnected learning	P4	"[…] we had tons of dandelions and there were bees out collecting pollen and the kids were nervous, and I said if you just sit down and watch them and you do not bother them, they won't hurt you. We sat there for ten minutes just watching the bees hop from one dandelion to another, to another. And then I said, I wonder what their hives look like. We went inside, and I looked it up and watched a video to make sure it was appropriate. After snack we brought my laptop out and we watched a short video of it [….] they saw the beekeeper and saw the honeycombs […] and we talked about how bees eat honey and the shape of the honeycomb […] and we talked about the honeycomb shape, like the hexagon from our tangram toys…"
Play as a vehicle for learning.	P4	"…and some kids took some of the hats in the classroom, put them on and pretended they were beekeeping."

Influence of culture and context on learning.	P4	"Last year with COVID happening, we took pictures of all the kids' artwork in our whole school program and then created a slideshow. We sent the parents access to the gallery exhibition, but it was virtual."
Active engagement is essential to learning.	P5	"I went on You Tube, and I looked up the song, *We're going on a bear hunt*, and they really enjoyed it [….] Then I connected it to my Echo Dot, and they were able to hear it, even though they did not see the actual You Tube video, they were able to hear the words and do the movement […] They were 100% fully engaged."
Technology is a useful tool to promote learning.	P4	"We talked about how there is a community garden down the street from the school that's near us, and then we talked about seeds and all the plants and vegetables […] and did some seed sorting. We talked about how plants grow from a seed and then different parts of the plant. And then I wanted them to see how a plant grows because we are growing bean plants inside with bags on the window. And so that is how we got into bringing out the tablet and watching the process of how plants grow a stem and leaves."
Used for research and inquiry.	P9	"So, in the summer we decorated tires to use as planters, and then I bought plants […] we used a

		plant picture app to talk about what sunshine amount the plants needed, how much water we needed, how often we needed to water them, and the difference between the plants."
Used to make real world connections.	P1	"…there are live cams [Sea World website] that we can go and watch and change the cameras around. Whoever wants to watch [otters, sharks, pelicans, stingrays], we will just pull up the live cam and place the phone on a little stand, because sometimes they [the sea creatures] are not in the picture. They will swim away, and you can't see them…so they [children] will come and go, and some will sit and watch them just play in the water."
Used to communicate with families and community.	P4	"...the app we use is called Learning Genie, and it allows us to send text messages, pictures, and flyers to the families…we took pictures of the kids when they were planning their beans and doing different other plant activities and sending pictures home."
The influence of philosophy on technology use.	P6	"So, my philosophy would be that technology is an important thing to introduce to the kids because they are going to have to know how to use it forever. It is not going away. It might change, but I don't feel like it's going

		away, but it shouldn't overtake their learning. It should be something to enhance what they're already doing."
	P1	"Technology is something that, there's so many ways to understand it and so many different things you can do on it […] technology is now something that really can link us all together as a world - as a small community. And if you're like [name omitted] and not going to use that because they have enough technology at home, you're really kind of missing the fact that you can use technology to change the minds of children and get them to a place where it doesn't always have to be staring at a video."
The availability of PD on technology use.	P3	"Gosh, I don't know if I've done any specific training in technology…I've attended a zillion early childhood conference. But, again, I honestly can't think of any specific technology, beyond the idea of books on CD and the idea of that kind of concept."
	P4	"I don't think I've attended a training that was solely on that topic [technology].
Used to reflect on prior experiences.	P4	"...we use it to help make plans for work time and for recall. We'll interview them and then at

		recall, they'll watch themselves being interviewed about what they were playing with […] I might stop them for a moment, and we have a toy microphone and I'll hand that to them and say, "What's the update? What are you doing right now? Where are you? And the child would respond, "I'm in the house area. I'm making hamburgers. And then at recall time we gather to watch it as a whole group. So, it's like we're watching them being interviewed on the news or something."
Used for transitions.	P6	"I was looking for apps that would go along and further what I was already doing in the classroom with them – expand on learning. I would use it a lot of times for transitions. So, we would have it up and when you would come up and have a turn, then you could go wash your hands. So, it would keep those kids who were waiting – they had something to do versus sitting there."
	P3	"I also use it [books on CD] when you have somebody come in and they're having a hard morning and they're crying, and they wave goodbye at the window and they're still sad. And you're like, "Would you like to listen to the book that we have

		right here that is about Valentine's Day?"
Used for assessment, documentation and recording observations.	P4	"We also use the phone to record observation notes."
Equitable access to technology or lack thereof.	P5	"I'm praying that we get a Smart Board soon because all my coworkers have it. I'm in pre-k through eighth school and every other grade level has a Smart Board. And I see the possibilities with Smart Boards. I even find myself researching how to use a Smart Board before I even have one."
	P5	"But we had a few iPads, but they don't have the contract with Apple anymore. So, once they don't work anymore, you can't use them. So as of right now, the students don't have access to iPads or desktop computers."
	P2	"I don't have a whole lot of money to buy anything either, so that's one of the things…I have a little girl that is going to be coming physically in March or April. I got to get some toys for her. I got to find some stuff [assistive technology] for her.
Use as adaptive equipment.	P2	"[…] we use a lot of assistive technology for speaking. We do have a couple kids with iPads with Touch Talk […] that is their way of communicating […] I've used the microphone that

connects to hearing aids and the wireless connection with a lightboard to support a visually impaired student."

In preparation for the next phase of analysis, I reviewed my conceptual framework which was NAEYC's (2022) DAP, and the research question guiding this study. This review allowed me to focus on the data relevant to my research question. I recorded each code on a white index card and added relevant quotes from the transcribed interviews, which allowed me another opportunity to re-engage with participant interview data. I moved the index cards around to make visual sense of the meaning making process of classifying larger units of data into categories, noted on pink index cards (Creswell, 1998). Additionally, I looked for multiple forms of evidence for emerging categories, while noting discrepant cases, and data not related to the research question.

The process of moving inductively from coded units to larger representations of the data classified as categories then themes, naturally flowed from a continuous back and forth immersion during and beyond first and second cycle coding, using pattern coding, which emerged into theming. The fluid and circular immersion within and throughout the data, including my reflexive journal and field notes, brought me to a contextually deeper understanding of the data, which seamlessly led me to the classification of larger thoughts represented by six categories (Table 6), and three themes (Table 6), which illuminated the answer to the research question, which was, how do teachers use technology within the preschool experience?

The codes in Table 6 were organized into the following categories: (a) play-based learning; (b) foster children's awareness of and connections to the community and world around them; (c) promote children's critical thinking; (d) assessment and planning; (e) communication; and (f) daily routines.

Table 6

Examples of Categories and Codes

Category	Code	Participant	Excerpt
Play-based learning.	Social engagement within the experience promotes learning.	P2	"We had some play acting that was going on. They were putting on a play and then a child said, "I can video graph! I'm going to video graph your play." So, the child is acting like the director and saying, "Okay. Go." And he was videotaping while the girls were performing [dance and singing]. And then they were able to watch the video back later. They took notes on it and then they did it again so that they could perfect [their performance]. It went on for the whole of free choice time […] and they let other people come in […]"
	Active engagement	P8	"[…] the weather was getting nice, so the kids were pretending to go to the beach. On the Beam Projector, there is a game or a setting that's a pool side with people floating around on floaties. I pulled that up and then the kids were

			playing around and pretending they were at the pool. They were bringing a bunch of different things to the rug that they would have at the beach or the pool, and they had a picnic."
	Play as a vehicle for learning.	P8	"[…] we have two Spheros [coding mice, named Sparky and Sprinkles. You can change colors on them, and you can roll them around. You can drive them around the classroom. There [are] features on there that allow you to code them. We encourage them to use it in dramatic play and pretend like it's their pet […] or their car […] they've really incorporated into their daily play."
	Used to make real world connections.	P4	"[…] and some kids took some of the hats in the classroom, put them on and pretended they were beekeeping."
Create connections to community and the broader world.		P8	"[…] we were doing apples and we don't have an apple factory to go to, so we just pulled up a video of how apples are processed in the factory, and they watched that before they went home."
	Used for research and inquiry.	P1	"So, if we're doing animal sounds, we use Google […] on both the cellphone and the tablet […]"

		P3	"It's called Story Bots. It's another thing [video] where it's asking a question and they are finding out the actual answers."
Promote children's critical thinking.	Interconnected learning	P1	"…we watched this true story of Winter. There is a little difference on how she was captured in real life, to what they made in the movies. We talked a little bit about that – how she was caught as a calf […] and a fisherman found her trapped to an oyster, versus trapped to a net in the movie […] we talked about that when we watched the movie […] how they pretended what happened, but [in real life] this is what really happened."
	Technology is a useful tool to promote learning.	P2	"They actually got to look back at it [imaginative play experience] with the iPad used to view the video of the child acting like the director of a video production."
	Reflection on prior experiences	P2	"…when I showed it [the recording of child playing in the water] back to her, she does this little kicker heels thing. She kicks the back of her heels onto things when she's excited. And when I showed her, herself playing in there, she was kicking her heels."

Assessment and planning	Observation, documentation, and assessment	P2	"I use the COR Advantage Plus. I really like that I have the app on my phone."
	Use as adaptive equipment.	P2	"But the visually impaired one has her [Como] board, for sure."
		P2	"I am starting to try to use it [video recorder] with my non-verbal kiddos for review in that same way."
	Environmental influences	P5	"I've tried using a traditional projector and pulling down the screen, but all the cords – I feel like it's just dangerous to have the cords to go from one plug across, so I don't really do that anymore."
		P5	"I learned about this exciting tool virtually called Boom learning cards, and I love it, but I don't have a Smart Board so I can't use it in my classroom."
		P8	"A lot of the time we have enough [tablets] for each kid to have one but since we're collaborating with another classroom more, we do open that up to her kids as well. And there aren't enough for everyone, so they have paired up and watched each other play and stuff like that too."
	Influence of culture and	P7	"[teacher's response to a child's frustrating experience] …think

	context on learning		of sometime when you're feeling frustrated – what do you look like? What do your feet look like when you're feeling frustrated? Take a picture of frustrated feet."
		P7	"There was a fantastic video…on how to talk to kids about COVID and returning to school safely and what you can do to stay safer. And it talked about the coronavirus, and it showed a picture and it kind of explained in kid terms what this is…then I would expect my staff to be able to articulate to them, about something they're still grasping to understand […] It gave the staff confidence to talk to kids about it, having been given the words."
		P6	[During the pandemic] "I was able to put the phone right on the two of us [daughter and P6] while I did the lesson with her and so the [parents] were able to see exactly what I was saying. There was no guessing about it […] I would explain to parents, "You're working on your fine motor skills and you're working on your hand-eye communication."
Communication	Used to communicate	P4	"[...] the app we use is called Learning Genie, and it allows us to send text messages,

	with families and community.		pictures, and flyers to the families…we took pictures of the kids when they were planning their beans and doing different other plant activities and sending pictures home."
Daily routine	Transitions	P6	"I would use it a lot for transitions. We would have it up [app on Clever Touch] and you'd have your turn, then you would go wash your hands. So, it would keep those kids who were waiting, they had something to do versus just sitting there."
	Movement activities	P3	"We'll watch videos. People record themselves…record just dance. So, I have one kid who is obsessed with Ghostbusters. So, we watched a "Just Dance" video from You Tube with the Ghostbusters song, and they followed along…"

Once data were classified by categories, I stepped back and re-reviewed the conceptual framework and research question guiding this study, while looking at the visual organization of the codes under categories and reflecting on the data. I re-read my reflexive journal and field notes and reviewed the full interview transcripts to ensure all relevant data were represented in the analysis process. Doing this also provided greater insight into contextually relevant information needed to represent participant data more fully and accurately. During this process, themes related to the research question became clear, while unexpected data unrelated to the research question also became clear. From

the corpus data, three themes which answered the study's single research question were identified. Those three themes were (a) enhance and extend contextually and culturally relevant experiences, (b) elevate children's play experiences, and (3) assist teachers in decision-making. Table 7 provides examples of categories and themes identified during this stage of the analysis.

Table 7

Sample of Categories and Related Themes

Category	Theme
Create connections to the community and broader world.	Theme 1 - Enhance and extend contextually and culturally relevant experiences.
Play-based learning. Promote critical thinking.	Theme 2- Elevate children's play experiences.
Assessment and planning Communication Daily routine	Theme 3 – Assist teachers in decision-making

During data analysis, I used descriptive and pattern coding, and thematic analysis. Pattern coding was indicated in my proposal, however, thematic analysis emerged naturally from pattern coding, and enabled me to represent major ideas that emerged from the data. The longer I reflected on the categories, and their related codes, themes became apparent. For example, as I moved back and forth between the coded data within the category, create connections to the community and the broader world, I noticed how technology use enabled children's abstract thinking as they explored new concepts of time and space, about people and animals they had little first-hand knowledge of, and the connections

between people, ideas, concepts, and ways of being. Reflecting on the research question, the process of thematic analysis brought forth larger ideas about the meaning of participant data.

There was one discrepant case revealed in the data. All participants but one possessed some level (minimal to plentiful) of access to technology that enabled them to see it within their preschool environment, to the extent they believed was appropriate. However, one participant noted the disparity between her state funded GSRP program's access to technology, as opposed to other programs like theirs. P5 shared ideas for using technology to enhance play-based learning in their classroom if they had access to technology. P5 also discussed how they use their own cellphone and Echo Dot at school to try to bring technology into children's experiences but noted that it is difficult for all children to view what P5 is pulling up on the small screen of their personal cellphone, because she has a large class. P5 stated the following:

> I am a GSRP in a public school district – one of the largest in the state. […] And it's sad because we have this thing called a fidelity checklist, and they go through the checklist to see what we have, and we don't have these things, but they don't give it to us. So, whose responsibility is it for providing it? And no one can answer that question.

During the interview P5 shared how discouraged they were with the lack of funding for materials like technology in their state funded preschool program. P5 stated, "Why are we normalizing that the kids don't have access to the basic things, let alone, technology". It was apparent during the interview that the participant is highly committed to the

children and families in the school district, and that they do everything they can to ensure the children in their classroom engage in meaningful experiences, but they also shared how discouraging it can become. As the interview ended, P5 stated the following:

> It's heartbreaking because it's like our kids deserve just as much as anybody else. And what can I do? I have this curriculum that I am expected to implement, but with what I must work with, I must be creative. […] I wonder as a teacher, how to teachers do not get discouraged when they don't have access to things they need? How do I not throw up my hands and say forget it? How do you keep them going? […] How do you get inspired to keep seeking resources when you don't have it? Nor do you have the money in your personal budget to buy it. What do you do?

The data from the one discrepant case in this study will be illuminated further in chapter 5. Though this discrepant case is not related to the research question, it is vital that the data is presented.

Results

From the data, three themes emerged that answer this study's research question which was, how do teachers use technology within the preschool experience? The three themes listed in no order of importance, were (a) enhance and extend contextually and culturally relevant experiences for young children; (b) elevate children's play, and (c) assist teachers in complex decision-making. Based on the corpus data, it is important to the credibility of this study, that information related to the degree to which multiple participants rarely use, or limit technology use, is presented.

All teachers but one, currently (post-pandemic) use technology within the preschool experience, though each teacher's use was to varying degrees and with distinctly different approaches. Only one teacher described multiple ways they used technology during the pandemic. P6, a teacher in a Tribal Preschool, stated that "one of the most meaningful things with technology is when we were shut down because of COVID. We [could] […] continue class with people through Zoom." The teacher also noted that post-pandemic technology has been used minimally because they are still working to get accounts set up so that tablets used during the pandemic can be used now. P6 stated that, "we're still trying to figure it all out […] because we have so many kids that are using technology [at home] but they're playing video games that are not appropriate for three- and four-year-olds. We want to give them experiences at school with appropriate technology."

The degree to which technology was used by teachers within the preschool experience was varied. Forty-four percent of participants reported that they limited, or very rarely used technology. Table 8 presents the participants who reported limited use of technology, with a rationale for why they use technology so minimally.

Table 8

Participant Reports of Little to No Use of Technology and Rationale

Participant	Rationale
P3	Personal philosophy Montessori program
P4	Personal philosophy
P5	Access to technology

P7	Personal philosophy

When asked at the beginning of the interview to describe a meaningful experience with technology use in their preschool classroom, P4, a Head Start teacher who said she was just completing their associate degree in early childhood, stated that, "they use apps to communicate with our parents a lot […] and they send drawings and pictures [to parents]." When asked to be more specific about how they use technology with children, P4 stated, "[…] we use the computer and tablet very rarely – watching educational, very short videos to add to our lessons and activities." Later in the interview, P4 slightly revised their response about their use of technology. When asked to share more about their philosophy of technology use with preschool aged children, P4 stated the following:

> […] I think it's appropriate in certain circumstances when it's educational – when used in small amounts throughout their day as a group if they are benefiting from it. If it is one on one - playing games that are not educational, then I'm not a fan of it.

Both P3 and P7 also expressed that they limited their use of technology for similar reasons – that they believed technology use did not align with their philosophy of play-based, concrete learning. P3 stated that their technology use was "pretty limited", because of her own philosophy and the Montessori program they teach in. P3 stated the following:

> I think it comes down to them getting enough of it at home – they get a lot of screen time […] I want them using their hands and I want them manipulating

> actual objects and making discoveries based on physical, concrete things rather than just clicking the button of whacking the screen.

Similarly, P7 shared they feel like there is a push for young children to know about technology like there used to be a push for children to learn "know their ABC's when they go to kindergarten once upon a time when that didn't exist". P7 stated, "I believe that the primary way that children should be learning is with manipulatives in front of them – real people, real interactions within their environment because they can't really grasp the abstract yet." As mentioned before, P5 does not have access to technology in their state funded GSRP classroom, and therefore the only technology experiences their children receive is when the teacher uses their personal technology tools.

Even though 44% of the participants reported they used technology rarely or that their use is limited, 100% of participants shared at least one example of how they use technology within the preschool experience. Next, I will present the three themes that answer the study's research question, which is, how do teachers use technology within the preschool experience? I have chosen to present the results by themes, in no specific order of importance, but in a logical order. These three themes were (a) enhance and extend contextually and culturally relevant experiences for young children; (b) elevate children's play, and (c) assist teachers in complex decision-making.

Theme 1: Enhance and Extend Contextually and Culturally Relevant Experiences

All participants described children's experiences with technology that facilitated their connections to the real world, and promoted knowledge-building, subsequently enhancing, and extending children's experiences. Integrated learning was apparent in

participants' accounts of technology experiences, with all but one participant's account being contextually and culturally relevant. Table 9 presents excerpts from participants related to the first theme, which is that technology enhances and extends contextually and culturally relevant experiences.

The use of longer excerpts was purposely used in this table, and throughout this chapter, to maintain the meaning of participant data. Creswell (1998) maintained that there are three acceptable types of quotes used in the presentation of study results, and that longer quotations are used to "convey more complex understanding" (p. 171). The purpose of this study requires a deep understanding of the nuances related to teachers' use of technology within the preschool environment.

Table 9

Theme 1: Participant and Sample of Related Excerpts

Participant	Excerpt
P1	"We talk about it [gun safety] beforehand […] and then we watch it. And we might repeat it a couple times. Sometimes even though we're in our work zone, we might leave it play so they can hear it as they're working […] suddenly, the [video will say] *stop, don't touch!* They'll stop, and they won't touch [anything] […] they'll pretend […] We'll take paper gun and hide them throughout the daycare because guns are everywhere. And then they [the kids] must find them and come and tell me…"
P2	"You had a couple kiddos that were working on it [the coding mice] and figuring it out. They would figure something out and […] show their friends […] and teachers [that they figured it out]."
P3	"I pick a book to go with my theme […] When it's Valentine's week […] I put out a Valentine book [on CD] and I usually have to teach them […] how to plug their headphones in and adjust the volume […]"
P4	"We talked about how there's a community garden down the street from the school that's near us, and then we talked about seeds and all the plants and vegetables […] and did some seed sorting. We talked about how plants grow from a seed and then different parts of the plant. And then I wanted them to see how a plant grows because we're growing

	bean plants inside with bags on the window. And so that's how we got into bringing out the tablet and watching the process of how plants grow a stem and leaves."
P5	"I wanted my students to hear [the song], *We're going on a bear hunt* […] I found it on You Tube […] and connected it to my Echo Dot, and they were able to hear it […] [they] were 100% engaged […] we talked about some of the terminology in the song – over, under, around […]"
P6	"We talked about life cycles and then one of the teachers came in and said, "I actually found eggs outside," and I said, "We have nowhere to put them." So that's when we brought it up with the kids and asked if they wanted to take pictures of the eggs. We had some kids who wanted to just take pictures, and some kids who wanted to draw everything out […]"
P7	"[teacher's response to a child's frustrating experience] …think of sometime when you're feeling frustrated – what do you look like? What do your feet look like when you're feeling frustrated? Take a picture of frustrated feet."
P8	"[…] we were doing apples and we don't have an apple factory to go to, so we just pulled up a video of how apples are processed in the factory, and they watched that before they went home."
P9	"So, in the summer we decorated tires to use as planters, and then I bought plants […] we used a plant picture app to talk about what sunshine amount the plants needed, how much water we needed, how often we needed to water them, and the difference between the plants."

Participants expressed multiple ways technology was naturally and intentionally woven into children's experiences, leading to sustained engagement in an experience or long-term investigation. P1 and P9, who are home daycare teachers shared examples of their integration of technology to extend and enhance children's experiences. P9 described a summer-long exploration that began when children painted tires to use for planting. Technology provided answers to children's inquiries based on the unfolding plant investigation. P9 shared that the children decorated tires to use as planters, and then the teacher purchased flowers for the children to plant. When children began to ask questions

about the types of plants, and how to care for them, the teacher showed them how to use the plant app on their cellphone. Children's questions continued. Questions like, "Are the plants safe around the dogs," and "How can we help the spider plant get more light," were answered by children's [supervised] access to the Google feature on the teacher's cellphone. P9 summed up their use of technology within the summer-long exploration by stating the following:

> […] we still dug, and we still planted, and we still watered and all those things that don't involve technology, but the technology gave us more information. To be able to pull up something that the kids are being introduced to all the time in life, whether it's preschool, regular school, [or the] home environment – [technology] it's something they're used to. I use technology to show them more things. It's not just [playing the game] solitaire or jumping monkey. You can use it [technology] to learn things you didn't know before.

P1 described how children made connections with the outside world through live webcams located at marine parks in a different geographic region from where they lived. Children's interest in the marine parks stemmed from their teacher's upcoming vacation. P1 explained that children were asking them what they were going to do on their vacation. One of the excursions the teacher was planning to take was a visit to see the manatees. The teacher took out a book about manatees, called Manny the Manatee, and the corresponding stuffed animal. After reading the book and talking about manatees, the teacher used their tablet and showed the children the live cam of the manatees and their babies at the marina where the teacher planned to visit. P1 shared that when she was on

vacation, they took photos of the manatees and showed the children when they returned. Showing the photos of the manatees prompted children's engagement in the book and the related stuffed manatee.

Like P1, P8 who is a teacher in a school based GSRP program, described how technology, specifically a video, connected children to a place they lacked access to. During their exploration of apples, the teacher wanted to extend the lesson by showing a video of an apple processing factory. P8 stated that "We were doing apples and we don't have an apple factory to go to, so we just pulled up a video of how apples are processed in the factory, and they watched that […]".

P6 shared how they also connected children with the outside world, using a Clever Touch (large white board) to show a You Tube video of an author reading one of the children's favorite books. P6 stated that they give children the option to hear the teacher read the book, or to view a video of the author reading the book. The older preschoolers were intrigued when they realized that the person reading the book in the video was the one who authored the book. P6 described that one child exclaimed after the author read the book, "Wait, so they wrote the book?! So, when you told me the author's name, that's what they look like?"

A video was also used by P1, but the purpose of showing the video was to provide culturally relevant and factually accurate information for children about gun safety. During hunting season - a culturally significant tradition in the region the study took place, P1 conducted a focused exploration on gun safety, using the video, Eddie Eagle: Gun Safety. The teacher launched the exploration by showing the video, and then placed

paper guns and pretend guns like water guns in the home daycare environment to enable children to practice what to do if they see a gun. P1 described what took place after watching the video, stating the following:

> Sometimes even though we're in our work zone, we might leave [the video] on so they can hear it […] suddenly, the video will say, "Stop! Don't touch"! They [the children] will stop. And they'll not touch. And they'll do the actions of what the video said [to do]. They'll pretend to do it." P1 explained that […] it's a way for them to learn and understand you can't touch guns, even if it's a toy gun.

Another participant recounted how they used a tablet to show the process of how plants grow stems and leaves. When describing the experience, P4, a Head Start teacher explained that the community garden down from their program inspired children's interest in plants. Building on children's interests, the teacher used a variety of activities like seed sorting and discussions about how plants grow. Next, the teacher used their tablet to show the growing process.

There were similar characteristics of participant's use of technology to enhance and extend children's experiences within the classroom. Environmental influences including responsive interactions between the teacher and children, and between children and their peers were apparent in at least one example by all participants. Additionally, all participants described at least one example of interconnected learning based on children's experiences which included technology.

P7 recounted in detail how technology was integrated in children's learning about the letter /n/. During their discussion about words that begin with the letter /n/, the

teacher presented the word, "narwhal." When children inquired about the word, the teacher described that it is sea animal with a horn, "like a unicorn." Wanting to know more, the teacher went to the National Geographic website, and showed the children what a narwhal looked like as they "were breaking the ice in the ocean with their horns." Next, the teacher extended the activity by stating that "now that you have seen this crazy animal – a narwhal, pick two animals in your head and let's put them together. What creature can you make?"

P6 recounted a time that technology facilitated children's documentation of their observations of eggs as they formed into caterpillars. When eggs were found outside of another teacher's classroom, P6 was asked whether their students would want to either bring the eggs into their classroom or do something else with them. The students and P6 decided rather than bringing the eggs into the classroom, they would take daily photos of the eggs. P6 stated that "We had some kids who wanted to just take pictures, and some kids who wanted to draw everything out. We gave them those different options." Children asked questions including, "When is it going to hatch?" The teacher and children would take a photo of the eggs every day. P6 stated that they "had pictures throughout the whole time because they [the children] just grabbed it [the digital camera] when they wanted to snap a picture […]." P6 noted that they printed photos of the documented process, so that children could recount and reflect on their observations. P6 summarized their experience with technology by stating the following:

> We had a visual of exactly what it looked like in our classroom, not just a generic picture. Then we took a picture of the caterpillar when it was teeny tiny, so we had that up. As it grew bigger, we could see how big it had gotten […].

P7 detailed how they encourage children's free exploration of digital cameras to take photos of things they see in their outdoor environment, or how they feel. During the children's use of digital cameras, social emotional learning occurred. P7, a teacher from a private childcare center, explained that a digital camera was a beneficial prop when children have access to it in their environment. Sometimes children were tasked to go take a picture of a shape or a feeling, and then come back to the teacher and talk about the picture they took. At other times children were encouraged to take a picture of whatever they wanted and bring back and discuss their photo with the teacher. P7 shared a time when the use of a digital camera strengthened a child's social emotional development when they admitted they broke a toy. P7 stated the following:

> I had one child take a picture of a broken toy and come to find out it was a confession that they had broken a toy. I wondered what happened to the toy. I said, 'Oh, was there a mistake with the toy?'" and he said, "Yeah, I couldn't get the arm down and it broke off." And I said, "that was frustrating. Good job for identifying that." I thought that was big of him.

Then, the teacher extended the teachable moment to talk about feelings of frustration, asking the child how they look when they are frustrated, and what their feet look like when they are frustrated. Next, the teacher encouraged the child to use the digital camera

to take a picture of "frustrated feet." P7 followed up their description of children's experiences with digital cameras, by stating the following:

> The act of using technology is only one component of the greater lesson. It's a vehicle for exploration. It's not using the tablet or the camera that's the focus of the lesson – it's that we learned by taking pictures and observing them […] it's a jumping off point for conversation, connection, further learning reflection, or as a reinforcement of a previously taught story, lesson, skill.

Theme 2: Elevate Children's Play Experiences

Play is fundamental to children's learning, and almost always has a social component to it (NAEYC, 2022). Characteristics of play include children's ability to choose and guide their explorations, to experience the joy of wonder as they investigate their own curiosities, and to delight, or find pleasure while making discoveries (NAEYC, 2022). Participants shared examples of how technology was integrated into children's play experiences, but other participants described child-led experiences that included technology. Participants described experiences that were also initiated by the teacher, resulting in co-created play experiences involving both the child and the teacher. NAEYC (2022) described a continuum of play experiences, ranging from children's self-directed play to guided play. Within guided play, teachers plan environments and activities based on children's interests, but what differs from child-led play is that teachers intentionally comment on children's play experiences or provide suggestions that extend children's play to promote learning outcomes. Keeping in mind that play includes both child-led

experiences and those that are teacher guided, I will describe participants' use of technology to elevate play.

Table 10 presents excerpts from participant interviews of children's play-based experiences using technology, along with the type of play.

Table 10

Theme 2: Participant's Play Scenarios, Related Excerpts and Type of Play

Participant	Excerpt	Type of Play
P1	"We have a karaoke machine, but our microphone is not working on it anymore, but they still sing and pretend it's working […]"	Child-led
P2	"We had some play acting that was going on. They were putting on a play and then [the child] said, "video graph." I'm going to video graph your play. He was [pretend] acting like the director"	Child-led
P3	"I have one kid who is obsessed with [the movie], Ghostbusters. So, we watched a "Just Dance" video from You Tube with the Ghostbusters song, and they followed along."	Guided
P4	"[…] and some kids took some of the hats in the classroom, put them on and pretended they were beekeeping."	Child-led
P5	"I wanted my students to hear [the song], We're going on a bear hunt […] I found it on You Tube […] and connected it to my Echo Dot, and they were able to hear it […] [they] were 100% engaged […] we talked about some of the terminology in the song – over, under, around […]"	Guided
P6	"[…] kids are telling each other how they want to take pictures, like, "Oh, let's get together here." They're making decisions together about what they want their picture to look like, and how they're going to use it. They were putting on different costumes, and trying to figure it out, as they said, "You're going to be this person and	Child-led

	you're going to be this person before I take the picture."	
P7	"[…] We send them outside and they take pictures of anything they think is a circle. And then we talk about how they took a picture of a square, and we ask, "How do we know it's a square? It's got four sides on it. And so, we know that that's a square. So good job finding a shape." Let's go onto your next picture – see if that one is a circle. It should be something as simple as looking at the pictures and reflecting on them."	Guided
P8	"[…] the weather was getting nice, so the kids were pretending to go to the beach. On the Beam Projector, there is a game or a setting that's a pool side with people floating around on floaties. I pulled that up and then the kids were playing around and pretending they were at the pool. They were bringing a bunch of different things to the rug that they would have at the beach or the pool, and they had a picnic."	Guided
P9	"They started asking why we were changing it […] and that led into where each of them lives. […] There were lots of different placement ideas of them being in a whole different world. They said, "I'm way over here and I live far from you." I pulled up Google Maps one day to show them what my house looked like and how far back it went. The children talked about the cars in my driveway, and that led to a conversation about trucks because I have a white truck."	Guided

All participants recounted at least one play-based experience that incorporated the use of technology, which elevated the level of play. P5 who shared that they were a preschool

teacher in an urban school based GSRP classroom, described just one play-based activity which incorporated technology. The teacher used guided play to enable children's engagement with the song, We're Going on a Bear Hunt. Using the participant's personal Echo Dot. P5 expressed that children were "100% engaged" in listening and doing the movements when the song played. As children sang with the music and tried to do the corresponding movements, children were engaging in a form of guided play and using the Echo Dot to play the song enabled children to hear and say the lyrics and move their bodies in unusual ways. P3 who is a Montessori teacher, chronicled a play-based activity that inspired children's movement to a You Tube "Just Dance" video that contained the Ghostbuster's song, and children followed along. Like P5, this too was the only play-based activity shared during P3's but it was their philosophy that influenced their minimal use of technology within play, rather than their lack of access, like P5 stated. During the interview, P3 stated that the guided play activity was a result of a child's "obsession" with the movie, Ghostbusters. Children watched a "Just Dance" video on You Tube that contained the Ghostbuster's song, and children followed along.

The placement of technology within the environment facilitated the natural integration of technology use within play-based activities for multiple participants. P9 described that they have an Alexa in the preschool setting, and the teacher's personal cellphone with various apps like a plant identification app, You Tube, and Google. P9 shared a complex guided play scenario that unfolded between multiple children in their home-based preschool setting. P9 recounted how children explored their community and the world around them using the Google Maps app on the teacher's cellphone. The

exploration stemmed from children's intrigue of the changes being made with the exterior of the teachers' home, which was a childcare program. Through discussions, the children began talking about their own homes and where one another lived and if their house was in the woods or on the highway. In response to the children's inquiries, the teacher facilitated children's use of Google Maps, to answer the questions they had posed. P9 detailed how children said things like, "I'm way over here and I live far from you", and "You have lots more trees around your house than I do". P9 summed up the way technology enhanced children's play-based experiences by stating that "So what they're actually getting is where they are in the world – how things change in the world and how families are different, or the same – how some people might have four dogs versus one dog versus a cat or a goldfish, which we can't see on Google Maps, but it's the technology piece that [branches] out of all the other things we're trying to teach them. So, these whole social studies - small family, big family, large world – technology pulls it all together and started with one little siding change on my house." The experience described by P9 was not an isolated one that included integration of technology within a guided play-based experience which elevated the level of play.

P2, a teacher in an Early Childhood Special Education (ECSE) classroom, chronicled a child-led activity that was enabled by the presence of an iPad in the environment. During a child-initiated socio-dramatic play experience, a child decided they were going to be the director of a video by taking a video of other children as they "were putting on a play." P2 stated that the child was acting like the director by saying things like, "OK, go!" to the other children, indicating that they could begin putting on

their play. The pretend actors viewed the video and took notes when they replayed the video of their acting. P2 stated, "They took notes on it and then they did it again so that they could perfect [it]." The teacher noted that the child-led play experience "went on for the whole of free choice time…and they let other people come in and play too." The level of play in the experience described by P2 was a perfect example of the influence of technology on elevating children's play.

Unlike P5 who works in the same preschool setting but in a different geographic area of the state where the study took place, P8, a school based GSRP classroom noted that they have access to a "wide range" of technology. Within their environment, they have a Beam Projector, a tablet for each child, two "Sphero" robots, interactive whiteboards called "Como Boards," coding mice, coding games, LCD tablets, and "a variety of educational games." The readily available technology set the stage for child-led play experiences like the one with robots, described by P8.

P8 shared how two small coding mice [robots] called Spheros, were available to children in the classroom. P8 recounted children's experiences with two robots which the children named, Sparky and Sprinkles. P8 detailed how children helped one another learn how to change the colors of the robots, how to drive them, and how to roll them around, further evidence of technology's influence on elevating children's play experiences. The teacher encouraged them to pretend the robots were pets and to take care of them. There are even coats available for children to put on the robots. P8 stated that "they've [the children] really incorporated it into their daily play […]". The plentiful availability of

technology in P8's preschool environment also enabled teacher initiated (guided play) and child led play experiences too.

When the weather was getting nice, P8 noticed that the children were pretending to go to the beach. Using the Beam Projector, the teacher beamed a poolside setting in the classroom environment. The projector beamed people floating around in a pool on floaties. P8 stated that, "[…] the kids were playing around and pretending they were at the pool. They were bringing a bunch of different things to the rug that they would have at the beach or the pool, and they even had a picnic." The teachers' intentional response to children's interest in the beach led to them turning on the Beam Projector, which elevated children's play.

The availability of a digital camera in the environment enabled the children attending the Tribal preschool where P6 teaches, to engage in higher level thinking through play. P6 reported how children used the digital camera to capture photos of one another dressing up in different costumes. P6 shared how children worked together to decide how they wanted the photo to look, what costumes they would wear, who was going to do what, and how they were going to use the camera. P6 stated that the children said things like, "You're going to be this person, and you're going to be that person". P6 followed up their account of the play experience with the following: "They're making decisions together about what they want their picture to look like, and how they're going to use it. They were putting on different costumes and trying to figure it out […].

P8 also shared a collaborative play experience using a game called Fast Feet, on the Beam Projector. The Beam Projector displays an obstacle course on the floor of the

classroom, and pairs of children work together to pop the most balloons of the color they are assigned (red balloons or green balloons). P8 stated that, [the Fast Feet game] promotes collaborative play and turn taking and […]". After P8 described this and the prior ways they use technology in the preschool environment, they expressed their philosophy that influences how they use technology in the preschool experience. P8 stated the following:

> Technology is a great tool to have in our world now – in these kids' worlds […] it's important to introduce technology in a positive way and teach kids the right and wrong ways to use it. Because it is going to be part of their lives […] integrating technology at an early age teaches them the right and wrong ways to use it.

P4 shared a play-based experience that emerged from children's observations of bees on dandelions outside. During their conversation, the children expressed they had never seen a beehive. Responding to the children's interest in beehives, the teacher played a You Tube video about bees, beehives, and how honey is produced and collected by beekeepers. Then, the teacher extended children's interest in beehives by placing materials in the environment for children to make honeycombs, and to pretend to be beekeepers. What started out as children's observations of a bee, turned out to be a socio-dramatic play experience in part, because the teacher integrated technology (the You Tube video) to expand on children's interests.

The integration of technology within children's play experiences can facilitate children's reflections, promoting their critical thinking. P2, P4, P6, and P7 recounted how

they used technology to engage children in reflection of prior experiences which promoted critical thinking. P7 recounted how they sent children outdoors with digital cameras and instructed them to "take a picture of anything you see that is a circle". When children came back inside, the teacher facilitated a reflection of their pictures, asking them "how do you know it was a square?" and "how many sides does it have?" Using technology in this guided play experience enabled children's active learning, facilitated content knowledge and critical thinking, and encouraged their expressive language.

During a guided play experience, P2 used a video recording to enable self-reflection with a child who is non-verbal. P2 retold what occurred when they replayed the video of the child playing in water. P2 said, "[…] when I showed it [the recording of child playing in the water] back to her, she did this little kicker heels thing. She kicks the back of her heels onto things when she's excited. And when I showed her, [the video of] herself playing in there, she was kicking her heels." Using video was a powerful way for a child to reflect on, and to express themselves as they reacted to seeing what occurred during play. P4 described how they used the cellphone to facilitate children's reflections of play, during planning and recall time. P4 expressed that they used the video feature on their cellphone to capture children's details about what they were planning to do during work time (another name for play). Once children chronicled their plans on the video, they went to the respective interest areas they chose, and played. P4 walked around during children's play with a "toy microphone", and pretended to be a newscaster, videotaping children's responses to questions like, "what are you doing right now?" and,

"where are you and are you having fun?" Then during recall time, P4 replayed the video which was like showing the children "being interviewed on the news".

Theme 3: Assist Teachers in Decision-Making

Multiple participants described how they used technology for decision-making including its use for documentation, recording observations and for assessments, for communication and collaboration with families, for children's access and full participation in regular activities and routines, and to facilitate classroom routines. Using technology for the purpose of communicating with families and others was expressed by 67% of all participants. Technology was also reported as beneficial within the daily routine by 45% of all participants, and 33% of participants related how technology assisted in transitions. Just one participant (11%) chronicled multiple ways technology promoted children's access and full participation in the preschool environment. Table 11 presents participants' use of technology for decision-making, with corresponding excerpts and their purpose.

Table 11

Theme 3: Participants, Related Excerpts and Purpose

Participant	Excerpt	Purpose
P1	• "[…] We're using it at transitions […] either before or after lunch we always have a quiet cartoon time to unwind […] while we get them on their cots, diaper changes, give everyone a few minutes to unwind and sit down." • "We'll take pictures [during camping] and send them with messages to mom […] and I will record their voice to say good night to their parents."	• Transition • Communication

P2	• "[…] I use my laptop and my cellphone for assessments and for tracking data and writing IEP's […] I use the COR Advantage Plus. I really like that I have the app on my phone, and I have three paras who also have the app on their phones now […]"	• Assessment • Communication
	• "We have a home bound student right now […] and technology brings my little one [the child who is home bound] into the classroom that we are […]	• Access and full participation
	• "[…] we use a lot of assistive technology for speaking. We do have a couple kids with iPads with Touch Talk […] that is their way of communicating	
P3	• "[…] I would use it [an educational app] a lot of times for transitions."	• Transitions
	• "I also use it [books on CD] when you have somebody come in and they're having a hard morning and they're crying […]"	• Transitions
P4	• "We also use the phone to record observation notes and we use it to help make plans for worktime and for recall […]."	• Assessment • Communication
	• "[...] the app we use is called Learning Genie, and it allows us to send text messages, pictures, and flyers to the families […]. Daily, I use it to communicate with families' multiple times a day […] and send photos and videos to them."	
P5	• "Most recently I sent my parents a list of educational websites and apps that were age appropriate […] I posted it on my Dojo page and sent home a hard copy […]"	• Communication
P6	• "[…] we use Clever Touch to play our lullabies during naptime."	• Daily Routine

	• "During the pandemic, I put the phone right on the two of us [daughter and P6] while I did the lesson with her so the parents could see exactly what I was saying. There was no guessing about it – I would explain to parents […]" • [During the pandemic] "We created a Facebook page where we would setup different activities […] and replicate them at home […] We purchased tablets, so they were able to get on it." • "[…] we would use it a lot for transitions. We would have it up [the Clever Touch app], and you'd have your turn, then you would go wash your hands."	• Communication • Communication • Transitions
P7	• "We use Bright Wheel almost solely as our means of communication with parents, and their response is that they love it." • "The staff have these little dinky tablets for their attendance and things like that."	• Communication • Daily Routine
P8	• "We use the interactive white board for planning purposes. We pull up a picture of all the areas […] and the kids will come up and write their name in the area that they want to play in."	• Daily Routine
P9	• "[…] When it got cold out and we can't get outside and they have too much energy, "You Tube" is amazing. We do brain breaks [Pokémon hunt, bear hunt, Grinch hunt] where they kids are dodging the Grinch […] we are watching the You Tube video, but our bodies are going, and doing jumping jacks and pushups and yoga poses, and they're ducking to the left and then to the right […]" • "Alexa is used every day. We have our favorite children's songs in our favorite	• Daily Routine • Daily Routine

> categories […] sometimes we ask Alexa
> to share a joke to cheer someone up […]"

Communication and collaboration are essential to culturally sustaining instructional decision-making. Multiple participants reported how technology assisted them in their communication with families. P4 shared how they use technology to communicate with families, specifically using the app, Learning Genie. P4 reported how they use an app called a "Learning Genie", to "send text messages, pictures, and flyers to the families […]". P4 further recounted how they took photos of the children when they were planting their beans and other plant activities and sent the pictures to families through Learning Genie.

P5 expressed that they use a different communication app called Class Dojo, to communicate with their families. When P5 detailed the lack of access to technology in their urban GSRP classroom, they expressed that "Most recently I sent my parents a list of educational websites and apps that were age appropriate […] I posted it on my Dojo page and sent home a hard copy […].". Like P4 and P5, P7 used an app to communicate with families; for them, it is Bright Wheel. P7 reported that they used Bright Wheel "almost solely as our means of communication with parents" and exclaimed that the parents "loved it!". P7 shared how they use a communication app to communicate with families, and that they have sent links to videos on important topics like COVID-19, which would benefit families. P7 explained in greater detail:

> […] it is a hard line that we don't show the kids the pictures that we're taking because then they spend the whole time wanting to see them. We tell them we are

> going to take a picture to show your mom, and to ask your mom to show you your picture tonight. Because then that brings it back to parents discussing with their kids what they did that day. […]

During the pandemic, P6 described how they created a Face Book page for the families in their classroom, and posted activities that parents could do with their children at home. To ensure that all families had the technology tools needed to access the Facebook page, P6 noted that they purchased tablets for families. Another way technology was used to communicate with families was shared by P1 as they recounted the camping excursion, they and the children in their home childcare center experienced. Using the camera feature on their cellphone, P1 recounted how they used the cellphone to "send messages and photos to mom", and that they would use the cellphone to "their voice to say good night to their parents." P2 described how the use of technology facilitated communication between a child who was homebound, and their classmates and teacher. P2 recounted that "[…] technology brings my little one into the classroom where we are." The teacher further explained that technology not only facilitated the child's communication and participation with their classmates, but explained the following:

> […] the kids are getting a chance to see her before she comes to school since she has a trachea tube, and all kinds of things. So, they're [the child's classmates] seeing all these things before they meet her in person.

Multiple participants shared how they used technology to facilitate the daily routine, including for transitions between activities or places. P1 and P3 shared how technology facilitated transitions. P3 told about the time a child was "having a hard

morning and they were crying". After helping the child wave goodbye to their parents out of the classroom window, the teacher used technology to help them comfortably transition into the classroom setting. P3 stated that they "[…] asked them if they would like to listen to the book [with the headphones] […] that made sounds [referring to the beep to turn the page]." Having a quiet activity readily available for the child helped them transition from their family to the preschool setting. The book on CD and headphones was helpful because it enabled the child to decompress in a quiet space and redirect their thinking to something they enjoyed. P1 related how they use the television to show "quite cartoons" before or after lunchtime "while we get them on their cots, do diaper changes, and to give everyone a few minutes to unwind and sit down." Multiple participants shared how technology was used within the daily routine. P6 shared that they "would use it a lot for transitions. We would have it up [the Clever Touch app], and you'd have your turn, then you would go wash your hands."

Beyond the use of technology for transitions, participants also recounted how technology was used throughout children's daily routine. P9 described how they used You Tube videos for "brain breaks" when it was too cold outside "and children had too much energy". P9 related how they used showed You Tube videos of "Grinch hunts", "bear hunts" and "Pokémon hunts" and as they were watching the videos, their "bodies are going – doing jumping jacks, pushups, yoga poses […] and they're ducking to the left and then to the right […]. P9 also expressed that they use Alexa throughout the day. Children initiate engagement with the Alexa by asking it questions, and P9 stated that "sometimes we ask Alexa to share a joke to cheer someone up […]." P8 described how

they used interactive white boards during their Plan-do-Review. The teacher related that "[…] we pull up a picture of all the areas […] and the kids will come up and write their name in the area that they want to play in." P6 noted that they play lullabies during naptime on their Cleve Touch, and P7 explained that teachers use "dinky tablets" for their daily tasks, including "taking attendance".

P2 and P4 reported that they use technology for assessment purposes. P4 stated that "they use the phone to record observation notes", and that they have three paras who also use the app on their phone to record observation notes. P4 provided further background on this practice by stating the following:

> I've gone through with the paras, the importance of documenting the learning because we are not doing ditto sheets and sending ten papers home every day, like parents expect to see. So, this is part of accountability, even though it's about what we are going to teach and where do we have gaps and what needs to be learned. It's a big part of the accountability piece to our parents.

As part of instructional decision-making, teachers must think about ways to facilitate children's access and full participation in the learning environment. As mentioned before, only one participant mentioned how technology assisted children in their access and full participation in the preschool environment. P2 shared that a child who is blind uses a communication board to participate in the preschool setting. They also expressed how they used videos during children's play which helped those that are non-verbal to reflect on their experiences. P2 described that they would use a microphone that connected to a child's hearing aid, and a wireless connection to a lightboard for

another child who is visually impaired. P2 also shared that they use "a lot of assistive technology for speaking, like iPads with Touch Talk."

Discrepant Cases

There was a discrepancy in P5's access to technology, as compared to the other participants in this study. There was one discrepant case that reported there is a disparity between their state-funded preschool program's access to technology, as compared to other state-funded programs. P5 reported that children have access to technology only when the teacher uses their own cellphone, which makes it difficult since she has a large group of children. Longer participant quotes are used to describe P5's technology experiences to minimize the chances that contextually valuable information is presented, which illuminates the participant's lived experiences (Creswell, 1998). P5 stated the following:

> I teach in an urban school setting, and I feel like I'm a little minimized when it comes to technology. […] I find myself using my phone and You Tube a lot and streaming songs from You Tube. I pray we get a Smart Board soon because all my coworkers have them. I see possibilities with Smart Boards, and I even find myself researching how to use a Smart Board even before I have one […] how to make it developmentally appropriate for preschool students. We had a few iPads, but they don't have the contract with Apple anymore, so they don't work, and we can't use them. So now the students don't have access to iPads or desktop computers. I use my cellphone for music, so I'll go to You Tube and then I'll stream it to my [personal] Echo.

P5 did not lack ideas on how they could use technology if they had access. P5 stated, "I learned about this exciting tool virtually, called Boom Learning Cards, and I love it! Love it! But I don't have a Smart Board, so I cannot use it in my classroom." P5 also stated that "I don't have any technology to give them those individual experiences or teach them about waiting your turn or sharing." P5 stated how they would use technology to extend one of their recent studies if they had it. P5 stated the following:

> Right now, we are doing a clothes study, and I've learned that some kids have washing machines and dryers at home, and some have a laundry room [in their building] or go to the laundromat. It would really be a good idea to present or do a virtual field trip to a laundromat. I only have my itty-bitty cell phone or a small iPad and what's the chance of me being able to show a virtual laundromat for those kids who have no idea what a laundromat is? […] And I love virtual field trips. I used them a lot during COVID [with my own children]. I would literally go to the San Diego Zoo, and we would watch the penguins and things like that. So, I know they're out there, it is just that I cannot show it in my classroom.

Further statements from P5 included the following: "I talked to the kindergarten teachers in my building a lot because I like to know what's going on and make connections. I was told for standardized testing that the kids do use technology to type in their username and password, but a lot of them entering kindergarten don't know how to do that because they have never had access to it. That's what was interesting. I should get in that habit of teaching the kids with a keyboard, even if it is a paper copy, just pointing to the letters on the keyboard."

In their concluding remarks, P5 stated the following:

> I would like to know about the disparities. I want to know. I would love to talk to people in other districts or even other counties or anywhere, just to know how you are using it in Pre-K, and how to you get access to it [technology]. Is there more because your district has more money? Is it because you are advocating for it? Is it the level of importance? Who makes those decisions to have that access? Because I feel like our kids missed out on so much and it's so unfair […] I wonder if money is being mishandled, or is it just not provided. I question what is happening here and why is this okay. Why are we normalizing that the kids don't have access to the basic things, let alone technology?

Evidence of Trustworthiness

To ensure trustworthiness of the research, I used a variety of strategies to address credibility, transferability, dependability, and confirmability. To establish credibility, I triangulated data through reflexive journaling and field notes, intercoder agreement, member checks, and peer debriefing with experts in early childhood education and qualitative design.

Using data from multiple sources to either corroborate or question the data were essential to the credibility of this study (Ravitch & Carl, 2016). I recorded notes throughout the study, comparing the proposal to decision-making from participant recruitment to the written results. When the decision to deviate from the proposal occurred, I recorded the rationale in the field notes.

Minimizing researcher bias is critical to the credibility of all qualitative research (Morse, 2015). I used reflexive journaling during participant interviews to record any potential biases that emerged. The reflexive journal was also used to record reflections from the intercoder agreement process, and any tensions that took place between my interpretation of the codes compared to the second coder's interpretation. The reflexive journal and field notes were periodically reviewed during data analysis.

Throughout this study, I consulted with qualitative experts with knowledge of education. During the development of the interview protocol, I consulted with a distinguished professor whose expertise is in qualitative design. When reviewing the interview protocol, that person evaluated alignment to the research question and conceptual framework and guided me in the revision of questions and the order in which to ask them, to facilitate a more responsive interview. The same person provided consultative support on the coding process and intercoder agreement.

In preparation for the process of intercoder agreement, I consulted Walden University's qualitative methodologist during their office hours. During our conversation, I was provided with expert guidance and related journal articles, on how to conduct intercoder agreement, and how the process strengthens the credibility of the study. I also consulted with a professor whose expertise is qualitative educational research, to guide how discrepant cases are addressed. Multiple reflexive dialogues with an early childhood expert with qualitative research during intercoder agreement strengthened this study's credibility. Member checks were conducted once the preliminary results were completed. One participant (P3) responded by stating that "The only thing I saw was that we did not

watch ghostbusters, but a "Just Dance" video on YouTube to the Ghostbuster's song." I made the related revisions based on this feedback and sent the results to P3 to confirm the revisions accurately portrayed their responses in the interview. accuracy of the revised P3 responded that they agreed based on the revision, that their perspectives were accurately portrayed in the results. The other eight members reported that they agreed that the results accurately represented their perspectives shared in the interview. Finally, a peer debrief was conducted to reflect on the study findings, and to ensure any potential biases did not influence the credibility of the study findings.

The aim of qualitative researchers is not to generalize findings, but instead to present participants' lived experiences related to the study's phenomenon (Creswell & Creswell, 2018). Participants were chosen based on their representation of diverse early childhood settings. The use of thick rich descriptions including context and descriptions of the unique settings of each participant allows readers to identify contextual similarities and subsequent findings that they may be able to relate to (Lincoln & Guba, 1986).

Dependability was established with the plan for data analysis, and the use of field notes to record study activities including steps performed in the data analysis including the process of intercoder agreement, and the reflexive journal to record insights, reflections, and responses to elements of my study that I may have reacted to. Doing so provided transparency with any potential biases that may have affected the integrity of the study (Lincoln & Guba, 1986).

Reflexive journaling, peer debriefs and consultations, and intercoder agreement established confirmability of this study. Through my reflexive journal, I provided

transparency to any potential biases that could be deemed as biased, causing study findings to be perceived as subjective (Creswell & Creswell, 2018). Multiple reflexive dialogues with an early childhood expert during intercoder agreement strengthened the confirmability of this study.

Summary

In chapter 4, I reviewed the purpose of the research study, and the research question. The setting and participant demographics were presented, and the data collection and analysis process were detailed. I presented excerpts from participant data related to three themes, and one discrepant case. A single research question guided this study and was frequently referenced during my data analysis to ensure that the themes identified answered the research question. I identified three themes from the data: (a) enhance and extend contextually and culturally relevant experiences, (b) elevate children's play experiences, and (c) assist teachers in decision-making.

Participants answered the research question by expressing the degree to which technology was used to enhance and integrate culturally and contextually relevant experiences – the first identified theme. All participants shared at least one experience children engaged in, that integrated technology. All the participants described how technology was one of many instructional approaches used to facilitate children's engagement within the preschool environment, however two people clarified that for philosophical reasons they use it very rarely. Participants delineated how technology was *not* used for the purpose of teaching how to use the technology tool itself, but instead, to extend and enhance a meaningful activity. P6 stated that, "It [technology] should be

something to enhance what they're already doing." Another participant (P7) stated that "[…] we try to limit it to either expanding their worldview or as a jumping off point for conversation, connection, further learning reflection, or to reinforce a previously taught story, lesson, or skill […]."

Creating connections for children to experience what they did not have access to, such as people, places, and experiences was prevalent throughout the data, which also addressed the research question. Technology connected children to apple processing, to a marine park, to other people's homes, to authors, works of notable artists, to the beach, and to people far away. In all cases, the technology tool used simply facilitated children's connections to the broader world but was not the focus of the children's experiences.

Participants also answered the research question by sharing the ways they use technology to elevate children's play experiences – the second theme identified from the data. Participants described how technology gave them a research tool to answer children's questions during their guided and child-led play experiences, while other participants related how technology promoted children's reflections and evaluation of their play scenarios. All the participants recounted experiences including technology that involved children's social engagement (a characteristic of play) with their classmates or someone else. Sometimes children used a digital camera or iPad for socio-dramatic play, while other times children used technology in collaboration with their peers to learn something that derived from an investigation or play scenario. Even the two participants who expressed they used technology little due to their philosophical beliefs, shared experiences that included technology, which engaged children socially.

Participants recounted multiple experiences which included children's active learning (a characteristic of play), while engaging with technology, however several people reported that they showed videos and programs on television, although all but one person clarified that there was joint engagement which occurred between the children and the teacher, throughout the entire time the passive media tool was used. One person reported that children viewed television for a brief time, while the teacher organized lunchtime.

The third and final theme identified from the data analysis was the influence of technology for decision-making. Participants chronicled how technology was used to document observations of children's learning, to communicate and collaborate with families, to facilitate the daily routine, and to enable children's access and full participation in the preschool environment. Participants reported the use of technology to facilitate children's transitions into the classroom, and between activities during the day. Technology was an element of various parts of the day including Plan-do-Review time, music and movement, naptime, outdoor time, and field trips.

Six participants reported that they use technology to communicate with families and others. Three participants used Apps like Class Dojo, Bright Wheel, and Learning Genie to communicate with families. A Face Book page was created by one participant during the pandemic, to share ideas for families to do with their children at home. Participants used cellphones to send text messages, pictures, or videos to families, to share how and what their child was doing during the day.

Next, in chapter 5, I will present my interpretation of the findings from this study, a discussion of study limitations, with recommendations and potential implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to explore teachers' perspectives about technology use in preschool. NAEYC's (2022) DAP was used to help understand how nine teachers from six distinct types of licensed early childhood programs used technology with the preschool experience. I conducted nine semi-structured interviews using an interview protocol I developed, which contained questions related to the single research question that guided this study. The research question was: How do teachers use technology within the preschool experience? Field notes and a reflexive journal were maintained throughout the study, to record decision-making and thoughts related to the data, to reduce researcher bias. Through an iterative and recursive data analysis process which included intercoder agreement, three themes addressed the purpose of this study.

As the researcher, I discovered that that all teachers used technology to some extent, within the preschool experience, despite most teachers who reported they had no specialized training. The prevalent use of technology by teachers in this study aligns to the findings by Dore and Dynia (2020), who discovered that technology was "prevalent" with the preschool teachers in their study (p. 9). The use of technology was reported by participants as hinging on their access to technology and their personal and programmatic philosophical beliefs about its appropriateness with young children. Additionally, most participants used technology as one of many instructional strategies to sustain children's engagement in contextually and culturally meaningful experiences, including play-based activities. Finally, technology used facilitated teachers' instructional decision-making.

This chapter presents my interpretation of findings, a description of the limitations of the study, and recommendations for further research and practice. The conclusion of this chapter summarizes the key points from this chapter.

Interpretation of the Findings

The aim of this study was to gain a deeper understanding of the ways teachers use technology within the preschool experience through participant responses to interview questions asked during semi-structured interviews. Responses from nine participants were analyzed for their relatedness to the research question. NAEYC's (2022) DAP was the conceptual framework which guided this study. McGlynn-Stewart et al. (2020) presented findings in their study that children's use of interactive technology within contextually and culturally relevant play activities sustained their engagement and deepened their explorations. The findings from this study were the same. Teachers reported how they integrated technology to connect children to places, people, or events, to discover answers to children's inquiries, to sustain children's engagement in contextually and culturally meaningful activities, which resulted in children's higher levels of play.

Notable to this study was the social aspect of children's engagement with technology. In nearly all the participants' accounts of children's use of technology within their preschool experiences, included social interactions with their peers, with the teacher, or both. which incorporated technology, children were either engaging with their peers, with the teacher, or with both. The concept of social scaffolding is consistent with NAEYC's (2022) DAP and reinforced by researchers like Fridberg et al. (2018) and

Awang et al. (2020). Both researchers pointed to the role that social scaffolding played in promoting children's engagement with technology.

There was only one participant who recounted a child using technology without the presence of social interactions, but the context is important to mention. One participant shared that a child chose to listen to a book and corresponding CD, when they appeared to be sad after saying good-bye to their family at morning drop off. While this finding was inconsistent with the recommendations of researchers like Fridberg et al. (2018) and Awang et al. (2020), the teacher's decision to use technology for this purpose seemed developmentally and contextually appropriate.

I identified three themes that addressed the research question, which I will discuss next.

Theme 1: Enhance and Extend Contextually and Culturally Relevant Experiences

Jack and Higgins (2019) found that technology can in fact, be used during children's open-ended explorations within the whole curriculum, which was previously discounted by earlier researchers (Kerckaert et al., 2015; Ludgate, 2019; Plowman, 2016) that the purpose of technology use with young children was simply for operational purposes. The findings from this study are congruent with those found by Jack and Higgins. Findings revealed that technology served as a tool to help sustain children's engagement during open-ended activities. Recurring throughout the findings was the contextual and cultural relevancy that technology was used. Teachers integrated technology as one of many instructional tools to promote experiences that children were interested in, including those that were culturally relevant. McGlynn-Stewart et al. (2020)

found that children's use and access to technology promoted their sustained engagement within their open-ended experiences outdoors. The findings of this study align with McGlynn-Stewart et al.'s findings.

When technology was available for use within the environment, children frequently used it to find answers to questions that naturally came up within their investigations. One teacher who reported they lacked access to technology, could share only one brief encounter of children's use of technology, though it did not occur naturally because the technology was readily available to children within the preschool environment. The role teachers played in their intentional responsiveness to children's observations, queries, and actions. Teachers' level of participation with children during investigations, whether teacher or child-initiated, was instrumental to technology's influence on extending and enhancing culturally and contextually relevant experiences. Like Park (2019), whose study revealed the important positive influence teachers had on sustaining children's constructive play, like my research findings. When teachers were present and active in children's experiences that incorporated technology, then children's activities were lengthier and more complex than those reported by teachers who had little to no involvement. Also notable were the ways teachers influenced children's extended engagement in activities that integrated technology.

Teachers' use of open-ended questions and encouragement of self-directed exploration which led to extended experiences using technology was evident in this research study. When children were encouraged and allowed to lead their explorations, children found creative ways to use technology for outdoor and indoor experiences.

Teachers' intentional responses to children's experiences that included technology were obvious. Sometimes teachers observed and offered little to no feedback but were clearly aware of cues that would call for their active participation. Other teachers were engaged in the children's experiences because the children were accustomed to the teacher being fully present. Teachers were attentive and their intentional responsiveness influenced how technology extended and enhanced culturally and contextually relevant experiences. These findings align with those found by Park (2019) in their study.

Theme 2: Elevate Children's Play Experiences

Described as the "glue that connects learning across content areas," play is the optimal vehicle for children's learning (NAEYC, p. 33). Taylor and Boyer (2019) described characteristics of play, based on theoretical influences including constructivism, socio-developmental and sociocultural theories. Within play, is the presence of social interactions and active engagement. Intentional integration of interactive technology within play can increase children's social interactions with peers, learning to increase critical thinking skills and peer collaboration (Taylor & Boyer, 2019). Participants in this study described children's play-based experiences which included technology use, which enabled children's critical thinking skills and peer collaboration. Two types of play experiences were evident in the study's findings, which align with NAEYC's (2022) description of guided play and self-directed play – both essential to children's growth and learning. Both types of reported play experiences in this study involved children's social interactions with peers and others, as well as active engagement which sustained children's interests. Developmentally appropriate

technology use within the play-based experiences including outdoor and indoor play, thematic studies and investigations, and socio-dramatic play were evident in this study, supporting the idea that technology used within children's play promotes children's critical thinking skills and collaboration, irrespective of whether it is guided or self-directed play.

Teachers and others intentionally scaffolded children's learning within play-based experiences that used technology. Participant accounts of children's play experiences revealed that the longer the children and the teacher were socially engaged in co-constructing the play scenario, the more intentional the use of technology became, leading to higher levels of play, such as socio-dramatic and symbolic play. These findings align with Kirova and Jamison's (2018) discovery of the importance of scaffolding within children's play experiences when technology is used. The play experiences described by participants that lasted the longest were ones where teachers allowed children to lead their play, while intentionally responding in varied and supportive ways. Consistent with NAEYC's (2022) description of guided play as a teachers' intentional response to children's "interests and creations" was several participants' descriptions of the intentional ways they incorporated technology in activities that children showed interest in (p. xxxiii). Rather than technology being the center of the activity, technology was available to children to enhance experiences that were meaningful to them. This concept aligns with the findings of Fantozzi (2021), who discovered that children integrated technology (an iPad) as "a part of play rather than a separate kind of play" (p. 125). Similarly, teachers in this study shared multiple examples when their observations

informed how they responded to children's interests that resulted from their play. Teachers shared how they would model and/or suggest to children how they might use technology to find answers to their curiosities. Consistent between most participant accounts was the adult engagement within the whole play-based experience - opening doors to technology when appropriate, or leaving children to discover how technology might lead them to discoveries they are curious about. NAEYC (2022) corroborates the impact teachers have on play-based learning in their statement that "Self-directed play, guided play, and playful learning, skillfully supported by early childhood educators, build academic language, deepen conceptual development, and support reflective and intentional approaches to learning – all of which add up to effective strategies for long-term success" (p. xxxiv).

NAEYC (2022) points out that active engagement is not only an integral part of play-based experiences, whether they are self-directed or guided, but essential for learning. In alignment with NAEYC, Huber et al. (2018), discovered the connection between positive learning outcomes and active engagement (versus passive) when using technology with young children. Active learning was evident in participant's accounts of how they used technology within the preschool experience. Depending on the technology tool used, the integration of technology within a play experience often caused children to physically sit and passively watch a video for less than a minute, up to fifteen minutes. In all cases, once the short video was viewed, teachers transitioned children to a related experience that was active. Nearly all teachers who showed a video integrated it as a small portion of a larger play-based, active learning experience.

For those who described children's passive use of technology while watching a video or television show exclusive from a play experience, expressed that they did so to fill children's time during rainy or chilly days and while teachers completed required tasks. This practice has negative implications to children's growth and development, as presented by multiple researchers including Jackson et al. (2020), McArthur et al. (2020), McNeill et al. (2019), and Tamana et al. (2019). Worthwhile mentioning is the study's finding that only one person reported specialized training through a college course they completed, and one other person recalled they went to one training on developmentally appropriate technology, but the remainder of participants expressed they had no specialized training.

Theme 3: Assist Teachers in Decision-Making

Teachers use technology for instructional planning, including promoting children's access and full participation within the preschool experience, and documenting observations of children's learning. Teachers used technology within their curriculum assessment system, to record anecdotal notes and upload photos documenting children's experiences related to their development. Additionally, one teacher reported using technology to ensure children's access and full participation in the preschool environment. No other teachers that used technology for this purpose, raising questions about the lack of specialized training found in this study.

Limitations of the Study

There were two limitations in this qualitative study, which were presented in Chapter 1. No additional limitations emerged during the study. The first limitation relates

to the small sample size. The study consisted of nine teachers. The purposefully chosen small sample size limits transferability to other teachers from uniquely situated settings (Ravitch & Carl, 2016). The second limitation relates to participants' geographic location. Participants represented one midwestern state, limiting transferability to preschool teachers living in geographic areas not represented in this study.

Recommendations

The purpose of this basic qualitative study was to explore teachers' use of technology within the preschool experience. Recommendations for further research based on the study limitations and its strengths, the literature review presented in Chapter 2, and the findings presented in Chapter 4 are threefold. First, the study was limited to nine preschool teachers representing five distinct types of early childhood settings, in one geographic region of the United States. The first recommendation is to repeat this study by using a large-scale survey to obtain the perspectives of more teachers across the United States from various settings. Increasing the number of participants and opening the geographic area for the study could bring forth opportunities for teachers to make connections to study findings if they find representation of their unique settings, within the study sample. Further, adjusting the study sample would strengthen the literature related to technology use within the preschool experience, across multiple settings within the United States. Jack and Higgins (2019), whose study sample was also small, made this recommendation to address the issue of transferability due to small sample size.

The second recommendation for further research is to conduct a mixed methods study to explore teachers' participation in specialized training integrating technology

within the preschool environment as it relates to their reported use of technology within the preschool experience. Knowing the breadth of teachers' specialized training using technology related to the experiences provided in the preschool environment could lead to interventions that address teachers' philosophical concerns for using technology with young children, as well as strengthening teachers use of developmentally appropriate technology use, including its use for promoting access and full participation within the preschool setting. In a 3-year study that involved teachers' integration of technology within their play-based environment, teachers reported that the specialized professional development given to them at the beginning and throughout the study, helped them see how beneficial and appropriate technology was to enhance children's play-based experiences (McGlynn-Stewart et al., 2020).

The third recommendation is to conduct a large-scale mixed methods study to determine the relationship between accessibility of technology within state-funded preschool programs and teachers' use of technology within the preschool experience. One teacher reported they did not have access to technology in their urban state funded preschool, limiting their use of technology within the preschool experience. In contrast, two other state funded preschools reported access to a variety of technology tools, which increased the teachers' use of technology within the preschool experience. The results of such a study could lead to financial investments to minimize the disparity between state-funded preschool programs across the state.

Implications

This qualitative study generated a deeper understanding of teachers' use of technology within the preschool experience. The potential impact for positive social change could lead to greater teacher support through specialized training including mentorship. Professional development should include the influence of teachers' active engagement on children's use of technology within a play-based learning experience; meaningful and relevant strategies to build on children's interests using interactive technology, and the influence of passive or active use of technology, on children's engagement in a contextually and culturally relevant learning experience. Vaughan and Beers (2017) found positive outcomes with teachers' meaningful integration of technology within the early childhood classroom after they participated in a professional development initiative. Teachers from the study reported that the professional development they participated in helped them use technology in "developmentally appropriate ways" by integrating it throughout the day, rather than only at certain times of the day. Schladant et al. (2022) reported capacity building with early childhood general educators, when they participated in professional development specifically on ways to use technology within the inclusive environment. Teachers learned how assistive technology benefited children with disabilities, by promoting their access and full participation in the general education environment. Professional development methods included online modules, coaching and access to assistive technology. The results of Schladant's et al., (2022) study, directly impacted the learning of young children with disabilities.

An implication of this study can be teachers' increased access to interactive technology to extend and enhance children's learning experiences. Multiple ways teachers intentionally use technology to extend and enhance children's learning were described by participants in this study. However, if teachers do not have access to technology, then children lose out on the benefits technology brings to culturally and contextually relevant experiences. NAEYC (2022) described the benefits of intentional use of technology to deepen children's learning experiences. When teachers have access and appropriate training, they possess the tools to apply developmentally appropriate pedagogical strategies using technology within the preschool experiences.

Conclusion

The purpose and nature of this study was presented in this chapter, as were the key findings and study limitations. Recommendations followed, based on the literature review and study findings. Through semi-structured interviews of nine teachers from five different settings within one geographic area, three themes emerged. Woven into the interpretation of findings was the conceptual framework guiding this study, which was NAEYC's (2022), DAP. When interactive technology is intentionally integrated within culturally and contextually meaningful experiences that incorporate teacher engagement, children's play experiences are enhanced through sustained engagement. Additionally, there is a connection between the availability of technology and teachers' use of technology within the preschool experience.

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Appendix A: Participant Invitation Survey

Greetings! My name is Cindy Basse, and I am an Ed.D. candidate at Walden university, pursuing my degree in early childhood education. In my professional role, I teach full time with Northern Michigan University as their lead early childhood instructor in the graduate program.

In partial fulfillment of my degree, I am conducting a research study to learn more about how teachers use technology within the preschool experience. Technology includes tools such as interactive tablets like iPads, computers and apps, cellphones, interactive whiteboards, televisions, digital recording devices or e-books.

You have been invited to complete a survey to determine if you meet the study criterion. To participate in this study, you must be working with preschool aged children. The second criterion is that you are working in a licensed early childhood program.

Before completing the survey, please read the attached informed consent form. The informed consent form explains what you will do if chosen to participate in the study. If you are interested in participating in the study, please complete the survey and sign, and email back to me.

If interested in participating in the study, please return the informed consent form and complete the survey within by _____.

If you have any questions at all, please feel free to reach out to me.

Thank you for your consideration.

Regards,

Cindy Basse

Appendix B: Interview Protocol

Participant ID: _____ Date: _____

Introductory Script

Thank you for taking the time to speak to me today. I appreciate that you have agreed to participate in my study. You are here because you currently instruct preschool-aged children.

As shared earlier, the purpose of this study is to explore teachers' perspectives about technology use in preschools. *Our interview will last between forty-five minutes to one hour. I encourage you to share as much detail as you feel comfortable with. Doing so will give me a deep understanding of how you use technology within the preschool experience. Please feel free to interrupt me or ask clarifying questions as needed.*

I received your signed informed consent form – thank you. As you recall, the informed consent form addressed that your personal identity will be held in complete confidence. You will be assigned a participant ID number which will be used instead of your name, on all your information. Additionally, data will be stored in a password protected file, labeled with your participant ID number, on my personal computer.

Do you have any questions about the informed consent form?

If not: All right. Thank you!

If yes: Answer question(s) and move on.

The informed consent form included a statement about recording this interview; are you still comfortable with my video recording of our conversation?

Yes____ No _____

If "yes": Great, I will turn on the video recording feature of Zoom, now.

If "no": I understand. Instead, I will take written notes during our interview.

Just to clarify when I will sometimes use the term digital media and technology, interchangeably. When I refer to digital media or technology, I am speaking about

interactive screens like iPads, whiteboards, or cellphones, along with computers, apps, digital cameras, e-books, and video streaming services and devices like television, YouTube, and the like.

Do you have any questions for me before our interview begins? If you have any questions during the interview, feel free to ask.

Interview Questions

Kindly share your first and last name, where you work, and for how long you have used technology with preschool aged children.

Opening Questions

Question #1: Describe one of the most meaningful experiences you have had with children when you used technology?

Question #2: What were the goals of this activity?

Question #3: What information influenced the way you planned for this experience?

Possible Follow Up Questions

What considerations did you take when choosing the technology used in this experience?

What, if any, influences would change how you offered this experience again?

What were the goals of the experience?

What if anything, would you change? Why?

Main Questions

Question #1: Describe your philosophy of technology use within the preschool experience.

Question #2: What do you believe are the most significant factors influencing your philosophy of technology use in the preschool experience?

Question #3: How has your use of technology changed over the years?

Question #4: Describe your professional development experiences related to technology use in the preschool experience.

Possible Probes

Could you give me an example?

What more can you share?

Could you provide more details?

Tell me more…

What else are you thinking?

Closing Questions

Question #1: Is there anything else you would like to share about your use of technology within the preschool experience?

Question #2: If you were asked to give advice to a novice teacher about how to use technology within the preschool experience, what would you share with them?

Question #3: What, if anything, do you feel teachers need to strengthen their use of technology within the preschool experience?

Closing Remarks

Thank you for taking the time to share your thoughts about how you use technology in your setting.

Do you have any questions or concerns about the interview that could influence the credibility of my study?

Yes _____ No _____

If "yes," note concerns:

Thank you again for taking time out of your day to participate in this interview. Once I analyze the data for my study, I will be sending you a rough draft of those findings, asking you to comment on my accuracy. I will send this draft to you via email, with instructions on where to provide your feedback. Thank you in advance for your willingness to comment on the accuracy of my findings.