EXPLORING HOW PRESCHOOLERS USE IPADS TO DEVELOP
PHONEMIC AWARENESS: A CASE STUDY

by

Patricia Pounds Scalf
Liberty University

A Dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

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The purpose of this qualitative case study was to describe how iPads may be used to develop phonemic awareness as part of emergent literacy skills acquisition for six preschool students at Little Lambs Christian Preschool (pseudonym) in central Tennessee. The theories guiding this study were the social constructivist theory, as it related to the use of play for the development of new skills, and the emergent literacy theory, which provided a framework for identifying and defining the skills children need to develop before learning to read. The following was the proposed central research question: How does the use of iPads in the preschool classroom affect young children’s development of phonemic awareness? This study used three methods of data collection – observations, document analysis, and interviews – to describe how children use iPads to acquire phonemic awareness skills in the preschool setting. Data analysis was conducted using patterns in the data that developed into themes. The goal was to gain insight into ways children develop phonemic awareness while using iPads and to enhance teachers’ understanding of how to use iPads in the early childhood education setting. The findings indicated that while students were able to use iPads to practice phonemic awareness, teachers had concerns surrounding the lack of human interaction when students engage with technology. Despite teacher concerns, student-participants engaged with each other and with the iPads in creative ways while practicing phonemic awareness.

*Keywords*: emergent literacy, phonemic awareness, iPads, preschool, early childhood education
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Dedication

This paper is dedicated first to my Lord and Savior, Jesus Christ. He led me to begin this journey and has carried me to the finish. Philippians 4:13 says, “I can do all things through Christ which strengtheneth me.” Second, thank you to my parents who encouraged their little girl who stuttered to follow God’s path and instilled God’s Word in her heart. To my husband, you are my rock. When I first proposed to pursue my degree, you encouraged me and supported me. To my mother-in-law, who has been babysitter and dishwasher, thank you. To my boys, thank you for supporting me and being patient with me through this long journey.
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When I first met Dr. Pearson in the late nineties, I never thought I would embark on this journey. Through God’s providence, He allowed her to walk by my side. You have been an encouragement and support throughout every stage of this process, and I thank you. Every time I felt like I needed to just quit, you unknowingly gave a word of encouragement. Dr. Collins, thank you for your expertise and insightful guidance. I also want to thank the teachers who participated in my study. You all brought a unique perspective that enhanced my project. To my “littles”, thank you for your smiles, hugs, and laughter as we played and learned together. You will always have a place in my heart.
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American Association of Christian Schools (AACS)

Early childhood education (ECE)

Emergent Literacy (EL)

English language learners (ELL)

Individual education plan (IEP)

International Society for Technology in Education (ISTE)

Institutional review board (IRB)

National Association for the Education of Young Children (NAEYC)

National Center for Education Statistics (NCES)

Southern Association of Colleges and Schools (SACS)
CHAPTER ONE: INTRODUCTION

Overview

In modern education, technology is playing an increasingly significant role in the standard K-12 curriculum. Over the last three decades, desktops, laptops, smartboards, tablets, and even smartphones have made their way into the classroom. While many elementary and secondary teachers have eagerly incorporated technology into their classrooms, early childhood educators have taken a much more cautious approach. Many early childhood education (ECE) teachers and parents have been reluctant to allow young children to use technology because of developmental concerns and the effects of its use on physical and cognitive growth for very young children (Neumann & Neumann, 2014). Despite this fact, children are seen using cell phones, iPads, tablets, and other forms of technology every day for entertainment. Although the National Association for the Education of Young Children (NAEYC) has developed guidelines for parents and educators on the use of technology with young children, continued research is needed to properly inform educators and parents of the ways that technology can be used in a developmentally appropriate manner to develop emergent literacy skills - particularly phonemic awareness - in early childhood.

The purpose of Chapter One is to provide background information and a brief description of the research to be conducted. This chapter introduces the topic being explored. Background information about the development of the iPad and touchscreen technology, phonemic awareness, and emergent literacy, situation of the researcher within the research, the problem to be explored, the purpose and significance of the study, and my research questions are all presented in this chapter.
Background

Use of technology in early childhood has typically been regarded by most ECE educators as unnecessary or irrelevant (Habler, Major & Hennessy, 2015). Because young children need to be active participants in the education process for authentic learning to take place, technology is not seen as a tool that invites children to participate in the physical activity required for proper cognitive and physical development (Hoffman & Paciga, 2014). Despite this concern over using technology with young children smartphones, tablets, and other handheld devices have quickly become popular tools in the ECE curriculum. As it continues to grow in popularity, technology continues to play a more significant role in daily living for many people in the United States and elsewhere (Edwards, Henderson, Gronn, Scott & Mirkhil, 2017; Ekici, 2016; Myrtil et al., 2018). Such is the case for even the youngest children who know how to use smartphones and tablets to watch their favorite videos, play their favorite games, and even take selfies. Parents and teachers alike have valid concerns about including technology in the early childhood curriculum; however, as technology increasingly becomes the focus of daily life, it is evident that it should be addressed by educators at all levels even early childhood. While technology consumes much of daily life, a closer examination of its history and development as it relates to children’s literacy is vital to understanding its impact on young children.

Historical Background

Long before iPads came into use in elementary schools, emergent literacy skills were taking precedence in ECE (Salmon, 2014). Emergent literacy, as described by Clay (1979), provided the foundation for learning to read. Along with learning the alphabet, early childhood educators in the mid to late 20th century began placing emphasis on children’s development of phonemic awareness, oral language, and print concepts (Lonigan, Burgess & Anthony, 2000).
This emphasis led to the development of emergent literacy theory (Arrow & McLachlan, 2011; Clay, 1979). Teachers who wanted to improve these previously identified emergent literacy skills saw iPads as a new, exciting means to gain children’s interest and attention (Merchant, 2015).

One of the more popular handheld devices recently developed, the iPad, has become a staple in the educator’s toolbox. When Apple introduced the iPad in 2010, the response was positive, especially in education, where it was lauded as a convenient tool for even the youngest elementary students (Flewitt, Messer, & Kucirkova, 2014). As iPad has evolved, so have the implications for its use in education, including ECE (Reeves, Gunter, & Lacey, 2017). iPads and other tablet computers are now used in schools across the United States as a method for presentation (Lu, Ottenbreit-Leftwich, Ding & Glazewski, 2017), as a tool for research (Gallagher et al., 2015), and as a means for skill reinforcement (Reeves et al., 2017). Many schools have adopted a one-to-one technology platform where there is a device for each child to use in the classroom (Kongsgarden & Krumsvik, 2016; Lu et al., 2017; Minshew, 2015). This practice has afforded many students opportunities they may not otherwise have had (Erstad, 2015). Also, differentiation of learning activities was streamlined and simplified by utilizing the available technology (Stone-MacDonald, 2015).

Overall, emergent literacy was the most significant aspect of early childhood education in as much as it provided the foundation for later educational success (Gallagher et al., 2015; Salmon, 2014). As the iPad became a popular tool in primary and secondary schools, ECE teachers were concerned about its effects on young children (Harrison & McTavish, 2016). However, many early childhood educators, seeking new ways to provide their preschool students with necessary skills before entering a formal educational setting, envisioned iPads and other technology as new educational possibilities because of the growing popularity of social platforms
Social Background

Many reasons have been proposed for why iPads and other handheld devices are so popular with elementary and ECE teachers. Convenience (Soby, 2015), low cost (Soby, 2015; Ward, Branson, Cross & Berson, 2016), student engagement (Bergdahl, Fors, Hernwall & Knutsson, 2018; Perry & Steck, 2015), and ease of use (Mertala, 2016; Perry & Steck, 2015; Stone-MacDonald, 2015) have been cited as reasons using iPads in preschool and elementary settings. Before iPads and other touchscreen tablet technology were developed, if young children used technology, they needed the dexterity to manipulate a mouse and alphabet awareness for using a keyboard (Lee, 2015). The advent of touchpads made technology accessible to young hands because it is lightweight, small in size, and easy to manipulate for young children who only need to tap the screen (Palmer, 2015). Even though the iPad is convenient, relatively inexpensive, and engaging, there are concerns about the developmental appropriateness of the technology for preschool students. Research and child development theories hold that children still require physical engagement (Edwards, 2016) and social interactions (Vygotsky, 1978) for authentic learning to take place.

Theoretical Background

According to social constructivist and social learning theories (Dewey, 1938; Piaget, 1954; and Vygotsky, 1978), learning is succinctly tied to social interactions. Knowledge constructed through social experiences (Vygotsky, 1978) and play (Dewey, 1938) uniquely influences our view of reality (Piaget, 1954). The construction of knowledge is a social activity where children use play to act out situations that are transferred later to real-life social situations (Edwards & Bird, 2017). Those same social situations are then used in the development of
phonemic awareness when children interact with one another in the context of reading a book, retelling a story, reciting a nursery rhyme, or singing a song (Bodrova, 2008; Edwards, 2016). Such activities provide the backdrop for literacy education.

Young children’s development of emergent literacy and phonemic awareness has been examined closely over the past century (Clay, 1979). During the 20th century, the development of emergent literacy theory began to influence ECE curriculum and practice. As a theory, emergent literacy identified five skills or areas of development that young children need before learning to read. Those skills are alphabet knowledge, oral language, print concepts, vocabulary, and phonemic awareness. Later, the motivation to read was added to this list (Arrow & McLachlan, 2011). According to Clay, these skills are fluid, develop over time beginning at birth, and are not learned in a sequential pattern or order.

This fluidity in emergent literacy theory has been a controversial topic (Arrow & McLachlan, 2011), and our understanding of the process that children follow to develop these skills has undergone many changes over the years (Arrow & McLachlan, 2011). Traditionalists adhere to the use of traditional educational methods such as recitation, written practice, and drills for teaching young children. On the other hand, more contemporary educators subscribe to a play-based method of teaching and learning for preschool age children (Bird & Edwards, 2015), a position which is considered more developmentally appropriate (Copple & Bredekamp, 2009; Dewey, 1938; Piaget, 1954; Vygotsky, 1978). All incorporated play into their philosophical ideologies when addressing young children.

Within the realm of play, the iPad holds a unique position. As a tool, it is useful for work and play, but educators have little understanding of how young children use it within the context of play. As a social device, children use iPads in small groups for creative activities such as
creating stories or videos and playing games together (Arnott, Grogan & Duncan, 2016). If children learn through these creative activities, then using iPads provides a backdrop for social learning as described by Vygotsky (1978), Piaget (1954), and Dewey (1938). I personally subscribe to play-based methods of teaching young children. But there may also be room for more structured activities such as recitation of nursery rhymes with finger plays to enhance children’s learning and provide focus on specific skills (van Goch, 2014).

**Situation to Self**

As an early childhood educator, I have observed how children interact with technology in and out of the classroom. I have also learned that phonemic awareness is an important building block for children’s success in learning to read (Clay, 1979). One of the most popular activities for preschool students that I have observed is using technology, especially iPads and other touchscreen tablets. Young students enjoy exploring the available applications, recording their own stories, and listening to books and music. However, there are still concerns among early childhood educators about how technology affects young children’s academic and cognitive development (Mikelic, Lesin & Sagud, 2016). Those concerns include how students’ emergent literacy skills are impacted by their use of technology. Understanding how touchscreen technology affects young children’s development of emergent literacy skills, specifically phonemic awareness, may improve the development of ECE curriculum to address this issue (Neumann & Neumann, 2014). Deeper understanding of how children develop phonemic awareness as they use touchscreen technology may offer insight into how to meet the needs of ECE students in the preschool setting.

In my career, I have been a secondary social studies teacher, elementary teacher, preschool program director for the military, and a training and curriculum specialist in early
childhood education. Over the last 25 years, I have seen the significant role that technology has played in education and culture change drastically. It is yet to be determined what type of impact these changes will have on young children and their development of EL skills. Currently, I am the director of the early childhood programs at Little Lambs Christian Preschool. As the director, I serve as the curriculum specialist, support teachers as a mentor on classroom management, and help with behavior management when necessary. At this time, I do not perform any supervisory duties such as teacher evaluations or hiring.

As a classroom teacher, program director, and training and curriculum specialist, I believe that I have established creditability with my potential participants. I also brought a holistic perspective to this study by looking at the whole of one preschool to gain an overview of this school’s use of iPads in relation to phonemic awareness. From this perspective, I explored children’s use of iPads as it related to phonemic awareness development which is an important part of the ECE curriculum. Insights into how children use the iPads for purposes of phonemic awareness may provide opportunity to plan and develop the curriculum in a way that guides children’s development of phonemic awareness and better prepare them to be competent readers.

Social constructivism also guided my research because young children learn through play that is constructed in a manner that allows them to explore without judgment (Dewey, 1938). As an early childhood educator, I think that physical experience through the engagement of the five senses dramatically improves a child’s learning and enables the brain to capture new knowledge. Children construct new knowledge through meaningful experiences in the form of play. Emergent literacy theory (Clay, 1979) was a guiding theory, as well, that informed my research and was also grounded in social constructivism.
Problem Statement

In 2017, Common Sense Media conducted a survey of families with children under age eight and their use of media and technology. They found that 42% of children under age eight have their own tablet, and 95% of families with young children own at least one smartphone. The survey also showed that the technology gap between lower- and higher-income families is narrowing. More than 95% of lower-income families own a smartphone, and 74% have high-speed internet access at home as compared to 96% of higher-income families (National Center for Education Statistics, 2017). Despite these figures, the literacy gap between children from differing socio-economic backgrounds still exists (Bouffard, 2017). The National Center for Education Statistics (NCES) also reported in 2017 that approximately 50% of children in the United States attended some type of preschool program (NCES, 2017). Given the fact that many of these children already have some exposure to handheld technology such as smartphones and tablets, teachers need more information that will help them use children’s own experiences with technology to advance students’ phonemic awareness (Lu et al., 2017).

The problem is that young children, while they are gaining increased access to technology, are not improving in their development of emergent literacy, specifically phonemic awareness. As a major component of literacy, phonemic awareness is often ignored in the early childhood classroom, where the emphasis is usually placed on alphabet knowledge, print concepts, and phonics (Clay, 2013; Lu et al., 2017). Several studies have been conducted on how iPads can be used in the early childhood setting to improve children’s reading (Barnyak & McNelly, 2016; Cheung & Slavin, 2013; Edwards & Bird, 2017; Flewitt et al., 2014; Gallagher et al., 2015; Lu et al., 2017; Kervin, 2016; Merchant, 2015). The problem laid in the fact that these studies, while addressing students’ general reading and writing abilities, did not
specifically address phonemic awareness which is the cornerstone for reading success (Neumann, & Neumann, 2014). These current studies only briefly examined phonemic awareness in relation to what students learn by using iPads. This case study examined how preschool students, in a Christian school, incorporated iPads into the curriculum to enhance or develop phonemic awareness as part of their overall development of emergent literacy skills.

**Purpose Statement**

The purpose of this qualitative case study was to describe how iPads may be used to develop phonemic awareness as part of overall emergent literacy skills acquisition for six preschool students at Little Lambs Christian Preschool in central Tennessee. Phonemic awareness was generally defined as the ability to distinguish the individual sounds or phonemes that make up a word (Clay, 1979). Two theories guided this study. First, the social constructivist theory related to the use of play to develop new skills (Vygotsky, 1978). Social constructivism, as posited by Dewey (1938), provided a foundation for the use of play to learn basic skills necessary for later success in formal educational settings. Secondly, emergent literacy theory provided a framework for identifying and defining the skills children need to develop before learning to read (Clay, 1979).

**Significance of the Study**

Early childhood educators play an important role in young children’s development of emergent literacy skills. Providing specific opportunities for children to develop their phonemic awareness through meaningful conversation, nursery rhymes, and music is the crux of early childhood education (Tracey, 2017). Phonemic awareness has been positively correlated to reading ability (DeGroot, Van den Bos, Van der Meulen & Minnaert, 2015). There was also evidence that reading with children increases their phonemic awareness and, consequently, their
reading ability (Westervel, Gillon, van Bysterveldt & Boyd, 2015). Furthermore, positive, shared reading experiences, even within the context of e-books, were positively correlated with reading success (Parish-Morris, Mahajan, Hirsh-Pasek, Golinkoff & Collins, 2013). In light of the growing interest in incorporating iPads and other touchscreen technology into the ECE curriculum, research into their intersection is required (Neumann & Neumann, 2014; Neumann, 2014). This study was empirically significant to ECE educators, program administrators, and ECE curriculum specialists in its exploration of the intersection of phonemic awareness and children’s use of iPads in the ECE classroom.

This study was practically significant for early childhood educators for two reasons. First, this study provided early childhood educators with information about how children use iPads in the development of phonemic awareness. As part of a child’s overall emergent literacy skill development, phonemic awareness provided an important building block for later reading (Arndt, 2016; Merchant, 2015; and Palmer, 2015). Second, children learn through their experiences (Dewey, 1938), and play was one of the most powerful experiences children can use to develop knowledge (Edwards & Bird, 2017). As a case study, this research provided insight into children’s use of iPads in their play as they develop phonemic awareness skills. Its impact on current practices and beliefs in the ECE classroom was also significant to ECE stakeholders such as classroom teachers, administrators, and curriculum specialists.

The theoretical significance of this study stemmed from its foundation in emergent literacy theory. More research was needed to understand the processes that young children use in order to learn to read. Since phonemic awareness is a vital part of learning to read (Clay, 1979), understanding how children utilize technology to develop phonemic awareness provided educators with knowledge about how children develop this foundational skill. This research
maybe useful in curriculum development and the continued broadening of emergent literacy framework.

**Research Questions**

The purpose of this qualitative case study was to describe how iPads may be used to develop phonemic awareness as part of overall emergent literacy skills acquisition for six preschool students at Little Lambs Christian Preschool in central Tennessee. The research questions were grounded in social constructivism, which focused on young children’s learning through active, social interactions (Vygotsky, 1978). The research questions were also bounded by the emergent literacy framework, which identified the main skills that young children develop before learning to read (Clay, 1979). As a means of fully understanding how the use of iPads may be used in developing young children’s emergent literacy, in particular phonemic awareness, the following questions guided me and clarified my research.

**Central Question**

How does the use of iPads in the preschool classroom affect young children’s development of phonemic awareness?

Children learn through social interactions that engage the senses, thus allowing for exploration and construction of knowledge (Arnott et al., 2016; Vygotsky, 1979). Neumann & Neumann (2014) suggested that more research was needed to explore the impact of iPads on children’s emergent literacy skills of which phonemic awareness is an essential component. The following sub-questions supported the central question.

**Sub-question 1.** What behaviors do young children typically exhibit when using iPads?

By observing children’s behaviors, I learned about how they may use iPads to develop phonemic awareness within the context of the activities provided on the iPad (McKenzie, Spence
The context for the children’s use of iPads was their social interactions in the classroom (Edwards & Bird, 2017; Kervin, 2016). Children often engaged in social interactions during regular classroom activities, including the time engaging with technology (Edwards & Bird, 2017; Vygotsky, 1979). These social interactions were an integral part of the research process.

**Sub-question 2.** How are iPads utilized in the preschool classroom for developing phonemic awareness?

A key to describing how iPads can be used to develop phonemic awareness was understanding how they were used in the classroom as part of the curriculum and activities that took place (Bird & Edwards, 2015). Young children utilize tools such as manipulatives, toys, and games during play to construct knowledge (Alade, Lauricella, Beaudoin-Ryan & Wartella, 2016). iPads were just one item that was used as they constructed knowledge of phonemic awareness as part of their emergent literacy skills (Andersson & Hashemi, 2016).

**Sub-question 3.** What do teachers perceive about children’s learning of phonemic awareness skills during iPad use?

Positioned in the emergent literacy framework (Clay, 1979), this question sought to examine how teachers understand the role of emergent literacy in children’s use of iPads. How teachers related children’s use of technology to their development of phonemic awareness was important to understand how iPads can be used to successfully develop emergent literacy skills (Fenty & Anderson, 2014; Gallagher et al., 2015; Reeves et al., 2017). Having a clear understanding of how children’s use of iPads impacted their development of emergent literacy skills such as phonemic awareness was important to the overall early childhood curriculum (Neumann & Neumann, 2014).
Definitions

1. *Developmentally appropriate practice* – Those practices in early childhood education that reflect the age, developmental level, and culture of a child (Copple & Bredekamp, 2009).

2. *Early childhood education* – Formal or informal education that takes place before a child enters the formal education setting, usually first grade (Copple & Bredekamp, 2009).


6. *Phonemic awareness* – The ability to hear the sounds that make up a word (Clay, 2013).


Summary

Since the release of the iPad in 2010, educators have been using iPads in the classroom. While there has been a plethora of research conducted on their relation to education, little has been done to explore how they can be used to support preschool children’s expansion of phonemic awareness, which is one of the building blocks for reading (Neumann & Neumann, 2014). The purpose of this qualitative case study was to describe how iPads may be used to develop phonemic awareness as part of overall emergent literacy skills acquisition for six preschool students at Little Lambs Christian Preschool in central Tennessee. Using emergent literacy theory and social constructivism as the theoretical foundation, I endeavored to understand how iPads can be used to develop emergent literacy skills.
CHAPTER TWO: LITERATURE REVIEW

Overview

With the passing of the No Child Left Behind legislation in 2002, emergent literacy has become the central focus of preschool programs and state standards for early childhood education. Steadily growing in popularity over the last four decades, ECE and programs such as Head Start have expanded exponentially. At the same time, technological developments have introduced educators to new possibilities in the classroom. One such innovation, the iPad, has grown in popularity over the last decade. Its ease of use, affordability, and simple, lightweight design has put it in high demand.

This review of the literature will explore the intersection between iPad use and young children’s development of phonemic awareness. Topics I will discuss include the history and background of emergent literacy and iPads, early childhood education, and young children’s use of technology. This study is grounded in the constructivist theories of Vygotsky (1979) and Dewey (1938). It is also founded on emergent literacy theory as proposed by Clay (1979).

Theoretical Framework

Much of ECE is based on the idea that children learn through play and their social interactions with adults and other children (Copple & Bredekamp, 2009). Working from the standpoint of developmentally appropriate practice (DAP), ECE teachers seek to provide students with activities that challenge without frustrating them (DeHaan, Elbers & Leseman, 2014). Early proponents of ECE such as Pestalozzi (Pestalozzi, 1894), Froebel (1899), and Montessori (Montessori, 1912) recognized that children needed thoughtful, meaningful experiences for learning to take place. The work of these early educators led to the more structured theories proposed by Piaget (1954), Vygotsky (1978), and Dewey (1938). Modern
theorists such as Clay (1979) and Bird and Edwards (2015) also based their theories on the early constructivist works that emphasize the active participation of children in the learning process. These modern theorists (Bird & Edwards, 2015; Clay, 1979; Edwards, 2017) emphasize play-based curricula for young children.

**Social Constructivism**

As it has developed over the last 30 years, early childhood education is based on principles related to social constructivism (Vygotsky, 1978) and social learning theory (Bandura, 1971). Observations of young children clearly show that they need physical movement (Bird & Edwards, 2015). Naturally curious about their surroundings, preschool children enjoy asking questions (Copple, Bredekamp, Koralek & Charner, 2013). According to Piaget (1954), children pass through several stages of development that enable them to construct new knowledge based on their cognitive development. Dewey (1938) also proposed that children learn by constructing knowledge through age-appropriate, meaningful experiences. Vygotsky (1978), on earlier theories asserting that children learn through their social interactions within their own environment. Vygotsky’s zone of proximal development explains that children learn best when in a social context that allows them to learn by interacting with more knowledgeable others (Barrs, 2017). By incorporating the ideas of developmental stages (Piaget, 1954), knowledge construction (Dewey, 1938), and social interactions (Vygotsky, 1978), developmentally appropriate practices (Copple & Bredekamp, 2009) have been recognized as the hallmark of early childhood education. DAP, as defined by Copple and Bredekamp (2009), is a framework for ECE that guides the choices of activities included in the program by teachers in a developmentally appropriate curriculum.
According to DAP and social constructivism, teachers are not the only source of knowledge (Liu & Chen, 2010). Rather, teachers facilitate opportunities for children to learn and explore new knowledge and develop new skills (Liu & Chen, 2010). Constructivism is basically a metaphor for the building process (Fox, 2001). Children construct knowledge as they participate in new activities and experiences (Edwards, 2014). As children explore their world, they construct new knowledge and add to their existing knowledge and skills (Dewey, 1938). Fox (2001) also proposed that learning is an active process experienced through social interactions. Fox’s descriptions are based on the theories of Piaget (1954), Dewey (1938), and Vygotsky (1978).

**Emergent Literacy Framework**

Employing a social constructivist framework, emergent literacy (EL) theory informs ECE instruction. EL, as first advanced by Clay (1979), proposed that there is a distinct set of skills necessary for successfully learning to read. In its original form, EL identified four areas of development that are needed before children can learn to read: alphabet knowledge, knowledge of print concepts, phonemic awareness, and oral language (Clay, 1979). Later, other researchers have added motivation to read as a fifth component of emergent literacy (Arrow & McLachlan, 2011).

According to Clay (1979), each EL skill is distinct in character and provides young children the foundation for learning to read. The first of these competencies, alphabet knowledge, is the basic identification of the letters of the alphabet. Children should be able to name each letter. Second, oral language is not only the speaking of words, but also understanding the words that are being spoken. Also, print concepts include skills such as reading right to left, starting at the top of the page, turning pages, and other concepts such as knowing where to find
the title of a book. In addition, phonemic awareness is the ability to hear individual sounds that make up words. The fifth component, motivation to read, is important for gaining young children’s interest in the reading process (Arrow & McLachlan, 2011).

As this framework has continued to develop, others have suggested that rather than being a step-by-step process of developing skills, EL is a circular process in which children develop concepts necessary for reading through the active experiences of life (Rohde, 2015; Senechal, LeFevre, Smith-Chant & Colton, 2001). Many of those experiences come through familial interactions such as reading books, playing word games, and conversations. Other learning experiences happen through interactions at school and other social activities (Heppner, 2016).

Following the principles set forth in DAP (Copple & Bredekamp, 2009), EL skills such as phonemic awareness, oral language, and alphabet knowledge are learned through positive adult interactions (Rohde, 2015) and developmentally appropriate activities (Neumann & Neumann, 2014). Clay (1979) has described EL as a series of steps; however, modern researchers no longer accept that definition. Current EL advocates describe it as the process of learning that begins at birth (Arrow & MacLachlan, 2011). Children flow through developmental stages of EL rather than following a series of steps in a particular order (Rohde, 2015). This process includes all of a child’s activities, not just those specifically designed for literacy by a teacher or caregiver (Rohde, 2015).

Based on the premise that children need meaningful, active learning activities, teachers need techniques or methods that challenge young children and hold their interest (Liu & Chen, 2010). Social constructivism supports the theoretical framework for research that delves into how children develop EL skills. This framework is appropriate, and other researchers have used it as well. For example, Kucirkova, Sheehy, and Messer (2015) researched how children use
iPads to share stories by using a Vygotskian perspective. Edwards and Bird (2017) also based their work with children’s digital play on social constructivism and social learning theory. Two other studies employed social constructivism in an examination of children’s development of EL and their use of iPads as a platform for literacy exploration (Kervin, 2016; Lafton, 2015). In fact, much of the literature presented in this review is grounded in social constructivism (Dewey, 1938) and social learning theory (Vygotsky, 1978).

**Related Literature**

In the wake of the growing popularity of early childhood education programs, the No Child Left Behind legislation of 2002 provided a springboard for restructuring such programs. At the same time, families with two working parents and single parent families are looking for childcare programs that provide a solid educational environment. As parents search through their options, childcare providers and early childhood centers strive to provide a quality experience for the families they serve. Also, in response to the call for quality early childhood education programs, the National Association for the Education of Young Children (NAEYC) and the Fred Rogers Center have provided guidelines for early childhood programs to ensure that children acquire the necessary skills for kindergarten success (NAEYC, 2012). NAEYC’s guidelines have become the building blocks for many programs across the United States from full-day childcare programs to part-day preschool and pre-kindergarten (pre-K) programs. Teacher training and education programs are also answering the call for quality early childhood education by focusing on developing teachers with the necessary skills to implement the guidelines proposed by NAEYC (Dodge, Colker & Heroman, 2002; Highfield, Gioia & Lane, 2016; Terrell & Watson, 2018). Programs that follow the guidelines set forth by NAEYC and other accrediting agencies, such as public school systems and Head Start, require staff in child development centers to
obtain training relevant to child development, classroom management, and EL skills, including phonemic awareness (Enache & Crisan, 2015).

**Focus of the Current Study**

For purposes of this study, phonemic awareness is defined as the ability to manipulate and focus on the individual sounds that make a word (Clay, 2013). These individual sounds are called phonemes and are the building blocks for spoken and written language (Clay, 1979). Phonemic awareness should not be confused with phonological awareness or phonics, which explores the relationship between sounds and the written word in the form of graphemes - the written expression of sounds (Arrow & McLachlan, 2011).

Beginning at birth, phonemic awareness develops through oral language interactions with others such as reading books, telling stories, reciting poetry, playing rhyming games, music, and other activities that develop the ability to auditorily distinguish the individual phonemes that make up words (Rohde, 2015). These types of oral language interactions in the ECE setting should be interactive, interesting games that keep the children’s attention and provide opportunities for movement (Dodge, Ceroman, Colker & Bickart, 2010). A theoretical framework based on social constructivism and the EL framework provides early childhood educators with an educational curriculum that is developmentally appropriate (Rohde, 2015).

Because technology has such a strong influence on so many aspects of daily life for adults and children alike, an examination of how technology affects young children’s development, especially in relation to EL, is critical to the improvement of young children’s EL skills. A small portion of this study will explore the lack of information on how phonemic awareness, which is part of EL, is affected by young children’s use of tablets, especially iPads, in the early childhood classroom. Several studies have been conducted on how iPads, or other tablet
computers, are currently being utilized in the early childhood classroom (Barnyak & McNelly, 2016; Cheung & Slavin, 2013; Edwards & Bird, 2017; Flewitt et al., 2014; Gallagher et al., 2015; Lu et al., 2017; Kervin, 2016; Merchant, 2015). However, there is very little information about the impact that iPads and touchscreen technology have on young children’s development of phonemic awareness.

**Early Learning and the Development of Early Childhood Education**

Historically, early childhood education has not been regarded as an essential step in the educational system of the United States. Nevertheless, with the support of historical proponents such as Dewey, Montessori, and Froebel, in addition to contemporary supporters such as NAEYC and the Fred Rogers Foundation, the last two centuries have witnessed a movement to provide preschool children with a strong educational foundation grow and strengthen its position within the educational system (Moss, 2015). Most modern early childhood educators look to the frameworks developed by thinkers such as Piaget (1954), Dewey (1938), and Vygotsky (1978) as the foundation for developmentally appropriate practices in early childhood programs.

The philosophies of Piaget (1954) and Erickson (1950) have also guided the development of early childhood programs from their inception. The initial idea of early childhood education was partially grounded in the philosophy of Pestalozzi (1894), who advocated for the development of a curriculum centered upon young children and their specific needs. Other thinkers such as Froebel (1899) and Montessori (1912) also had a lasting impact on how early childhood education is implemented today. For example, Froebel’s kindergarten program which he introduced to the German education system is the foundation the modern kindergarten programs we have today. Additionally, Montessori has had a lasting and very visible impact on early childhood education through her philosophy that was child-centered and based on utilizing
experiential learning techniques in a loving, safe environment that encourages exploration (Montessori, 1912). Her influence can be seen in the Montessori schools that bear her name.

Since the introduction of kindergarten in the United States in the mid-19th century, early childhood education has progressed to include infants. Some argue that early childhood education has grown and developed over the past several decades because of the need for childcare for working parents (Garrity, Longstreet & Linder, 2016). Whether this is the case or not, preschool education has evolved into an important sector of the general educational system (Copple et al., 2013; Lysklett & Berger, 2017). One offspring of the early childhood education movement is NAEYC, which is a source of guidance, information and support heavily relied upon by many early childhood educators and programs.

Within the bounds of the recommendations made by NAEYC, the Fred Rogers Center, and the American Academy of Pediatrics, ECE programs in the United States have taken on different characteristics. Many programs offer play-based programs where the centers and activities are focused on skill development by utilizing developmentally appropriate programming (Edwards, 2016; Lysklett & Berger, 2017). These play-based programs include the Montessori method (Montessori, 1912), along with others that incorporate a naturalistic, discovery method of education (Lysklett & Berger, 2017). Still some programs offer a more traditional format including a classical style of education (Foster, Anthony, Clements Sarama & Williams, 2016); however, Fuller, Bein, Bridges, Kim, and Rabe-Hesketh (2017) indicated that heavily structured programs often fail to improve children’s early learning. In either case, preschool programs have become more popular with parents wanting to provide their children with the best education possible (Common Sense Media, 2017). Those programs that provide a
strong foundation in EL to prepare young children with the necessary tools to be successful throughout their educational experience are in demand (Senechal et al., 2001).

As preschool programs continue to gain in popularity in the United States, kindergarten is still considered the beginning point for formal education. Most states now require children to attend an approved kindergarten program (Common Sense Media, 2017). As advancements in kindergarten programs have been developed, educators have identified key skills and developmental milestones that would be better implemented in early childhood programs even before young children enter a formal setting (Bouffard, 2017). These skills and developmental milestones began to be identified during the last quarter century through the efforts of researchers such as Clay (1979) and the National Reading Panel (1999).

During the mid-20th century, early childhood education was not always considered an essential part of the formal educational process. Then, in the late 20th century, educators began noticing gaps in children’s reading skill development, a situation which led to the creation of a task force by Congress to explore how children learn to read and to identify the skills they need to have to have acquired before they can learn to read. The task force, known as the National Reading Panel (1999), presented its first progress report on the national reading crisis in the 1990s. This panel identified key skills that very young children need to obtain to become proficient readers. The formal report (Armbruster, Lehr & Osborn, 2005), presented by the National Institute for Literacy, identified five components in teaching children to read: phonemic awareness, explicit phonics instruction, fluency instruction, vocabulary instruction, and comprehension instruction (Armbruster et al., 2005). In response, early childhood educators have worked to develop and implement curricula and strategies that support these key skills.
In more recent years, curriculum developers, such as Dodge et al., (2010), have relied upon Vygotsky to develop curricula that are sound in both the social and cognitive realms. While Dodge’s *Creative Curriculum* (2010) has been one of the most highly regarded early childhood programs, *Developmentally Appropriate Practice in Early Childhood Programs* (Copple & Bredekamp, 2009) continues to be the cornerstone of developmentally appropriate practices within early childhood programs today.

The Reggio Emilia approach (Malaguzzi, 1998) to early childhood education is another program that has gained in popularity, as well, over the last few decades. This particular philosophy of early childhood education supports a student-centered approach (Malaguzzi, 1998). As with the *Creative Curriculum*, this approach, constructivist in nature, allows for self-directed, experiential learning for young children (McNally & Slutsky, 2017). Another aspect of this approach that supports the developmentally appropriate practices is its emphasis on relationships between young children and teachers or other adults (Santin, Merce & Torruella, 2017). Teachers and parents are expected to be guides as children direct their own learning choices (Hong et al., 2017).

Along with many other programs, the *Creative Curriculum* and Reggio Emilia approach support children’s cognitive, social, and emotional growth within developmentally appropriate programs. The work of NAEYC and the Fred Rogers Center has also been relied heavily upon by early childhood educators to ensure that whatever approach they choose to implement, their programs are age-appropriate for children ages birth to 8 years old. Developmentally appropriate programs ensure that consideration is given to the ways that young children learn (Santin et al., 2017).
How Young Children Learn

Through the historical work of educators such as Dewey, Montessori, and Pestalozzi, it is understood that young children learn through experiences. Dewey (1938) implemented project-based learning in which children learn through discovery, experiences such as field trips, and hands-on activities. Montessori, as stated earlier, understood the importance of activity and experiences in the learning process and developed her method based upon child-centered choices of activities (Montessori, 1912). Even Pestalozzi understood the importance of making learning relative to the children and their experiences (Pestazzoli, 1894). The one observation these educators had in common was their understanding that children learn through hands-on, guided learning experiences.

These types of experiential learning are still in use today. They are seen in the Montessori schools and project-based systems used in other schools. Another form of experiential learning related to the methods of Pestalozzi and Montessori that is utilized in contemporary preschool classrooms is play-based education (Pyle & Danniels, 2017). Curricula based on this philosophy of how young children learn are centered on the children allowing for their own personal choices of activities that are planned by the teacher (Nilsson, Ferholt & Lecusay, 2018). One of the highlights from the National Reading Panel (1999) findings was the importance of direct instruction in the key areas of phonemic awareness, phonics, vocabulary, and comprehension (Armbruster et al., 2005). For young children direct instruction may take on different forms of experiential learning (Pyle & Danniels, 2017). A child’s manipulation of phonemes and experiences with graphemes and their relationship to the sounds of language are keys to learning to read (Armbruster et al., 2005). Nilsson et al. (2018) commented that, “Learning as an outcome of a child’s participation in play and exploration… highlights the fact that formal
Experiences and activity are one aspect of how young children learn. Another characteristic of young children’s learning is its cooperative nature. Collaboration between children or between children and adults is of supreme importance to successful learning experiences for young children (Santin et al., 2017). An attentive, collaborative attitude held by a teacher or parent supports a child throughout the learning process. This type of collaboration also points to the importance placed on relationships as part of the learning process (Hong et al., 2017). Just as play has been established as a key element in young children’s learning, policies (NAEYC, 2012) and curricula (Dodge et al., 2010; Nilsson et al., 2018) have been developed to reflect the importance of play to children’s development (NAEYC, 2012) and learning (Nilsson et al., 2018; Pyle & Danniels, 2017).

As stated, the role that parents and early childhood educators play in a child’s development cannot be underestimated. Reading is one of those key aspects of learning that is affected by young children’s relationships (Neumann, 2018a). Many essential pre-reading skills are addressed in early childhood programs, but most children do not learn to read until kindergarten or first grade. Furthermore, what children learn in the early years is crucial to reading success (Clay, 2013). Providing a strong support system for young children’s development of EL skills in the early years is extremely important (Afflerbach et al., 2013). Whether that support comes from parental participation or classroom support is inconsequential (Neumann, 2018a). Young children who have consistent guidance and support in EL activities often find success in learning to read (Neumann, 2018a).

This support, or scaffolding, that young children require for learning to read may come in several forms. Cognitive scaffolding provides children with knowledge and skills required for
learning to read (Neumann, 2018b). Also, affective scaffolding strengthens a child’s confidence throughout the learning process (Neumann, 2018b). In any case, teachers and parents play important roles in the development of EL skills in young children.

**Emergent literacy skills.** Along with the increasing demand for early childhood education, EL skills have grown in prominence as the centerpiece of most ECE programs, whether those programs are play-based or traditional. EL skills, as identified by Clay (1979), are simply the skills that a person needs before he or she can learn to read. Clay (1979) identified oral language, listening, alphabet knowledge, phonemic awareness, and print awareness as the building blocks of reading. Historically, EL skills have been recognized as necessary for reading to take place (Armbruster et al., 2005; Arrow & McLachlan, 2011). In addition to these pivotal skills, motivation for learning to read is currently included as a fifth skill included in EL (Arrow & McLachlan, 2011). Most typical ECE programs over the past several decades have incorporated some instruction, whether direct or indirect, in these skills (Rohde, 2015).

As a major element of the NAEYC guidelines (NAEYC, 2012), EL places the focus of early childhood education on developing children’s print concepts, oral language skills, phonemic awareness, knowledge of the alphabet, and vocabulary comprehension. A strong emphasis is also placed on helping children learn to enjoy reading. There are several preschool curricula based on the guidelines produced by NAEYC. One example is the *Creative Curriculum* (Dodge et al., 2002), which emphasizes EL skills at all age levels, even infants. Dodge was also one of the first to articulate what is now known as developmentally appropriate practices in early childhood education as a means to identify exceptional practices that are developmentally acceptable for children from birth to eight years old (Dodge et al., 2010). Other programs also emphasize the importance of EL to the overall early childhood curriculum. As programs seek to
provide developmentally appropriate activities, educators and program directors must take into consideration the role that technology plays within the curriculum (Bergdahl et al., 2018). By understanding technology’s role, early childhood educators can develop a curriculum that supports children’s EL (Andersson & Hashemi, 2016).

**Components of emergent literacy.** EL skills are the bedrock for early childhood education in the modern preschool environment. As such, these skills permeate every activity from circle time to centers to teacher-child and child-child interactions (Senechal et al., 2001). To understand why EL is so important, one must examine the skills that make up EL. According to Clay (1979), EL consists of print knowledge, phonemic awareness, alphabet knowledge, and oral language. Some contemporary researchers tend to include listening comprehension and the motivation to read in the EL framework as well (Arrow & McLachlan, 2011; Rohde, 2015). Nevertheless, these skills listed are the necessary precursors to learning to read (Clay, 1979). In addition, they are the key components of a strong reading program listed by the National Reading Panel (Armbruster et al., 2005). It is also important to note that the development of EL skills is a fluid process that young children experience but not a sequence of methodical steps (Rohde, 2015). It is the linking of experiences through positive adult interactions that models EL skills in a meaningful way (Lonigan et al., 2000). In researching the relationship between technology and young children’s EL skills, it is important to examine each of these skills closely.

**Print awareness.** Print concepts are important to the development of EL because they provide a basic understanding of how to manipulate books and other reading materials (Senechal et al., 2001). From books, newspapers and magazines to classroom labels and road signs, print is everywhere. As children interact with print, they learn to follow a book front to back and from the top of the page to the bottom of the page (Arrow & McLachlan, 2011). They also learn that
words and pictures have corresponding meanings (Clay, 2013; Milburn et al., 2015). Young children also learn to follow a line from left to right. They also learn that sentences begin with capital letters (Clay, 2013).

**Alphabet knowledge.** Along with print concepts, an understanding of the alphabet is also crucial to the development of EL. When children understand that letters represent sounds that, in turn, make words, they can make meaning from the letters that they see in print (Huang, 2015). Understanding that a letter on a page is a representation of a sound is basic to alphabet knowledge (Heilmann, Moyle & Rueden, 2018). Recognition of the letters of the alphabet provides young children with a rudimentary knowledge needed to make sense of print (Heilmann et al., 2018). This knowledge of the alphabet extends EL into the areas of oral language and listening skills (Piasta, Purpura & Wagner, 2010; Senechal et al., 2001).

**Oral language and listening.** Oral language and listening skills are actions that begin at birth (Senechal et al., 2001) and continue throughout a person’s life (Spies & Xu, 2018). Oral language and listening are interactive processes rather than a series of individual skills that children must learn (Rohde, 2015). Children smoothly advance through the task of listening and interacting both orally and auditorily (Gray, 2017). Through their interactions with others they make sense of the world around them. These interactions with adults and other children provide experiences that enhance oral language and listening within the EL framework (Clay, 1979).

Sometimes there is a breakdown in the development of oral language which makes it necessary to intervene with methods or programs to support a child’s oral language development (Vernay, Kahina, Thierry & Jean-Yves, 2017). Programs that offer specialized activities and interventions promote healthy development for young children (Schaefer, Bowyer-Crane, Herrmann & Fricke, 2016). Preschool age children, especially, may need support to develop
proper oral language skills before learning to read (Stone-MacDonald, 2015). However, exposure to developmentally appropriate oral language and listening interactions with adults often provides children with the support they need before problems arise (Heppner, 2016; De Haan et al., 2014).

**Phonemic awareness.** As children begin developing oral language and listening skills at birth, they are also beginning to relate sounds to meaning. Many experts identify phonemic awareness as the cornerstone of EL (Arrow & McLachlan, 2011; Clay, 1979; Lonigan et al., 2000; Rohde, 2015; Senechal et al., 2001). According to EL theory, phonemic awareness is the ability to distinguish individual sounds that make up words (Clay, 2013). It is the understanding of beginning sounds and rhyming sounds that hinge on children’s oral language abilities and listening skills (Rohde, 2015). In ECE, phonemic awareness is one of the most important components of EL that children must acquire before learning to read (Kenner, Terry, Friehling, & Namy, 2017). According to Kenner et al. (2017), phonemic awareness is the strongest independent predictor of early reading success.

Several programs have been developed that specifically target young children’s development of phonemic awareness, including the Heggerty (2014) program for phonemic awareness. Most programs and curricula include specific instruction in onset-rime awareness, syllabication, rhyming, and word awareness (Kenner et al., 2017; Suggate, 2016). Suggate (2016) suggested that direct instruction is profitable in some situations when students need extra support for learning to read. With such emphasis placed on phonemic awareness and the growing popularity of touchscreen technology in many early childhood classrooms, research into how these two interconnect is important for early childhood educators to make appropriate choices within their curriculum (Dong & Newman, 2016).
Motivation to read. One factor that may help students who are learning to read is motivation (DeFauw, 2016; Dube & McEwen, 2017). As EL theory has developed, motivation to read has been added as an extra dimension to the skills needed to learn how to read (Rohde, 2015). Motivation is the interest that a student takes in learning a new skill or concept (Ciampa, 2014). A student’s motivation, or lack thereof, has been identified as a strong indicator of success in learning to read (Laverick, 2014), especially for students with special needs and those from lower income families (Barnyak & McNelly, 2016). As a motivational tool, personal technology, such as handheld devices, and the animation of the applications (Broemmel, Moran & Wooten, 2015) provided opportunities for students to develop an interest in learning to read (Ciampa, 2014) which may, in turn, improve their ability to read (Barnyak & McNelly, 2016).

Creative Play. In order to offer a program that is developmentally appropriate and focuses on EL, many early childhood programs provide a play-based curriculum that emphasizes child-directed activities and learning because children learn through their creative play (Pyle & Danniels, 2017). Activities experienced by children during creative play offer meaningful learning opportunities (Edwards, 2017). Children’s play is conceptualized as two major types of play – pretend play and adult-guided play (Weisberg, Hirsh-Pasek, Golinkoff, Kittredge & Klahr, 2016). Within the ECE environment, much of the play-based curriculum falls in line with adult-guided play where the teacher controls the curriculum, but the activity and practice can be child-initiated or adult-initiated (Weisberg, Hirsh-Pasek & Golinkoff, 2013). Play-based learning, considered developmentally appropriate for young children, (Pyle & Danniels, 2017), may offer developmentally appropriate activities for developing EL and math skills (Edwards, 2017).

Early childhood educators employ two basic forms of play in the classroom. First, open-ended play is exploratory in nature and is one form of play (Edwards, 2017). The second form of
play is modelled play. The latter is somewhat more structured than open-ended play and involves the teacher (Edwards, 2017).

Adult-guided play could be described as purposefully-framed play. In purposefully-framed play, teachers may use a variety of materials such as games, toys, or technology to draw children into a wide variety of learning activities (Edwards, Cutter-Mackenzie, Moore & Boyd, 2017). All of these forms and types of play take place within the bounds of early childhood curriculum whether it is traditional or play-based (Edwards et al., 2017).

Within the framework of play, children naturally enjoy activities that allow for creative play (Dodge et al., 2010; Reeves et al., 2017). Creativity allows children to explore their environment (Dewey, 1938; Edwards, 2017). Blocks and other building materials provide children the opportunity to create, problem solve, and cooperate with one another (Sakr & Kucirkova, 2017). A variety of art materials can also be a source of creative expression for young children as they learn and explore (Dezuanni, Dolley, Gattenhof & Knight, 2015; Yates & Twigg, 2017). iPads can also be used in similar ways to enhance children’s creativity by providing a platform for strengthening or recording their creative activities (Edwards & Bird, 2017), developing a narrative that describes the processes they used in creating structures, or exploring alternative venues for their creative ideas (Arnott et al., 2016). Sakr and Kucirkova (2017) suggested that familial interactions can be enhanced through children’s creative activities as well. Besides supporting familial interactions, play that is engaging, meaningful, and interactive also has the potential to support young children’s cognitive development, including EL skills (Zosh, et al., 2018).
Technology Trends in Education

As with any educational program, early childhood education has not been immune to changing trends in curriculum, programming, and management. One of the latest trends in education is the use of technology. As early childhood education has gained prominence over the past few decades, technology has also become an inherent part of the educator’s possible tools and methods to use in educating young children. The development of touchscreen technology and the handheld tablet has made the integration of technology into the classroom less difficult (Hye & Kim, 2017). Touchscreen devices have become a viable option in most school settings, including the early childhood environment (Dietze & Kashin, 2013). On the other hand, many educators still have concerns about the impact that touchscreen technology may have on children’s cognitive development (Arndt, 2016; Gallagher et al., 2015). Although the lack of physical interaction and face-to-face communication still give cause for concern for many educators and parents (Garrity et al., 2016; Habler et al., 2015), schools still use technology in many aspects of the daily classroom routine (Bergdahl et al., 2018).

The No Child Left Behind legislation of 2002 sparked a movement to develop and pursue improvements in early childhood education (Bouffard, 2017) in order to improve children’s reading skills. Those improvements have prompted discussions of several important topics related to young children and developmentally appropriate practices (Copple & Bredekamp, 2009). Educators have noted the need for a more focused and cohesive plan for providing early childhood education programs, especially those that serve children within the low socio-economic status, such as the Head Start program (Heilmann et al., 2018). One way that some programs have attempted to develop a more cohesive curriculum is by focusing on academics (Zosh et al., 2018). Many educators see technology as a method for improving children’s
academic growth, but it is important to understand the characteristics of the type of technology that is developmentally appropriate for young children to use (Neumann & Neumann, 2014).

**Characteristics of technology.** Two unique features of the iPad that make for easy manipulation by children as young as two years old are the simple design of the touchscreen and its lightweight portability (Walsh & Simpson, 2013). These two features allow it to be an essential tool in the early childhood classroom. Young children can easily maneuver between applications, swipe and tap the screen, and follow verbal commands from the activities with little adult intervention (Merchant, 2015). Because they can easily manipulate the iPad, young children can use it in developing oral language (Heppner, 2016), listening skills (Salmon, 2014), phonological awareness (Gallagher et al., 2015), and alphabet awareness (Hall, 2017; Salmon, 2014).

**Role of technology in education.** Contemporary culture is permeated with technology. Questions about how to incorporate technology must be addressed. The reasons for the exclusion of technology from a program must also be addressed. Research has shown that balance between DAP and technology is important to early childhood curricula (Nilsson et al., 2017). Balance between the 21st century skills related to technology and the need to develop EL skills is important to the process of developing a balanced curriculum (Santin et al., 2017). Sources such as NAEYC and the Fred Rogers Center emphasize emergent literacy as the cornerstone of early childhood education (National Association for the Education of Young Children, 2009).

**Emergent literacy, elementary students, and iPads.** In relation to EL, the physical action of touchscreen technology complements how elementary students process information for reading, listening, and writing (Walsh & Simpson, 2013). iPads have also been shown to have positive effects on students’ oral fluency (Musti-Rao, Lo & Plati, 2015) and motivation.
(Laverick, 2014). These findings show that when elementary students are motivated to use the technology, their fluency and reading engagement improves. On the other hand, touchscreen technology, when used exclusively, may inhibit children’s emergent writing skills (Price, Jewitt & Crescenzi, 2015).

**Emergent literacy, preschool children, and iPads.** While iPads have shown promise as a tool in the elementary setting, some critics are still skeptical about their use with preschool children. For example, Neumann (2014) found that iPad use in the home with children ages 2-5 years was not related to any EL skills, although the tablets were used for some literacy activities. On the other hand, children’s oral language and awareness of print concepts were positively impacted by iPads within a preschool setting during a seven-week study of two preschools that incorporated iPads into their curriculum (Beschorner & Hutchison, 2013). Children’s social interactions have also been shown to improve and increase in the number of child-child interactions while using iPads (Beschorner & Hutchison, 2013; Gallagher et al., 2015; Neumann & Neumann, 2014).

**Acceptance of technology in ECE.** Technology is now an accepted part of daily life for most adults and children alike. In educational environments, it has been proven to be an effective support tool for many aspects of learning in primary and secondary schools. Special education programs use assistive technology to help children with vision and hearing impairments (Brouwer et al., 2017; Stone-MacDonald, 2015; Vernay et al., 2017). It also supports oral language development (Heilmann et al., 2018; Maich & Hall, 2016) and enhances English language learning (Schaefer et al., 2016). Furthermore, assistive technology helps students participate in general education classes (DeGroot et al., 2015; Spies & Xu, 2018). Special education preschool programs are designed specifically to support children with developmental
delays, including the use of assistive technology. In early childhood education, however, there are still concerns about the role that technology should play (Chmilliar, 2017).

Cultural difference is another reason that some schools use technology to support children’s learning. Some schools provide students with cultural experiences within their time for technology. These cultural experiences bridge the gap between home and school. Two important consequences result from cultural experiences. First, children learn to become participants in the culture, and, second, they develop their learner identity (Lynch & Redpath, 2014).

When used in a developmentally appropriate curriculum that provides a culturally rich environment (Lynch & Redpath, 2014), iPads provide a platform for literacy that is motivational and educational for very young children (Barnyak & McNelly, 2016). The challenge in the modern ECE classroom is making learning interesting and relevant to the child (Andersson & Hashemi, 2016). If technology is used for its own sake, it may not be relevant to the child’s personal experiences, thereby causing the child to lose out on a powerful learning experience (Dube & McEwen, 2017).

**Impact of Technology on Early Childhood Education**

As modern early childhood programs have grown in popularity, technology has been changing the way that education is delivered (Flake, 2017). With the introduction of the iPhone in 2007 and the iPad in 2010 by Apple, the popularity of touchscreen technology has increased exponentially. The push to make technology more user-friendly and manageable has created a market for devices that can be used by even the youngest children. For current educators who see the potential for touchscreen technology in the classroom, its mobility (Nikolopoulou & Gialamas, 2015), ease of use (Flewitt et al., 2014), and affordability (Lu et al, 2017) all make
touchscreen tablets and computers a desirable tool in the classroom. ECE educators are exploring the possibilities in their classrooms with even the youngest children (Harrison & McTavish, 2016; Roblin et al., 2018). As a tool for ECE, teachers see the possibility of reinforcing young children’s EL skills by using touchscreen technology (Reeves et al., 2017).

Results of current research have also generated several findings about young children’s learning as it relates to technology. First, learning occurs when the learner is engaged and not distracted (Noorhidawati, Ghalebandi & Hajar, 2015; Reeves et al., 2017). Second, learning occurs when the learner is active rather than passive (Hall, 2017; Lim, 2015). Third, meaningful content and positive social interactions contribute to learning (Noorhidawati et al., 2015). Last, guidance toward a learning goal allows for young children to learn in an environment that supports their natural curiosity (Noorhidawati et al., 2015) and creativity (Zosh et al, 2016).

Other domains impacted by technology. Young children today use technology in a variety of ways. While games and videos are probably the most prominent methods of use for young children, these games and videos often provide opportunities for other activities as well. Opportunities to practice other skills are also part of many young children’s interactions with technology. Four such activities are discussed here: pre-writing skills, digital play, emergent math skills, and assessment, specifically alphabet awareness and vocabulary building.

Pre-writing skills. Pre-writing skills, the ability to make meaningful marks, are a complement to EL. Emergent writing provides children the opportunity to practice skills that are necessary for reading and writing to take place (Neumann, 2014). While the use of iPads does not seem to impact the amount of writing that young children in preschool attempt, it does limit the types of marks that children can make (Price et al., 2015). Even though practice with traditional paper and writing utensils is still important, learning to work with touchscreen
technology is also helpful for young children in preparation for later technology use (Arndt, 2016; Musti-Rao et al., 2015). The prevalence of technology in the daily life of very young children also points to the necessity of instruction that is developmentally appropriate (Parette et al., 2013), effective (Perry & Steck, 2015), efficient (Patchan & Puranik, 2016), and appealing to even the youngest preschool students (Neumann, 2018a).

**Digital play.** As technology has become a permanent part of the culture, the way children play has also changed (Edwards, 2014). Children are using technology such as iPads and other tablets as a tool for creative play. Bird and Edwards (2015) studied the way that teachers observe children’s play with technology and found that using technology such as iPads within the boundaries of play helped children to learn how to use the technology and created an extra layer of creativity in the play (Edwards, 2016). Furthermore, as children participated in digital play, young children participated in more social learning and created social networks with others as they played. By creating these social networks, children’s digital play supported their play-based learning in the classroom (Bird & Edwards, 2017). However, further research is still needed into how technology can and should be used in schools and in early childhood education, in particular (Edwards, 2014). Touchscreen technology, such as iPads and other tablets, is continuing to gain in popularity as teaching tools in early childhood programs (Neumann & Neumann, 2017).

Just as pre-writing skills go hand in hand with EL, digital play is another aspect of technology utilization that is related to children’s EL. As technology has become more accessible, digital play has become a new aspect of children’s creative play. Digital play is recognized as the way children use and manipulate technology within the bounds of play (Edwards & Bird, 2017). The constructs developed through technology are different from the constructs of traditional play (Edwards, 2016). Hence, children’s play is evolving as they use
more technology (Flewitt et al., 2014). It has even been suggested that children’s digital play may provide new opportunities for developing EL skills (Lafton, 2015).

As children control their digital play, they become more engaged (Edwards & Bird, 2017) and are more likely to gain a deeper understanding of literacy. This engagement is a result of the child’s interest in the activity and the skill level being challenged (Kervin, 2016). In order to engage a child in digital play, the application provided needs to meet specific criteria. First, the application should be an open-ended activity that allows for the child to be more creative and provide choices (Palmer, 2015). Second, the application should be developmentally appropriate to the age of the child (Hirsh-Pasek et al, 2015; Palmer, 2015; Papadakis, Kalogianmakis & Zaranis, 2017). Last, application provided to young children should be meaningful to them (Hirsh-Pasek et al., 2015).

**Emergent math and numeracy skills.** Children not only use iPads and other tablets for play and language acquisition, but they also use these devices for the development of math and numeracy skills (Disney, Barnes, Ey & Geng, 2019; Piatt, Coret, Choi, Volden & Bisanz, 2016). Many drill and practice applications have been developed to strengthen young children’s understanding of simple math concepts (Beschorner & Hutchison, 2013; Papadakis et al., 2017). As children use math applications, they develop those foundational math facts necessary in developing other skills (Piatt et al., 2016). Most of the applications available to young children center on drill and practice without providing for higher order thinking skills (Lynch & Redpath, 2014). However, educators often look for applications that are more open-ended to provide children with more opportunities to explore mathematical concepts (Disney et al., 2019; Palmer, 2015).
According to Ingram, Williamson-Leadley & Pratt (2016), children’s engagement with the technology seems to improve their development of numeracy concepts. iPads and other easily manipulated technology may also motivate children to engage with number and number concepts (Beschorner & Hutchison, 2013; Papadakis et al., 2017). There is evidence that when young children are engaged, they retain information and skills more readily (Ingram et al., 2016; Kongsgarden & Krumsvik, 2016; Piatt et al., 2016). In order to measure retention of learned skills, some research points to the use of iPads and the applications that children use as an appropriate method of assessment for young children’s retention of learned math skills, numeracy, and EL (Ingram et al., 2016; Lee, 2015; Lynch & Redpath, 2014).

**Assessment.** For early childhood educators, assessment is the key to providing young children with a developmentally appropriate curriculum tailored to their individual needs whether those needs are in EL or numeracy (Copple & Bredekamp, 2009). As an assessment tool, iPads have the potential for assessing young children’s development of mathematical concepts and EL skills (Lee, 2015; Piatt et al., 2016). Many applications are developed with features that provide parents and teachers with feedback about progress and milestones that children have completed (Klubal, Kostolanyova & Gybas, 2017; Reeves et al., 2017). While applications designed for young children may be fun and motivating (McKenzie et al., 2018), the limitations of the applications should be taken into consideration when assessing student progress (Northrop & Killeen, 2013; Papadakis et al, 2017).

**Controversy over technology in early childhood.** With the status of EL in early childhood programs well-established, the current debate has turned to the role that technology should play in the early childhood classroom. Many early childhood educators disagree on what technology’s role should be in an early childhood environment (Harrison & McTavish, 2016).
Each side of this debate can point to research that supports its claims. For example, those who want to strictly limit young children’s use of technology point to the American Academy of Pediatrics (2018) and their stance on the dangers of young children using too much technology. Pediatricians often tout the possibility for childhood obesity in children who do not get enough exercise.

On the other hand, proponents point to the advantages that technology provides to children with special needs (Stone-MacDonald, 2015), dual language learners (Schaefer et al., 2016), children from low socio-economic status (Heilmann et al., 2018), and those who struggle with learning to read (Broemmel et al., 2015). Cooperation, perseverance, and confidence are all enhanced by preschool children’s use of tablet applications in mathematics (Ingram et al., 2016).

Despite the positive outcomes for some children in relation to their use of technology, there is still evidence to support the argument for limiting young children’s use of technology (American Academy of Pediatrics, 2018). Accordingly, touchscreen technology, in the form of tablets and smartphones, has become more common in the early childhood environment. In this argument, proponents point to technology’s prominence in general society, its ease of use (Habler et al., 2015), and children’s interest in using technology (Alade et al., 2016) as reasons to include technology in early childhood programs. Still, some educators disagree with a position that would allow young children to freely use technology in the classroom.

These opponents point out yet another limitation of technology: the lack of physical activity that is necessary for the proper cognitive and physical development of young children (Copple & Bredekamp, 2009; Liu & Chen, 2010; Lysklett & Berger, 2017). Opponents also point to the tendency of technology to foster only sedentary activities (Dietze & Kashin, 2013). Physical movement has been established as one of the keys to DAP for young children (Copple
et al., 2013; Pyle & Danniels, 2017). In view of this controversy, the search for better methods of incorporating technology into the early childhood classroom in more developmentally appropriate activities has led many schools and preschools to look at touchscreen tablets as a viable product for the incorporation of technology into the preschool curriculum. The touchscreen technology makes tablets easily accessible to young children who may not have developed alphabet awareness (Bergdahl et al., 2018).

**Educators’ concerns.** Although there are concerns, there is evidence that the use of touchscreen technology may have a positive impact on young children’s EL and skill development (Beschorner & Hutchison, 2013; Gallagher et al., 2015; Laverick, 2014; Neumann, 2014;). In a quasi-experimental study, researchers found that print knowledge and oral language were impacted in a significantly positive manner by use of iPads in the preschool classroom (Reeves et al., 2017). That same study also suggested that the specific applications used in the study may have also affected the outcomes that were not part of the study. Researchers also found that iPads can be used to positively impact EL when teachers have been provided with appropriate training in DAP related to technology use (Hoffman & Paciga, 2014; Lu et al., 2017;).

However, teachers are often hesitant to use technology in the early childhood classroom for several reasons. First, the cost of purchasing and maintaining iPads and other technology is often out of reach for many early childhood programs that run on very tight budgets (Roblin et al., 2018). Second, early childhood educators often do not have the training they feel necessary to implement the technology in a developmentally appropriate manner within the confines of the curriculum (Hye & Kim, 2017; Nikolopoulou & Gialamas, 2015; Vaughan & Beers, 2017).
Finally, a perceived lack of support from administration causes many early childhood teachers to hesitate using technology with their young students (Nikolopoulou & Gialamas, 2015).

**Possibilities for technology in early childhood.** Despite the apprehension voiced by some parents and educators, tablets, and specifically iPads, are becoming more common in the early childhood classroom (Neumann & Neumann, 2014). The growing popularity of tablet technology prompted NAEYC and The Fred Rogers Center, along with the American Academy of Pediatrics, to issue recommendations for technology use with young children and for professional development for early childhood educators (NAEYC and Fred Rogers Center, 2012). Their recommendations include screen time limits for children should spend using technology (including television), the types of applications that are most appropriate for young children, and suggestions for professional development opportunities for educators. Amid these concerns, many early childhood educators find a variety of ways in which to include iPads in their daily classroom activities. Development of pre-writing skills (Price et al., 2015), exploration with digital play (Edwards & Bird, 2017), and pursuit of EL (Gallagher et al., 2015; Merchant, 2015; Neumann, 2014) are just some of the ways iPads are currently utilized within many early childhood programs.

**Summary**

As technology becomes more accessible and affordable, opportunities to utilize its different forms become more appealing to early childhood educators. Although some teachers prefer to minimize technology in ECE, its popularity is growing as a tool in the early childhood classroom (Edwards, 2016). As educators, it is important to study the issue of technology in ECE from multiple perspectives. While some researchers have concluded that spending too much time with technology can be detrimental to young children’s cognitive and physical development
(Arndt, 2016; Common Sense Media, 2017), there is research that points to positive gains in EL by young children in programs that employ touchscreen technology (Alade et al., 2016; Habler et al., 2015). Positive, quality interactions with technology that are limited in duration should be a priority for parents and educators of young children (Fenty & Anderson, 2014).

As teachers look for ways to incorporate technology into the ECE curriculum, emphasis should be placed on how it can be used to better aid young children in learning the EL skills critical to their preparation for learning to read. Using technology for the sake of technology does not necessarily improve the curriculum or children’s learning (Hall, 2017). For the development of EL to take place in a digital format, children need to be engaged by interesting, open-ended applications (Palmer, 2015) and motivated to persist (Papadakis et al., 2017).

Studies have been conducted that examined how iPads are used in ECE (Arnott et al., 2016; Beschorner & Hutchison, 2013; Edwards, 2014; Erstad, 2015; Roblin et al., 2018), in professional development for early childhood educators (Lu et al., 2017; Reeves et al., 2017; Vaughan & Beers, 2017), and EL for young children (Kervin, 2016; Neumann & Neumann, 2014; Salmon, 2014; Walsh & Simpson, 2013). Studies that examined the relationship between iPads and EL are general in nature, taking a holistic approach to EL and all its aspects, including alphabet awareness, print concepts, oral language and listening, phonemic awareness, and motivation to read. Very little research, however, has specifically isolated phonemic awareness as it relates to iPad usage. The research that has been conducted shows a promising opportunity for educators using iPads to assist young children in developing phonemic awareness (Aliagas & Margallo, 2017; Laverick, 2014; Stone-MacDonald, 2015).

While the current status of iPads in relation to EL is promising, more needs to be done to investigate how young children use iPads to develop the specific components. Phonemic
awareness is one component that has yet to be researched in relation to young children’s use of iPads. Research has shown that strong phonemic awareness in young children is an indicator of future success in learning to read (Suggate, 2016). Because phonemic awareness is an important factor in how children learn to read, studying the relationship between phonemic awareness and children’s use of iPads may yield important information for planning in the early childhood classroom (Neumann, 2018b).

From a constructivist viewpoint, children need opportunities to explore their world and develop new skills (Fosnot, 1996; McNally & Slutsky, 2017; Nilsson et al., 2017). Neumann and Neumann (2017) suggest that more research is needed to determine which EL skills can be promoted by iPad use and which may be hindered by using iPads. One way to answer this question is to explore how preschool children use iPads to develop phonemic awareness. Finding the possibilities for using iPads in this particular portion of EL. Connections between iPad usage and improved phonemic awareness should be examined closely. More research is needed to explore the relationship between iPads and phonemic awareness. Such research may provide application developers insight into the types of applications that would be developmentally appropriate for young children and offer them new, engaging opportunities to develop phonemic awareness (Hirsh-Pasek et al., 2015; Palmer, 2015). More research may also give teachers insight into developmentally appropriate uses of iPads with young children that can motivate children to learn to read and start them on a successful educational journey.
CHAPTER THREE: METHODS

Overview

This qualitative case study endeavored to describe how young children can use iPads to develop emergent literacy skills. Early childhood educators frequently look for methods and new, innovative ways for students to practice and develop the skills they need for success in formal reading instruction. This study provided insight into additional means of providing young children with technology-based methods of developing phonemic awareness. This chapter outlines the design, research questions, setting, participants, procedures, methods of data collection and analysis, and trustworthiness of this case study.

Design

The purpose of this qualitative case study was to describe how iPads may be used to develop phonemic awareness as part of overall emergent literacy skills acquisition for six preschool students at Little Lambs Christian Preschool in central Tennessee. Qualitative research attempts to interpret the world from a naturalistic approach, observing phenomena in its natural, real-world context (Creswell & Poth, 2018; Lincoln & Guba, 1985). Also, Yin (2018) described case study as an in-depth study of a phenomenon in its natural setting. Research that involves young children is best investigated from a qualitative standpoint because of the nature of learning for young children (Arnott et al., 2016; Bird & Edwards, 2015). Looking at how young children interact in their natural environment gave me a more realistic understanding of the phenomena. The case study design allowed for a holistic perspective of the single phenomenon of how children use iPads in developing phonemic awareness (Creswell & Poth, 2018; Yin, 2018) in one preschool setting.

The phenomenon of children’s use of iPads for the development of phonemic awareness
was best studied from a qualitative perspective using a case study design. The student-participants’ interactions with iPads were studied as they naturally occurred during classroom activities. Case studies have been used in research involving young children for a variety of educational purposes. For example, Bird and Edwards (2015) completed an extensive study of children’s digital play using a case study. Since I planned to explore phonemic awareness within the context of iPad usage, a case study design provided the appropriate boundaries for the study (Yin, 2018). My study was bounded by time and location.

For purposes of this study, I conducted a case study of preschool age students in a private, Christian preschool. As an educational research method, case studies have been used in education for several years as a basic form of qualitative research (Stake, 1995). This type of study was appropriate for the phenomenon under examination because it allowed me, as a researcher, to study how children, in one setting, used iPads in their development of phonemic awareness. Conducting the research as a case study allowed for an in-depth picture of children’s use of iPads for phonemic awareness through participant-observations, examination of children’s artifacts, and interviews with teachers (Yin, 2018). An example of a similar case study was Edwards’ (2016) case study in which she explored how children develop new skills through digital, play-based learning.

I utilized a holistic approach to my case study. According to Yin (2018) a holistic approach was applicable because there were no apparent subunits in this case. Therefore, a holistic approach afforded me the opportunity to describe the case of one preschool and its use of iPads in emergent literacy instruction. By conducting my study in this manner, data from the case was analyzed by looking for patterns in the data (Yin, 2018). The development of phonemic awareness was bounded by young children’s use of iPads and provided a clear limit to the data
collection as it related to the research questions.

**Research Questions**

The central research question is as follows:

How does the use of iPads in the preschool classroom affect young children’s development of phonemic awareness? The sub-questions are as follows:

1. What behaviors do preschool age children typically exhibit when using iPads for phonemic awareness activities?
2. How are iPads utilized in the preschool classroom for developing phonemic awareness?
3. What do teachers perceive of young children’s learning of phonemic awareness skills during iPad use?

**Setting**

Little Lambs Christian Preschool (pseudonym) was the site for this study. I used this specific school because it met the criteria for using iPads in its preschool curriculum. Little Lambs Christian Preschool is part of a large Christian school in central Tennessee and is a member of and accredited by the American Association of Christian Schools (AACS), AdvancEd, and the Southern Association of Colleges and Schools (SACS). The school offers Pre-K3-12th grades. There is an on-site school administrator, an assistant principal, and a director of early childhood programs for the school. The pre-K program consists of two Pre-K3 classrooms, five Pre-K4 classrooms, and three kindergarten classes. The Pre-K program offers both full-day and part-day programs. Kindergarten is full day. The school is funded by tuition and private donations; however, there are some scholarship funds available. The student population is 3% Hispanic, 8% Asian or Asian/Pacific Islander, 5% African-American, and 84% Caucasian. Three students in the school are English Language Learners (ELL), 11 students are in
speech therapy, and 23 students have individual education plans (IEPs).

Participants

The participants for this study were chosen by purposive sampling, which is the selective process in a qualitative study for choosing participants who fit the characteristics needed for the proposed study (Merriam & Tisdell, 2016). For student observations, I chose six four- and five-year old students from the pre-K4 classes at Little Lambs Christian Preschool for this case study. All student-participants were from middle and upper-income families.

In addition to student-participants, six teacher-participants were chosen from among the teachers and assistants in the Little Lambs Preschool and kindergarten programs. All fourteen current employees in the early childhood program are full-time employees. There are ten teachers and four assistants. Two teaching assistants have at least some college experience. Seven teachers have a bachelor’s degree. Two teachers have at least an associate degree. One teacher is currently enrolled in a bachelor’s program for early childhood. Five of the teacher-participants teach K-4. One teacher-participant teaches K-3.

The school was chosen because it met the following criteria:

- iPad and wireless internet access
- Offering of at least a part-day pre-kindergarten program
- Incorporating phonemic awareness into the curriculum
- Willingness of leadership and teachers to participate

Procedures

To conduct this study, I followed Liberty University’s guidelines for obtaining Institutional Review Board (IRB) approval by completing all necessary steps. Before obtaining IRB approval (see Appendix A), I received approval from my desired school.
Recruitment letters (see Appendix B) followed the Liberty University IRB templates. The student and teacher participants were chosen from the Little Lambs Christian Preschool program because of their use of iPads in the classroom. Included with the recruitment letter, each recruit was asked to complete a screening tool (see Appendix C) to ensure that each person met the criteria for participation. All participants were recruited from the early childhood program at Little Lambs Christian Preschool. All parents who completed the screening tool received an email (see Appendix D) stating their child’s acceptance or rejection for participation in the study. Acceptance emails included the parental assent form (see Appendix E), all of which were completed and returned to me. Since the students needed for this study are of such a young age, I used picture cards (see Appendix F) to explain to them how they would participate in the study. The picture cards helped to explain the child assent form (see Appendix G) to the student-participants.

Teachers also received a recruitment letter (See Appendix B) via email to explain my project and how they could participate. The recruitment letter included a link to a screening tool (see Appendix C) that helped to determine if the teacher met the criteria for participation in the study. I also followed up personally with possible participants to answer questions and clarify their roles in the research, the risks involved, compensation, and what to do if they decide not to participate. Once teachers completed the screening tool, I contacted each one through an email explaining their acceptance or rejection for participation in the study (see Appendix D). Teachers who had been selected to participate were given a letter of consent (see Appendix E) to complete along with the acceptance email.

Once IRB approval had been granted and all participant consent forms have been obtained, I first conducted a pilot study to practice my data collection methods. When the pilot
study was complete, I made necessary corrections to my data collection methods. I conducted video-recorded participant-observations in the classrooms of children by utilizing iPads as part of the literacy curriculum. As a participant-observer, I also interviewed and questioned student-participants as they used the iPads to gain insight into how they were using the iPads and what skills they were using and learning during their iPad time. Next, I analyzed the artifacts gathered during the participant-observations. Last, I interviewed six ECE teachers within the program to ascertain their views of how students use iPads in the development of EL skills. Conducting interviews allowed me to gain insight into their perspectives on what role iPads and other technology should play in ECE.

**The Researcher’s Role**

For this case study, I was an active participant in data collection. The nature of ECE requires that teachers spend a great deal of time observing students’ activities and using questions to guide students’ learning and discovery (Copple & Bredekamp, 2009; Merewether & Fleet, 2014). As an active member of the ECE community, I felt this research was personal in nature and relevant to my field of study. While I see many benefits in using technology in ECE classrooms, I still have concerns about its impact on young children’s development - socially, cognitively, and physically. One research tool that was of use in my research is the reflexive journal (see Appendix H). I kept a journal of my concerns and biases which was helpful in the data collection and analysis process. While I have concerns, I believe that this research provided more insight into the potential of technology’s role in ECE and may educate teachers and parents on how to use technology in a developmentally appropriate manner.
Data Collection

The process of data collection was crucial to developing an accurate representation of the study being conducted here. Triangulation of data has been identified as a key to the credibility of research (Creswell & Poth, 2018; Lincoln & Guba, 1985; Yin, 2018). In addition, triangulation of data (Patton, 2001) is essential to the trustworthiness of the study; therefore, I used three forms of data collection: participant-observations, document/artifact analysis, and semi-structured interviews.

Participant-Observations

Observations in qualitative inquiry are important because they provide the researcher with visual data on the phenomena (Creswell & Poth, 2018). An important aspect of observation is the corresponding field notes (see Appendix I), which provided a description of the activities taking place during the observation. During participant-observations, I utilized video- and audio-recordings which allowed me to review the activities and ensure that my field notes and memos were accurate in relation to the recordings. Participant-observations also provided me with information that answered questions regarding student-participants’ use of iPads in relation to phonemic awareness and how they used the iPads to develop or practice phonemic awareness. This eventually led to data that answered my sub-questions two and three. These questions related to children’s direct use of iPads for phonemic awareness practice and the behaviors they exhibited as they interact with iPads. I conducted at least three one-hour observations over the span of about four weeks for each participant.

A pilot study was conducted before participant-observations to ensure the planned process was appropriate. The pilot study ensured that the procedures for conducting participant-observations and collection of artifacts were appropriate. During the pilot study, I determined
that using audio-visual recordings of the sessions mitigated the necessity for taking extremely
detailed notes in real-time because I had the opportunity to write down observations as I
reviewed the recordings. By using audio and video recordings of each session, I was able to
review each session repeatedly and had more time for observing and questioning during the
sessions. During the pilot study, I also taught student-participants how to take screenshots of
their activities. By doing so, student-participants were able to take screenshots during iPad time
with a minimum number of disruptions. By combining observations (Appendix I) with artifacts
such as the student-participants’ screenshots and videos, I gathered the necessary data for
analysis. As a participant-observer, I also had the opportunity to take screenshots of the student
activities on the iPads, which were included as artifacts for analysis.

One of the unique challenges of working with young children was gaining insight into
how and what they think. By employing participant-observations, I was able to participate
alongside the children as they interacted with iPads and practice phonemic awareness. My
participation allowed me the opportunity to better understand how they use and interact with
iPads in relation to their phonemic awareness. The second challenge to participant-observations
was the potential for bias. Yin (2018) noted that the participant-observer may not have enough
time for note-taking, may be too closely involved in the activity to pay close attention, or have
less ability to externally observe. The use of audio-visual recordings alleviated some of the
concerns over notetaking. Recordings and screenshots of student-participants activities on the
iPad taken during the participant-observations provided artifacts for analysis as well.

A third issue was my interactions with student-participants. Some children may have
hesitated or not felt comfortable playing with iPads while someone was watching or asking
questions. One thing that may have alleviated some anxiety for student-participants was the fact
that they already know me and are comfortable interacting with me. The last concern was that
the student-participant might rely on me to provide answers or solutions to their activities with
iPads. While this was true for one student-participant, use of simple prompts to help him
continue working independently seemed to clear that problem. I do not think that this issue
affected the results. Using recordings and detailed notes provided enough data to eliminate any
questionable points of information.

Document Analysis

The second method of data collection that I employed was artifact analysis. Children’s
pictures using iPads, video-recordings, and screenshots from their activities on the iPads were
analyzed. According to Yin (2018), these artifacts can be powerful components of the overall
case. The screenshots and pictures of children’s actual activities on the iPad screen provided
insight into how children practice phonemic awareness and what behaviors they displayed during
their iPad activity. These artifacts also showed aspects of the activities that related to phonemic
awareness. These screenshots and pictures of the actual activities related to the research sub-
questions one and two sought to identify the behaviors young children displayed during iPad
time and how iPads were utilized to develop phonemic awareness in young children (Neumann

Semi-Structured Interviews

As the last method of data collection, I conducted interviews with the teacher-participants
at Little Lambs Christian Preschool. In qualitative research, interviews are an opportunity to
describe the phenomena from the participants’ viewpoint (Patton, 2002). While the participant-
observations were from the student-participant’s point of view, semi-structured interviews with
individual teacher-participants allowed me to collect data that came from the perspective of the
teacher rather than the researcher (Creswell & Poth, 2018). This data was used to answer the third research question, which focused on teachers’ views and observations of iPads in early childhood education. All interviews were audio-recorded.

I utilized open-ended questions in interviews with teacher-participants to answer the question of how children perceive the role of iPads in learning phonemic awareness. The following questions were used for the teacher interviews.

Standardized Open-ended Interview Questions (see Appendix J)

1. Please introduce yourself.
2. Please describe your position at Little Lambs Christian School.
3. What is your educational background? How long have you been in the field of education?
4. Describe the roles you have had in early childhood education.
5. What is your philosophy of early childhood education? What are your personal goals as an educator?
6. How does your philosophy affect your teaching and lesson preparation?
7. Phonemic awareness is the ability to distinguish the sounds or phonemes that make up words. Please describe your understanding of phonemic awareness as it relates to emergent literacy.
8. What are your views on the role of technology in early childhood education?
9. How do you incorporate technology into your curriculum?
10. What do you perceive to be a positive aspect of utilizing iPads in the classroom? Why?
11. What do you perceive to be a negative aspect of utilizing iPads in the classroom? Why?
12. Please describe how iPads, in particular, are utilized within your classroom.
13. Please explain why you chose the particular applications that you have available for your student to use in the classroom.

14. How do you observe those applications supporting phonemic awareness development in your students?

15. Within your experiences using iPads with young children, do you see that any of the applications support phonemic awareness development even though that may not be the target of the application or game? How would you describe those activities in relation to phonemic awareness?

16. How do the activities that your students do in the classroom that specifically target phonemic awareness compare to their activities that use iPads? What would you like to see as an application in relation to phonemic awareness? Why that particular skill or topic?

17. What perceptions do you have about the impact that iPads have on young children and their development of emergent literacy, particularly their development of phonemic awareness?

18. What are your perceptions of the impact iPads may have on your students’ phonemic awareness? Make sure to include any negative or positive aspects. Please share examples that support your perceptions.

19. Please describe any verbal interactions you see children engaged in during their use of iPads/tablets in the classroom.

20. Is there anything else that you would like to add that may be of interest from your observations and experiences?
Questions 1-4 are introductory and allowed the teacher-participant to provide relevant personal information related to the study. Seidman (2013) describes interviewing as a relationship which needs to be developed. Questions which allow the interviewee to provide personal or background information create the opportunity to develop rapport between the interviewer and interviewee.

Once a similitude of rapport was developed, questions 5-6 provided information about the participant’s personal philosophy of education that guides decision-making and choices made in planning for student learning (Al Hazza, 2017). Teachers’ personal views and perspectives on learning and the learning environment (Edwards, 2017), how they teach (Al Hazza, 2017), and the methods they use in the classroom (Erstad, 2015) were examined. Continuing with teacher perspectives, question 7 provided insight into the teacher-participant’s understanding of phonemic awareness and emergent literacy. In addition to teacher-participants’ guiding philosophy of learning, questions 8-12 explored their views of the role that technology plays in the early childhood classroom. Understanding how teachers perceive technology’s role in ECE is crucial to the overall understanding of how it is used in the ECE classroom (Neumann & Neumann, 2017).

Questions 13-16 explored the teacher-participant’s personal experience utilizing iPads in the classroom. In order to answer the research questions, it was crucial to delve into the teacher-participant’s personal experiences with technology. Teachers’ use of technology in the classroom can influence their beliefs and methods (Fenty & Anderson, 2014). The last group of questions examined the participant’s observations and perceptions of children’s activities that incorporate iPads. Teachers gather data in the classroom through observations of students’ activities, interactions, and play (Edwards, 2017). Not only did these questions provide data that related to
the teacher’s perspective on iPads and phonemic awareness, but they also played a role in answering research question one, which explored how young children use iPads in the classroom (Neumann, 2018b).

**Data Analysis**

For purposes of this case study, I analyzed data according to methods described by Yin (2018). Pattern matching, according to Yin (2018) is data analysis by comparing or matching similar points of data in order to find commonalities. Looking for common patterns surrounding children’s use of iPads to develop phonemic awareness is a viable method of analyzing qualitative data. According to Yin (2018), the pattern can be matched to a prediction made before data are collected.

In order to identify patterns, I used several strategies. First, I developed a prediction for comparison. Second, after the data were collected, I built a case study database that was used for analysis. For case studies, a database is essential to the validity and reliability of the study (Yin, 2018). The database was housed in the NVivo program. This database was designed specifically for qualitative research and afforded me a place to house and analyze the data collected. It was also useful for organizing the data.

Third, memoing (Patton, 2001) throughout the data collection stage provided more details on the processes, activities, and discussions of the participants and added to the database. Memoing is the process of synthesizing meticulous notes from observations (Creswell & Poth, 2018, Patton, 2001). Once I built my database, I followed the pattern of analysis set forth by Yin (2018). The database was housed in the NVivo program, which is a program designed specifically for qualitative analysis. Within that program, I was able to organize the data points
into codes. Those codes, created from memos, artifacts, observations, and interviews, assisted in identifying the patterns in the data which led to three major themes.

**Trustworthiness**

Throughout the data collection process, it was necessary to take precautions that protected the trustworthiness of my study. Trustworthiness in qualitative research addresses the confirmability, dependability, credibility, and transferability of the research being conducted (Lincoln & Guba, 1985). Because qualitative methods do not rely on statistics for validation, it is essential that each of these four areas be addressed to ensure the trustworthiness of the research to be conducted. The following sections provide descriptions of how I plan to protect the trustworthiness of my research.

**Credibility**

Credibility, as it relates to trustworthiness, refers to how accurate the gathered information is and how clearly it describes reality (Lincoln & Guba, 1985). According to Yin (2018), a clear plan for data collection that enables replication of a case study is the key to credibility. Also, member checks provided teacher-participants the opportunity to correct errors, challenge incorrect interpretations, or volunteer any additional information they may feel is pertinent to my study (Lincoln & Guba, 1985). Another method for ensuring credibility was the length of the observations conducted. Allowing for longer observations provided more data collection points (Creswell & Poth, 2018). Last, triangulation of data among three types of data – participant-observations, document analysis, and semi-structured interviews – lent credibility as well because the information has been analyzed from at least three sources (Lincoln & Guba, 1985; Patton, 2001; Yin, 2018).

**Dependability and Confirmability**
Dependability and confirmability are as equally important as credibility and were assessed through the nature of the descriptions of data within the analysis (Patton, 2001). Use of quotations from participants and member checks by the teacher-participants, which allowed for active participation in the analysis of data by the participants, supported the dependability of the study. Clear, precise descriptions of the participants, site, and procedures provided for the opportunity for replication of the study and provided a means for affirming the results (Lincoln & Guba, 1985). Lincoln and Guba (1985) also pointed to the use of a reflexive journal in which I recorded my insights and biases as part of the research process. A third method of ensuring the confirmability of the study was the research database where the data is housed and can be accessed for confirmation if necessary (Yin, 2018). I used NVivo to assist in analyzing the data. For my project, I used this program to house all of my data and assist in developing codes from the data which, in turn, developed into themes.

Transferability

Transferability may be the most difficult aspect of trustworthiness to ensure. Descriptive data and descriptions of the site and participants throughout the research is critical to the transferability of the results (Lincoln & Guba, 1985). Memoing throughout the research process also provided insight into the transferability of the research. Along with memoing and clear descriptions, Lincoln and Guba (1985) described the audit trail (see Appendix K) as the most important method for developing the transferability of a study.

Ethical Considerations

In addition to trustworthiness, the ethical considerations of the study played a significant role in the research process. When working with very young children, I had to address confidentiality and other ethical considerations. In my research, I used pseudonyms for all
participants to protect their identity. Also, data collected from observations and interviews are kept on a laptop and secured with passcodes that restrict visibility.

While participants’ privacy was a concern, I also had to consider my position within the research. As the director of the program in which I conducted my research, I needed to ensure that teachers and children participated willingly. A clear explanation of the boundaries of the study, along with a reflexive journal where I recorded my thoughts, concerns, predispositions, and biases (Lincoln & Guba, 1985), alleviated concerns that teacher-participants may have had in relation to my position within the program. Also, parents needed to understand that their children’s non-participation in no way affected the classroom activities in which they chose to participate. All children had the same classroom experience whether they chose to participate in my study or not.

**Summary**

Phonemic awareness is a crucial piece in the preparation of young children for formal schooling. Exploring the ways that young children use iPads to develop those skills is important to today’s ECE teachers as they continue to discover how technology can best be used in the ECE setting. Utilizing a case study design in a Christian preschool setting provided an in-depth exploration of how young children use iPads in their development of emergent literacy skills. As a case study, pattern analysis of participant-observations, formal artifacts, and teacher interviews guided me in identifying patterns in relation to the student-participants’ development of emergent literacy skills and, specifically, phonemic awareness. Memoing and member-checking, along with rich, descriptive text, an audit trail, and a reflexive journal, all assisted me in ensuring the trustworthiness of my research.
CHAPTER FOUR: FINDINGS

Overview

The purpose of this chapter is to present a report of the findings. The goal of this qualitative case study was to explore how young children use iPads to develop phonemic awareness. Data were obtained from early childhood educators and young children between the ages of four and six years old. Participant-observations, artifacts, and semi-structured teacher interviews were used as methods of data collection to answer the central question. How does the use of iPads in the preschool classroom affect young children’s development of phonemic awareness? Additional sub-questions were:

1. What behaviors do preschool age children typically exhibit when using iPads for phonemic awareness activities?
2. How are iPads utilized in the preschool classroom for developing phonemic awareness?
3. What do teachers perceive of young children’s learning of phonemic awareness skills during iPad use?

Chapter 4 includes a rich description of the case participants and a summary of their perceptions. Next, the patterns, themes, and coinciding evidence that developed from the data are included. Last, a report of the findings and a brief summary are presented.

Participants

The participants in this study consisted of early childhood educators and preschool students in a mid-South Christian school. Purposive sampling was used to choose participants (Creswell & Poth, 2018; Yin, 2018). Little Lambs Christian Preschool was selected for the case study due to their overall use of iPads in the preschool program. Students and teachers all either used or had used iPads in the preschool classroom. The six teachers and six students were
assigned pseudonyms to protect their identities. All teacher and student participants were from middle- and upper-income families. Participant demographics including name, position, student age, and teachers’ years of experience are included in Table 1.

Table 1

*Participant Demographics*

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Teacher Years of Experience</th>
<th>Student Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felicia</td>
<td>Teacher</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Gayle</td>
<td>Teacher</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Julie</td>
<td>Teacher</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Lisa</td>
<td>Teacher</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Nancy</td>
<td>Teacher</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Pam</td>
<td>Teacher</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Andy</td>
<td>Student</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Scott</td>
<td>Student</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Seth</td>
<td>Student</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Sofie</td>
<td>Student</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Wally</td>
<td>Student</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Wes</td>
<td>Student</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**Teacher-Participants**

**Pam.** Pam has a total of 13 years of teaching experience at Little Lambs Preschool and the K-12 academy. She graduated from college with a B.S. in math. Recently, she completed a specialized reading program certification that targets students with dyslexia and other learning differences. Currently, she teaches K-4. She uses iPads in her classroom occasionally for rewards and for reinforcement of skills learned in the classroom. While she thinks that many children spend too much time using technology, she believes that it should play a small part in early childhood education.

**Julie.** Julie has been teaching K-4 at Little Lambs Preschool for two years and holds a B.S. in elementary education. Before teaching K-4, she taught K-3 for two years and worked in a
child development center for three years in the toddler program. She rarely uses iPads in her classroom reserving them for special centers and activities. Julie stated that young children need more tactile, hands-on activities that cannot be provided through technology.

**Felicia.** Felicia has a total of 16 years of experience working in early childhood education. She has taught K-3 for 10 years at Little Lambs Preschool and ran an in-home daycare for six years. She holds a B.S. in early childhood education. She has used iPads in her classroom for reinforcement activities and games in the past but has not used them during this school year. She based that decision on the maturity of the students in her class and their ability to participate in a manner that would be meaningful for the student.

**Lisa.** Lisa earned a B.S. in early childhood education from a Christian college. Over the past 20 years she has taught K-3, K-4, served as a nanny, a program director, and a teaching assistant in preschool classrooms. She also taught 2nd grade for one year. In her classroom, she uses iPads on a weekly basis in a center as reinforcement of skills taught within the curriculum. She also uses an interactive big screen TV for group activities and games.

**Gayle.** Gayle holds a degree in elementary education. She taught for one year in public school, and now she has taught K-4 at Little Lambs Preschool for four years. Gayle made a conscious choice not to use iPads this year in her classroom but has used them in the past. She feels that young children are inundated with technology at home so she tries to give them an environment that does not center on technology. However, she does use iPads and video screens for YouTube videos and other group activities.

**Nancy.** Nancy was a homeschool parent for 18 years and has some college education. She also taught kindergarten at a Christian school for four years. Currently, she is in her 3rd year of teaching K4 at Little Lambs Preschool. As part of the curriculum, Nancy uses iPads on a
regular basis as a center choice. On occasion, she chooses specific activities for students to do on the iPads; however, students usually have a choice of activities. When asked about the benefits that she sees students gaining from technology, she responded, “I don’t think we’ve lived long enough to see the impact that it has on children.”

**Student-Participants**

**Seth.** Seth is a four-year-old Caucasian boy that attended Little Lambs Preschool. He came to the preschool in the middle of the year and was in Ms. Lisa’s K-4 class. During observations, Seth often chose to guess answers during games related to phonemic awareness rather than listen for the sounds. During iPad time, he played several different games but always changed activities choosing to play with puzzles or ‘Splat!’ (a board game for learning words) rather than iPads.

**Wes.** Wes is a four-year-old Caucasian boy at Little Lambs Preschool. He was a part of Ms. Lisa’s K-4 class. Although he was one of the youngest students in the class, he exhibited clearly developed emergent literacy skills. He is an emergent reader and often chose activities that included sight words. He also spent time on several different iPad activities that supported emergent literacy skills.

**Wally.** Wally is a five-year-old Caucasian boy in Ms. Gayle’s K-4 class at Little Lambs Preschool. He had two or three apps that he consistently chose to play during iPad time. Often, Wally chose to include other items such as books and coloring sheets with his iPad play. He also sought for attention and help from the teacher or the researcher on several occasions.

**Sofie.** Sofie is a four-year-old Caucasian girl at Little Lambs Preschool for K-4. She was in Ms. Nancy’s classroom. She often worked in a group with one or two other children during
observations and had two or three apps that she repeatedly played. She also showed classmates how to do some of the activities on the iPads and often collaborated with others to play games.

Scott. Scott is a four-year-old Caucasian boy that attended Little Lambs Preschool along with his twin. He often worked with one or two other children during iPad time and only played one app unless prompted to play other apps. His app of choice included mostly videos to watch that centered on a letter of the alphabet presenting different items that had that letter as its beginning sound.

Andy. Andy is a five-year-old Caucasian boy that attended the Little Lambs Preschool for two years. At the time of this research, he was in Ms. Julie’s classroom. He stated that he liked to play on the iPads but preferred to play on the playground. During observations, he participated in the activities that were assigned, but he often moved to other available activities. He often chose to read books on a reader app and then retell the story to a classmate.

Results

The results from the data collected were used to develop themes and answer the research questions. Before identifying any themes in the data, observation transcripts, interview transcripts, and artifacts were read and studied. Video recordings were reviewed to ensure the accuracy of memos and transcripts. Also, the reflexive journal and annotated notes helped to ensure that researcher biases were separated from the data. In order to conduct a bias-free system of data analysis, NVivo, a computer software program designed for qualitative data analysis was employed (Yin, 2018).

Once data was coded and placed into digital folders within NVivo, the coded data were also printed and highlighted according to the codes developed within NVivo. Digital and manual data codes were compared and adjusted several times until an explicit set of codes were
identified. Codes were also compared to ensure they were in alignment with the research questions. Once the coding was finalized, each code was categorized. The codes created are presented in Table 2. Once the data were coded and grouped, three major themes emerged from the data. The following is a presentation of those three major themes.

Table 2

Open Codes as Referenced by Teachers and Observations

<table>
<thead>
<tr>
<th>Open Codes</th>
<th>Total References</th>
<th>Teacher References</th>
<th>Observation References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Constructivism</td>
<td>9</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Collaborative Learning</td>
<td>9</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Verbal Interaction</td>
<td>22</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Physical Interaction</td>
<td>36</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Fun and Play</td>
<td>9</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Practice/Reinforcement/Reward</td>
<td>8</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Teacher Concerns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boredom</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Lack of Human Interaction</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Too Much Screen Time at Home</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Substitute for Parental Supervision</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Non-Interactive Activities</td>
<td>8</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Emergent Literacy Skills Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language Development</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Alphabet Awareness</td>
<td>12</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Phonemic Awareness</td>
<td>27</td>
<td>10</td>
<td>17</td>
</tr>
</tbody>
</table>

Theme Development

As the data were coded and grouped, themes were revealed. Data was again highlighted and grouped according to the emerging themes. This process was repeated several times to ensure the authenticity of the themes (Creswell & Poth, 2018). The final themes were the culmination of several strategies used throughout the coding and grouping process. Social
constructivism and emergent literacy theory, the underlying frameworks for this case study, were used as the basis of the coding process. By relying on these two theories, the themes that developed provided an exploration of the case. According to social constructivism, children learn through their experiences and from other more experienced peers (Vygotsky, 1978). Since the case study was intended to explore how young children use iPads in developing phonemic awareness, the themes were grounded in social constructivism. Three major themes emerged from the analysis (see Table 3).

**Table 3**

*Themes and Subthemes*

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subthemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme 1: Collaborative Learning</td>
<td>Student collaboration on new skills and concepts</td>
</tr>
<tr>
<td></td>
<td>Reinforcement and review through collaborative activities on iPads</td>
</tr>
<tr>
<td>Theme 2: Teacher Concerns</td>
<td>Young children use technology too much</td>
</tr>
<tr>
<td></td>
<td>Not enough personal interaction when using iPads</td>
</tr>
<tr>
<td>Theme 3: Emergent Literacy Skill Development</td>
<td>Phonemic awareness as a secondary skill in iPad applications</td>
</tr>
<tr>
<td></td>
<td>Phonemic awareness skills as basic part of other emergent literacy skills</td>
</tr>
</tbody>
</table>

**Theme 1: Collaborative Learning.** The analysis of the teacher interviews, participant-observations, and artifacts revealed that collaborative learning to develop new skills and concepts does take place as students use iPads in the classroom (see Table 4). As a code, collaborative learning occurred several times during observations. Collaborative learning manifested in several forms including fun and play, practice and reinforcement, verbal interactions, and physical interaction. The subthemes for collaborative learning were
collaboration for new skill and concept development and reinforcement and review through collaborative activities on iPads.

**Table 4**

*Theme 1: Collaborative Learning*

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration for new skill and concept development</td>
<td>Collaborative Learning (9), Social constructivism (9),</td>
</tr>
<tr>
<td>Reinforcement and review through collaborative activities on iPads</td>
<td>Practice/Reinforcement/Reward (8), Fun and Play (9), Physical Interaction (49)</td>
</tr>
</tbody>
</table>

*Note.* Numbers in parentheses indicate the number of times a response was provided for that code.

In developing the subtheme of collaboration for new skill and concept development, students worked together to complete tasks, or one student showed another how to play a game. For example, Wes and Seth worked together to learn how to play a new game that was added to the iPads. Wes, who was more comfortable using the iPads, included Seth in the learning process by asking him to press buttons as he (Wes) talked through the process and listened to instructions given within the app. At the next session, Seth played the game independently indicating that he had learned from Wes the skills he needed to play that game. This observation demonstrated how social constructivism works when young children are provided opportunity to work together on constructing knowledge. Also, Pam and Lisa both mentioned that they intentionally paired students during iPad time to allow for shared experiences. Pam stated, “When we do it [play iPads], they pair off and share because I’ve learned that when they play together…, they help
Lisa also shared that she likes to get children to help each other when learning to use a new app. “I like to get children to help each other. Show each other how to play a game or find a game,” she stated.

The second subtheme for collaborative learning revolved around reinforcement and review through collaborative activities. Collaboration provided student-participants opportunities to practice phonemic awareness skills, language skills, and social skills. For example, as Wes played a beginning sounds game, he had to choose the letter that corresponded to the beginning sound of the word. When asked, “How did you know that was the correct sound for that letter?” he replied, “Because I have my brain on!” and pointed to the letter chart used at circle time as demonstrated in a screenshot of his activity (see Figure 1). He made the connection between the circle time activities for letter recognition and the game he was playing on the iPad.

Figure 1. Pointing to the chart and then to the letter he recognized from circle time.

Five of the six teacher-participants also indicated that the main purpose for their use of iPads was reinforcement of skills that had been taught in the classroom. Lisa and Felicia both mentioned that one of the positive aspects of using iPads in early childhood classrooms is the
opportunity for reinforcement of learned skills. Felicia said, “Anything that has the letters and
does the sounds. They’re not just hearing it from me. It’s reinforcing what I’ve already taught.”
When asked if she thought there was a positive aspect of using iPads in ECE, Lisa included, “reinforcement of what they’ve learned.” In addition, five teachers also responded that they used iPads for a fun activity in the classroom. Statements such as, “play a fun game,” “a special activity for fun on a rainy day,” and “Fun Fridays,” indicated that teachers liked using iPads for fun activities. While fun activities may have seemed to be just fun activities to the teacher-participants, students were engaged in collaborative play during those fun times as evidenced by Scott and Seth. They played a game together that was just catching letters and putting them in the correct groupings. When questioned about why they liked that game, Scott said, “It’s fun with my friend.” Then, Seth added, “We like to play together.”

Language development was also closely associated with collaboration although it was coded into emergent literacy skills. Screenshot artifacts showed Andy used a book app to listen to a story about a butterfly, and then he retold the story to a classmate (see Figure 2). When he finished retelling the story, the classmate wanted to see the book. Andy showed him where to find the book in the app that he used. While the retelling of the story coded as language development under emergent literacy skills, the fact that he went a step further in collaborating with a classmate to show him where to find the book also coded this observation as collaboration. During the coding process, this overlapping of codes occurred several times, thus indicating that emergent literacy skills and collaboration are closely connected to one another as they relate to critical skill development in very young children.
During another observation, Scott worked with a classmate on a game that targeted letter recognition. As they worked through the game, Scott listened and repeated as his classmate pronounced the beginning sound of each word presented in the game. One student said, “g-g-goat”. Scott asked, “What’s g?”. His classmate pointed to the screen as she said, “Oh”. Then, they worked together to find the correct letter choice. By doing so, Scott was learning the sounds of the letters and identifying the beginning sound of the word. He and his classmate were also developing valuable collaboration skills such as taking turns and listening.

During many of the observations, photos and videos documented student-participants physically interacting with iPads as well. The physical interaction usually manifested as tapping the screen to answer questions. All physical interactions were similar tapping motions which did not seem to be a collaborative effort. Even when students were working with a partner, only one student tapped the screen. Despite the screen tapping, physical interaction with iPads did not equate to more collaboration, students were minimally engaged physically when utilizing iPads.

Collaboration seemed to be an important factor in early childhood education for all six teacher-participants. Gayle, who rarely uses iPads in the classroom, was asked her views on
using iPads in ECE. She stated, “I don’t think it has to [be used in preschool]. It takes away from learning print.” She intentionally sets up activities that provide students opportunity to interact with one another as a means of developing collaboration and social skills. In addition, Julie noted social skills as an important part of a preschool classroom. Nancy also identified the social aspect of using iPads in small groups as a positive reason for including iPads in the preschool classroom. But, when asked what she perceived as a positive aspect of using iPads, she also said, “I don’t know if we’ve lived long enough to know what the positives are.”

**Theme 2: Teacher Concerns.** As Nancy showed concern about what effects iPads have on young children, the second theme that developed from the data was teacher concerns related to using iPads in the early childhood classroom. Two subthemes emerged from the interviews with teachers (see Table 5). First, teachers expressed concern about the lack of personal interaction when students are engaged for too long with iPads or other technology. Nancy shared this concern when she said, “I think it’s abnormal for 13 4-year-olds to sit quietly for 20 minutes with no noise…They get absorbed in the game and ignore all around them.” The second major sentiment expressed by teachers was the fact that children already use too much technology at home and do not need more at school. Felicia stated this concern, “At the age of three, I don’t think it’s necessary…When they use it, parents need them to be quiet.”

**Table 5**

*Theme 2: Concerns about iPad Usage*

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of personal interaction</td>
<td>Lack of Human Interaction (4), Substitute (3), Non-interactive (8)</td>
</tr>
</tbody>
</table>
Too much technology
Boredom (3), Too Much Screen Time (6)

*Note.* Numbers in parentheses indicate the number of times a response was provided for that code.

Development of the first subtheme centered on the concerns of four of the six teachers. These four teachers explicitly noted that they felt the lack of human interaction or connection played a part in how much time they allowed for iPads in their classrooms. Julie feared that the iPad was just a “babysitter” replacing meaningful interactions with adults. Felicia also used the term “babysitter” for the lack of interaction. She said, “I feel like when they get technology [at home], the parents need them to be quiet. A babysitter. It’s not ‘here, I want you to learn your ABCs’ it’s, ‘sit here and be quiet’.” When asked to clarify that statement, she added that iPad use at home usually was more of a convenience for parents to be able to do other things rather than an educational tool for the child. Statements like these identify teacher concerns that maybe they should not use iPads as much in their classrooms. Boredom was also coded as a concern that was expressed by two teachers, but it was also demonstrated during an observation. Nancy explained, “I use it sparingly, or they get bored.” Additionally, Wally stated that he was bored with the iPad when he said, “It’s boring now,” and decided to do chalk drawings instead.

The last code that emerged for this subtheme was the non-interactive nature of iPads. During observations, there were ten incidents where students simply sat and watched a video without any interaction with the iPad or other students. Andy put on headphones so “I can’t hear”. When questioned, he said he did not want to “hear the noise” in the classroom (see Figure 3). Nancy also expressed her concern for the non-interactive nature of iPads when she stated, “I think it’s abnormal for 13 four-year-olds to sit quietly for 20 minutes with no noise. I think it’s
not good for them to do that. They get absorbed…and ignore all around them.” Additionally, Gayle questioned whether to use iPads at all in her classroom. Her concern primarily stemmed from the fact that she considers socialization and the development of social skills to be the most important aspects of early childhood education. If students are not interacting with each other while on an iPad, they are not developing the social skills they need to be successful later on in life. According to Gayle, “It’s [interaction] an all-day event.”

Figure 3. Wearing headphones to block out classroom noise.

Because social skills are such an integral part of early childhood education, all six teachers expressed concerns about young children spending too much time on iPads and technology in general. This concern developed into the second subtheme for teacher concerns. They expressed this concern in different ways. First, the most often noted code was simply too much screen time. Pam, Julie, Gayle, and Felicia expressly noted that they believe their students already get too much screen time at home. Julie stated, “They can spend too much time in front of it and overdo it.” Gayle said, “I feel they get enough of that at home or wherever. They don’t need more.” Along the same path, Nancy was concerned that it “can be very destructive for the ones that are behind the screen and not interactive.” Despite each teacher’s expressed concerns over students having too much screen time, their willingness to utilize iPads in the classroom, even in limited capacities, allowed opportunities to observe students and how they might use iPads for phonemic awareness.
**Theme 3: Emergent Literacy Skill Development.** As codes began to emerge from the data, a third theme developed around emergent literacy skills, particularly phonemic awareness (see Table 6). As the data were dissected and reviewed, it became clear that phonemic awareness was, in most instances, an indirect product of the games and activities that students played on the iPads. During the identification of codes, specific emergent literacy skills were identified as the targets for most of the applications available to the students. The two main skills identified were alphabet awareness and language development. Artifacts, including screenshots and videos of students playing games, demonstrated that alphabet awareness and language were the main emphasis of the available apps. One specific application was designed to target phonemic awareness; however, it required players to have a basic understanding of the alphabet in order to play (see Figure 4). Language development, alphabet awareness, verbal interaction, and phonemic awareness emerged as codes.

**Table 6**

*Theme 3: Emergent Literacy Skill Development*

<table>
<thead>
<tr>
<th>Subtheme</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apps target other EL skills</td>
<td>Alphabet Awareness (12),</td>
</tr>
<tr>
<td></td>
<td>Language Development (5)</td>
</tr>
<tr>
<td>PA is secondary skill during EL activities</td>
<td>Verbal Interaction (22),</td>
</tr>
<tr>
<td></td>
<td>Phonemic Awareness (27)</td>
</tr>
</tbody>
</table>

*Note.* Numbers in parentheses indicate the number of times a response was provided for that code.
The first subtheme presented indicated that most applications target emergent literacy skills other than phonemic awareness. While phonemic awareness was coded 27 times, most of those codes were either artifacts that I gathered or observations that I made while student-participants were engaged with apps that targeted alphabet awareness or language development. The apps most used by student-participants most often targeted alphabet awareness. Sofie, for example, played one app during almost every observation. Artifacts from her iPad time show that she traced letters, watched videos, and played games included in the app (see Figure 5). During one observation, after tracing a letter with her finger on the screen, she watched a video and listened to a song about words that began with the letter she had traced. Wes played a game during several sessions that said the sound of the letter, showed the letter on the screen, then asked the player to choose the pictures that began with that letter. In order to hear the sound that
the letter made, the player had to tap the letter. Wes was only observed tapping the letter three times for the purpose of hearing the sound. When asked why he did not listen to the sound the letter made before making his choice, he said, “I know my letters.” His behavior pointed to his level of comfort with letter recognition. He recognized all of the letters that were presented to him while playing that game. According to Julie, “practicing the alphabet is a positive [for using iPads].”

Figure 5. Using an app for tracing, playing games, and watching videos.

Along with alphabet awareness, language development was a code that helped shape this subtheme. As discussed earlier, language development also coded closely with collaboration. Andy’s sharing of the butterfly story with a classmate was not only an example of collaboration, but also one of language development. Using new vocabulary, presenting the story in correct sequence, and listening to questions all exemplified how young children use iPads to develop emergent literacy skills. While playing a letter recognition app, Sofie was confronted with new
vocabulary. She said, “dolphin”; however, the video used the word “porpoise”. When questioned about the new word she said, “I’m going to color the whole tail pink. Pink Porpoise!” Not only was she exposed to new vocabulary, but she made the connection between beginning sounds of “pink” and “porpoise”.

A second subtheme also developed from the emergent literacy skill theme. Phonemic awareness was identified as a secondary skill learned during other EL skills practice. Although phonemic awareness was coded 27 times, only seven of those events were related to an activity or game that specifically targeted phonemic awareness. Twenty times, phonemic awareness was a secondary effect of an activity that targeted either alphabet awareness or language development. While students practiced alphabet recognition or language development, they were also engaged in developing phonemic awareness as a secondary activity. For example, during games that highlighted alphabet recognition, Sofie, Andy, and Wally all tapped on the letter to hear its sound and repeated the beginning sounds of the pictures aloud as they searched for the beginning letter. Although players could tap the letter on the screen to hear the sound of the letter, Seth, Andy, and Scott were only observed a total of 4 times tapping the letter in that game to hear the letter sound as well. Wally was the only student-participant who consistently tapped every letter to hear the sound when playing that game as documented by videos and photographs. While he sometimes repeated the sound aloud, on two occasions, he asked a classmate to say the sound aloud for him instead of saying it for himself. For example, he asked, What’s that sound?” Again, this demonstrated an overlap between collaboration and emergent literacy.

Verbal interactions were included in this subtheme because of the close association between phonemic awareness and verbal interactions. Alphabet awareness and language can be developed through visuals; however, phonemic awareness is totally dependent upon a person’s
ability to hear the phonemes that make up a word. Twenty of the phonemic awareness codes were also coded at verbal interactions because of this relationship. Videos show students were verbally making the sound that corresponded to the beginning sound of the picture presented in the game. Wes and Seth engaged in more verbal interactions with the games they played than other student-participants. For example, videos showed both students repeated letter names, words, and letter sounds aloud. Seth repeated beginning letters aloud before choosing corresponding pictures within the app he chose to play. Wally, Scott, and Sofie were only observed twice repeating sounds aloud. Andy often mouthed the letter or sound but was only heard once as he repeated a beginning sound. As a secondary effect of games targeting other emergent literacy skills, the presence of opportunities to practice phonemic awareness were available within the apps that the students chose to play (see Figure 6).

Figure 6. Tapping the letter to hear the beginning sound.

Other apps also proved to provide students with opportunities to practice phonemic awareness. Revisiting Andy’s retelling of the butterfly story from a book app, he was careful to
repeat the beginning sound in butterfly as it was read in the book. “B-b-butterfly,” he repeated. Another unusual demonstration of phonemic awareness came from Sofie. As she played Garage Band, an app that allows you to create your own music through a variety of instruments, she wrote her own song which included lyrics. According to the video of her session, she sang, “I love my d-d-doll!” In that instance, she isolated the beginning sound in the word. Last, Wes, who was an emergent reader, played a game that practiced sight words such as “the”, “and”, and “she”. Instead of isolating the beginning sounds of the sight words, three times he repeated the ending sound in order to make his choice. For example, the game said, “And”. Wes repeated, “d-d-d-d”. Then made his choice. When asked how he knew which sight word to choose, he said, ”I looked for the d.”

**Research Question Responses**

After the previously discussed themes were developed, those themes were employed in answering the following central question: How does the use of iPads in the preschool classroom affect young children’s development of phonemic awareness? In order to answer this central question, three sub-questions were analyzed and compared to the three major themes that emerged from the data.

**Sub-question 1.** The first sub-question for this study was: What behaviors do young children typically exhibit when using iPads? In order to answer this question, observed behaviors needed to be identified. Typical behaviors exhibited by the student-participants during iPad use were: collaborating with classmates to complete activities, including other activities into their iPad activities, verbal interaction with the apps through repetition of sounds or repeating words, incorporating other activities into iPad activities, tapping the screen to provide answers or repeat sounds within the activities, and talking back to videos. These behaviors were embedded in the
codes that were analyzed and the themes: Collaboration and Emergent Literacy Skill Development.

Student-participants often engaged with a partner demonstrating collaboration. Sofie stated that she liked to play with her classmate because it made it [iPad] “fun”. Collaboration and cooperative learning played integral roles in the activities of the student-participants. As they played games, they verbally interacted with other students and with the apps they played. Seth verbally interacted with the apps he played at every observation session. While playing a beginning sounds game, he repeated every sound presented before making his choices. Creativity on the part of some of the student-participants was evidenced in their behavior as they played some of the games. Notably, Andy and Wally both watched videos on the letter recognition app about words and their beginning letters. Both students, during different observation times, chose to make chalk drawings of other words that began with the letters presented in their respective videos. Andy drew a picture of a dog for the letter d. Wally drew a spider web for the letter w. By incorporating chalk drawing into their iPad time, these students also demonstrated how more physical and creative activities can be integrated into iPad activities providing the student with a more meaningful learning experience.

Student-participants also engaged with the activities and games they played through physical and verbal interactions. Andy, who watched several videos and listened to books being read to him, often made verbal comments to the video. “Underwear, that’s a funny word!”, he said when watching a video about the letter u. Physical interactions, while limited to tapping the screen, were evident in every observation with all student-participants. Even those occasions where a student only watched a video, he was still required to make tapping motions to find the
desired video. Once, Wally talked back to a video he watched about whales. The narrator asked a question to which Wally responded, “I’ve never swam with a whale! That’s silly!”

As students worked with the iPads and played games, it became evident that collaboration was a key component in their behaviors. Working together, verbal interactions between students and verbal interactions between students and the iPads demonstrated their need for interaction in order to construct new knowledge as they learned to use the iPads and the games that they chose to play. As Sofie and Scott worked together to play a new game, Sofie directed Scott to make a choice. “Choose g-g-goat!”, she demanded. Scott replied, “What’s g?” To which Sofie said, “Oh”. Then, she calmly pointed to the g on the screen. This interchange offered Scott the opportunity to learn the sound of g. It afforded Sofie time to practice listening skills and cooperation with others. As a verbal exchange, this example is also indicative of Scott’s learning of new phonemic awareness skills.

Students’ activities involving repeating of sounds and verbal exchanges such as the one between Scott and Sofie were evidence that student behavior while using iPads depended upon what they were practicing or reinforcing. During activities that supported language development or phonemic awareness, more verbal interactions such as repeating sounds or words and asking questions or asking for help from classmates were observed. Wes was the most consistent in repeating sounds during emergent literacy activities. During a matching game, he took time to repeat words and blends aloud before making choices. However, his emergent literacy skills were more advanced than the other student-participants. Videos showed that he was able to read simple sight words and CVC words. It could not be determined from observations whether his skills were more advanced because he had more verbal interactions with the games.
Sub-question 2. Closely related to the behaviors that young children exhibit while using iPads are the intended uses of iPads in the preschool classroom. Therefore, sub-question 2 is: How are iPads utilized in the preschool classroom for developing phonemic awareness?

Exploring this sub-question revealed that the collaboration and emergent literacy themes again lent evidence to answer this sub-question. During the process of coding the data, information that teachers shared about how they used iPads in their classrooms and the data from the participant-observations moderately differed. For example, all teachers stated that their primary purpose for using iPads was either reinforcement or fun. Pam indicated, “I use iPads to review what I’ve taught.” Additionally, Nancy uses iPads for “Fun Fridays”. Students did use the iPads to reinforce skills that they had learned in class, and they seemed to enjoy the activities which could be classified as having fun, but there was more to their actions. Seth repeated several times during observations, “This is fun!”.

Pam and Lisa both specifically stated that they used iPads for review and fun. However, Lisa’s use of iPads in her classroom for review and fun extended further than the other teacher-participants. She not only used iPads as an activity, she also used a large touchscreen interactive TV for group games and review activities. She stated, I like the large touchscreen better than the iPads because it’s more of a group activity that they can all participate with.” demonstrating her emphasis on collaboration and working together. Nancy also used iPads for fun in her classroom. She called it “Fun Fridays”, during which students could play any iPads games they wanted as a center choice.

When pressed to clarify what skills or knowledge teachers wanted students to learn or review on iPads, the one skill mentioned was alphabet awareness. However, students not only reviewed alphabet awareness, through their collaboration, they practiced listening skills, taking
turns, and scaffolded learning from their peers. That is where the teachers’ perceptions of how iPads were used in the classroom and how students were observed using iPads diverged from one another. According to the videos of iPad sessions, all student-participants worked with a partner on at least one occasion while being observed. While working with a partner, Scott waited his turn to play a game and listened to his partner explain the rules of the game. Then, he asked his partner, “What letter is that?” To which his partner replied, “T-t-t.” This demonstration of collaboration provided a picture of learning that went deeper than just reinforcement of learned skills. These students were practicing social skills as well by taking turns, listening, and problem solving. Scott and his partner took turns tapping the screen. They also listened as each said sounds presented by the game. More importantly, when Scott did not know the answer, he looked to his partner for help identifying the letter t thereby demonstrating his problem-solving skills.

Students also used the iPads in more creative ways to practice phonemic awareness. Three particular incidents exemplified this unconventional use of the iPads. First, Alec’s retelling of the story of the butterfly provided him opportunity to practice phonemic awareness. Second, Sofie’s use of Garage Band to write her song that included her emphasis on the beginning sounds of certain words was a very unconventional use of the iPad for learning phonemic awareness. Last, Wally and Seth included chalk drawings of their new vocabulary and practiced repeating the beginning sounds of the pictures they drew (see Figures 7 and 8). While unconventional, these examples all pointed to opportunities available for students to practice phonemic awareness during iPad time even though the student’s chosen activity was not specifically designed for developing phonemic awareness skills.
Figure 7. Wally’s drawing derived from the video he watched.

Figure 8. Seth’s drawing of a web he drew while playing a game where he identified a web.
Sub-question 3. Analysis of the themes to answer this sub-question posed the most difficulty. What do teachers perceive about children’s learning of phonemic awareness skills during iPad use? Teacher-participants had very strong views and beliefs about children’s learning during iPad use. Most of their perceptions centered around their concerns about young children’s iPad use. However, they did discuss some ways that iPads can be useful in early childhood classrooms. Therefore, to answer this question, teacher concerns and emergent literacy skills themes were employed.

First, all teacher-participants expressed concerns about young children using iPads. The most referenced concerns were too much screen time and not enough personal interaction. Julie stated that she believed her students already had too much screen time at home so she uses them intermittently for review games or “as a special activity for fun on rainy days”. Pam also concluded that her students were allowed too much iPad time at home as well when she said, “I feel like these children are loaded down with technology at home.” Nancy, Felicia, and Lisa all expressed similar sentiments about young children being afforded too much screen time. Felicia and Julie went a step further by indicating that iPads were most likely used as a “babysitter” by many parents who needed their children to be entertained for a short time.

Along with too much screen time, Gayle’s main concern that she shared was the lack of interactions with other people. When discussing her philosophy of early childhood education, she emphasized the need for social interactions and time to work together. She did not view iPads as affording her students opportunities for collaboration. Pam corroborated Gayle’s philosophy of ECE when she stated that her main goal for her students were to gain the social skills needed to succeed in school. Her comment that “if…they’re not hitting one another, I think that’s success at this age level. A lot of it’s social.”, indicated her philosophy is based on the importance of
appropriate interactions between students. Nancy also agreed that students need interaction for learning to take place. Her comment, “…it’s abnormal for 13 four-year-old children to sit quietly for 20 minutes with no noise. I think it’s not good for them to do that. They get absorbed in the game and ignore all around them.” Nancy also surmised from her experiences, “It [technology] can be very destructive for the ones that are behind the screen and not interactive.” She went on to discuss an article she had read about the art of letter-writing and how it is becoming a thing of the past as an example of how technology has changed how we do some things.

A third concern expressed by Nancy bears mentioning as well. Nancy was not only concerned about a lack of human interaction, she was also concerned about students getting bored with iPads. She explained that some of her students who used iPads at home often tired of using them in the classroom and quickly moved on to other center activities when given the opportunity. This concern was exemplified by one student-participant who stopped early during an observation stating that he was bored with the iPad.

While teacher-participants expressed their concerns about young children using iPads and the effects it may have on them, they did identify some activities that they felt would benefit their young students. Felicia and Lisa both indicated that they believed an app that would specifically target phonemic awareness may be helpful for their students as they develop their emergent literacy skills. Furthermore, Julie expressed her feelings that, “activities that are more hands-on benefit young children’s development of phonemic awareness,” but she was not aware of any apps that fit that description. Lisa, however, mentioned that she thought apps like ABCYa and Starfall were excellent choices of activities for young children because of the variety of activities offered within those apps. She included, “Ones [games] that say the sound then find the letter…ABCYa. The sound is more important.”
While teachers revealed concerns about their young students being allowed too much time on iPads, their lack of personal interaction, and boredom, all of the teacher-participants revealed that they still used iPads in their classrooms with the exception of Gayle who had made the conscious choice not to use iPads this year. Teachers’ perceptions of how they used iPads in their classrooms included using iPads for review, fun, and as a reward. Review was the most often noted reason that teacher-participants used iPads in the classroom. However, observations indicated that students actually used iPads for much more than just review of learned skills.

During observations, student-participants were observed using iPads for review of phonemic awareness through games designed for phonemic awareness or other emergent literacy skills. They also used other apps that were not specifically designed for phonemic awareness such as *Garage Band* and *Epic! Books*. Last, although teachers only indicated that review games could help students learn phonemic awareness, students incorporated other materials such as the chalk drawings to enhance their learning during iPad sessions.

**Summary**

This qualitative case study aimed to explore how young children use iPads to develop phonemic awareness. Teacher interviews, participant-observations, and student artifacts were used as data collection methods to answer the central question and sub-questions. While teachers indicated that they used iPads for review and fun, they had serious reservations about whether or not to use iPads within their classroom. Nevertheless, students demonstrated that they were able to use iPads to develop phonemic awareness. Apps available to the students during iPad time did not all specifically target phonemic awareness. Those that did target phonemic awareness afforded students opportunities to interact verbally with the material to be learned or reviewed which is the essence of phonemic awareness. Students also demonstrated that other apps
designed for developing other emergent literacy skills provided opportunities as well to practice their phonemic awareness skills. Last, other unconventional sources of phonemic awareness skill practice were identified as students used apps such as *Garage Band* and *Epic!Books* to practice phonemic awareness.

Three themes developed from this study: Collaboration, Teacher Concerns, and Emergent Literacy Skills. The surprising theme that developed from the data was the collaboration theme. Throughout this research project, concerns about students’ lack of interaction and collaboration when students worked with iPads were the focus of much of the research. However, in this small case study, students worked together, collaborated to gain new knowledge, developed language skills, advanced their social skills, and practiced phonemic awareness all within the confines of their iPad activities.
CHAPTER FIVE: CONCLUSION

Overview

The purpose of this qualitative case study was to explore how preschoolers utilize iPads for developing phonemic awareness in the classroom. Phonemic awareness, the ability to hear the sounds that make up words, is one of the critical foundational skills young children need to gain before learning to read. As part of emergent literacy, phonemic awareness supports young children’s learning of other skills such as alphabet awareness. The problem is that while children are gaining access to technology, they are not exhibiting improved emergent literacy skills, in particular, phonemic awareness. Participant-observations, artifacts, and teacher interviews were employed to gather data for this case study. The data gathered were organized into themes for the purpose of answering the research questions. The goal of this chapter is to discuss the findings and present the researcher’s conclusions and recommendations. Chapter 5 includes a summary of the findings, discussion, implications, delimitations and limitations, and recommendations for future research.

Summary of Findings

This summary of the findings presented in Chapter 4, briefly reiterates what was generated from the data collection and discusses the themes that emerged as they relate to the research questions. The central question was: How does the use of iPads in the preschool classroom affect young children’s development of phonemic awareness? The supporting questions were as follows:

1. What behaviors do young children typically exhibit when using iPads?

2. How are iPads utilized in the preschool classroom for developing phonemic awareness?
3. What do teachers perceive about children’s learning of phonemic awareness skills during iPad use?

There were six teacher-participants. Teachers were chosen because they used iPads in their preschool classrooms. There were also six student-participants. Each student was in a classroom where iPads were used. All students were either four or five years old.

How does the use of iPads in the preschool classroom affect young children’s development of phonemic awareness? To answer this question, three major themes developed from the data that were collected as they related to the research questions. Those themes were: (a) collaborative learning, (b) teacher concerns, and (c) emergent literacy skill development. As the themes emerged, it became apparent that several codes were so closely related as to overlap in several topics. This overlapping highlighted the close association between collaboration, verbal interactions, and phonemic awareness. Phonemic awareness is a skill that is completely reliant upon a student’s ability to distinguish sounds. It relies heavily upon verbal interactions which invokes collaboration between students, students and teachers, or students and iPads. The findings demonstrate this close association.

What behaviors do young children typically exhibit when using iPads? Student-participants were observed performing a variety of behaviors during iPad time. They tapped the screen, worked with partners, engaged in verbal interactions with the iPads and with other students, and they repeated sounds and words as they played games related to phonemic awareness and other emergent literacy activities. Although most of the activities that students chose to play did not specifically target phonemic awareness, phonemic awareness was a secondary skill that students were able to practice and use as they played games that focused on other emergent literacy skills. Repeating the beginning sounds of words to isolate the beginning
letter was one of the most frequently observed behaviors. These behaviors pointed to student-participants’ employment of collaboration during iPad time.

Collaboration between students and collaboration between students and iPads were evidenced by verbal interactions that took place during observations as well. For example, Sofie interacted on several occasions with other students to play games or to explain how to play a game to a classmate. Student-participants also collaborated more often while playing phonemic awareness games than was expected. As the key component for identifying student behaviors, collaboration was evident in almost every observation. The behaviors that student-participants exhibited also provided insight into how iPads are used to develop phonemic awareness.

How are iPads utilized in the preschool classroom for developing phonemic awareness? According to the teacher-participants, iPads were used in their classrooms for reinforcement of learned skills and just for fun. However, the data collected from observations showed that students used iPads for much more than just review and fun. In the process of playing games, students practiced collaborative skills and incorporated art into their learning activities. Also, teachers responded that most of the review their students did on iPads was intended to practice alphabet awareness, students actually practiced phonemic awareness and language development skills as well. Most of the available games listed alphabet recognition, vocabulary, or sight words as the main focus of the activity, but phonemic awareness was a secondary activity in almost all of them. Students played the games that were available to them as expected by the teachers; however, students extended many of the activities through their verbal interactions with classmates and with the games. They also included other available materials into the games such as the students who completed chalk drawings of some of the videos they watched. In addition, one student-participant listened to story and retold the story to a classmate extending the activity
to include phonemic awareness. Last, one student exemplified his problem-solving skills by asking for help from a classmate to identify the letter that matched a sound.

While teachers believed that their students were simply using iPads as a means for review or just for fun playtime, students’ activities demonstrated that the available apps provided opportunities for practicing other skills. Collaboration, verbal interaction, active listening, and phonemic awareness were all secondary activities that took place as students practiced alphabet awareness skills, read a book, watched a video, or had fun playing a game. Therefore, the observations of student activities did not necessarily coincide with teachers’ perceptions.

What do teachers perceive about children’s learning of phonemic awareness skills during iPad use? During interviews with teacher-participants, the comment made most often was that students already use iPads too much. That comment guided teacher perceptions of how students can use iPads to develop phonemic awareness. Concerns over students using iPads too much seemed to outweigh the benefits of using iPads in the minds of the teachers. Teacher-participants also pointed out their perceived lack of interactions with either teachers or other students. It became clear that the teacher-participants believed that students were not interacting during their iPad time. One teacher stated that she believed students needed interactions with others to learn the social skills that are the heart of early childhood education and that her students do not get interactions when they are using iPads.

Despite the concerns expressed by teacher-participants that young children use technology too much, they agreed that iPads can be used for phonemic awareness development. The caveat to their agreement was discussed by two teachers who both explained that they did not know of any apps that specifically taught phonemic awareness. However, if one were to be developed, it could be very helpful in the early childhood classroom. Pam explained further that
she considered phonemic awareness to be extremely important to students’ ability to learn to read.

**Discussion**

The purpose of this section is to discuss the study findings in relationship to the empirical and theoretical literature reviewed in Chapter Two. I present the analysis of how the findings confirm or corroborate previous research related to phonemic awareness. This section also discusses where the findings of this study diverged from, extended previous research, and any novel contributions this study adds to the current field of education.

Based upon the empirical and theoretical research presented in Chapter Two, phonemic awareness is one of the foundational emergent literacy skills that young children must develop before learning to read. Phonemic awareness is described as the ability to distinguish individual sounds or phonemes that make up spoken language (Clay, 1979). Often, phonemic awareness is confused with phonics which is the relationship between spoken words or phonemes and graphemes which are the written expression of sounds (Arrow & McLachlan, 2011). For the purposes of this study, only phonemes were examined.

**Theoretical Framework**

Research shows that young children learn through experiences that are filtered through their senses and supported by others who are more experienced whether that is other children or adults (Santin et al, 2017; Vygotsky, 1978). Studies of early childhood education recognize that most programs are grounded in social constructivist theory which explains the phenomena exemplified by how young children typically learn through their senses. Touching, listening, examining, and even tasting novel items. Those experiences are enhanced by their collaboration
with others who have had more encounters and more knowledge. This idea of collaborative learning allows young children to construct new knowledge.

Another framework that bounds early childhood education is the emergent literacy theory. First presented by Clay (1979), emergent literacy framework identified four skills or sets of knowledge that a young child must develop before learning to read. Those skills are alphabet awareness, print awareness, oral language, and phonemic awareness. Early in the development of this theory, it was explained as a linear progression of skills development; however, later research has described as a circular continuance of constant growth that begins at birth. All of a young child’s experiences build upon this group of foundational skills (Arrow & MacLachlan, 2011; Rohde, 2015). Children flow through stages of development as they attain emergent literacy skills. When coupled with social constructivism, emergent literacy framework offers a clear picture of how young children learn beginning from birth.

One of the key components in social constructivism and emergent literacy is collaboration. This study found that collaboration was a fundamental component of young children’s development of phonemic awareness. One example of this collaborative learning was evidenced several times as Sofie assisted classmates who asked for help. Also, Scott exemplified collaborative learning by working with a partner who was able to teach him letter sounds that he previously did not know.

When using iPads for phonemic awareness, lack of collaboration was also a concern for teachers who expressed their belief in the importance of human interactions for young children in the early childhood classroom. Teacher-participants expressed their concern that young children do not experience collaboration when using iPads for literacy practice, therefore, iPad use should be strictly limited. However, this study showed evidence that young children do collaborate and
have positive interactions with each other and with iPads as they participate in phonemic awareness activities and other iPad games.

Overall, this study supports the premise that young children learn through social experiences. It also provides insight into the extent to which young children collaborate. Although student-participants were provided with individual iPads, most often they migrated to working with a partner either using one iPad or even two iPads discussing what each was doing as they worked through a game or activity. Despite teacher-participant concerns that students did not interact with each other or their teachers during iPad time, students did have some meaningful interactions with each other as they used iPads. Students also verbally interacted with the iPads on several occasions. Throughout their interactions, they were collaborating, practicing active listening skills, and engaging in dialogue.

In addition to providing opportunities for children to interact and engage each other as they constructed new knowledge and developed new skills, they were practicing and developing phonemic awareness in unique ways. Andy, for example, used an app to read a book which was designed to focus on his print awareness skills and develop vocabulary. However, as he retold the story to his classmate, he also demonstrated phonemic awareness by repeating beginning sounds of new words for his partner who was listening to his retelling. Other research explored how children use iPads to share stories (Kucirkova, Sheehy, and Messer, 2015); however, that research did not extend into the specific emergent literacy skills that were exemplified in the current study. While corroborating the earlier study’s statement that iPads can be used from a social constructivist standpoint by young children, it did not extend as far as this study. Kervin (2016) and Lafton (2015) also examined children’s development of EL as part of their iPad use, but those studies focused on alphabet awareness and vocabulary development. By highlighting
the phonemic awareness, this study shed sheds light on more specific ways that young children use iPads to learn and make new connections.

**Empirical Framework**

As early childhood education has evolved over the last several decades, the need to identify the underlying fundamentals that justify such programs have been developed and modified (Lysklett & Berger, 2017). Two basic groups of skills have been identified as the heart of ECE. These competencies are emergent literacy skills and social skills. The National Institute for Literacy also included phonics and comprehension as part of ECE (Armbruster et al., 2005). Teacher-participants in the current study indicated that the earlier mentioned foundational skills guided them as they prepared lessons and activities for their students. The current study examined the relationship between these skills and young children’s use of iPads for phonemic awareness development. Phonemic awareness is the focus of this study because it has been identified as the strongest indicator of early reading success (Kenner et al., 2017).

As data from the current study were examined, three themes emerged as the supporting evidence for the exploration of students’ phonemic awareness development: collaboration, teacher concerns, and emergent literacy skills. Here again, the theme of collaboration played a major role in exploring how young children use iPads to develop phonemic awareness, which is a major factor in emergent literacy. Children’s collaboration in this study presented itself through their play with iPads.

One unique aspect of this study was the amount of collaboration and cooperative play in which student-participants engaged. Previous research commented on collaboration as part of creative play with iPads (Edwards, 2017); however, this study observed students engaging in creative play that extended to their development of phonemic awareness. Although teacher-
participants were concerned that students were not engaging in verbal interactions, students were observed not only verbally interacting with one another during iPad time, but they were also engaging verbally in creative ways that enhanced their phonemic awareness. The most telling evidence came from several observations. First, Andy, who enjoyed reading books on an app, retold a story to a classmate using the book he had just listened to on the app. As he retold the story, he showed pictures and carefully repeated the beginning sounds of the word ‘butterfly’ so that his partner was able to hear the sound. On other occasions, students were observed repeating sounds orally as they played games either individually or with partners. Wes was one of the more vocal participants. He consistently repeated beginning sounds during games that did not necessarily expect players to work on verbal skills. However, when questioned, he said it helped him to find the words he needed to answer the questions. Wes also, on one occasion, used the ending sounds to identify the correct answers rather than the beginning sounds. Research corroborated the teachers’ concerns for students’ need to engage in verbal interactions (Neumann, 2018a); on the other hand, student behavior indicated that those interactions may not always need to be with an adult. Peer-to-peer interactions and student-to-iPad interactions can provide a meaningful learning environment for young children according to the evidenced presented.

Throughout this study observations consistently revealed that young children can use iPads to develop phonemic awareness, but that it may not be through traditional methods. In accordance, teacher-participants expressed that they believed young children can use iPads to develop phonemic awareness if there was a good app for it. Only one app available for this study identified phonemic awareness as one of its goals. However, students played other apps using a variety of techniques that encouraged their phonemic awareness development. Sofie illustrated
this when she wrote her own song using *Garage Band*, a musical app that allows you to make music with a variety of instruments. Not only did she create a melody, she wrote lyrics that came from a video about the letter d as well. In the words, she included repeating the beginning sounds of some words for emphasis. She repeated, “I love my d-d-doll!”

In other research, children’s creative use of iPads in their play and in developing social skills has been addressed (Edwards, 2017; Neumann, 2018b); however, my study diverged from that general discussion to more specifically addressing phonemic awareness. Dezuanni et al. (2015) also addressed creative uses of iPads by young children as that creativity related to their play. I went a step further in my study and identified creative ways that children’s use of iPads in the course of play supports their phonemic awareness. In addition, iPads can provide a platform (Edwards & Bird, 2017) to strengthen phonemic awareness. Wally demonstrated this creativity by incorporating chalk drawings of pictures from his iPad activities. He watched a video about the letter w. Then, he drew a picture of a spider web to which he commented, “w-w-w spider web.” As an alternative or complimentary activity, Wally was able to use his chalk drawing to showcase his knowledge of beginning sounds supporting the claim of Arnott et al. (2016) who argued that exploring alternative venues for creative ideas supported young children’s learning.

One thing that continually presented itself during data analysis was the circular and overlapping nature of student activities as they practiced phonemic awareness. Emergent literacy itself is by nature constantly evolving and begins at birth for every child. Young children’s experiences, relationships, and senses all support the learning process. For example, as student-participants played a game that focused attention on alphabet awareness, they also had opportunity to develop new vocabulary and practice phonemic awareness in relation to recognizing letters. Phonemic awareness is not necessarily an isolated skill that must be
explicitly taught. As young children move through activities, they practiced phonemic awareness by repeating beginning and ending sounds and playing games that included rhyming words. It was also evident that phonemic awareness does not have to be learned through an explicitly emergent literacy-centered activity. Furthermore, phonemic awareness can be practiced and strengthened through more creative methods such as storytelling, creating with music, and various visual arts such as drawing. In accordance with teachers’ concerns that students engage in meaningful human interaction, they can develop phonemic awareness using iPads as part of a curriculum that is rich in well-planned activities.

**Implications**

The purpose of this section is to address the theoretical, empirical, and practical implications of the study. The findings of this case study have implications for parents, teachers, and early childhood programs and their administrators.

**Theoretical Implications**

Early childhood education is grounded in social constructivism and emergent literacy theory. For programs that serve young children, providing an environment that is rich in collaborative activities is paramount. This study found that one of the keys to developing phonemic awareness was collaboration in the form of verbal interactions. Including time for children to play together using iPads can be an effective method of practicing phonemic awareness even when the planned activity is not designed specifically for phonemic awareness.

Also, teachers need to develop a clear understanding of the value of verbal interaction to the development of phonemic awareness. While teachers indicated that interaction is important, they were unable to explain why it is important other than social skill development. Since phonemic awareness is dependent on social constructivist theory, it is important that meaningful
interactions be abundant in an early childhood program. According to Edwards (2017), students who engage in digital play develop more creative ways to interact with other materials and have more meaningful verbal interactions. Those interactions may be between teachers and students or peer-to-peer, but they can also come from using iPads in creative ways in the classroom.

**Empirical Implications**

Teacher concerns over students using technology too much and its negative impact on their learning is documented (Harrison & McTavish, 2016), and the American Academy of Pediatrics (2018) warns against too much screen time for young children. Nancy’s comment, “we have not lived long enough to know the negative effects of iPad use,” supports the current push to limit young children’s use of iPads. However, as part of a thoughtful, well-planned program, it has benefits (Stone-MacDonald, 2015; Schaefer et al., 2016; Heilmann et al., 2018). Early childhood programs and classroom teachers must make a conscious choice to use iPads in the classroom. Findings from this study agreed that teachers’ concerns should be included in the decision-making process when iPads are incorporated into the ECE classroom.

**Practical Implications**

The practical implications of my study include specific changes that can be made by teachers and even parents when allowing young children to use iPads. First, teachers and curriculum specialists need to spend time observing their students while they are engaging with iPads. Observation is the key to understanding how students learn (Neumann, 2014; Arrow & MacLachlan, 2011). Using those observations, teachers may be able to develop a more creative plan for implementing iPad use in the classroom as part of a developmentally appropriate curriculum. Understanding how students collaborate with one another and the creative activities that they invent as they play may provide ideas for later implementation. Also, understanding the
secondary benefits that students glean from their iPad activities may alleviate some of the concerns that teachers have regarding children’s use of iPads in the classroom.

Parents also need to closely observe their children as they interact with iPads or other tablets. While some games may be directed toward specific skills or knowledge, observation will pinpoint other skills that the child is learning as a secondary effect. Observing also provides opportunities for interaction with children as they play. Asking questions and playing along provide a child with meaningful verbal and physical interactions that support the development of phonemic awareness and other emergent literacy and social skills that are major factors in later academic success.

**Delimitations and Limitations**

Delimitations are purposeful decisions the researcher makes to limit or define the boundaries of the study (Simon & Goes, 2010). Limitations are potential weaknesses of the study that cannot be controlled (Simon & Goes, 2010). As the researcher, I made purposeful decisions that affected the boundaries of this study. This section presents reasons for the specific scope of the study and any limitations.

First, although my study provided a rich description of the participants and data for only one preschool program, the first delimitation was the small case size. As a case study, the aim was not to generalize the results to a larger population. My study was designed to be a snapshot of one program’s use of iPads as it related to phonemic awareness. Using teacher interviews, artifacts, and participant-observations which occurred over a three-week period, the researcher was able to develop a deeper understanding of teachers’ perceptions of phonemic awareness and how young children use iPads as they develop phonemic awareness. Another delimitation was
the site of my study. I chose to use this site because it offered convenience. I was able to collect data without any difficulties.

Second, my study was limited by the choice of site and the demographics of the participants. I was very familiar with the teachers and students at the site which may have allowed my biases to impede data analysis. However, familiarity with the students also afforded me the opportunity to interact with students who were already comfortable with me. Participants were chosen through purposive sampling from a small population which also limited the scope of my study. As a single case study, perspectives from a demographically diverse population was not feasible. All participants were from middle- and upper-income families which also limited my study and could be construed as a weakness. Despite the limited population, triangulation of data largely minimized this problem. I also believed that participants were honest about their experiences and biases were limited by the triangulation of data. A final limitation was the fact that student-participants only came from three of the six teacher-participants’ classrooms. Initially, I had intended to observe one student from each classroom. However, I did not receive permission from parents in three of the classrooms. Therefore, I did not have the opportunity to observe iPad use in three of the teacher-participants’ classrooms.

**Recommendations for Future Research**

In consideration of the study findings, limitations, and the delimitations placed on the study, this section provides recommendations for future research. With the aim of pursuing more insight into this topic, research that validates the findings of this study, enhances the findings, or expands on the current findings should be pursued.

First, the research sample for this study was very small and limited to a homogeneous demographic. To validate the findings of this study, a study that includes a larger and more
diverse population may be needed. The small number of participants was appropriate for this study because the scope was targeted at one school; however, data from different perspectives may be gathered from a more diverse population. A larger sample size and more diverse pool of participants would also improve the representation of a whole population and expand the findings of the current study outside of this single case.

Second, this study was a qualitative case study. A larger study may be appropriate for examining a larger population of early childhood students and teachers. The qualitative nature of this study was necessary for evaluating the behaviors of young children. In particular, participant-observations afforded the researcher opportunities to work closely with students to gain a deeper understanding of their activities. Multiple researchers conducting observations may provide a broader understanding of young children’s behaviors when using iPads for phonemic awareness. Multiple perspectives may also provide for improved coding during the analysis of data.

**Summary**

Two considerations from the implications of this study should be reiterated. The study findings and implications presented some interesting facts about young children’s development of phonemic awareness as it related to their use of iPads. Children used iPads in unique and creative ways to develop phonemic awareness. This creativity was illustrated by Andy who practiced phonemic awareness as he retold a story by repeating the beginning sounds in the new vocabulary words that he had learned. Sofie also was very creative when she wrote her own song. The lyrics of which included beginning sounds of a word for which she had watched a video. Also, the fact that children flow through developmental stages of emergent literacy was evidenced in the fluidity of their activities. The collaboration that they demonstrated and the fact
that phonemic awareness was a secondary activity in most of their activities painted a picture of a fluid process of learning that engaged their senses and depended heavily on verbal interactions.

For practical purposes, teachers in early childhood classrooms should consider closely observing students’ iPad use as a means of understanding how children use iPads. The fluid way that they learn can best be understood through observation and interaction. Not only did students in this study use iPads to practice phonemic awareness, they were observed collaborating and creating new ways to use the apps that were available. As teachers observe students, they may identify more creative ways to use iPads for more than just reinforcement or fun activities. In addition, although this study provided information on how young children use iPads for phonemic awareness, administrators should still consider teachers’ concerns about the time that young children spend using technology. Warnings from the Fred Rogers Foundation and American Academy of Pediatrics should play a role in how much iPads are used in ECE. Therefore, adopting a balanced approach to iPad use in ECE is critical to supporting young children’s development of phonemic awareness.
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APPENDIX A: IRB Approval

Dear Patricia Scalf,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases are attached to your approval email.

Your study falls under the expedited review category (45 CFR 46.110), which is applicable to specific, minimal risk studies and minor changes to approved studies for the following reason(s):

Your study involves surveying or interviewing minors, or it involves observing the public behavior of minors, and you will participate in the activities being observed.

Please retain this letter for your records. Also, if you are conducting research as part of the requirements for a master’s thesis or doctoral dissertation, this approval letter should be included as an appendix to your completed thesis or dissertation.

Your IRB-approved, stamped consent form is also attached. This form should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document should be made available without alteration.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

Liberty University | Training Champions for Christ since 1971
APPENDIX B: Recruitment Letters

PARENT/GUARDIAN RECRUITMENT

October 25, 2019

Dear Parent:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for the Doctor of Education degree. The purpose of my research is to understand how young children use iPads to develop phonemic awareness, and I am writing to invite your child to participate in my study.

If you are willing to allow your child to participate, and your child is willing to participate, he/she will be asked to complete some activities using iPads that incorporate emergent literacy skills such as phonemic awareness, rhyming, and alphabet knowledge. Participants will also be interviewed about their activities on the iPad as they use the iPads. Artifacts such as video/audio-recordings and pictures will be collected. It should take approximately 3-4 hours spread out over a series of 4 or 5 sessions for your child to complete the activities and interviews described. Your child’s name and other identifying information will be requested as part of his/her participation, but the information will remain confidential. For research purposes, your child will be assigned a pseudonym.

For your child to participate, please contact me at the main office at [Contact Information].

If your child is eligible to participate, I will provide you with a parental consent form. The consent document contains additional information about my research. Please sign the consent document and return it to the main office at [Contact Information] before the first observation. Your child will have the opportunity to provide his/her assent prior to the first observation.

Sincerely,

Patti Scalf
Liberty University, Doctoral Candidate
TEACHER RECRUITMENT

October 25, 2019

Dear Teacher:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for the Doctor of Education degree. The purpose of my research is to understand how young children use iPads to develop phonemic awareness, and I am writing to invite you to participate in my study.

If you are willing to participate, you will be asked to participate in an interview discussing your views of how iPads can incorporate emergent literacy skills such as phonemic awareness, rhyming, and alphabet knowledge. You will also be asked about your students’ activities that involve the iPad. If you agree to participate, I will also conduct observations within your classroom during your normal activity time to observe how students use iPads within the learning environment. Your name and other identifying information will be requested as part of his/her participation, but the information will remain confidential. You will be assigned a pseudonym.

In order to participate, please complete the screening tool that was included in my initial email and submit it.

If you are eligible to participate, I will provide you with a consent form. The consent document contains additional information about my research. Please sign the consent document and return it to me at the time of the interview.

Sincerely,

Patti Scalf
Liberty University, Doctoral Candidate
APPENDIX C: Screening Tools

Teacher Screening Tool

1. Do you teach students ages 4-5 years old?
   a. Yes
   b. No

2. Do you use iPads or other tablets for academic purposes in the classroom?
   a. Yes
   b. No

3. Are you willing to participate in this study?
   a. Yes
   b. No
Student Screening Tool

1. Is your child age 4-5 years old?
   a. Yes
   b. No

2. Does your child use an iPad or other tablet at home or in the classroom?
   a. Yes
   b. No

3. Are you willing to allow your child to participate in this study?
   a. Yes
   b. No
APPENDIX D: Acceptance/Rejection Letters

Student Acceptance Letter

October 30, 2019
Dear Parent,
Thank you for your interest in my research. Your child has been selected to participate in the study. Please complete the attached informed consent form and return it to me by ____. Once you have completed the consent form, your child will participate in the activities and interviews. If you have any questions, please feel free to contact me.
Thank you,
Patti Scalf

Student Rejection Letter

October 30, 2019
Dear Parent,
Thank you for your interest in my research. However, your child has not been selected to participate in the study at this time.
If you have any questions, please feel free to contact me.
Thank you,
Patti Scalf
Teacher Acceptance Letter

October 30, 2019
Dear Teacher,
Thank you for your interest in my research. You have been selected to participate in the study.
Please complete the attached informed consent form and return it to me by ____. Once you have completed the consent form, I will contact you to schedule an interview.
If you have any questions, please feel free to contact me.
Thank you,
Patti Scalf

Teacher Rejection Letter

October 30, 2019
Dear Teacher,
Thank you for your interest in my research. However, you have not been selected to participate in the study at this time.
If you have any questions, please feel free to contact me.
Thank you,
Patti Scalf
APPENDIX E: Consent Forms

PARENT/GUARDIAN CONSENT FORM
Exploring How Preschoolers Use iPads to Develop Phonemic Awareness

This research study is being conducted by Patricia Scalf, a doctoral candidate in the School of Education at Liberty University. Your child was selected as a possible participant because he/she meets the age criteria as a 4 or 5 year old student in a classroom where iPads are utilized. Please read this form and ask any questions you may have before agreeing to allow him/her to be in the study.

Why is this study being done?
The purpose of this study is to understand how the use of iPads affects young children’s development of phonemic awareness.

What will my child/student be asked to do?
If you agree to allow your child to be in this study, he/she will be asked to do the following things:
1. Answer questions about how they used the iPads and what they liked about using it.
2. The observations are expected to take 2-3 hours and will be completed in 4-5 sessions over a period of 2-3 weeks.
3. I will collect artifacts for analysis which will include video/audio documentation of activities, participant drawings illustrating what they did on the iPads, and screenshots.

What are the risks and benefits of this study?
Benefits: Participants should not expect to receive a direct benefit from taking part in this study.
Risks: The risks involved in this study are minimal, which means they are comparable to the risks of everyday life.

Benefits to society include a greater understanding of how young children use iPads to support their emergent literacy skills.

Will my child be compensated for participating?
Your child will not be compensated for participating in this study.

How will my child’s personal information be protected?
The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Participants will be assigned pseudonyms. Research records will be stored securely and only the researcher will have access to the records. I may share the data I collect from your child for use in future research studies or with other researchers; if I share the data that I collect about your child, I will remove any information that could identify him or her, if applicable, before I share the data.

- I will conduct the interviews in a location where others will not easily overhear the conversation. Participant activities will be conducted in the classroom.
CONSENT FORM
How Preschoolers Use iPads to Develop Phonemic Awareness
Patricia Scalf
Liberty University
School of Education

You are invited to be a part of a research study of how preschool children use iPads to develop phonemic awareness. The purpose of this study is to examine how iPads may be used to develop phonemic awareness as part of young children’s overall emergent literacy skills acquisition. You were selected as a possible participant because you teach children ages 4-5 years and have access to iPads for educational purposes. Please read this form and ask any questions you may have before agreeing to be in the study.

I, Patricia Scalf, a doctoral candidate in the School of Education at Liberty University, am conducting this study.

Background Information: The purpose of this study is to describe how iPads may be used to develop phonemic awareness as part of overall emergent literacy skills acquisition.

Procedures: If you agree to be in this study, I would ask you to do the following things:
1. Participate in an interview with me. The interview will focus on your philosophy of learning, iPad use in the classroom, and emergent literacy. Audio equipment may be used to record the interview for research purposes only. This interview may take 45-60 minutes.
2. Review any notes from the interview to ensure accuracy.
3. Answer any follow up questions for clarification or if more information is needed.

Risks: The risks involved in this study are minimal. The risks would be equal to daily expectations in the classroom. As a mandatory reporter, I would be required to report any indicators of child abuse or neglect observed as part of this study.

Benefits: Teacher-participants will receive no direct benefits from this study. Benefits to society include insight into how young children use iPads in the classroom and how iPads use may impact their development of phonemic awareness.

Compensation: Teacher-participants will be entered in a drawing for a $25 gift card.

Confidentiality: The records of this study will be kept private. In any sort of report that I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records. I may share the data I collect from you for use in future research studies or with other researchers, if I share the data that I collect about you, I will remove any information that could identify you, if applicable, before I share the data.
Research Helpers

As a research helper, you will get to use iPads during special classroom activities.
This will help me to learn how you use iPads.

Playing Games

You will play some games that I have chosen while a video recorder records what you are doing.
Telling about your iPad playtime

- You will get an opportunity to draw pictures of what you did on the iPad or what you learned about while you use the iPads.
- You can also draw pictures of what you liked about using the iPad and what you did not like.

When we are all finished, we will have an ice cream party.
APPENDIX G: Child Assent Form

ASSENT OF CHILD TO PARTICIPATE IN A RESEARCH STUDY

What is the name of the study and who is doing the study?
My name is Patti Scalf, and I am researching the topic. How preschoolers use iPads to develop phonemic awareness or hear the sounds that make up words.

Why are we doing this study?
I am interested in studying this because I want to be a better teacher and administrator and help students hear individual sounds in words so they can learn to read.

Why are we asking you to be in this study?
You are being asked to be in this research study because you are the right age for the study and are learning word sounds right now.

If you agree, what will happen?
If you agree to be in this study you will use iPads in the classroom to play games with letters and word sounds. I will video you as you play the games, ask you questions, and then we will sit together and watch your recordings and talk about what you did with the iPad.

Do you have to be in this study?
No, you do not have to be in this study. If you want to be in this study, then tell the researcher. If you don’t want to participate, it’s OK to say no. The researcher will not be upset or angry. You can say yes now and change your mind later. It’s up to you.

Do you have any questions?
You can ask questions any time. You can ask now. You can ask later. You can talk to the researcher. If you do not understand something, please ask the researcher to explain it to you again.

The child listed gives verbal agreement.

Witness ____________ Date ____________

Child’s Name ____________ Date ____________

Patti Scalf
Pscalf@liberty.edu or (615)351-2628
Dr. Constance Fauson (Dissertation Chairperson)
Liberty University, School of Education
professor@liberty.edu or (434)355-1683
Liberty University Institutional Review Board, 1971 University Blvd, Green Hall 1887, Lynchburg, VA 24515
or email irb@liberty.edu.
## APPENDIX H: Reflexive Journal

<table>
<thead>
<tr>
<th>Date</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 10, 2019</td>
<td>This week I had discussions with three colleagues from other ECE programs about if, how, and why they used technology (mainly iPads) in their programs. We discussed some of the barriers to its use and some of the negative aspects of technology in relation to young children.</td>
</tr>
<tr>
<td>February 18, 2019</td>
<td>I received verbal permission from my head of school to conduct my study in our preschool program.</td>
</tr>
<tr>
<td>March 2, 2019</td>
<td>I am still working to solidify my research questions. Even though I am finishing my chapter 2, my research questions still need to be improved.</td>
</tr>
<tr>
<td>March 17, 2019</td>
<td>Today, I was approached by a former colleague with a job opportunity for the fall semester. If I take the position, I will need to change my setting for my study.</td>
</tr>
<tr>
<td>April 17, 2019</td>
<td>I accepted the new position with the proviso that I would be able to conduct my study on-site.</td>
</tr>
<tr>
<td>April 27, 2019</td>
<td>As I have worked to complete final revisions to chapter 2, I find more studies looking at the surface of how technology affects young children’s emergent literacy. It is a difficult question. And phonemic awareness may be difficult to pinpoint because it is intertwined so closely with other skills such as alphabet awareness. I will need to be very clear on how to isolate phonemic awareness.</td>
</tr>
<tr>
<td>May 2, 2019</td>
<td>I have been exploring apps to use for my observations. I want students to be able to play iPads in the classroom as they normally would, but I need to ensure that there are apps available to them that include opportunities to practice phonemic awareness. I am not finding many apps that support or present themselves as phonemic awareness.</td>
</tr>
<tr>
<td>June 15, 2019</td>
<td>I would like to use a phonemic awareness inventory as an artifact to gauge the student-participants’ level of phonemic awareness before beginning the research. I think that the level of PA may have an affect on performance. But I’m not sure how to keep it from becoming a quantitative measure.</td>
</tr>
<tr>
<td>September 9, 2019</td>
<td>I have sent my paper to be edited and should have it back soon.</td>
</tr>
<tr>
<td>September 20, 2019</td>
<td>Editing is completed for chapters 1-3.</td>
</tr>
<tr>
<td>October 18, 2019</td>
<td>I completed my proposal defense today. I thought it went well.</td>
</tr>
<tr>
<td>October 26, 2019</td>
<td>I applied for IRB approval.</td>
</tr>
<tr>
<td>October 28, 2019</td>
<td>I had to add 2 documents to complete my application</td>
</tr>
<tr>
<td>November 25, 2019</td>
<td>IRB asked for revisions. (I have emailed IRB several times.)</td>
</tr>
<tr>
<td>November 29, 2019</td>
<td>I submitted the requested submissions.</td>
</tr>
<tr>
<td>January 22, 2020</td>
<td>I received IRB approval. Now I can begin my data collection.</td>
</tr>
<tr>
<td>January 25, 2020</td>
<td>I have consent from 6 teachers for participation. I also received 8 declinations from parents who declined to allow their children to participate.</td>
</tr>
<tr>
<td>Date</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>February 3, 2020</td>
<td>I finally have 6 students to participate. They are not spread out through the different classrooms like I had expected. I had hoped that I would be able to observe in all 6 teachers’ classrooms.</td>
</tr>
<tr>
<td>February 5, 2020</td>
<td>The pilot study went well. I found that I really don’t need a research assistant to help with the video camera. If I show the children how to take screenshots and screen videos, then I will not have to interrupt their activities as much. I can just ask them to take a screenshot of what they’re doing. I also realized that some of the children like to work in groups.</td>
</tr>
<tr>
<td>February 14, 2020</td>
<td>One parent informed me today during class parties that she changed her mind about allowing her child to participate. I have already completed an hour of observations with her child. I will need to find another participant.</td>
</tr>
<tr>
<td>February 17, 2020</td>
<td>I contacted a parent who had given permission for her child to participate, but I had not chosen her child since I had 8 parents agree. She again agreed and signed a consent form for participation.</td>
</tr>
<tr>
<td>February 24, 2020</td>
<td>I completed 3 of my interviews today. I asked a lot of follow-up questions because I seemed to be having difficulty getting the teachers to discuss how students are using iPads for phonemic awareness. All three teachers emphasized their concerns for students using technology too much and too often.</td>
</tr>
<tr>
<td>March 5, 2020</td>
<td>I’ve had trouble getting into classrooms during regular iPad time. Today, 4 of my participants were in after-care which also uses iPads as a center. I joined my participants in their after-care group to observe. This worked out really well.</td>
</tr>
<tr>
<td>March 6, 2020</td>
<td>I worked with my participants again in after-care. I’ve noticed in after-care, they tend to work together more than they do in the classroom. Not sure why that is. Maybe because they are in a more relaxed environment.</td>
</tr>
<tr>
<td>March 13, 2020</td>
<td>Our school is closing for COVID-19. I’m not sure how this will affect my study. I needed to get 2 more sessions in with my late joining student. I wanted 3 hours with each of them, but I only have about 2 ½ hours with him. I needed to go back with him and watch some of the videos that I took of him playing.</td>
</tr>
<tr>
<td>March 18, 2020</td>
<td>I did a video conference with my last participant and his mother today. We discussed his activities, and he shared a picture with me that he drew of himself playing with an iPad.</td>
</tr>
<tr>
<td>March 20, 2020</td>
<td>I am working through the data analysis. I’ve been trying to learn how to use the NVivo. It’s been difficult. I’m simply inputting the information.</td>
</tr>
<tr>
<td>March 23, 2020</td>
<td>As I’m developing the codes, I see that the teachers had a lot of concerns about even using iPads in ECE. They’re concerned mostly about the lack of interaction when children are playing. I agree that I don’t like that aspect of technology. It seems to be disengaging when they need to be engaged the most.</td>
</tr>
<tr>
<td>April 17, 2020</td>
<td>Chapter 4 is going slowly. I think the most difficult part is reconciling the children’s engagement with each other when they played on the iPads with the teachers’ concerns about not getting enough interaction. Something one of the teachers said about the children not listening to the teacher or not paying attention to the teacher caught my attention. Maybe</td>
</tr>
</tbody>
</table>
some of the concern has to do with classroom management and making sure that children engage with the teacher. I saw a lot of engagement during my observations.

<table>
<thead>
<tr>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 30, 2020</td>
<td>As I am writing chapter 5, I keep going back to the codes and wondering if I should adjust them and further divide them into smaller categories. However, I think that may just cloud the issue. I think that the teacher concerns were my surprise. I knew there were concerns, but I didn’t realize that they would play such a large role in how they used iPads in the classroom.</td>
</tr>
<tr>
<td>May 1, 2020</td>
<td>I submitted a rough draft of chapter 4.</td>
</tr>
<tr>
<td>May 5, 2020</td>
<td>I submitted a rough draft of chapter 5.</td>
</tr>
<tr>
<td>May 24, 2020</td>
<td>I’m continuing making corrections. I wasn’t clear enough about the teacher concerns. And fixing my appendices. One problem I have is that I can’t find one of my journals that I needed to complete this portion. I had to review some other things to make sure that everything is completed correctly. We just moved in the last few weeks, and I evidently put it in a box instead of keeping it in my office with my other materials.</td>
</tr>
</tbody>
</table>
APPENDIX I: Field Notes

Observation Field Notes

<table>
<thead>
<tr>
<th>Title of Study</th>
<th>Start Time</th>
<th>End Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10:20</td>
<td>11:00</td>
<td>10/20</td>
</tr>
</tbody>
</table>

**Researcher Name:** Self

**Descriptive Notes:**
- Andy, goes to the letter of the beginning sound.
- No prompts for the sound used.
- Uses letter that sounds alike.
- Plays a game: listen to the sound prompt and make a choice.
- Sound prompt is the name: how to tap a speaker to hear the letter sound.
- Andy is already reading CVC words. It’s too easy for him.

**Reflective Notes:**
- Changes to Eric Bache game: listens to story about butterflies.
- Surprise to turn pages.
- Takes a screenshot of shears the story.
- Taps a classroom tool.
- The story is about the animal.

**Language - PA:**
- Day 1 B - butterfly. The B - what butterfly says is B.
APPENDIX J: Semi-Structured Interview Questions

1. Please introduce yourself.

2. Please describe your position at Little Lambs Christian School.

3. What is your educational background? How long have you been in the field of education?

4. Describe the roles you have had in early childhood education.

5. What is your philosophy of early childhood education? What are your personal goals as an educator?

6. How does your philosophy affect your teaching and lesson preparation?

7. Phonemic awareness is the ability to distinguish the sounds or phonemes that make up words. Please describe your understanding of phonemic awareness as it relates to emergent literacy.

8. What are your views on the role of technology in early childhood education?

9. How do you incorporate technology into your curriculum?

10. What do you perceive to be a positive aspect of utilizing iPads in the classroom? Why?

11. What do you perceive to be a negative aspect of utilizing iPads in the classroom? Why?

12. Please describe how iPads, in particular, are utilized within your classroom.

13. Please explain why you chose the particular applications that you have available for your student to use in the classroom.

14. How do you observe those applications supporting phonemic awareness development in your students?

15. Within your experiences using iPads with young children, do you see that any of the applications support phonemic awareness development even though that may not be the
target of the application or game? How would you describe those activities in relation to phonemic awareness?

16. How do the activities that your students do in the classroom that specifically target phonemic awareness compare to their activities that use iPads? What would you like to see as an application in relation to phonemic awareness? Why that particular skill or topic?

17. What perceptions do you have about the impact that iPads have on young children and their development of emergent literacy, particularly their development of phonemic awareness?

18. What are your perceptions of the impact iPads may have on your students’ phonemic awareness? Make sure to include any negative or positive aspects. Please share examples that support your perceptions.

19. Please describe any verbal interactions you see children engaged in during their use of iPads/tablets in the classroom.

20. Is there anything else that you would like to add that may be of interest from your observations and experiences?
APPENDIX K: Audit Trail

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 22, 2020</td>
<td>IRB approval granted.</td>
</tr>
<tr>
<td>January 24, 2020</td>
<td>Recruitment began. Emails were sent to teachers and parents of students.</td>
</tr>
<tr>
<td>February 3, 2020</td>
<td>Recruitment completed. Six teachers and seven students were secured for participation.</td>
</tr>
<tr>
<td>February 5, 2020</td>
<td>Pilot Study conducted with one student was conducted.</td>
</tr>
<tr>
<td>February 10, 2020</td>
<td>Participant-Observations and artifact collection began.</td>
</tr>
<tr>
<td>February 14, 2020</td>
<td>One parent pulled her student from the study. She did not give a reason. She simply said that she had changed her mind. I did not try to convince her otherwise.</td>
</tr>
<tr>
<td>February 17, 2020</td>
<td>New student was recruited to replace the student who left the study.</td>
</tr>
<tr>
<td>February 24-27, 2020</td>
<td>Teacher interviews conducted with all six participants within a three-day period.</td>
</tr>
<tr>
<td>March 12, 2020</td>
<td>Participant-observations completed.</td>
</tr>
<tr>
<td>March 13, 2020</td>
<td>Data analysis began.</td>
</tr>
<tr>
<td>April 14, 2020</td>
<td>Data analysis completed.</td>
</tr>
<tr>
<td>April 15, 2020</td>
<td>I began writing chapter 4 rough draft.</td>
</tr>
<tr>
<td>April 27, 2020</td>
<td>I began writing chapter 5 rough draft.</td>
</tr>
<tr>
<td>May 1, 2020</td>
<td>I submitted chapter 4 rough draft.</td>
</tr>
<tr>
<td>May 5, 2020</td>
<td>I submitted chapter 5 rough draft.</td>
</tr>
<tr>
<td></td>
<td>Chapters 4 and 5 completed.</td>
</tr>
<tr>
<td></td>
<td>Defense scheduled</td>
</tr>
</tbody>
</table>