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"How Mobile Phones (Apps) are changing the way of learning English with young learners

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Declaration of Authorship

I hereby certify that this thesis has been composed by me and is based on my own work, unless stated otherwise. No other person's work has been used without due acknowledgement in this thesis. All references and verbatim extracts have been quoted, and all sources of information, including graphs and data sets, have been specifically acknowledged.

Date: June, 2019 Signature: Fjolla Gashi

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Sincerely

Fjolla

Abstract

Smartphones and tablets have rapidly infiltrated all walks of life. Many children bring their experiences of using digital devices in the home to the classroom and there is a pressing need to understand the mobile literacies associated with such devices and they role that they play on the lives of children.

This thesis intends to provide evidence regarding young children just starting to learn to read at an early stage of emergent literacy. Its aim is to investigate young children's engagement with mobile apps and to explore conditions that engage children with such interventions and further to understand how children learn throughout the engagement process in an informal learning setting.

The study is carried out using a qualitative approach by observing young children's interactions with 9 selected mobile apps (e-storybooks, gaming apps and creating mobile apps) all categorized under educational purposes. Parts of the experiment are 20 preschoolers aged 4-6 years, coming from the private school "Britannica" located in Peje/Kosovo. Participants were recorded and observed and the data was analyzed using a thematic approach to examine children's emergent behaviors when engaging with mobile apps. Also a survey questionnaire was sent to parents to gather information about their children's use of technology.

The findings of this study are expected to contribute to an understanding of pedagogic principles for effective early literacy instruction, as well as suggest suitable features in choosing appropriate mobile apps for certain age group of children.

Key Words: digital devices, mobile apps

Abstrakti

Telefonat e mençur dhe tabletët kanë infiltruar gjitha rrugët e jetës tonë. Shumë femjë sjellin në klasë eksperiencat e këtyre paisjeve digjitale që i përdorin në shtëpi, prandaj edhe është e domosdoshme të kuptojmë se si ata mësojnë të lexojnë përmes këtyre paisjeve, si dhe të dimë se çfarë roli luajnë këto paisje në jetën e tyre.

Ky punim përpiqet të sigurojë evidenca të fëmijëve të vegjël që sapo kanë filluar të lexojnë dhe janë plotësisht në fazen e hershme të procesit të leximit. Qëllimi i këtij punimi është të hulumtoj se si fëmijët angazhohen me telefona të mençur si dhe se si mësojnë ata përmes këtij angazhimi në një vend joformal mësimi.

Një hulumtim kualitativ është zhvilluar duke vëzhguar sjelljet e fëmijëve me 9 aplikacione të ndryshme por që të gjitha të kategorizuara për qëllime edukative (aplikacione krijuese,

aplikacione për te luajtur dhe tregime elektronike). Pjesë e këtij hulumtimi janë 20 nxënës të moshes 4-6 vjeçare që vijnë nga një shkollë private në Pejë/Kosovë e quajtur “Britannica”. Pjesëmarrësit janë vëzhguar dhe gjiruar dhe të dhënat janë analizuar duke përdorur një mënyrë tematike që të hulumtojmë sjelljet emergjente të fëmijëve gjatë angazhimit të tyre me aplikacione të ndryshme. Gjithashtu një anketë me pyetje u është dërguar prindërve të fëmijëve në mënyrë që të mbledh informata lidhur se sa e përdorin teknologjinë (telefonat e mençur dhe aplikacionet) fëmijët e tyre.

Gjetjet e këtij ekpserimenti do të kontribuojnë që të kuptojmë principet pedagogjike për instrukcione efektive të letërsisë më të hershme, gjithashtu të sugjeroj përzgjedhje më të përshtatshme të aplikacioneve duke u bazuar në moshën e fëmijëve.

Fjalët kyçe: paisjet digjitale, aplikacionet

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CHAPTER 1: INTRODUCTION

Within few years after the introduction of Apple's popular I-pad tablet, mobile tablet software, commonly referred to as "apps", has rapidly grown in popularity and has become a much-debated issue in the education and child-development spheres.

Early interaction with mobile phones or I-pads is a global phenomenon. In Kosovo we can see parents that let their children play with mobile phones while running errands, while doing chores around the house and also to calm their children. Tablets differ from traditional computers because they are lightweight, portable, mobile and consist of a flat glass screen that responds to a range of tactile actions such as tap, swipe and drag. Unlike mouse operated computers that require greater fine motor control, tablets remove this operational barrier and increased opportunities for learning in the early years (Merchant, 2015). Given the presence and early introduction of mobile technologies such as touchscreen tablets in the everyday lives of children, it is important to examine and understand how children's earliest interactions with the mobile computer technologies develop.

Nearly half of 0-3 years old in my country are able to turn tablets on and off, swipe, drag, tap, open and exit apps. Also, the multimodal features of tablets (e.g., sounds animations and text) engage young children's attention in multisensory ways and due to these user friendly features, tablets are becoming an increasingly popular device amongst toddlers and preschoolers in homes and early childhood settings (Beschorner & Hutchsion, 2013; Marsh et al., 2015). Therefore, it is not surprising that young children are spending significant amounts of their time on tablets and

mobile phones. So the main focus of this thesis is to examine how children engage with mobile apps and how much they learn through such interactions.

1.1. Background of the Study

Children are growing up in a world surrounded by media that are instantly accessible. Despite the apps growth and popularity among young children, limited studies have examined their effects on learning, raising an urgent need for further research. Understanding the impact of apps on learning is essential because it contributes to knowledge development and provides insights to educational stakeholders, as to whether and how mobile apps should be integrated and used in early years' curricula and, parents, as to which apps to select and use with their children. Lastly, it contributes to withstanding controversies as to whether mobile devices are good or bad for the development of young children. Organizations such as the American Academy of Pediatrics (2016) discourages any time interacting with media screen other than video chatting for children younger than 18 months old and advices for shared use between parents and children. Yet, ICT experiences in early years might be crucial to set the foundations for ICT efficiency in later years (Siraj-Blatchford, 2000). Mobile technologies allow for modern forms of play, including the use of mobile game applications (apps) hosted on interactive screen media such as smartphones and tablets. In many parts of the world, digital devices and the texts they mediate are embedded in everyday life from the earliest years (Razfar & Gutierrez 2013). In the UK, nearly three-quarters of children aged 3-5 have access to a touchscreen device at home (Formby 2014), and surveys report an increase in tablet ownership among children (Ofcom, 2016). The design of mobile apps targeting young children has been the focus of interest of educational app designers with 72% of educational apps online aiming at preschoolers and toddlers (Shuler, Levine, & Ree, 2012).

Therefore this thesis aims to shed light on our understanding of the impact of mobile apps on young children by examining the learning effects of specific mobile games applications.

1.2. Significance and purposes of the thesis

The educational values of e-book or mobile apps for children are widely argued. Even though young children have been reported as being able to use e-book or mobile apps on tablets and touchscreen devices such as applying required skills e.g. tap, flick, drag and drop, pinch and spread that progress from novice to mastery (Cohen, 2012); and demonstrating ability to collaborate, express joy, frustration, discuss and socially engage with surroundings (Sandvik, Smordal, & Ousterud, 2012); and reading faster as they could manipulate the text easier (Larson, 2010). Chiong, Ree Takeuchi and Erickson (2012) on the other hand found that children may recall less details when using enhanced e-books or apps because they are often too busy with additional features such as games and hotspots. Chiong et al. (2012) additionally indicated that enhanced e-books may distract children from a story and disrupt their memory of narrative details, in contrast to their behaviors when using print versions and textual e-books based on the same stories. This thesis reports a study that seek to understand further on children learning experience while interacting with mobile apps in a context of informal learning setting where no direct reliance with teachers.

1.3. OBJECTIVES OF THE STUDY

1.3.1. General objectives

- The aim of this study is to show the importance of creating an interactive atmosphere in ESL classroom setting by using mobile phones. Its aim is to investigate young children's engagement with mobile apps, to explore conditions that engage young children with such interventions and further to understand how children learn throughout this interaction without direct reliance with teachers.

1.3.2. Specific Objectives

- To find out whether children learn though mobile apps
- To find out conditions that engage children with mobile apps
- To find out how does exactly learning take place when children engage with mobile apps

Summary

This chapter defines the importance of mobile apps as supportive tools to help preschoolers learn through such interactions; also it highlights the general and specific objectives of this study.

CHAPTER II: LITERATURE REVIEW

2.1. INTORDUCTION OF LITERATURE REVIEW

Engagement is a concept that involves a combination of interest, attention and enjoyment that encompasses self-direction, interaction, emotion and choice naturally motivated by stimulating activities or actions. As a new generation of computer technology, mobile tablets offer children novel ways to engage with digital content using innovative human computer interfaces and advanced interactivity. These tablets come in different physical sizes such as a 4-inch phone-sized tablet (e.g. I-phone Touch), a more common 7-inch tablet (e.g., i-Pad Mini, Kindle Fire), and a larger 10-inch full size tablet (e.g., I-Pad, Nabi XD). Children with just a simple gesture swipe, tap, or touch on a multi-touch screen, can access thousands of electronic books, video games, software applications, internet content, music and videos. Unlike the desktop computers that we were used to, mobile tablets are portable and ideal for use anywhere and at any time due to their small size and could be equipped with mobile data or Wi-Fi connectivity. The role of the children, how he or she interacts with technology must be taken into account as Papert (1990) wrote: “The role that the computer can play most strongly has little to do with information. The role of the computer is to give children a greater sense of empowerment, of being able to do more than they could do before without technology.” Because of ease of portability researchers expect that mobile devices offer tremendous educational potential especially for young children in preschool and kindergarten (Judge, Floyd, & Jeffs, 2015). This chapter explores the historical and contemporary perspectives on children’s mobile technology.

2.2. Mobile Apps and Emergent Literacy

The term “literacy” has evolved from traditional notions of reading and writing to include student’s ability to learn, comprehend and interact with technology such as personal computers, tablet devices, electronic books and more recently mobile apps (Castek et al., 2006; Coiro,2003). While emergent literacy refers to a range of literacy-related skills for children in preschools years that includes naming letters of the alphabet, and phonological awareness and oral language skills (Demir, Applebaum, Levine, Petty, & Goldin-Meadow, 2011) that is important for children learning and literacy development. The development of digital media has introduced a rich display of visual and auditory features that can be used to promote learning in children as they are being entertained (Calvert, 2008).

Nowadays, more and more children have accessed to new reading devices such as e-readers, touchscreen tablets and multi touch smart phones that offer literacy-related education intervention to children. Pearman and Elfever-Dvis (2006) have promoted e-books as useful intervention for addressing five elements of reading development as identified by the National Reading Panel: phonemic awareness, phonics and concepts about print, fluency, vocabulary and comprehension.

According to Mangen (2010) children’s interactions with any technology is multisensory action that is especially useful when e-books or mobile app interventions provide both action and perception to facilitate new learning experiences that seem to be more engaging and enjoyable for young children. Several studies have supported this premise such as Shamir and Bruch (2010), who report that interaction with e-books as computer based activities could develop

motivation for children to learn through a variety of multimedia representations including text, oral narrations, animations and illustrations. They also reported improvement in both children's vocabulary and early math skills through use of e-books. Moreover, Hourcade, Williams, Miller, Heuebner and Liang (2013) found that children's social interactions with one another were increased when they used tablet apps rather than paper books in their storytelling activities.

Even though young children have been reported as being able to use mobile apps or e-book on tablets and touchscreen devices such as applying required skills e.g. tap, flick, drag and drop, pinch and spread that progress from beginner to advance (Cohen, 2012); and demonstrating ability to collaborate, discuss, express joy, frustration and socially engage with surroundings (Sandvik, Smordal, & Ousterud,2012) ;and reading faster as they could manipulate the text easier (Larson,2010), Chiong, Ree, Erickson (2012) on the other hand found that children may recall fewer details when using enhanced e-books or apps because they are often too busy with additional features such as games and hotspots. Also, Mangen (2008) reported that non-physical touch of digital text has caused the reader to have a shallower and less-focused reading experience.

2.3. Historical Perspectives on Children's Tablet Technology

Today's generations grow up with computer technologies of all types and use these technologies in a way that surpassed the imagination of those who created them (Gardner & Davis, 2013). This generation of children grows up in a world saturated with digital media and computer-mediated experiences. These technologies could be seen as "one of the indispensable symbolic goods of contemporary parenting" and that "investing in

computers is a way of investing in your children's future" (Buckingham & Scanlon, p.109).

Early thoughts and theories of using machines to learn and teach preceded the invention of the modern computer. Skinner (1961) wrote about his intervention of a Teaching Machine, a mechanical device that could administer a curriculum of programmed instruction automatically. This machine was grounded in Skinner's behaviorist perspective of operant conditioning. A tape of paper with a list of questions would be placed in the machine and the learner would answer these questions one at a time. After answering each question, the learner would operate a mechanism to reveal the answer and proceed to the next question. The Teaching Machine lied in its ability to produce immediate feedback and systematically advance the curricular content to new material at the learner's pace. The teacher could adjust the machine to present more or less curriculum content based on a report on the learner's activity, to ensure that the curriculum would be at the appropriate level for each child. Skinner's machine highlighted several critical directions and areas where early researchers wanted to explore.

The Learning Company (TLC) and Minnesota Educational Computing Consortium (MECC) were two publishing powerhouses of early children's software with promise to make learning fun and innovative. They founded a new market of computer software targeted to children for learning and educational purpose. These early children's software grew effort in educational software for higher learning.

Between the 1960s and 1980s, "PLATO" a computer assisted instruction system, developed at the University of Illinois at Urbana-Champaign dominated educational software. Educators and computer scientists saw the potential of such technology by offering drill and practice to anyone

with an access to a terminal. PLATO favored a branch content programming methodology and incorporated course materials into interrelated conceptual packages. When a student demonstrated good skills over a topic, Plato would adjust to the next level of content and students who needed additional support would be directed back and forth through the lessons in a calculated manner until the concept was mastered (Van Meer, 2003). Using PLATO students in the elementary through university levels accessed course content from mathematics to reading to foreign languages. Swinton, Amarel and Morgan (1978) found positive learning gains among students in grades four to six using the PLATO Elementary Mathematics Curriculum.

Seymour Papert and colleagues created the Logo programming language as an educational tool for children to explore computer programming and computer logic (Papert, 1980). These researchers focused on learning through creating and expression ideas.

After the release of the Apple II in 1977, educators and programmers began to think of new ways to approach computer-aided instruction that could support individualized learning. Educators and creators by borrowing elements and design approaches from the video game at that time created a new category of content known as edutainment of children's software (Ann McCormick, 1979). This edutainment industry released a line of software that combined learning with play and during the 1980s these learning games were very popular and successfully created a market for computer software for children.

In 1972, early computer pioneer Alan Kay envisioned a personal computer for children resembling today's tablet computers, "A personal Computer for Children of All Ages" (Kay, 1972). In it he proposed and laid out the design for a tablet or slate computer, firstly named the KiddiComp and then later renamed the DynaBook, that had "the

> attention grabbing power of TV, but controllable by the child rather than the networks. It can be like a piano, which can be a tool, a toy, a medium of expression, a source of unending pleasure and delight (Kay, 1972, p1).

Today's tablet technology owes its success to a long history of innovations. Decades of research and development brought the arrival of the Apple's iPad in 2010. Today numerous brands and types of "toy tablets" are available on the market and each tablet choice offers access to a unique library of content.

2.4. Children and smart mobile devices

Children nowadays are increasingly using a range of touch devices like tablets, smart phones, smart boards, I-Pads and more to play, learn and communicate in new ways (Goodwin, 2013)and spend a large time in front of screens (Papadakis et al., 2014). A study in Singapore done by Ebbeck et al. (2016), that included 1058 adult parents of 1559 children below 7 years of age, found that tablet were the most popular devices used by children under 7 years daily. A 3 year old spent the 6 hours per day on smartphones.

Large screen displays, high resolution, lightweight, user-friendly, multimedia content viewing ability are the technological features of smart mobile devices that make them popular among children (Papadakis, 2016). Also smart device mobility and ease allow children in a variety of settings instead of the traditional chair and desk (Ellingson, 2016). These features permit children to lay the tablet on their lap, on the floor or moving with it to any area within their space (Wood et al., 2016).

Touchscreen technology offers a mode of interactive experience that mirrors the child's natural constructivist learning (Papadakis & Orfanakis, 2014). Smart devices accompanying applications can create exciting and effective learning environments for instruction and learning in early childhood (Goodwin, 2012; Papadakis et al., 2016). Purposeful use of touchscreens and interactive tabletops can encourage cognitive growth in young children when supplemented with traditional practices (Plowman, 2016). Apps excite children and keep them motivated and engaged in active learning (Berggren & Hedler, 2014). Touchscreen devices can help children release their creative potential to increase learning outcomes (Geist, 2014).

2.5. Smart mobile devices in early childhood education

When in 2010 I-Pad was first introduced it was not supposed to be an educational tool but it has found its way into classrooms across the world. Our society puts pressure on educators and parents to provide digital literacy to young children (Pearsall, 2014). Educational policy-makers, according to the World Bank, are authorizing the purchases of tablets in many education systems around the world as these devices are seen as powerful as symbols of modernity within an education system (Trucano, 2015). At the end of 2014, in the UK, over 70% of all primary and secondary schools had tablet devices in their classrooms (Coughlan, 2014). Redpath and Lynch (2014) found out in their research that children as young as 2 years old can use i-Pads independently and Hutchison (2013) demonstrated that young children are able to navigate the iPad on their own.

Smart mobile devices provide opportunities for genuinely supporting differentiated, autonomous and individualized learning (Shuler, 2009). Previous research supports that appropriate use of

technology can encourage the cognitive and social growth of young children (Beschorner & Hutchison, 2013). Tablets and mobile phones present unique opportunities for enhancing young children's understandings of abstract concepts through the presentation of dynamic representations, opportunities for embodied learning and the inclusion of interactive elements (Goodwin, 2012). Studies from the USA and Australia have shown that young children's learning can be enhanced using real educational apps (Goodwin, 2013). Mobile devices and their apps can enhance knowledge acquisition through three different learning styles: visual, acoustic and kinesthetic (or physical tactile) learning (Beeland, 2002).

The National Association for the Education of Young Children (NAEYC) in 2012 stated that they encourage children from birth to 8 years old to use tablets and age appropriate educational apps to support early literacy development (Ellingson, 2016). Tablets can provide fun activities to allow children to articulate their creative perspectives, foster interest in the research process and offer a route towards informed consent (Arnott et al., 2016). Engaging children with creative app activities shifts the child's focus away from the subjective experience of winning or losing to a personal best competition (Cohen et al., 2011). So choosing the most appropriate educational apps for children is a difficult and problematic for both teachers and educators because there are thousands of apps available today.

2.5. Mobile applications (apps)

A computer program designed to run on mobile devices such as tablets and smart phones is known as a mobile application (Yusop & Razak, 2013; Wikipedia, 2016: Buock et al., 2016). A

mobile application may be known as an app, iPhone app ore smart phone app (Techopedia, 2016).

There are five types of apps but Goodwin (2012, p.12) distinguishes apps into three different categories according to their pedagogical dimension:

1. Constructive or productivity apps which are characterized by an open-ended design that allows users to create their own content or digital artifact using the app. These are designed for creative expression.
2. Instructive apps have elements of drill and practice design, whereby the apps delivers a predetermined task, which elicits a homogenous response from the user. These apps require minimal cognitive investment on behalf of the learner.
3. Manipulable apps allow for guided discovery and experimentation within predetermined context or framework. These apps require more cognitive involvement than instructive apps but less than constructive apps.

According to Cohen et al. (2011, p9) the "world of apps" includes three general types: gaming apps, creating apps and e-books.

1. In gaming apps the activity includes a range of challenges, actions and reactions that lead to skill acquisition and achievement as levels are played and mastered.
2. In reading apps, the reading of the story is the activity. Mini activities are integrated into a familiar schema of reading a book. The curriculum is in this context whether explicit in the text or implicit and embedded in the activities.
3. Creating apps provide tools, workspace and activities (e.g. robots, painting, etc.)

Children learn best when they are cognitively active and engaged, when learning experiences are meaningful and socially interactive and when learning is guided by a specific goal (Hirdh-Pasek et al., 2015). Children progress quickly from novice to mastery when using a well-designed app (Cohen et al., 2011, p3)

2.6. Mobile Apps in the Classroom

How young children interact with tablets and mobile apps is multifaceted. Couse and Chen (2010) investigated the viability of tablets for three to six year-old students by integrating tablets into their classroom curriculum. Despite their lack of familiarity with the tablets, the students seemed to take the devices quickly and persisted through technical challenges. Through individual observations of 41 children using a tablet for drawing lesson, Couse and Chen (2010) found that children's engagement with the activity was high. Interviews with teachers revealed that children performed the assigned drawing tasks beyond what would be expected of them in a typical classroom setting.

A number of other case studies have demonstrated successful use of the I-Pad and mobile apps to enhance children's learning and development especially in the area of communication and social interaction. Dundon et al. (2013) examined two particular apps to support communication among children with autism spectrum disorders and found that combining reinforcement techniques with i-Pad apps designed to facilitate communication greatly improved the children's communication skills.

Sandvik, Smordal and Ousterud (2012) found that with guided instruction from a kindergarten teacher, children in a multilingual and multicultural classroom were more likely to help and engage with one another around the I-Pad to complete class activities than when without i-Pads.

A study by Chiong and Shuler (2010) gave 90 children iPod Touch devices with two early literacy apps (Martha Speaks and Super Why) over the course of two weeks. Using pre and post assessments, researchers found that three to seven year-old preschool and early elementary children made significant gains in vocabulary and phonological awareness after the intervention. In 2012 Milman, Carlson-Bancroft and Googart with their interactive i-Pad initiative found positive results where the school provided 300 individual i-Pads to elementary students over the course of one school year. Using apps as Math Bingo, researchers found that the tablets most prevalently supplemented mathematics instructions and practice. Moreover, teachers' interviews indicated that the tablets were most helpful when they differentiated the curriculum so teachers could offer different levels of content to students based on student progress.

Despite other educational apps designed to facilitate learning, educators and researchers continue to find the educational benefits of these devices and point that among the wide selection of apps and programs, teachers have to select carefully ones they seem useful and then strategically integrate the technology into developmentally appropriate curriculum (NAEYC, 2012). As such, the researchers argued that preschool teachers can benefit from training and professional development to integrate mobile apps into the classroom in meaningful and authentic ways.

The joint position statement from NAYEC and the Fred Rogers Center wrote, "The adult's role is critical in making certain that thoughtful planning, careful implementation, reflection,

and evaluation all guide decision making about how to introduce and integrate any form of technology or media into the classroom experience" (NAYEC, 2012, 6)

2.7. Mobile Apps at Home

Mobile tablet use by young children at home is often less deliberated. The rhetoric about playtime gained traction vs. screen-time after the release of 1999 policy statement, "Media Use by Young Children than 2 Years" by the American Academy Pediatrics (AAP, 1999). The AAP raised serious concerns and claims about the role of screen-based media in the lives of young children.

Excessive screen time could pose serious consequences on social development, parent-child interaction and physiological maturation among infants and toddlers. Research has found parents who use television or other screen based media as virtual babysitters are likely to spend less time with their children thus reducing opportunities that foster early social development and parent-child attachment. Napier (2014) said that early screen-based media exposure could put children at risk as screens could over stimulate young children's developing brains.

Based on these concerns and citing the lack of evidence for educational and development benefits, AAP discouraged media use by children younger than two years and advised parents to limit screen-time for older children.

AAP (2016) cautioned parents against screen time for children and adolescents, and advised parent to set rules about media use at home. Given emerging evidence linking major health epidemics including childhood obesity (AAP, 2011B) and attention deficit (Schmidt &

Vandewater, 2008) to an inactive lifestyle occupied by passive media consumption, it is no wonder that these concerns remain in the general discourse on children and media.

Researchers in the field of media studies (Barron, Martin, Takeuchi & Stevens, 2011) have supported parent-child joint media engagement or sometimes called co-playing or co-viewing as beneficial to children's learning and development. Joint media engagement (Stevens & Penuel, 2010) refers to media experiences in which multiple people such as parent and child interact together alongside or with media content. Joint media engagement may take different forms such as when and adult and a child co-create using a virtual platform, when an adult provides support, guidance and scaffolding to a child as the child engages with the content, or when they engage in activities that requires direct adult input (Takeuchi & Stevens, 2011).

Although the potential for joint media engagement is discussed still children as young as three years now have access to screen-based media anytime and anywhere such as in the car or when queuing at a store. According to Chiong & Shuler (2010), children typically take these devices to play games or engage in other activities for about five to twenty minutes per session. Parents might be co-present but not co-engaged and still screen time continues to be a concern.

As stated by the AAP (2012), parental involvements in the form of joint media engagement and setting media rules is critical to the health of children. Furthermore, Veldhuis et al. (2014) found that parenting styled and home contexts are crucial determinants of screen time among children who are five years old.

In 2014 Veldhuis, in a survey over 3000 families found that children whose parents institute house rules concerning daily screen time spend about thirty minutes a day in front of a screen; this is in contrast to about two hours of screen time among children whose parents have no set

rules at home. They found that parents who set rules at home were more likely to offer their children a more balanced media diet composing of television, computer and game consoles. Also they found that authoritarian parent spent less time in front of a screen.

2.8. Developing standards for mobile design and development

Appropriate apps can support children's learning so the selection of appropriate mobile applications is of particular import (Bennett, 2011). The quality of mobile applications targeted at early childhood depends on two conditions: employing an interaction design that is appropriate to the child's cognitive and psychomotor development, and taking into consideration the developmental stage of the child when formulating content and activities (Crescenzi-Lanna and Grane-Oro, 2016). Guidelines that are found in developmentally appropriate apps according to (EAS) Educational App Store – an independent app marketplace, are (Parmar, 2012):

- The apps are educational and purposeful.
- The apps encourage children to be in control.
- The apps are intuitive, interactive and transparent.
- The apps encourage collaboration between the teacher/parent and child.
- The apps must not contain any indication of violence or stereotyping.
- The apps can strengthen home and school connections.

There are lots of very good apps that are fun to play with but that have no real educational goals (HirshPasek et al., 2015). It is important for educators and parents to note that just because an app is in the "Education" section of the digital stores that does not necessarily mean it is educational (Goodwin, 2013).

Cohen et al (2011, p9) state that research findings indicate that except for the lack of real educational goals there are several barriers that inhibit use and learning with "education" apps. These include"

- Apps' unclear, unfriendly or unresponsive interface.
- App gameplay that lacks reward or feedback.
- Apps' obscure objectives.
- Too many distractions.
- Apps that lack 'palm rest' where buttons trigger themselves if accidentally touched within play area.

2.9. Parents and educators selecting educational apps

App Store features 80,000 educational apps (Apple, 2016a) and Rodriguez Arancon et al. (2013) state that it would be difficult to think that all the apps have been designed according to current theoretical understanding about effective pedagogical practices (Walsh et al., 2010) so as to be beneficial for learners of any age, especially young children. In September, 2013 the Apple company announced "Kids Category" to the App Store enabling software companies to target specific groups of customers (5years and under , 6-9 years and 9-11 years). Apple provides little information or guidance regarding the appropriate design and content guidelines for the apps targeting these age categories (Chau, 2014). Vala et al. (2015) suggest parents and educators to look information about apps of interest across app stores and at producers' websites even though this kind of research is not reliable or enough. Yelland and Gilbert (2011) found that the majority of apps are classified as being 'practice and drill' and characterized by limited choice and

controlled outcomes so they suggest that parents and educators should take the time to play and become familiar with apps and to ensure that they suit their goals for learning with the particular age range of their children. The choice of developmentally appropriate applications can be quite a difficult process for those interested (Henderson and Yeow, 2012). Parents sometimes participate in mobile media activities with their children only if they find the activities fun and enjoyable and do not worry about the content of the apps (Heider and Jalongo, 2014). Many apps in the market have interactive yet repetitive game formats with 'closed' content so the content could not be changed or extended by the user (Flewitt et al., 2014). Such apps rely on low levels of thinking skills and only promote rote learning, a memorization of technique based on repetition (Grose, 2013), such as apps to rote learn colors, numbers, letters or shapes (Goodwin, 2013). Parents need evidence based information about the safe and effective use of mobile devices where to seek quality apps and suggestions of ways these devices can be used at home and support learning (Goodwin, 2012). Apps that are found on websites like Eduapps or EduTecher are simple apps without a defined goal that can be applied to formal education (Cardenal and Lopez, 2015).

2.10. Parent Scaffolding of Young Children When Engaged with Mobile Apps

The increased presence of mobile technologies which permit learning in multiple contexts, sometimes referred to "here and now" learning (Martin and Ertzberger, 2013), it is important to determine how parents support foundational skills associated with self-regulated learning in a mobile technology learning context.

The selection and use of mobile devices may be best facilitated if scaffolding from parents is present. Scaffolding refers to the use of techniques or tools that would allow a child to reach a particular goal that would otherwise be unachievable through unassisted efforts (Wood et al., 1976). Vygotsky (1978) supported the idea that guided interactions (e.., instructional dialog) with an adult can afford a higher level of thinking within the child's zone of proximal development. Parental scaffolding encourages children to become independent in controlling their own actions when using computers and promotes learning. Parents desire to support children's learning and seek to provide positive learning environments for them (Evans & Shaw, 2008; Neuman et al., 2009; Davies, 2011; Eagle, 2012). Parents view home and their role as being highly influential in children's development, for example, over a third of parents rated themselves as being responsible for children's literacy development. (Evans et al.,2004). The role that parents play in children's learning is very important for example, when parents use more spatially descriptive words (e.g., long, small) during joint activities, their children demonstrate long term gains in spatial word production (Pruden et al., 2011). Learning at home can be intentional or incidental.

Yelland and Masters (2007) showed three types of scaffolding that occur while interacting with stationary computers: cognitive, affective and technical scaffolding. Cognitive scaffolding supports modeling and asking questions by the parent and facilitates children's understanding of concepts. Affective scaffolding supports encouragement and feedback and, technical scaffolding supports effective learning strategies that are built into software design such as automatic leveling and immediate feedback (Grant et al, 2012).

2.11. Content Matters

Since the introduction of computers to education over 30 years ago much has been written about their promise to help improve and transform teaching and learning. Numerous organizations have argued that the real question is not how much media children should consume but what they should be consuming. Content and quality of media are factors just as important as how much time children sit in front of a screen. Knorr, 2010 argued that the affordance of a platform from which media is consumed greatly influences the child's relationship with that content. For example, we should perceive a tablet offering educational content differently from the passive viewing of a television show and also should perceive age appropriate.

2.11.1. The Current Landscape

There are now more than 100.000 educational and children's apps on the Apple App Store (Shuler, 2012). Some apps claim to teach basic skills such as phonics (e.g., Super Why Phonics Fair), number recognition (e.g., Elmo Loves 123s), handwriting (e.g., Learn to Write with Mr. Pencil) and vocabulary (e.g., Endless Alphabet), while other profess to build social skills or develop emotional awareness despite the pseudo- social nature of the child to tablet context. Also, there is an entire category of children's apps for fostering creativity and critical thinking. Interactive children's apps roughly fall into three categories: game apps, interactive eBooks and open ended utilities. Each category has its own design and affordances. The variety of children's mobile game is as wide as the video game industry. The industry organizes games into genres. Herz (1997) divided games into genres as action games, adventure games, puzzle games, role-

playing games and simulation games. But, in 2004 Hunickle, LaBlanc and Zubek (2004) focused more on how the players perceive a game and they classified eight types of fun games:

1. Sensation - Games that evoke emotion and affect by manipulating visual and auditory features and the pace of the game. This type of game offers thrill or pleasure that is difficult to experience.
2. Fantasy – Games that create a make-believe world with activities that cannot be realized in the real world. This type of game emboldens players believe they have powers that they otherwise cannot obtain.
3. Narrative – Games that engross players in a story that unfolds over a series of player interactions. This type of game places the players as influencers of the narrative, giving players control over the direction of the game's journey.
4. Challenge – Games with obstacles for players to overcome and test their skills. This type of game offers strong feedback loop and dynamic content progression to challenge and support the players' skill development.
5. Fellowship – Games that provide a digital framework for social interaction and cooperation. The dynamics of the game extend beyond the relationship between the player and the game, to the interactions among the multiple players of a game.
6. Discovery – Games that afford players a virtual space to explore and learn new things, such as the history of artifacts or the way things work. This type of game encourages players to learn new concepts or new knowledge through play.
7. Expression – Games that create a safe space for players to express themselves while maintaining the rules of the game and its dynamics. This type of games situates creativity within a game narrative.

8. Submission – Pastime games that allow players to lose themselves in mindless tasks. This type of game tends to be repetitive and rarely engages the players emotionally, affectively or cognitively.

Sequire (2008) offered a framework for educational games and organized content into targeted games (puzzles and activities), linear games (narrative-based), open ended sandbox games, and persistent worlds (virtual reality). But, Goodwin and Highfield (2012) proposed three broad classifications:

1. Instructive apps refer to drill and practice activities that deliver instruction and the player selects an answer as a response. These apps may focus on assessment and may or may not include tutorials.

2. Manipulable apps offer players digital manipulative for guided discovery and experimentation of particular curricular concepts. As digital manipulative, the activities fall with pre-determined and scripted parameters but still offer players some level of freedom to explore.

3. Constructive apps reflect an open-ended design allowing players to create their own content or digital artifacts. The apps may or may not include tutorials or teaching elements. They often provide space for players to create their own digital portfolio to reflect on or share with others.

Richards, Stebbings and Moellering (2013) offered eight categories of games for children: a) drill and practice, b) puzzle, c) interactive learning tools, d) role-playing, e) strategy, f) sandbox, g) action/adventure and h) simulations.

The current landscape of children's mobile apps is quite broad offering various content experimentations and explorations to find the next "killer app". Content may be designed to achieve different goals with particular pedagogies. The landscape of children's media offers a variety of content options from educationally or cognitively engaging exercises, to apps that encourage and promote social interaction and to activities that foster healthy choices.

What is appropriate for a child depends on the age of that child, his or her developmental stage and as such, an examination of what content is good must begin with an understanding of the developmental needs of children.

2.12. Positive Technological Development for Young Children

Grounded in the work of Papert's Constructionism (1980), content creation allows young technology users to manipulate virtual tools to exercise and hone their knowledge to create personally meaningful artifacts. Learning and cognitive development for young learners happens through the dynamics between individual actions and social interactions.

Preschool children are beginning to explore logic and reasoning and discover new abilities as they encounter new experiences (Piaget, 1952). To do this children experiment, explore and adopt knowledge and skills through a series of assimilating and accommodating new concepts.

The role of education is then is to provide children with new experiences still within their reach. The distance between what a children or a learner can do without help and what he or she can do with guidance and support is called the zone of proximal development (Vygotsky, 1978). Learning happens when children are guided through this zone of proximal development with proper scaffolding and support. Due to their adaptive nature, digital technologies can offer scaffolding support dynamically to cater to each learner. Miliband (2005) called for technologies that can dynamically adjust content to personalize and individualize learning.

Bers (2012) hypothesized technology mediated activities affording children an opportunity to created content can promote the developmental asset of competence. Bers (2012) hypothesized technology-mediated activities allowing young children to express themselves in creative ways can promote the developmental asset of confidence. Underlying this concept is the freedom to "transcend traditional ideas, rules, patterns, relationships, or interpretations create and imagine original new ideas" (Bers, 2012). For preschool children this type of freedom takes the form of finding purpose in what they do. The freedom to take initiative allows children to develop their self-worth and a sense of accomplishment (Harter& Pike, 1983). Preschool children between the ages three and five are very concrete in their thinking, including their perception of the self. They show little awareness or care about how they compare to others and other description of the self tends to stem from their physical attributes ("I'm this Big!"), possessions ("I have this toy"), activities ("I go to school"), or skills ("I can do this myself").While their self-esteem gives young children the enthusiasm to explore and try new things (Berndt, 1997).

Bers (2012) hypothesized technology-mediated activities helping children communicate with peers to share thoughts, opinions and information can promote the developmental asset of connection. New forms of technologies such as social media platforms promote new ways for

building social relationships and expanding one's social network. For preschoolers Sullivan (1953) emphasized the development of speech and communication skills as critical in this stage of social development. Bers (2012) hypothesized technology-mediated activities encouraging children to make choices about conduct and behaviors can promote the development asset of character. With virtual technology children can explore "what if" situations and observe consequences or their actions in a safe and secure virtual context. For preschool children these choices reflect their understanding of rules and punishment.

2.13. Developmentally Appropriate Practice in the Context of Apps

> "The effectiveness of technology and interactive media depend on their being used in the right way and under the right circumstances by those skilled in their use" (NAEYC, 2012). Interactive media refers to digital and analog materials including apps, broadcast and streaming media, some children's television programming, e-books and other forms of content designed to facilitate active and creative use by young children and to encourage social engagements with other adults. (National Association for the Education of Young Children "NAEYC" 2012, p1).

> Given the rapid growth of mobile technologies and mobile apps as a popular medium for children's media consumption, entertainment and enrichment, it is critical that research efforts are dedicated to conceptualize what developmentally appropriate practice means in this new context (NAEYC, 2012b).

Guiding principles for integrating technology in the early education classroom from NAEYC are:

1. The use of technology tools and interactive media should not harm children
2. Developmentally appropriate practices must guide decisions about whether and when to integrate technology and interactive media into early childhood programs.
3. Developmentally appropriate teaching practices must always guide the selection of any classroom materials, including technology and interactive media.
4. Appropriate use of technology and media depends on the age, development level, needs, interests, linguistic background and abilities of each child.
5. Effective uses of technology and media are active, hands-on, engaging and empowering; give the child control; provide adaptive scaffolds to ease the accomplishment of tasks; and are used as one of many options to support children's learning.
6. When used properly technology can enhance children's cognitive and social abilities.
7. Interaction with technology should be playful and support creativity, exploration, pretend play, active play and outdoor activities.
8. Technology tools can help educators strengthen home-school connections.
9. Technology can enhance early childhood practice when integrated into the environment, curriculum and daily routines.
10. Technology tools can be effective for dual language learners by providing access to a family's home language and culture while supporting English language learning.
11. Digital literacy is essential to guiding early childhood educators and parents in the selection use, integration and evaluation of technology.
12. Digital citizenship is an important part of digital literacy for young children.

2.14. Guidelines for Children's App Design

Several organizations have attempt to identify key design principles to guide producers and creators of children's mobile apps, as well as parents and educators, as they select and incorporate apps into children's activities and curriculum. McManis and Parks (2011) from Hatch, a company that focuses technology for early childhood education, offered the Early Childhood Educational Technology Evaluation Toolkit that translates the principles and sentiments of the joint statement to a rating scale. The evaluation toolkit includes 20 questions on a 4-point Likert-type scale to assess whether the piece of software is: a)educational, b)appropriate, c) child-friendly d) enjoyable e)progress monitoring: f)individualizing and g) integrating.

Category	Question
1. Educational	a) Should be focused on learning or on winning? b) Content research or learning standards based?
2. Appropriate	a) Appropriate cognitive skill(s)/ subject matter? b) Is it set in interesting context? c) Can a non-reader navigate?
3. Child-Friendly	a) Does it have clear choices? b) Does it have multiple and positive opportunities for success? c) And, after adult support can children use it independently?
4. Enjoyable/Engaging	a) Does it have enough activities with variety? b) Do activities match well to attention span?
5. Progress Monitoring	a) Does it cover all the key areas the software teaches? b) Is it easy to use and interpret?
6. Individualizing Features	a) Can it be customized for children's needs? b) Does it allow creation of new activities?
c) Integration	a) Is initial training on integration included? b) Are ongoing training opportunities?

Table 1. Items on the Early Childhood Educational Technology Evaluation

Whereas McManis and Parks' scale focused on the appropriateness of a piece of software for classroom use, Haugland's scale (1998) focused on the developmental appropriateness of a piece of software with items more detailed and specific than those found on McManis and Parks' scale. The Haugland Developmental Software Scale includes 38 polar questions (YES/NO) across 11 components: 1) age appropriate, 2) child in control, 3) clear instructions, 4) expanding complexity, 5) independence, 6) non-violence, 7) process orientation, 8) real world model, 9)technical features, 10) transformations and 11) anti-bias.

Category	Items
1. Age Appropriate	a) Realistic Concepts b) Appropriate Methods
2. Child in Control	a) Actors not Reactors b) Can Escape c) Children Set Pace d) Trial & Error
3. Clear Instructions	a) Picture Choices b) Simple and Precise Directions c) Verbal Instructions
4. Expanding Complexity	a) Low Entry, High Ceiling b) Learning Sequence is clear c) Teaches Powerful Ideas
5. Independence	a) Adult Supervision Not Needed After Initial Exposure
6. Non-Violence	a) Software is free of violent characters and actions b) Software models positive social values
7. Process Orientation	a) It discovers learning not skill drilling b) Intrinsic Motivation c) Process Engages, Product Secondary
8. Real World Model	a) Concrete Representations b) Objects Function c) Simple and Reliable Model
9. Technical Features	a) Animation b) Colorful c) Installs Easily d) Prints e) Realistic Corresponding Sound Effects of Music f) Runs Quickly
10. Transformation	a) Do the objects and situations change

	b) Process highlighter
11. Anti-bias	a) Multiple languages b) Mixed gender and role equity c) People of diverse cultures d) Differing ages and abilities

Table 2. Items on the Haugland Developmental Software Scale

Buckleitner (1985) offered a more comprehensive scale, the Children Interactive Media Rating Instrument. It focused on five design categories: 1) ease of use, 2) childproof, 3) educational, 4) entertaining, 5) design features.

Category	Items
1. Ease of Use	a) Children can use the program independently after the first use b) To access key menus is straightforward c) To use the program reading ability is not prerequisite d) Graphics make sense to the intended user e) Printing routines are simple f) To get in or out of any activity it is easy at any point g) To get to the first menu is quick and easy h) Controls are responsive to the touch i) Instructions can be reviewed on the screen j) Children know if they make a mistake k) Icons are large and easy to select with a moving cursor l) Installation procedure is straightforward and easy to do
2. Childproof	a) Offers quick, clear, obvious response to a child's action b) Children have control over the rate of display c) Children have control over exiting over time d) Children have control over the order of the display e) Title screen sequence is brief or can be bypassed f) When a child hold a key down, only one input is registered g) Files not intended for children are safe h) Children know when they have made a mistake i) This program would operate smoothly in a home or

	classroom
3. Educational	a) Offers a good presentation of one or more content areas b) Graphics do not detract from educational intentions c) Feedback employs meaningful graphic and sound capabilities d) Speech is used e) The presentation is novel with each use f) Good challenge range g) Feedback reinforces content h) Content is free from gender bias i) A child's ideas can be incorporated into program j) The program comes with strategies to extend the learning k) There is sufficient amount of content
4. Entertaining	a) The program is enjoyable to use b) Graphics are meaningful and enjoyed by children c) This program is appealing to a wide audience d) Children return to this program time after time e) Random generation techniques are employed in the design f) Speech and sounds are meaningful to children g) Challenge is fluid or a child can select own level h) The theme of the program is meaningful to children i) The program is responsive to a child's actions
5. Design Features	a) The program has speech capacity b) The program has printing capacity c) The program keeps records of child's work d) A child's ideas can be incorporated into the program e) Sound can be adjusted f) Feedback is customized in some way to the individual child g) Program keeps a history of the child's use over time h) Teacher or parent option are easy to find and use

Figure 3. Items on the Children's Interactive Media Rating Instrument.

Apps vary so widely in terms of content, scope, design and pedagogy. Not one scale could capture all the parameters and variables necessary to evaluate all apps on the market. In 2012 the Sesame Workshop released a white paper summarizing several best practices they have

identified for designing apps for children. These tips are specific to modern tablets and cover nine categories: 1) use of characters, 2) interactive design, 3) intuitive gestures, 4) screen design, 5) text, 6) visual layout, 7) visual design, 8) audio design and 9) intentionality.

Category	Items
1. Characters Use	a) Use familiar character as "hosts" throughout
2. Interactive Design	a) Begin with a character greeting the user b) State the objective and how to accomplish it. c) Use inactivity prompts, 3-5 seconds eBooks and 6-8 seconds for games. d) Three levels of wrong answer scaffolds with audio and visual feedback e) Encouragement feedback for non-assessed activities f) Context-specific instructions via dialogue, with thorough "How-To" instructions for parents
3. Intuitive Gestures	Intuitive: Tap, trace, swipe, drag, Slide Unintuitive: Pinch, tilt, multi-touch, flick, double tap
4. Screen Design	a) Make game play goal visually explicit b) Distinguish interactive elements from background c) Use visual indicators to signal hidden elements d) Use colors and borders to highlight hotspots
5. Text	a) Avoid text instructions and text labels b) Highlight text in an eBook as it is read aloud
6. Visual Layout	a) Menu should be present and accessible at all times b) Landscape view is preferred. c) Use typical scan directionality (left-right, top-bottom). d) Avoid the edge of the screen where the child might place his/her finger
7. Visual Design	a) Accompany any audio instructions with visual support. b) Use sounds and visuals to indicate interactivity c) Use icons that follow standard conventions
8. Audio Design	a) User input should interrupt unessential prompts. b) Recognize user input with sound effects. c) Use sound effects or music to transition from narrative to interactive experience d) Avoid background music that detracts from gameplay
9. Intentionality	a) Register user input on touch rather on lift b) Use colors and recognizable icons in confirmation screens.

Figure 4. Selected tips from Sesame Workshop's App Design Best Practices.

2.15. Design Considerations for Educational Mobile Apps for Young Children

Touchscreen devices such as I-Pads, Samsung Galaxy and Amazon Fire have emerged as instrumental learning tools for children as young as two because they engage and motivate children in active learning (Berggren & Hedler, 2014). Purposeful use of digital devices (touchscreens and interactive tabletops) can encourage cognitive and mental growth in young children when supplemented with traditional practices (Plowman, 2016). Apps should be compatible with child users including interaction and appearance of the interface and designers should always maximize engagement and motivation because children primarily use apps for educational and entertainment intentions. Designers must remember that children are still developing cognitively, physically, emotionally and have lower mental and intellectual capabilities than adults and the software needs to adapt to the needs, knowledge and experience level of children by providing appropriate task guidance (Hanna, Risden, Czerwinski & Alexander, 1999). So, when designing mobile apps for young children we should consider children's cognitive factors, physical factors and emotional factors (Jose & Nathan, 2017).

2.15.1. Cognitive factors:

Young children have limited vocabularies, read slowly and are still learning to write. The language that they have to be engaged to should be age appropriate, easy to remember and coherent to minimize confusion and frustration (Gilutz & Nielsen, 2002). Children have yet conception to learn so designers should pay attention referencing "left" and "right" to

preschoolers. Cossen, Nitsche & Nurnberger (2012) recommend image-based menus that are audio-supported to assist children who are still learning to read.

When text is accompanied with audio, studies show that instructions are better understood especially to accommodate varying reading levels (McKnight & Fitton, 2010; Brooks, 2012). Hanna et al (1999) observed that competent reader would start to interact before the audio instructions were finished whereas less confident readers would wait for the full audio interaction to finish before performing an action. In general, audio can be helpful for understanding but could also be ineffective in a classroom. Hanna el al. (1999) said that an animated character speaking instructions out loud can be useful to direct attention. Apps should provide instructions repeated such as tapping the character because children want these kinds of instructions. Instructions should also include visual guidance whenever possible to support varying literacy levels (Brooks, 2012). For example when a child must move an object from one location to another, a colored dotted pathway can connect the source to the target and after instructions are given, visual or auditory feedback can let the child know when they have control of interactivity again.

Children have a limited vocabulary and may not be familiar with some terms used in directions but McKnight & Fitton (2010) found that young children can recognize general gesture terminology. For instance, children can transfer their knowledge from using desktop computers and apply instructions to “click” on soft buttons on a touchscreen. The command “select” is proved to be the most confusing term, while “pick” and “choose” proved to be more successful. McKnight & Fitton (2010) showed that children struggle with the timing of gestures when the duration of the action is not indicated in the instructions. Hiniker et al. (2015) showed that

instructions accompanied with animated hand demos help children understand the timing of gestures.

2.15.2. Physical factors:

Touchscreen devices bring a unique set of physical challenges for children who enjoy exploring and making independent decisions in this exploring environment. Young children are successful in performing interactive gestures but they lack dexterity required to target small icons used in conventional interfaces (Anthony et, al., 2014; Hiniker et al., 2015). Anthony et al. (2014) found out that young children often miss and tap what is termed the ”gutter”, the area between the target and the edge of the screen. Designers should be aware that young children have difficulty performing complex gestures like drag and drop, pinch to zoom and multi-touch interactions (Anthony et al., 2014). Single taps are found, across all studies, to be the simplest and most intuitive of gestures for children to perform. For young children “Tilt” and “shake” are also difficult functions because they have smaller hands and weaker arms. This creates a risk of damage by throwing or dropping the device. Brooks (2012) recommend using these functionalities only with smartphones because they are more manageable.

When children spend time completing the tasks at hand, software provides value so designers must focus on the efficiency of an interface as well as the elements that keep children engaged. Apps should seek to motivate through the entertainment because children have short notoriously attention and are quick to judge. Brooks (2012) said that digital experience should be designed to be fun and engaging with educational elements. Nielsen (2002) found that multimedia effects and animations create a good first impression for children since kids in preschool are more

driven by visual and auditory stimuli. When children feel that they can make their own decisions and have freedom of control of the environment they are also engaged (Geist, 2014). Geist (2014) recommends apps that are open –ended, giving children creative opportunities to create, animate, build and construct. They are curious and enjoy exploring at their own pace (Hanna et al., 1999). Contexts and graphics need to be age-appropriate as kids are aware of content that do not belong in their age group, for example, Nielsen (2002) found that even a six-year old considered a product "for babies" because of the "cartoons and trains".

2.16. Developmentally Meaningful App Design

Children's mobile apps as a form or interactive digital experience must be designed appropriately to address the abilities of young children. Good mobile need to be usable and compatible with what children can comprehend and do whether the app intends to entertain or educate. Good mobile apps should engage children in the type of meaningful activities and behaviors that promote optimal development. They should foster children's confidence, expand their social interactions and build their character. And, finally, they should address content relevant to the learning and development of children and enrich children socially, cognitively, physically, emotionally and academically.

The notions form the three pillars that make a mobile app meaningful to children's overall development and learning.

Pillars	Description
Design	Developmentally meaningful apps must be created with appropriate

	design features to accommodate the abilities of young children.
Dynamics	Developmentally meaningful apps must engage children in activities that promote positive technological development.
Content	Developmentally meaningful apps must address the cognitive, social, emotional, physical or academic dimensions of children.

Figure 5. The Three Pillars of Developmentally Meaningful Mobile Apps

2.17. The dilemmas and conflicting guidelines on young children's screen time

Educators, parents, and doctors interested in child health, are faced with a dilemma: On one hand, education authorities encourage the use of digital technology by technology to prepare them to thrive in a digital world (enhancing learning, promoting children's digital skill set, engaging in STEM i.e. Science, technology, engineering and Mathematics, but health authorities in contrast, discourage young children's use of digital technology and raise concerns about the potential negative effect on children's emotional, health, cognitive and social well-being (Pediatrics, 2016). Physical concerns include poor postures, repetitive movements and accidents during use and, increasing sedentary time with displacement of gross motor activities that impact on bone and muscle growth, obesity and motor skill. Cognitive concerns include limitation of time for learning opportunities, problem solving and creativity. Emotional concerns include addiction, depression and, access to inappropriate content. Social concerns include isolation and cyber-bulling. The use and access to mobile touch-screen devices by young children has grown rapidly since the 2000s. For example, 98% of homes in the US with young children had a mobile touch-screen device in 2017, compared with just 52% in 2011 (Rideout, 2017).

CHAPTER III: RESEARCH DESIGN AND METHODOLOGY

3.1. POPULATION AND SAMPLE

The study took place at a private school and target of population were preschoolers who learned English as a Second Language. This study was conducted in the private school "Britannica"-Peje, which was focused in finding how young children engage and learn with mobile apps. The participants were 20 preschoolers aged 4-6 years. 11 were girls and 9 boys.

All of the participants had sixty minutes English language classes, two times per week.

3.2. RESEARCH METHOD

To observe children's engagement with mobile apps, a descriptive research approach was used. Prior to the data collections, consent letters were distributed to parents to obtain formal consent for their children to participate in the study. A survey questionnaire was disseminated to the parents to gather demographic information and responses related to mobile app usage. Post observation survey was comprised of 9 questions. Two forced choice (yes or no) questions assessed whether parent allowed their children to use mobile technologies and if the downloaded programs for their children. For parents who responded "yes" to downloading applications there was further prompt for parents to select from 5 possible choices all of the reasons they use for supporting their decision to download applications for their child (fun or entertainment, occupying their child, my child asked for it, developing skills in languages or in other subjects.)

Parents were also asked to indicate the age at which they would consider introducing digital technologies to their children (interval from birth to six years).

The study began by allowing the children to interact with available mobile apps installed in handheld devices. 9 mobile apps were made available for children to choose from. Mobile apps were selected based on users' ratings (4.0 and above) and they were all categorized under educational purposes. Observational data was collected within a week in morning and afternoon sessions where children were invited to a play room equipped with child-sized tables and chairs to provide informal learning setting without direct reliance with teachers. The children were given about 20-25 minutes to interact with their preferred mobile apps.

One video camera was used to record the children's interactions with the mobile apps. Field notes were also taken to provide data complementary to the observation session.

3.3. PARENTS' SURVEY QUESTIONNAIRES

Findings from parents' survey questionnaire provided information on the children's backgrounds. A total of 19 of 20 responses were collected from the parents whose ages were between 30 and 40 years. The parents indicated that they read book to their children at home. 15 of them were aware of mobile apps and only 14 of them had downloaded the apps mainly installed in handheld devices for their children. Five of them preferred printed books because they felt their children would pay more attention during interactions (e.g. reading process) and better learn and understand the story. Parents 14 out of 19 supported introducing technology in the first year of life (2-2.5 years of age) only 5 of them supported school age or later as the ideal time for introduction. And, the reason why parents support downloading applications was: 7 of

parents said that they downloaded applications for fun and entertainment and 8 said for developing language skills for example “English”.

3.4. THE MOBILE APPS

The mobile apps collection used for this study was categorized into interactive e-storybooks, gaming mobile apps and creating mobile apps. The interactive e-storybooks were mobile apps with text, read-aloud narration, pictures and animation features. Creating mobile apps contain drawing, tracing and building tools. And, gaming mobile apps contained memory flash card activities (e.g. pairing or flipping numbers/alphabets/pictures); puzzles and matching games.

CHAPTER IV: RESULTS

This chapter presents the main results from a total of 410 min of video observation footage and 20 pages of observation notes that were gathered during the study. A thematic analysis (Braun & Clarke, 2006) approach was used to identify, generate code and produce themes in examining children emergent behaviors (verbal and non-verbal) when they were engaged with the mobile apps.

4.1. CONDITIONS THAT ENGAGE CHILDREN WITH MOBILE APPS

Results showed three main conditions that engaged children with the mobile apps based on the following notions: a) collective sensory skill; b) emotional expression; and c) verbal expression.

4.1.1. Collective sensory skill

The results indicate that children have control over the device and achieve a larger number of independent interactions while using the mobile apps. Collective sensory reflects sensory motor skills such as touching, looking, listening and gesturing while interacting with the mobile apps. Some instances of the collective sensory skills are:

4.1.1.1. Touching

Touched the light option and moved the cursor to change the light volume (Student 1, Day 2)

Moved the animation displayed on the screen to the left and to the right (Student 2, Day 1)

Pointed at and touched different features while showing unhappy facial and vocal expressions (Student 3, Day 1)

Tried to move the picture on the screen (Student 4, Day 2)

4.1.1.2. Looking

Looked at the screen where a new page showed a list of options and asked, “How to use this” (Student 5, Day 2)

Student looked at the option list on the screen then asked himself “Which one should I choose?” (Student 6, Day 2)

4.1.1.3. Listening

Listened and mimicked the narrator with a better accent as he touched number 7 on the screen (Student 2, Day 2)

Listened and repeated the words she heard from the narrator (the various kinds of animals’ sounds) (Student 2, Day 2)

4.1.1.4. Gesture

Rotated the device to get a proper view (Student 7, Day 1, Session 2)

Clapped his hands as he clearly enjoyed finishing the task (Student 8, Day 1, Session 1)

4.1.2. Emotional expression

Emotional expression reflects the occurrence of facial expressions and noises made during interaction with mobile apps in touch-screen devices. Several children exhibited positive feelings by making noises to express their feelings although some did not express such behavior and were more natural. The females showed more emotional expression than the male, while 4-year –old children exhibited more emotional behavior than the others. Some instances of the emotion behaviors that included positive facial gestures or negative facial gestured are:

4.1.2.1. Positive

She was excited after being able to complete the matching tasks and made some noise afterwards (Student 5, Day2, Session 1)

She looked amazed and genuinely appreciated the apps and activities included in it (Student 9. Day 2, Session 1)

As she managed to drag all pieces of puzzle to the proper spots, for each successful attempt the app generated the following audio comments: “Good Job”, “Great”, “Awesome”, “Nice going!” She seemed excited with the responses (Student 10, Day 1, Session 1)

4.1.2.2. No expression/gazing.

He showed no facial expressions, he did not know what he was supposed to do next (Student 12, Dsay2, Session 2)

4.1.2.3. Negative facial gestures

He looked confused and poked his head (Student 14, Day 1, Session 1)

She stared at the screen and looked bores, and did not know what to do. She did not wait to listen to the narration but kept tapping to see what it was about but it failed to interest her (Student 15, Day 1, Session 1)

4.1.3. Verbal expression

Verbal expressions showed by the children during their interaction with mobile apps are reported as verbal expressions. Some instances of verbal expressions are:

He uttered “Oh puzzle! Oh color, this on, is pink…, when he finally knew how to fill the image with color. (Student 17, Day 2, Session 1)

He exclaimed with excitement “Wow!”, when the color turned red. (Student 4, Day 2, Session 1).

The student felt good about the results of the tasks and exclaimed “Yes!” (Student 4, Day 2, Session1).

4.2. THE LEARNING EXPERIENCE

How learning takes place when children engage with mobile apps, the results, from the observation sessions showed three main notions: a) cognitive, b) psychomotor and c) affective.

4.2.1. Cognitive

The cognitive notion involves thinking, learning knowledge and development of intellectual attitudes and skills characterized by Awareness and Goal Accomplishment.

4.2.1.1. Awareness.

Awareness is the ability to understand, recognize and remember the mobile apps. A learning process occurs when children interact with the apps and become aware of the content that provides interactive elements and be able to comprehend its purpose such as in matching and puzzle activities/games and drawing tools.

Children when interacting with e-storybook apps such as “Cinderella” and “Little Red Riding hood”, they were aware of auditory and visual stimulations. Children were able to initiate the narrator’s voice and listen to the audio as the narrator read the highlighted text or when multimedia elements were activated.

Children were also able to browse available apps on the tablets and choose apps that catch their interest.

Some observation notes demonstrate children’s awareness on how to interact with the application read as follows:

Student selected the “Shapes” app. He pointed all available pictures such as anchor, ankle and airplane, one after another, and an audio description of each picture played He now knew that these pictures were interactive multimedia elements with audio features that would be activated upon touching of tapping (Student 4, Day 1, Session 1).

Student selected the “Cinderella” app that included three different modes (read to me, full version, read it myself). Student selected the “Full Version” mode. The full version directed the app to the website and then the user can purchase the app. As the website was loading, the student returned back to the main page and this time selected “Read it myself” mode. This showed that student was able to identify modes available in the app and quickly changed from one mode to another (Student 6, Day 1, Session 1)

Student selected the “Alphabet F” app and opted the “Matching activity from the menu. Student started randomly flipping over cards on the screen. As he flipped over all the memory cards, she found a repeated alphabetic letter “G”. Then he flipped over a letter “G” from another row. The two cards were matched and after that they disappeared from the screen. He know was aware on how to complete the memory matching game (Student 7, Day, Session 2).

Student selected the “Little Red Riding Hood” app. The app had various modes of activities. As the student tapped on the “hear me” mode, the narrator started reading the title and he hesitantly listened and looked at the page. Then she tapped the forward button. The next page was displayed and again the narrator read the story (Student 18, Day 1, Session 1).

Student selected the “Art Studio” app- a drawing app. When the student started to draw a few shapes on the sheet he immediately was aware that she could draw using her index finger. (Student 3, Day2, Session 2).

4.2.1.2. Goal Accomplishment

Goal Accomplishment reflects children’s ability to understand and construct meaning from the mobile apps when using them to perform or complete certain tasks. Interacting with mobile apps give the children opportunities for interacting with digital objects that provide different learning experiences, i.e., enabling multimedia components, audio, animations and highlighted text; moving interactive images or objects; using navigation tools to skip, proceed, exit or return. The children used their knowledge to complete certain tasks correctly and solve simple problems through trial and error or through repeated learning patterns. From some observations goal accomplishments are demonstrated:

Student chose “Alphabet F” app and then selected the “DOTS” activity from the menu. The screen displayed a number of dots that needed to be connected with one another to form an alphabet letter. As Student dragged her finger from one dot to another, the alphabetic letter “D” was formed (Student 14, Day 2, Session 2).

Student chose the “Puzzle Fun for Kids” app. The game (puzzle) included a few blank spots of jungle animal shapes. He dragged the pictured (e.g. sheep, butterfly) and placed them at the bottom of the screen. He managed to find the correct animal pictures for the given spots and completed the puzzle quickly (Student 8, Day 2, Session 2).

4.2.2. Psychomotor

Psychomotor exhibits physical actions e.g. haptic and tactile as in perception and manipulation of objects using the sense of touch, kinesthetic as in bodily movement. The results showed that children are able to demonstrate touch gestures and body movement while using the apps in the touchscreen device and exhibit fundamental skill while interacting with the applications particularly in gaming and creating type of apps. Psychomotor skill is observed based on these two characteristics: Perception, Imitation and Manipulation.

4.2.2.1. Perception

Perception means the capability of children to use their gesture to actively interact with the mobile apps such as how to use fingers to drag and drop items and estimating where digital objects should be placed. Results demonstrate that children are responsive to the objects, features and multimedia elements in the apps and be able to use their gesture to interact with them. The children to interact with the application mainly used touch gestures such as tap, drag and swipe.

The most popular selected apps were from gaming and crating category such as “Alphabet F”, “Draw Finger", "Art Studio” in which required more sensory motor skills to be applied. Observations notes that demonstrate perception are:

Student selected the “Alphabet F” app, and choose the “Matching” activity from the menu. This app is composed of a memory matching game of alphabetic letters. Lina started randomly flipping over cards on the screen. As she slipped over all the memory cards, she found a repeated alphabetic letter “D”. Then she flipped over a letter “D” from another row (Student 11, Day 1, Session 2)

Student selected the “Art Studio” app. It was a drawing app. Lina tapped on a color icon (red) and tapped her finger on the sheet, displaying a red spot. Tiara drew a circle, a tree and a square on the sheet. She tapped a brush and changes the size to the thicker one. Then she drew a simple line on the sheet (Student 19, Day 2, Session2).

4.2.2.2. Imitation and manipulation

Imitation and manipulation show the ability to repeat and perform an action with confidence and proficiency through taking repetitive actions (Ferris & Aziz, 2005). Children’s acquisition skills begin with experimentation and repetitive actions, making them able to shift from novice level to mastery of certain skills. The results indicated that children were constantly involved in discovery as to how to interact with available interactive and multimedia component available in the apps and trying to perform and accomplish a task or interacting with the other features. With each repeated effort they improved their skills and knowledge with respect to how properly to complete an activity. Imitation and Manipulation from observations notes are:

Student selected the “Kids First ABC” app. Student tapped the “Start” button the opted for a piece puzzle. She dragged the pieces to the given spots using her finger. After she successfully completed the first puzzle (a heart shape) she selected another puzzle with 6 pieces. She failed after few attempts but later she decided to drag the pieces one by one and move them around on the given spots to find the best match and drop them into their correct places. In the end, she completed the 6 piece puzzle (Student 16, Day 2, Session 2)

Student selected the “Alphabet F” app and chose the “DOTS” activity from the menu. The screen displayed a number of dots that should be connected together to form an alphabetic letter. The student dragged her finger from one dot to another. He connected all the dots and an alphabetic letter “P” was displayed on the screen. Then a new page showed another alphabetic letter and the student dragged his finger from one dot to another and letter “B” was formed and displayed. He continued these actions for other letter including “A”, “H” and “D” (Student 15, Day 1 , Session 2).

The “Alphabet F” app was selected by one student and chose “WORDS” activity that is all about learning vocabulary, and sounds of the letters. The page showed a letter “D” and number of pictures showing objects beginning with the letter “D”. As she tapped on the pictures, the app narrator read the name of each, and then she repeated after the narrator words such as “Dog”, “Duck”, “Door” (Student 13, Day 2, Session 2).

4.2.3. Affective

The affective theme shows emotion, attitude and value while interacting with mobile apps. As a result of such interaction the children exhibited different emotions such as amused, motivated,

interested, happy as well as negative feelings such as boredom, confusion and frustration. From the affective theme there are two characteristics observed: Receive and Response

4.2.3.1. Receive

Receive shows sensitivity of children to the mobile apps as stimuli. The behavior indications of receive include attentiveness and take interest and not interested to experience. It reflected in positive and negative emotions. Most of the children showed positive emotions and were amused while interacting with the apps,that was demonstrated by laughing and smiling. Some children showed negative emotions such as confusion, frustration and boredom when interacting with the app and were not interested, failed to successfully complete a task or were distracted. From observation notes demonstrating the Receive theme are:

When one of the students finished successfully connecting all the dots in “Alphabet F” she smiled and asked her peer to see the result. The she started to clap her hands and looked very happy (Student 8, Day 2, Session 1).

Student was amused when looking at her peer’s screen that showed an animated dancing cat with an alphabet board in its hand (Student 9, Day 2, Session 1).

When the student selected the “Little Red Riding Hood” app, he listened to the story attentively, looked at the screen and at some point started to move the animations as directed by the narrator. He was focused while listening to the narrators until the story reached its end (Student 10, Day 1, Session 1).

One of the students selected the “Shapes” app and then he chose “PLAY” mode. Then on the screen it displayed a red Circle. The student tapped on the circle and the narrator mentioned ‘red circle’. He started to tap on the red circle then it moved to the left and the right and each time the

narrator's voice said 'red circle'. He kept tapping but nothing new happened until he looked bored and exited from the app (Student 4, Day 1, Session 1).

4.2.3.2. Response

Response reflects children's ability to react and attend to the mobile apps as they interacting with them then demonstrating enthusiasm and motivation to proceed, contribute, perform or otherwise. Most children were motivated enough to complete a task, just a few of them did not. Some children were willing to explore the apps although in a few cases they declined to finish the task by abandoning the task in the middle of interaction and electing a different activity.

A few children demonstrated satisfaction and contentment by making noises and clapping when they had successfully passed through different stages of activities. Some observation notes demonstrating Response are:

One of the students selected the "Alphabet F" app and chose the matching activity. It included a memory matching game using alphabetic letters. The student started flipping through displayed cards. At first she was unable to understand the goal of this game but after a while she found a repeated alphabetic letter, the letter "K". Then she flipped over the other letter "K" from another row then the two cards were matched and disappeared from the screen. As she gained knowledge on how to complete the task she looked motivated to play more (Student 9, Day 1, Session 2).

One of the students tapped on the "Alphabet F" app and chose the "Puzzle" activity. She wasn't able to properly drag the object to the correct spot and she failed to perform the task. In the beginning she could not also find a match for the blank spots but she eventually managed to complete the puzzle and put objects into correct positions. But in the end she managed to complete the puzzle successfully and then decided to return to the main menu and selected

another puzzle, one that included more pieces of puzzle items. She seemed motivated to do more. She successfully completed the puzzle (Student 10, Day 2, Session 2).

A girl student selected the “Art Studio” app and began tapping on different drawing tools to explore their functions. She was not able to properly use the drawing tools but still managed to sketch some patterns although she was not sure what to do next. She commented that she was not interested in continuing (Student 14, Day 2, Session 2).

One of the students had opened several apps. He explored the interactive elements and features of each app but kept changing to try another app without having real interest in using any of them (Student 15, Day 2, Session 2)

CHAPTER V: DISCUSSION AND CONCLUSION

5.1. Discussion

This study was conducted in order to find out if children can learn through different applications and if they learn from these interaction at an early age, a survey questionnaire was disseminated also to parents to get a demographic information and responses about the usage of mobile apps, to find out if parents allow children to use mobile technology and if they downloaded applications to them. Parents were also asked to indicate the age they would consider introducing digital technologies to their children.

Only 5 out of 19 parents advocated for school age as the time for introduction of technology. Instead 14 of them indicated introduction in the first years of life (1.5-2.5). There is one important implication that follows from these outcomes. Early exposure as noted from the parents clearly challenges the recommended guidelines regarding screen exposure that is currently advocated by the American Academy of Pediatrics (2015) that “television and other entertainment media should be avoided for infants and children under age 2. (2015)” What parents believe is good regarding the introduction of mobile technologies and what experts believe is good in early development indicate as appropriate could be a problem for children developmentally. As Napier, 2014 said that early exposure may limit valuable learning experiences consistent with the deficits identified with passive television viewing by limiting opportunities to interact with live individuals and limiting active engagement with toys and the larger environment.

Parents also demonstrated a desire to support their children's learning and identified mobile technologies as a platform for achieving educational and entertainment goals. Eight parents out of 15 indicated that the download apps for their children's entertainment and 7 of them indicated that the reason why they download apps was for developing language skills e.g. learning English. This consistency in response indicates that parents believe mobile technologies afford engaging experiences for their children. Several researchers (e.g., Willoughby and Wood, 2008) have identified high engagement as a product of children's software and computers in general.

As to what kind of apps retained children's engagement, although e-storybook apps included interactive elements in the text, animation and read-aloud narration, it could not retain children engagement when compared to gaming and crating apps. As Roskos, Burstein, Shang and Gray (2014) reported that children are more engaged with haptic perception i.e., recognizing objects through touching. This could possible because of psychology factors that children in the age of 4-6 years old would prefer and engage more to game based apps as they are learning more through playing and pleasurable activities. This was reported by Wright, Fugett and Caputa (2013) in their study that indicate children who experience enjoyment would be more motivated to read from mobile apps.

Therefore, it is important for parents to choose appropriate apps for their children such as based on their different learning styles (e.g. visual, auditory, tactile and kinesthetic).

Most mobile apps that available in the market do not indicate its suitability for a particular children learning style hence mobile app designers/developers could take this into account when designing mobile apps for children based on multiple intelligent concepts. Although mobile apps in game and creating category would be more appropriate for children at very young age, reading on the other is also essential. The current available featured in e-story books apps such as read

aloud narration and animation hotspots feature seems could not maintain children engagement thus new features should be introduced and included to entice children engagement especially at the early age. This could include co-reading features involving active participation of parent, teachers close relatives such as incorporating role-play feature in the reading process, collective dictionary building and collaborative pronunciation assistant.

This study was conducted in an informal learning setting without direct support from teacher or any organized curriculum , the findings could provide some insight on pedagogical implication on how the engagement concepts and type of mobile apps could facilitate children in achieving their learning outcome mainly in emergent literacy development (e.g. letter-sound knowledge, phonemic awareness and print recognition).

5.2. Conclusion

This study was focused on the use of mobile apps to see how preschoolers learn through such interactions in a private school "Britannica" in Peja. The main purpose of the study was to find out how children engage with mobile apps and if they can learn through such interaction in an informal learning setting without direct reliance with teachers.

Three types of mobile apps were used for the purpose of this study: e-storybook apps, gaming apps and creating apps. Children's interactions with these mobile apps were observed and video recorded.

The results demonstrated three main conditions that engage children with mobile apps through sensory motor, emotional and verbal expressions. The children were observed to be able to learn when interacting with mobile apps. This is showed in their learning incidents related to

knowledge (cognitive); actions/motor skills (psychomotor); attitudes, feelings and emotions (affective).

Learning through cognitive involves thinking, learning, knowledge and development of intellectual attitudes and skills characterized by awareness and goal accomplishment. The children were aware and could apprehend content of the mobile apps that normally include interactive elements, matching activities, drawing tools and puzzle games. The children were also aware of navigation and button functioning of the mobile apps and device used and were able to choose mobile apps that catch their interest. The observation revealed that the children through their interaction could engage and learn when they managed to complete and accomplish goal of certain tasks such as solving memory games and puzzles.

Learning through psychomotor shows physical actions such as kinaesthetic actions in body movement, haptic and tactile actions as in perception and manipulation of objects using the sense of touch to support cognitive growth and recognition skills. The results show that children are able to demonstrate touch gestures and body movements and achieve skills when interacting with the apps to manipulate events on the screen. The results show that children prefer using crating and gaming apps rather than e-storybook that offer more features for sensory motor skills. Psychomotor skill is characterized by manipulation, perception and imitation. Perception shows children's ability to use their gesture to actively interact with the mobile apps and to discover how to use their fingers to drop and drag such objects. Manipulation and Imitation demonstrate children's ability to repeat and perform actions with confidence and proficiency through taking repetitive actions such as completing matching activities, completing puzzle and dot-to-dot activities.

Affective learning reflects emotion, value and attitude while interacting with mobile apps. Receive and Response were two characteristics of affective learning. Receive involves positive and negative (happy, amused, boredom, confusion and frustration) attributes. This was apparent through their laughing and smiling while interacting with mobile apps. The results indicate that in Response children are able to give feedback through the apps features in showing interest and motivation to proceed as they either successfully pass through different stages or otherwise give up and discontinue. The results showed children disengagement in the interaction with mobile app because they were demotivated and not interested to pursue the activity.

The results in general show that children learning are more prevalent in psychomotor aspect as also supported by the engagement condition through collective sensory skills.

The study had three hypotheses. The first one is that there are three main conditions that engage children with mobile apps: through sensory motor, emotional and verbal expressions. These three engagement conditions were considered through the children's learning experience as observed from three learning incidents associated to knowledge (cognitive); actions/motor skills (psychomotor); attitudes, feelings and emotions (affective) . And, the second hypothesis was that the engagement conditions were evident in more than one learning experiences (as such Collective sensory skill in Cognitive and Psychomotor; Emotional and Verbal Expression in both Psychomotor and Affective). This was proven from the findings when children were engaged through collective sensory skill they also demonstrated theta they were able to experience the learning process from Cognitive and Psychomotor. For example as the children were engaging with collective sensory skills using gesturing, touching, looking and listening they could manage to solve and complete puzzle or memory game as reflected in goal accomplishment(in Cognitive) and imitation and manipulation (in Psychomotor). The third hypothesis was that parents

download applications for fun and entertainment but also to develop language learning skills, this was proved through the parents' questionnaire that was given before the study begin, and really in the end they seemed to develop learning English.

In conclusion, mobile apps used from young children tend to be effective and successful based on all the instruments used during the study. In addition, most of the researchers who have studies in this field claim that using and choosing the right mobile apps can have positive effects on learning. From the results of this study, children are more interested in the gaming and creating mobile apps rather than e-storybook. This was expected, because gaming and creating apps provide multi-sensory learning experiences that stimulate children's motivation, enjoyment and attention and maintain their engagement.

Participants in this study demonstrated three main learning notions: cognitive, psychomotor and affective, to support learning incidences

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Appendix 1:

Apps used during the study:

1. Cinderella
2. Little Red Riding Hood
3. Shapes
4. Alphabet F
5. Kids First ABC
6. Draw Finger
7. Art Studio
8. Puzzle Fun For Kids 2

Appendix 2:

Demographic Information

1. Gender: Male Female
2. What is your age?
3. Marital Status:
4. What is your first language?
5. What is your child's first language?
6. How frequently does your child access tablet or smart phone?
7. Do you download apps for your children? YES/NO
8. If YES, what is the reason that you download these apps:

a) Fun/Entertainment

b) Occupying your child

c) Your child has asked for it

d) To develop their skills in language

e) To develop their skills in other subjects

9. What age would you consider introducing technology to your child?

Appendix 3

Name of the app:

Content Type:

Game App - Academic Non-academic

eBook Non-Interactive Read to Me only Read & Play

If game, check all that apply:

Instructive – Drill & practice with correct/incorrect answers or moves

Manipulable – Allows players to use digital artifacts to explore and learn

Puzzle – Series of cognitively challenging activities, little to no narrative

Simulation – Players empowered to experiment with the environment

Casual – Mindless, repetitive; does not challenge players cognitively

Appendix 4:

Name of the App:

Interaction Design

1. Circle all gestures used:

Tap Trace Swipe Drag Slide Multi Touch Double Tap

Visual Design

1. Are visual mechanics consistent through the apps? YES/NO
2. Scene draw focus to game foal with little distractions? YES/NO

Audio Design

1. Are audio instructions accompanied by visual cues? YES/NO

Instructional Design

1. Form of "How to Play" tutorial:

   Interactive Visual Only Audio Only Text Only None
2. Interactive prompt to guide user interaction? YES/NO

Parent Feature

Describe the parent feature if any: