«WHO TAUGHT YOU HOW TO PLAY?», «I DID!»:

DIGITAL PRACTICES AND SKILLS OF CHILDREN UNDER 6

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ABSTRACT

The objective of this research is to identify digital practices and skills with technologies of children up to the age of 6. The approach is qualitative, semi-structured interviews were conducted with 15 families (including parents and at least one child under 6) and observations. Families were selected varying their socio-economic level and family composition. The following was explored: 1. what practical use and capacities do children obtain by using digital media and 2. what skills they acquire. Children are autonomous using digital media, especially when using their favourite devices, such as the tablet and smartphone. They search and install apps without knowing how to read or write, using the «store» suggestions and voice search features. Some of these apps need to be purchased, but most parents won't allow it, so children ingeniously switch user configurations on their devices as a work around. Some parents mention that children under 2 learn how to write the name of their favourite cartoon characters as to search them on YouTube. Parents renounce these learning's and notice that children are self-taught on the use of digital media. This use may favour the development of certain skills, like the ability to take decisions and problem-solving. Furthermore, children are cognitively stimulated and become more collaborative, training fine motor skills and develop their reading and writing skills.

KEYWORDS

Children, technology, families

SOMMARIO

L'obiettivo di questa ricerca è di individuare le pratiche digitali e le abilità tecnologiche dei bambini fino all'età di 6 anni. L'approccio è qualitative e si è basato su interviste semi-strutturate realizzate con 15 famiglie (includendo i genitori e almeno una volta un bambino al di sotto dei 6 anni) e osservazioni. Le famiglie sono state selezionate sulla base del loro livello socio-economico e della composizione familiare. Si è cercato di fornire una risposta ai seguenti interrogativi: 1) quali usi pratici e quali capacità sviluppano i bambini utilizzando i media digitali?, 2) quali abilità acquisiscono? I bambini sono autonomi quando si avvalgono dei media digitali, soprattutto quando usano i loro strumenti preferiti, come il tablet e lo smartphone. Cercano e installano app senza saper leggere o scrivere, usano le funzionalità di archiviazione e ricerca vocale. Alcune di queste app devono essere acquistate, ma la maggior parte dei genitori non consente l'acquisto, inducendo in tal modo i bambini a cambiare le configurazioni utente per aggirare queste restrizioni. Alcuni genitori osservano che i bambini sotto i 2 anni imparano a scrivere il nome dei personaggi dei loro cartoni animati preferiti per cercarli su YouTube, e notano che i bambini sono autodidatti nell'uso dei media digitali. Questi impieghi possono favorire lo sviluppo di alcune abilità, come la capacità di prendere decisioni e di problem solving. Inoltre, i bambini sono cognitivamente stimolati e diventano più collaborativi, allenano le loro capacità motorie sottili e sviluppano le loro abilità di leggere e scrivere.

PAROLE CHIAVE

Bambini, tecnologia, famiglie

ISSN 2038-3002 – Vol. 7, n. 2, anno 2016, pp. 281-302

1 Introduction

Nowadays children live in an «e-society» based on digital connectivity (McPake, Stephen, & Plowman, 2007). The information society influences their lives, even though families probably aren't aware of it.

Children are increasingly surrounded by technologies, such as tablets, smartphones, game consoles, TV and the Internet (Lauricella, Wartella, & Rideout, 2015). They mostly prefer mobile devices, using them from a very young age (Wood & Jocius, 2014). According to the Common Sense Media research (2013), about half (52%) of American children have access to a recent mobile device at home: a smartphone (41%), an iPod (21%) or a tablet (8%). Chiong and Shuler (2010) report that 6% of American children from the age of 2 to 5 have their own smartphone and this percentage is increasingly rapidly in developed countries each year. Due to this early practice, children up to 6 years old already have some skills in using these technologies (Parette, Quesenberry, & Blum, 2013).

According to Plowman et al. (2012), when children interact with technology it can be beneficial on four learning areas: understanding the role of technology in daily life, developing dispositions to learning, extending knowledge and understanding of the world and development of operational competences.

More and more children have access to mobile devices at home and use them. Several debates about the use of these devices by children and the resulting learnings and skills have arisen. These discussions are preceded by attitudes, both positive and negative, in relation to technology (Blackwell, Lauricella, & Wartella, 2014), making assumptions that may raise concerns about the use of technology by younger children. This concern refers mostly to touch screens, such as tablets and smartphones, which in recent years have become indispensable devices in family homes (Flewitt, 2011; McPake, Plowman, & Stephen, 2013) and being even available to children under 2 years old. However, these views are not well founded, highlighting the need to a better understanding of the role of digital devices, above all the touch-screen in the acquisition of children's skills (Price, Jewitt, & Crescenzi, 2015). Furthermore, there are only a few studies referring to the use of technologies by children with less than 6 years of age (Hsin Li & Tsai, 2014).

The aim of this research is to know how and whom with children learn to use digital devices and what skills and competences they develop. To reach this goal a total of 15 Portuguese families with children up to 6 years old were observed and interviewed on their habits and use of digital technologies at home.

A brief theoretical background on the use of technology by young children is presented, focused on its added value at home, concerning learning and competences. Children and parents dialogues about the use of technologies will be presented, as well as skills and competences acquired, finishing with some conclusions and references.

2 Children and the use of technologies

Modern touchscreens designs allow very young children to start interaction with the digital world at an earlier age (Orlando, 2011; Plowman et al., 2012). In the last two years there has been an increase in use of technology be ever younger children. There is already research that corroborates this idea, from 2013 the number of children who have used a mobile digital device increased in three age groups: 38% in children under 2 years, 80% in children aged 2 to 4 years and 83% in children from 5 to 8 years (Common Sense Media, 2013).

In the United States, and in most developed countries, according to Common Sense Media (2013) the number of digital devices, mainly tablets, increased by 5 times in families with children up to 8 years, from 8% of households in 2011 to 49% in 2013. The percentage of children with access to some kind of «smart» device at home (e.g. smartphone or tablet) increased from half (52%) to 3/4 (75%) of all children in only 2 years. Nearly twice as many children use a mobile device, comparing 2011 and 2013 and the average usage time tripled: in 2013, 72% of children under 8 years used a mobile device compared to any type of digital activity (like playing games, watching videos or use apps) and in 2011 they were 38%. While the time spent using these devices on a typical day has tripled from an average of 5 minutes per day in 2011 to 15 minutes a day in 2013, the time spent using more «traditional» devices such as television, DVD's, consoles games and computers, declined substantially, from more than half an hour a day.

Recent research related to European countries show the same trend, kids have access to digital devices with web access increasingly early: in Sweden, in 2011, half of all 3 year old children accessed the web and in 2013 the age decreased, half of all 2 year old children accessed the web (Findahl, 2013). In the UK 33% of children aged 3 and 4 years access the web on a desktop or laptop, 6% on a tablet and 3% on a mobile phone; the number of children between 5 and 7 years who accessed the web increased by 68% compared to 2007; 9% of children with 3 and 4 years uses a tablet and 6% uses the tablet to access the web (Ofcom, 2013). In Belgium 70% of children with 3 and 6 years old access the web, usually from 3 to 4 years on, and most accesses several times a month (Teuwen, De Groff, & Zaman, 2012, p.1).

Children younger than the age of 3 already have a digital footprint. According to the European research EU Kids Online (Holloway, Green, & Livingstone, 2013), in developed countries most babies (0-2 years old) already have an online presence. Although the American Academy of Pediatrics (2011) do not advise this exposure to children under two years, recommending only 2 hours a day for children older than 2 and adolescents, recent data indicate that children aged 4 and 5 years use digital devices with web access more than 2 hours per day (Skouteris et al., 2014).

These percentages reflect a worldwide trend, at increasingly younger ages children are having contact with web-enabled digital devices, spending increas-

ISSN 2038-3002 – Vol. 7, n. 2, anno 2016, pp. 281-302

ingly more time online than their parents and older siblings do, especially in more developed countries.

3 Technologies as a tool for children's learning

The continuous use of digital technologies in the day to day lives of children at home have a positive impact in regard to numerous development areas. Several authors state that the use of technology promotes the learning of reading (letter recognition, letter formation, letter sounds, simple spelling), such as the alphabet, phonics, recognition and word building and learning a second language (Lieberman, Bates, & So, 2009). Research shows that children's access to apps that promote reading and electronic books (e-books) improve literacy skills (Kucirkova, 2014) and also increases their ability for better dialogues and heightened knowledge of spoken language (Aubrey & Dahl, 2008; Stephen & Plowman, 2008).

Mathematical skills may also be stimulated with the use of technology devices, such as number recognition, number formation, counting, grouping, enumeration, arithmetic problem solving, spatial reasoning, and geometric knowledge (Lieberman, Bates, & So, 2009).

Thinking and reasoning skills, perceptual skills (Lieberman, Chesley, & Biely, 2009), and cognitive development of children can be enhanced with this interaction (Hatzigianni & Margetts, 2012; Sackes, Trundle, & Bell, 2011). Educational activities and quality games can improve abstract thinking skills, development of reflective thinking (Wood & Jocius, 2014), information analysis and evaluation (Klein, Nir-Gal, & Darom 2000; Nir-Gal & Klein, 2004). Furthermore, other research report positive effects on the ability to make decisions and problem-solving (Price, Jewitt & Crescenzi, 2015).

According to Radesky, Schumacher & Zucherman (2014), technologies allow children to perform sensorimotor activities such as handling and construction, which support the development of visual-motor skills that will be relevant for successful learning of mathematics and science.

The use of open-ended software allows children to control the activities which will provide opportunities for creative choices or imaginative expression, increasing their interest and involvement in the activity (Lieberman, Chesley, & Biely, 2009). Children who use video games to be entertained in leisure time improve their spatial representation capacities, spatial cognition, visual attention skills and iconic skills (Subrahmanyam et al., 2001).

The use of technology also promotes independence (Chou & Fen, 2014), socialization, collaborative learning and social skills (Stephen & Plowman, 2008; Lieberman, Chesley, & Biely, 2009). Moreover, it also promotes social relationships with parents and educators/teachers (Roberts-Holmes, 2014) and even in the expression of emotions (Tanyel & Knopf, 2011).

Finally, technologies predispose children for learning (Aubrey & Dahl, 2008; Stephen & Plowman, 2008), promoting motivation, concentration, resilience and perseverance.

4 Technologies, children's and families

As seen in the previous sections, children who are exposed to technology can benefit from this in several developmental areas.

They like to use them and want to try the technologies that belong to adults that are closer to them, appropriating objects of the «adult world» for their games. For instance, Wohlwend (2010) in his research found that girls used a plastic carrot like a smartphone and two boys pretended playing a video game in a game console sketched on paper. Brito (2016) observed children under two years imitating their mother with an old smartphone, talking on the phone and pretending they were in an office playing with a damaged keyboard. Children are astute observers and develop their understanding of the role of technology by watching adults using digital media (O'Mara & Laidlaw, 2011; Roberts-Holmes, 2014).

Since adults spend more and more time using technologies and these are present in several contexts within the child's ecological system, it is natural for children to constantly observe parents and others in this use.

Culturalhistorical activity theory that comes from neo-Vygotskian theory perceives technology as a tool that we must learn to use (Rivera et al., 2002). This theory has some principles in common with the guidelines for Developmentally Appropriate Practices developed by the National Association for the Education of Young Children (NAEYC). Both have the opinion that children learn from social interactions with adults and need to be challenged through activities suitable to their age, taking into account higher levels, through a variety of opportunities to gain knowledge and skills (NAEYC, 2012).

Also corroborating with this idea is Bandura (1977), which states that learning and behaviour occur as a result of observing behaviours. Younger children spend a lot of time observing and learning from their parents and siblings, especially at home: they watch parents making dinner, interacting with each other and using technologies. Due to the increased use of individual technology, children witness the use of several technological devices by their parents in different environments during the day.

Research suggests that there is not a particular way to learn to use digital technologies. The home environment, access, experiences with technology, peer learning and autonomous learning will positively influence the way they develop technology fluency/digital skills (Palfrey & Gasser, 2008; Tapscott, 2009). This use begins mainly at home and the first learning's take place by observing their parents. If they need help, parents are who they elect first for assistance (Maribor, 2013). If parents are not around, they turn to older brothers and sisters or grandparents (Maribor, 2013).

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When they begin the autonomous use of these devices they no longer need their parents help and begin to explore other activities and developing several skills through those uses.

Although most children are still very young while learning how to use these devices, they use their visual abilities to surf the web and install apps, looking for what they want. Sometimes they just need some quick support from an adult, given that most of the activities can been performed on their own thanks to operating systems becoming more intuitive and easy to manage (Dias & Brito, 2016).

There are several activities that children under 6 years can perform independently with technologies. They know how to search on Google and find videos they enjoy on YouTube. For instance, in his research Davison (2009) mentions that a boy of six and a half used Google to search for information on a species of lizard he had seen in a book. Other researches report that children are very fond of watching music videos on YouTube and do their research independently (Brito, 2016; O'Mara & Laidlaw, 2011). Children may accomplish this standalone use as they identify multimodal cues and realize their significance when they are embedded within the contexts of text. These multimodal cues can be symbols, sounds, images and gestures that are used in several digital devices such as tablets, smartphones, computers, TV, game consoles and touch screens (e.g. Brito, 2016; McPake, Plowman, & Stephen, 2013).

In Plowman, McPake and Stephen (2010) research, where 346 families with children (between the age of 3 and 4) were surveyed and conducted 24 case studies in order to understand how technologies are used in a familiar environment, it was found that parents weren't actually concerned with educational learning of children with digital devices, although this seemed to change as children grew older and approached the age to enter primary school. However they had an interest in children to develop operational skills, like how to find websites, so that they become independent and entertain themselves. Parents also thought their children how to use a television remote with the same purpose.

Some parents were not themselves very enthusiastic on using technologies, but nonetheless encouraged their children to adopt them. In these families, the ability of a child knowing how to manage such technology was seen as something valuable for their future. In other families, more traditional activities were promoted, such as games that resorted to imagination, pretend games or outdoors activities. Parents reported that they were not against technology, but they preferred that children only used it as they got older (Plowman, McPake, & Stephen, 2010).

McKenney and Voogt (2010) interviewed 167 children aged 4 to 7 years on their practices with computers, finding that most boys and girls could, independently, load and play a game on the computer, make a drawing and do research online autonomously.

The age and maturity of children is closely linked to the activities carried out on the devices. In the Michael Cohen Group and USDOE (2011) research, 60 children aged 2 to 8 and their interactions with tablets were observed. This

research identified several differences between age groups. Children with 2 to 3 years of age used gesture exploration as if the image were represented in 3D and learned to direct, press or drag, which gradually changes to click and slide. The children were anxious to see things happen on tablets, while perfecting their understanding of cause and effect, preferring apps with familiar characters, colourful and attractive. Children aged 4 to 5 used more advanced motor skills such as initial pressing, drag, and slide. They knew how to use the apps and being able to overcome several levels during the game maintained their interest. Children from 6 to 8 years old quickly learned the necessary skills to play games and dominated several tasks, also applying some skills already acquired in the use of other apps. These observations suggest that children develop a more immediate and concrete sensory experience for a more conceptual and abstract understanding, a further independent operation of the device, through the use of apps (Neuman & Neuman, 2014).

5 Methodology

Research questions

With this article I intend to know i) how and with whom children learn to use electronic devices and ii) what skills and competences do they learn during this use.

Research design and sample

The approach is exploratory and qualitative, based on the Grounded Theory, because I did not intended to test existing theory, but to create a new one. This new theory will be «based on systematically collected and analysed data» (Strauss & Corbin, 1994, p. 2).

I intended to have in depth look at a limited number of cases, in order to get as much information on the use of technology by children and families.

The main method of collecting data was semi-structured interviews and observations. Interviews were conducted at their homes to understand how and which digital technologies were used and learn about the family's favourite activities. The interviews were supported by other techniques in order to facilitate data collection and to motivate the participation of young children (e.g. card and table games), and also by participant observation.

I interviewed a sample of 15 families including children from 3 to 6 years old. Children with less than 3 years old were just observed.

The sample was theoretically selected according to Strauss & Corbin (1998) in order to obtain variety of variables such as gender of the child; family composition (both parents *versus* mono-parental; with *versus* without siblings; younger *versus* older siblings), and socioeconomic level. The visits took place between May and August 2015 and involved a group activity and different interviews to parents and children. The data was registered in audio and in photograph, as well as in participant observation.

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For the interviews I relied on the scripts used in the European Report Young children (0-8) and Digital Technology (Chaudron et al., 2015), having obtained the consent of the coordinator of the study in regards to their use

The participant names will not be mentioned in this text, they will be encrypted to ensure confidentiality and anonymity. The coding for the members of the family begins with a fictitious name assigned to each one, in this case based on the NATO phonetic alphabet (Alpha, Bravo, Charlie, etc.). Thus, families were appointed by interview order, followed by their family relationship or gender of each family (f - father; m - mother; g - girl; b - boy) and age. For example: 5 year old boy from Alfa family: Ab5; father from Bravo family: Bf.

6 Findings and discussion

6.1 *Who taught you how to use the devices?*

When asked *«Who taught you to use the tablet?... smartphone?... PlayStation?... Is it hard to use?»* almost all children answered *«I did!»*, *«I already knew it!»* or *«It's so easy!»*, which reveals their motivation and ease in exploring these devices. However, after reflecting a bit on the issue, they mentioned that someone, such as a family member or friend, helped with this interaction. Although they really learn to use digital devices through its self exploration, they initially learn by observation, especially by watching their parents.

R: How did he [Ab5] learned how to use the smartphone?

Am: I think it was... It seems that they born already taught, isn´t it? [...] I don't know if it was by watching his sister... I think it was it, he is very observant and although... he sometimes sees us doing things, since he was a toddler, he observes and he memorizes things. If he sees once, he memorizes it very easily. I think it was it!

Df: Dg6 sees, she doesn't ask. She sees it and then explores. She does the same thing on YouTube, she goes to music's… [...]. I don't know if she was 3 or 4 or 2… She was very young and I taught her to write «Ruca» because she wanted to watch Ruca. Then I taught her that when she inserted the «R» and «U» letter the complete word appeared. And then she knew that it was that… she clicked with the mouse. Then she surfed there watching Ruca and sometimes other cartoons appeared because of suggestions.

There are several people who teach children how to use digital media, especially close family members. The most nominated family member, mentioned by half of the interviewed children, was the older brother.

R: When you are struggling with the game, who do you ask for help?

Bg3: Brother.

R: Your brother helps when you do not know how to play the game?

Bg3: Yes.

R: How do they [Og10, Ob6, Ob5] learn how to play?

Of: From each other.

The usual order when asking for help is: older brother, father, mother and friend. In this research, although there are more High Digital Users[1] parents (male), it did not reveal preference for children regarding technological clarification.

Ib6 and Jb6 mentioned that they learned to use the technology alone. Jb6, one of the few High Digital User children said *«Nobody taught me, I taught myself!»*, information confirmed by his mother. In fact this child mastered several digital devices such as tablet, smartphone and television, and the mother have to put him strict rules due to excessive use.

The Jb6 also said he learned to play games at school's computer with some older colleagues. While vacationing in school, in the summer months, the in charge teacher gathered children of several ages in a room, performing various activities, and the ones who could write put games on the computer so the younger's could play.

The cousins were reported with regard to learning to use PlayStation, so the PlayStation was a digital medium used in group by children.

Sometimes each family is more comfortable with a specific technology, or so the child's routine justifies it. For example, in Alpha family the Ab5 uses a different digital device with each family member, since each of them has a favourite: Am is available to play with Ab5 on the PlayStation and he teaches him how to use it; both father and cousins have a PlayStation Portable (PSP) and so they teach Ab5 how to play; Ag13 has a smartphone and is very proficient using it, and Ab5 learned from observing her.

R: Your sister teaches you how to use the smartphone and your father the PSP, is that it?

Ab5: Yes. Mother on the PlayStation, father on the PSP and my sister on the smartphone.

R: And your cousins?

Ab5: Cousins… they teach me how to play on the PSP and PlayStation.

6.2 When you are struggling with the devices, who gives you a hand?

In addition to teaching children to use digital media, father and older brothers are those who help out in difficult moments.

R: Has he [Lb5] asked for your help to play a game?

Lb7: A lot of times.

[1] Every parent and child participant in this research was characterized regarding their digital level. To this definition (digital user) the following criteria was established: *High Digital User*: using more than four devices or using 3 devices and one with intensity; *Medium Digital User*: use of 3, 4 or 5 devices, but all moderately; *Low Digital User*: use of 2 or fewer devices.

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R: And you helped him?

Lb7: Yes.

Dg6: Daddy helps me with everything!

On two occasions children mentioned their grandmothers. In the case of Mg4, the grandmother would search for cartoons on YouTube and let her play games on the computer. Gg5´s grandmother offered her a tablet and helped her install apps as well as doing the typing when searching for cartoons on YouTube.

R: Who installs games on grandma's smartphone?

Gg5: It's grandma, grandma helps my brother [Gb1] and I to play. [...] Grandma plays, then my brother [Gb1] plays and after that it's my turn, but grandma helps.

6.3 Autonomous use of technology

Children start to use technologies by observing their parents, they start to explore the devices on their own and memorizing the functions of each option.

R: *How do you know you have to press those buttons* [to play]*? Who taught you?*

Jm: Don't ask me... I never teach him anything...

Jb6: In every game… I found out by myself! I thought that to play I need to press here, then I pressed and began to realize that to play I must press here.

R: You were pressing and learning at the same time?

Jb6: *Yes*!

Through the observations I found that boys were more enthusiastic in the use of technology, regardless of the device. Girls explored basic casual games like «Cut The Rope» or «Tom the Cat». These games belong to a genre that focus on simplicity and require little effort to master, the player usually only has to control one task at a time. Boys prefer more elaborated games, such as FIFA and Role Playing Games, games that required a higher level of concentration, allowing them to make an extended use of the device by exploring its capabilities. Although parents and children did not mention the exact duration of use of these devices, it is noted that in comparison to girls, boys had a significantly more frequent and prolonged activity. Furthermore, given the opportunity boys mastered more devices than girls. As an example, most of the time girls would use a tablet and smartphone, while boys would also use other devices such as a PlayStation, PlayStation Portable or other consoles, consequently acquiring more skills and making them more independent when interacting with technology.

Children's personality is also related to its use and acquired skills. For example, Hb5, a quiet boy that prefers more withdrawn activities, loves to play football on his tablet, while Hb4, a more active boy who likes to be in a group to play with friends, prefers physical toys. Bb3 is a very active girl, she uses the

smart TV, tablet and mother's smartphone, though briefly as she quickly gets bored given her short attention span, I observed her wandering around the house for people to interact with. In contrast her brother Bb6 is calm and withdrawn. As I pursued Bg3 throughout the house and talked with her, Bb6 was in his room playing on a Nintendo DS and a tablet and later went to the living room to play on the computer. The same goes for Dg6 and Dg10 sisters, as conferred by Dm.

Dm: It's funny because that [chosen digital activities] also has a lot to do with them [Dg6 and Dg10]. The usage, the technology is closely related to their personality and therefore they use technologies for what they like most. If they like more social contact, as the oldest [Dg10], they are used for social contact, for communication. If you are more cognitive, like [Dg6], then they are more used to cognitive aspects. It's not technology's fault, whether for good or for bad, it has to do with a person's profile and the way it interacts with technology.

The fact that children have a more reserved and introverted personality made them dedicate more time to the use of technology.

In general, children that have a more reserved and introverted personality will spend more time with technology. Usually using a tablet or smartphone while on the living room couch.

AG13: He [Ab5] sometimes like to go to that couch [farther from the TV couch] and is entertained in his little world.

It is accepted that the more mature a child is, the more he or she will be attracted to elaborated games and perceive their goals. Jb6 was the only child up to 6 years who was able to explain the goals of his favourite games, playing them with ease and skill. The 6 year old boy seemed very focused for his age and was able to maintain a detailed dialogue about the plot of his favourite games. It is worth noting that the mother claims that she hadn't assisted him in any way.

A: What is your favourite game?

Jb6: It is a game of monster battles. It is fighting against monsters: you have symbols, you press one of the symbols, if it's red the dog that is on the machine explodes blood. Then you press the orange button and continue. But if none is red the dog turns into a monster. You press on the green where you are playing and then you'll pass the level.

In general, younger children play for less time than their older brothers, preferring to wander around the house interacting with adults. This is the case of Hb4 who just wants to use the tablet when he sees Hb5 using it. Hb5 used the technology, according to the parents, for too long and they had to enforce a rule of only playing on weekends. Nevertheless, he gained prowess in using these technologies and loves to play football games that require a lot of fine motor skills, he also learnt the name of all the teams of various countries and their players. When Hb4 plays his brother's tablet football game he lacks the understand of how to play the game properly and ended up scoring own goals.

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HB5: You are scoring goals in your own goal! It must be in the other one!

HB4: Goallllllllllll! I Won! [Screamed effusively]

The fact that the older brothers know how to read and write also influences their activities, performing a higher number of searches for schoolwork and videos on YouTube.

Lb7: On YouTube I usually watch videos about Minecraft, they teach me how to play. On the iPad I also do research for schoolwork. The teacher sets a research topic and then I make a presentation in Keynote and present it in the classroom.

6.4 Skills developed by children while using technology devices

By exploring digital devices children acquire operational and educational skills.

With regard to operational skills, the most common is app management: searching, installing and eliminating apps in regards to themselves.

R: Do you install the tablet games that you want?

Hb5: Yes.

R: How do you know which game you want to install? [...] The soccer one.

Hb5: It was me. I picked it.

R: How did you do that?

Hb5: It was... [...] [He went and grabbed the tablet to show me. He opened the app store] Then I see here if it's good or not.

R: How you can see if it's good or not?

Hb5: It has a video.

R: How do you know it's a video?

Hb5: Because one day I tried and watched. [...] This [game] is not purchased.

R: What is to purchase a game?

Hb5: You click here. To buy means to install the game.

R: Where?

Hb5: Here. We press here and then there's a line here [presenting download process] and then when you get here [end of the download bar] you have to wait a bit and then it stays here on the tablet.

The voice-to-text feature is an important aid for searching the web and finding new apps to install given that children can not yet read or write. They use this feature with their normal search engine or app store, but instead of typing they press on the microphone icon, they then speak into the tablet or smartphone specific words regarding what they are searching for and in no time a list of results pop up with suggestive app icons and images (i.e. screenshots, video, demos,

etc.). Several children were introduced to this feature by their friends and managed to discover it on their own.

R: Who installed this game on the [father's] smartphone?

Dg6: I did!

R: How did you manage to do that?

Dg6: I said like this [selecting the voice search feature], I pressed in a place and I said «My Little Pony» and it appeared.

R: Then you pressed the button and downloaded it?

Dg6: I pressed somewhere which is «put the game» and I pressed again in «game» and after that the My Little Pony game appeared.

Children notice and comprehend that their parents' devices are usually newer models with more data storage and processing power, are faster to load and render games than their own less capable devices.

Im: Last Christmas my husband gave me an iPad, which has a different capacity in terms of games and graphic and he'd [Ib5] rather play on mine [tablet] a thousand times more than playing on his.

They also knew when the tablet filled up it's data storage capabilities and therefore had to eliminate several games in order to install new ones.

R: Do you install the games that you want?

Og10, Ob6 and Ob5: Yes.

Ob5: But you cannot install many or else the memory gets full.

One of the most popular rules applied by parents was the prohibition to install paid apps, the parents felt that it made no sense to pay for their children to play games because so many of them are for free. However, some children, especially the elder ones, from 6 to 7, liked paid games such as Minecraft and Grand Theft Auto, but because of the rule imposed they weren't allowed to download them. Thus, Lb7 and his friends found that by exchanging the user login on the app store configuration among their tablets, each could install the apps that at least one of them had already bought.

Lm: Minecraft isn't free, but it was through another child's login. We bought the FIFA game, I think that I only bought them for them [Lb5 and Lb7] FIFA. Because when they ask me [to buy an app], I usually say no.

R: Why?

Lm: Because I say so. There are so many fun apps for free that I shouldn't have to be paying for. They have Minecraft because it was another friend's login, otherwise they wouldn't have it installed.

[...]

R: They change login accounts on each other's tablets?

Lm: Yes they do! And they install each other's games on their tablets and come home with different games.

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In addition to these skills on mobile devices, they also master the subscription television set-top box. When they arrive home after school, after putting away their backpacks the first thing they do is turn the TV on a children's channel. They sit on the couch and with the set-top box remote start searching for automatic scheduled recordings to see the cartoons that they missed during the day. They select which episode they want to watch and press «Play».

When given the opportunity of experiencing with different brands of devices, children seem to adapt easily to different operating systems and interfaces, switching between iOS, Android or Windows Surface with ease.

Dm: They used my iPad and used the other tablet, migrating from one device to another easily.

Children acquire several educational skills through the use of devices such as identifying some words and symbols with certain actions. A father reported that his 2 year old son learned to write some words, including «Steve McQueen», his favourite movie character, so he could search it on YouTube.

Mf: He learned the letters, he memorized how to write «Steve McQueen» so he could write it on the iPad to watch the cartoons. Once I was watching him, he was two years old, writing on the iPad. «You know how to write?», «Yes dad!» He only knew how to write that, right? He did the letter recognition and automatically selects them from the keyboard.

Some recognize the «play» word and the triangle symbol relating them to video viewing.

Fm: Wherever the play symbol appears he [Fb3] knows that there is ... or even the word «play» he already knows what it means. Whenever he sees the symbol he knows that from there he can get into things.

To watch their favourite TV shows, children learn by memorizing the channel number and select them on the remote control, which stimulates their mathematical reasoning, including how to distinguish numbers.

Gg5: I enjoy the Panda Channel and then, with the remote, when he was at his grandmother's house [...] I pressed «four four» and then learned that.

R: So at grandma's house the Panda Channel was «four four»?

Gg5: I was watching the Panda Channel and then I was pressing «one one», «two two».

R: Why were you doing that?

Gg5: I don't know, it was just to see what happened. And then «three three».

7 Conclusions

With this paper I intend to see how and with whom children learn to use digital devices and what skills and competences they develop.

Young children are curious, they like to use the technologies and want to use them more and more often and for longer periods of time. This desire is influenced by all members of the family, but mostly by their parents because they are the dominant figure and with how children spend most of the time.

The tablet is the preferred device and several children have their very own device, usually offered by their parents or relatives. Children initiate their interaction with technology by watching their parents and older siblings, becoming relatively autonomous shortly afterwards, turning to parents for help only when they can't complete a game level or some other kind of difficulty, on the other hand older siblings will present them with new activities and digital games.

Several parents said that when their child had several difficulty, explaining just once was enough for him to memorize the solution and never ask again, from there on forward dealing with that challenge on his own.

After mastering the device in a basic manner and since operating systems are increasingly intuitive, children gradually explore all available app options without fear of spoiling the equipment. As they select all options, they also memorize the actions of each one and create a kind of an app «mindset». Thus, the next time they use the app, they will already know what action is linked to each «button» or option.

Through interviews and mostly through observations I found that the children's technological competences are directly related to several factors: *their age*, *maturity*, *time spent using a device*, *personality* and *gender*. With regard to *age*, the older children are, the more mature they are and better able to use the devices (e.g., Cviko, McKenney, & Voogt, 2012; Korat & Shamir, 2012). The *amount of time spent using a device* greatly influences children's skills because the more they use a device, the more they explore it and therefore more autonomous they become (Lonigan et al., 2003; Segers & Verhoeven, 2005). Their *personality* also influences their skills, especially if children are very physically active and enjoy to be in constant interaction with the family group or are more tranquil and reserved by nature, who prefer more isolated activities. Introverted children, who prefer to be at home tend to use more technologies and therefore be more autonomous. Children who are more active spend more time outdoors or playing with toys, although they also like technologies they do not use them as much and sometimes need some adult assistance in using a device. Finally, the *gender* proves to be also an essential factor, boys spend more time using technologies than girls and consequently acquire more skills in using such devices (Sackes, Trunde, & Bell, 2011).

Children explore these devices, learning how to use them independently. Parents are unaware of their children's skills, children use them better than their parents are aware of, they are autonomous, and able to search online for videos and discover on their own how to install and play the games, even though they cannot read, write or understand English. This use should be mediated for children given that at this age they are still very naive and vulnerable to unfiltered and potential harmful content on the web, not being able to identify risks such as sexual

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content, violence, in appropriate language, among others (Ey & Cupit, 2011). As the use of web by children increases, it is vital to monitor children when they are using the web as to minimize the risks associated with such activity.

This curiosity, the desire to explore the equipment and the fact that they master it from a young age can be beneficial in children's personal life and professional future, due to the fact that effective use of digital devices has become a core competence in the digital age (Johnson, 2010; Judge, Puckett, & Bell, 2006; Marsh, 2010). Users should have the competence to use a device and know how to find relevant content. Individuals who have high levels of digital literacy can access information more efficiently and express their own ideas through digital media, reaching the highest levels of professional and social engagement across devices (Park, 2011).

According to Plowman, Stephen and McPake (2010) and Plowman and colleagues (2011), children know how to use a DVD player, the TV remote control to change or select a desired channel, take pictures with smartphones and tablets, use a computer to draw and play games. That is, children already have some knowledge of digital literacy through daily use of home technologies. However, some researchers are concerned of the discrepancy between digital literacy at school and their homes. This is because kindergarten teachers do not take advantage the children's digital literacy skills as to enhance their learning with technologies (Marsh, 2010; Plowman et al., 2010). Furthermore, parents also disregard benefits of using technologies for learning, as they use them mainly only for entertainment (Stephen et al., 2008).

Technologies are an inexhaustible source of information, which allow children to create and learn through collaboration (Lim, 2012), sharing their knowledge with others, hence its incorporation into education is relevant.

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