Technologies and children up to 8 years old: what changes in one year?

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Abstract

In this chapter, we present a longitudinal study which aims to explore the involvement of children up to 8 years old and their families with digital technologies, focusing perceptions and use, during a one-year period. In a first phase, ten families with children up to 8 years old were interviewed. In a second phase, we interviewed eight of the initial ten families. In both moments, children elected the tablet as their favourite device, and their preferred activities were playing games and watching videos on YouTube. Due to an increase in their reading and writing skills, on the second visit to families, we observed that children had become more autonomous in their digital practices, being able to search about their interests and refine such searches. In addition, parents showed more positive perceptions regarding the use of technologies by their kids, promoting their use for scholar searches. The type of parental mediation is related to the parents' perceptions about technologies: parents who consider their use beneficial for more pedagogic purposes, encourage their children, monitoring and supporting them, thus leading to their children using and perceiving the Web as an important tool to explore personal and school interests; parents who hold a less positive view about digital media do not encourage their use, not even for pedagogic purposes, frequently restricting screen-time, and therefore their children use the devices for limited time and mostly for play activities.

Keywords: families, 0-8-year-old children, longitudinal study, digital technology, perceptions.

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Introduction

The importance of digital media in contemporary society is clear. The way we communicate and relate, access and share information, learn and exercise our citizenship has suffered significant alterations. Such changes have an important impact in the personal and social development of children, posing considerable challenges to parents, schools, teachers and the children themselves.

This new way of disseminating information and establishing communication influences all the aspects of contemporary life. From domestic, professional, and school tasks to moments of leisure, consumption, and civic participation, we are currently living in a "global village", using the notorious expression of Marshall McLuhan (1964). This new media landscape and its social impact call for reflection about the way the so-called "digital generation" is developing their personal, social, and professional competences. Within this

frame, we question place of children in contemporary society and stress the importance of understanding childhood cultures (Sarmento & Pinto, 1997) under the assumption that children are social integrated actors in a vaster culture and have rights that must be protected, in the context of different childhood conditions. In contemporary society, the ways of socialization, knowledge construction, and children's specific values, are being negotiated in the different spaces of digital culture, which implies the need to think about the different ways of networked consumption and interactions. Such processes highlight the need of protecting children's rights regarding the media – the 3 "P's": Protection, Provision, and Participation – and challenge practices in media and education.

Even though research regarding technology usage by children has been growing in the last decades, especially regarding children over 9 years old (i.e. EU Kids online, undertaken since 2006), studies with children up to 8 years old are still scarce (Brito & Dias, 2018, forthcoming; Given et al., 2014; Mawson, 2013). Also, the research regarding the family's role concerning the usage of technology by children up to 8 years old is limited, being mainly focused on questionnaires that calculate the number of hours they spend per day using technology (Plowman, Stevenson, Stephen, & McPake, 2012; Ponte & Batista, 2019). The reason is that it is challenging to involve children with less than 8 years old as active participants in research and to have access to families and to their familiar environment (home) (Plowman et al., 2012).

In 2015, we interviewed ten families aiming to explore the use of digital technologies by children and their parents' perceptions on the matter. As a way to give continuity to the study, one year later, we went back and interviewed eight of those ten families. One of the great motivations for the study's reprise was the fact that, in this period, the children had significantly developed their reading and writing skills. We wanted to understand to what extent such skills had a reflection on their digital practices, especially the ones related with pedagogic activities, thus contributing to a more informed and productive discussion on the use of digital technologies by family as learning tools.

Theoretical background

Technology and learning

Due to the fast-technological development, children are growing up in a technology-immersed world and using digital devices in their daily life (Brito, & Ramos, 2017; Kucirkova, 2018; Holloway, Green, & Livingstone, 2013).

Research refers that children up to six years old are immersed in daily technological practices, showing confidence and skills in this use even before they start primary school (Ismail, Hasan, & Mustapha, 2017).

One of the most notable effects of the domestication and familiar appropriation of digital technologies is the emergence of an informal teaching-learning system, built and fed by technical knowledge that comes from the web, acquired and disseminated whether in the family or among the networks of childhood peers (Buckingham, 2008). Children actively seek, develop and disseminate digital knowledge, emerging as protagonists of their learning. Such proactive attitude and knowledge accumulation, practiced at home, doesn't stay outside the school: students nowadays enter the classroom with new perspectives and competences, with which they interpret and assess teachers' performance, programmatic contents, and

pedagogies. Authors like Buckingham (2008) and Sigalès and Mominó (2009) bring to our attention the dangerous gap that is being dug between learning cultures "in-school" and "out-of-school" – which is corroborated by more recent research (Grant, 2011; Gu, Zhu & Guo, 2013): on one side, we have hierarchy, formality, and the conception of the child as a passive and dependent agent; on the other side, we have informality, spontaneity, and the conception of the child as an autonomous and living learning agent.

Research shows that the impact of technologies in learning can be positive. Several studies report positive effects in decision-making and problem-solving capacities (Kim & Cho, 2013; Falloon & Khoo, 2014; Price, Jewitt, & Crescenzi, 2015), in the development of critical thinking (Wood & Jocius, 2014), in independence (Chou, 2013), in collaborative work (Kucirnova, Messer, & Sheely, 2014), in the social relationships among peers and with parents and teachers (Roberts-Holmes, 2013), and even in the expression of emotions (Tanyel & Knopf, 2011). As examples of more concrete results, we highlight the research of Ihmeideh (2013), who reports that a group of preschool children using e-books learned to read more easily than another group of children that used paper books; of Huda et al. (2017) who have concluded that Primary school children with higher digital media literacy and competences displayed more empathy and tolerance towards diversity; and of Qian and Clark (2016), who concluded that game-based learning is effective in facilitating the development of 21st century skills.

Despite the existence of literature that reports advantages in the integration of digital devices in schools and also in informal learnings (Hsin & Tsai, 2014), Fallon (2013) highlights that many parents and teachers still have no conscience of this potential that remains suboptimal.

The importance of motivation and co-use of technologies by young children and their parents

Research clearly shows that the involvement of parents and the home environment are extremely important in the global development of children (American Academy of Pediatrics, 2011), and that, in the long term, social inequality related to well-being and learning are shaped by the initial life experiences, underlying the influence of parents as an important factor (Dias et al., 2016).

In the last years, scientific research about younger children (with less than 8 years) and digital technologies has increased, as the first generation of "digitods" (Holloway, Green, & Stevenson, 2015), that is, children who were born in homes full of digital, portable, and touch-screen devices, grows older (ex. Bittman et al., 2011; Craft, 2013; Dias & Brito, 2016, 2017; Kucirnova & Sakr, 2015; Ponte, Simões, Batista & Jorge, 2017). An unanimous result of these recent studies is the importance of the role played by parents in the engagement of children with digital media, as parents decide upon and condition their access to the devices, to content and to activities (Livingstone, Ólafsson, Helsper, Lupiañez-Villanueva, Veltri & Folkvord, 2017). Beyond that, parents are the ones who usually "introduce" digital technologies to their children, shaping their adoption. Children look up to their parents and perceive them as models, and, so, they tend to mimic their practices and preferences (ex. Dias & Brito, 2016, 2017; Findahl, 2013; Genc, 2014; Kucirnova & Sakr, 2015; Plowman, McPake, Stephen, 2008; Zimmerman et al., 2007).

Parental mediation styles of digital media

Several studies agree that, at such a young age, children, even though they are able to explore, in great measure, digital technologies independently, need guidance and help. The role of parents is fundamental as they are the first mediators, it is with them that children usually have their first digital experiences, and children regard them as examples, tending to replicate their practices and preferences (Kucirkova & Sakr, 2015; Plowman, McPake, & Stephen, 2008).

The concept of parental mediation was presented in academic literature a while ago, applied to television (Dorr, Kovaric, & Doubleday, 1989; Sang, Schmitz, & Tasche, 1993), and referring to the role played by parents as mediators of the involvement of children with this communication medium, therefore shaping their practices and perceptions. Literature identifies different styles, strategies, and models of parental mediation. One of the most used proposals is the model of Valcke et al. (2010), following the work of Maccobby and Martin (1983) and Baumrind (1991). This model relates the styles of parenthood with the styles of parental mediation of digital media. The authors define two axes related parental control concerning the use of Internet at home, and affection in the relationship with parents – that lead to a matrix model with four styles of parental mediation: *authorized, authoritative, permissive,* and *laissez-faire*. Generally, the mediation of screened media tends to be primarily restrictive, reactive, and focused on time of use; active mediation is the most beneficial for children, but is usually emerges by request of the children (Dias & Brito, 2018; Domoff, Radesky, Harrison, Riley, Luming & Miller, 2019; Goh, Bay & Chen, 2015; Livingstone, Ólafsson, Helsper, Lupiañez-Villanueva, Veltri & Folkvord, 2017; Ponte, Simões, Batista & Jorge, 2017). There is usually negotiation of rules to some extent in most of the homes, and adults and older siblings play an important role in setting examples and leading practices.

Factors and perceptions that influence the usage of digital technologies by families

There are multiple factors that can influence the usage of digital technologies by families and their parental mediation. Couples with children are more prone to have positive attitudes regarding the Web than couples without children (Allen & Rainie, 2002). For them, technologies, instead of replacing face-to-face interaction, allow the strengthening of existing familiar bonds (Hampton & Wellman, 2003; Hertlein & Blumer, 2014).

The academic level of parents can also be an influence in some of their behaviors and perceptions. Connell, Lauricella and Wartella (2015) questioned 2326 parents of US children up to eight years old and concluded that parents with a lower academic level were more likely to co-use television with their kids than parents with a higher academic level. Parents whose academic level was high school or lower were significantly more prone to co-use video games than parents with a higher education. Other studies refer that parents with digital skills are more conscious of the risks, considering support as a factor of great importance (Walrave, Lenaerts, & De Moor, 2008; Wang, Bianchi & Raley, 2005). These parents let children use technologies for greater periods, learning to use them by trial-and-error method. On the other hand, parents with fewer technological skills display less activities of control and orientation (Nevski and Siibak, 2016).

The socioeconomic level of parents proves to be influencing. According to Clark (2013), who undertook a study with US families, in lower socioeconomic households, the education is based on hierarchy and

obedience, while higher socioeconomic level families stimulate children to think and be responsible, promote self-control and opinion expression. In families of higher income, parents who intensely use digital media in their professional lives consider that their own practices go against their efforts to limit the use of technologies by children and try to find offline alternatives of play and learning for their children.

The majority of parents do not see this use as negative, they consider digital technologies as important tools for the professional future of their children and as source of learning (mainly informal at such a young age, as there is not much articulation with school activities) (Ortiz, Green, & Lim, 2011; Plowman, McPake, & Stephen, 2008).

Several parents' perceptions regarding digital technologies are related with learning and the articulation with school. There are some studies about the usage of tablets in the classroom, and also about learning in domestic contexts, focusing on specific activities as co-using or e-book reading before sleep time (Bus, Takacs, & Kegel, 2014). Literature reports positive and negative effects of digital technologies in learning, depending on the skills and knowledge being developed (Hsin & Tsai, 2014). For example, tablets favor the development of skills such as independence (Bassiouni & Hackley, 2014), collaboration (Kucirkova, Messer & Sheeny, 2014) and social interaction (Chou, 2013), but can be responsible for the decreasing of time of attention and, consequently, for a lower retention of information or a cognitive overload (Bus, Takacs, & Kegel, 2014).

Methodology

Method

In this study, we used a qualitative methodology, namely Grounded Theory, as the aim was to develop theory "(…) based on data systematically gathered and analyzed (…)" (Strauss & Corbin, 1994, p. 2). It wasn't our intention to start with an already existing theory, but to create a new theory. Such theory is characterized by no suppositions to where it could or should lead, in the beginning of the investigation, but by being based solely on gathered data for the creation of a substantive theory (Charmaz, 2004).

We have developed a longitudinal study, visiting the same families in 2015 and 2016. In this type of study, the same variables are measured repeatedly in different periods (Menard, 2002). According to Menard (2002), longitudinal studies have two goals: to describe change patterns and to establish a trend (whether positive or negative or from X to Y).

Participants in the study

In regards to the selection of the participants, we used a theoretical sample. This type of sample aims representativeness of the themes being studied and not of the sample itself.

We used the following criteria to select the families in our sample:

- Children's age (in the first phase, the child had to be 6 or 7 years old, and, in the second phase, the majority was already 8);
- Gender;
- Family composition (divorced parents, younger and older siblings);
- Socioeconomic level (being given preference to a lower socioeconomic level, whenever possible);
- Technology usage intensity ('low-user', uses the digital device at least once a week; 'medium-user', uses the digital device at least two or three times a week, 'high-user', uses the digital device at least one time per day).

In Portugal, we selected a theoretical sample of 10 families using the researchers' contacts and also indications from a Social Centre and a Parrish, the later to reach low income families. All families were contacted via telephone to schedule the visits and information about the project and consent forms were sent via email prior to the visits. On our second phase of data collection, it was only possible to visit 8 of the 10 initial families. All family members were coded in a way to ensure their confidentiality and anonymity. Codification starts with a fictitious name given to each person, followed by "PT", the abbreviation for Portugal, the corresponding number to the sequence families were interviewed, followed by the familiar relation or gender (f – father; m – mother; g – girl; b – boy; gf – grandfather; gm – grandmother) and age. For example:

- 4-year-old boy from the first interviewed family: Vicente (PT1b8).

Table 1 presents in detail the demographic information regarding the participant families in the study.

Table 1: Demographic information regarding the participant families in the study

Interview moments they participated in	Member code	Family income	Nationality	Gender	Age	Level of education	Parents profession
1st and 2nd	Susana PT1m38	Low	PT	m	37	Doctorate	Preschool teacher
	Vicente PT1b8		PT	f	7	Primary	
1st and 2nd	Paulo PT2f40	Average	PT	m	40	Graduate	Consultant
	Clara PT2m41		PT	f	40	Graduate	Consultant
	António PT2b9		PT	m	8	Primary	
	Álvaro PT2b4		PT	m	4	Preschool*	
1st and 2nd	Vítor PT3f36*	Average	PT	m	36	Graduate	Technology Consultant
	Marisa PT3m41		PT	f	40	Middle school	Communications
	Leonor PT3g8		PT	f	8	Primary	Product Manager
	Mário PT3b1*		PT	m	1	-	
1st and 2nd	Miguel PT4sf39	Low	PT	m	39	High School	Plumber and fireman
	Vanessa PT4m29		PT	f	29	High School	Unemployed
	Soraia PT4g10		PT	f	10	Primary	
	Francisco PT4b8		PT	m	8	Primary	
	Timóteo PT4b7		PT	m	7	Primary	
	Joaquim PT4b3		PT	m	3	Preschool	
	Rafael PT4b1		PT	m	1		
	Matilde PT4g1		PT	f	1		
1st	Pedro PT5f42	Low	PT	m	42	High School	Unemployed
	Filipe PT5b11		ES	m	11	Primary	
	José PT5b7		ES	m	7	Primary	
	Manuel PT5b6		ES	m	6	Primary	
1st and 2nd	Cristina PT6m42	Low	PT	f	42	Middle School	Healthcare Assistant
	Mateus PT6b8		PT	m	8	Primary	
1st and 2nd	João PT7f44	Average	PT	m	43	Graduate	Civil engineer
	Teresa PT7m40		PT	f	39	Graduate	Civil engineer
	Gonçalo PT7b7		PT	m	7	Primary	
	Bruno PT7b2		PT	m	2	Preschool	
1st	Tiago PT8f42*	Low	AO	m	42	Middle School	Electrician/Plumber
	Filipa PT8m40		AO	f	40	High School	Unemployed
	Joana PT8g15		AO	f	15	High School	
	Fábio PT8b6		AO	m	6	Primary	
1st and 2nd	Gabriela PT9m36	Average	PT	f	36	Graduate	Anatomic Pathology
	Ana PT9g8		PT	f	8	Primary	Technician
1st and 2nd	André PT10f60*	High	BR	m	60	Graduate	Dentist
	Maria PT10m42		PT	f	43	Graduate	Clinical Psychologist
	Laura PT10g7		BR	f	8	Primary	

Implementation of the observation protocol

The first phase of visits took place between June and November 2015. In the second phase, interviews began in November 2016 and ended in January 2017.

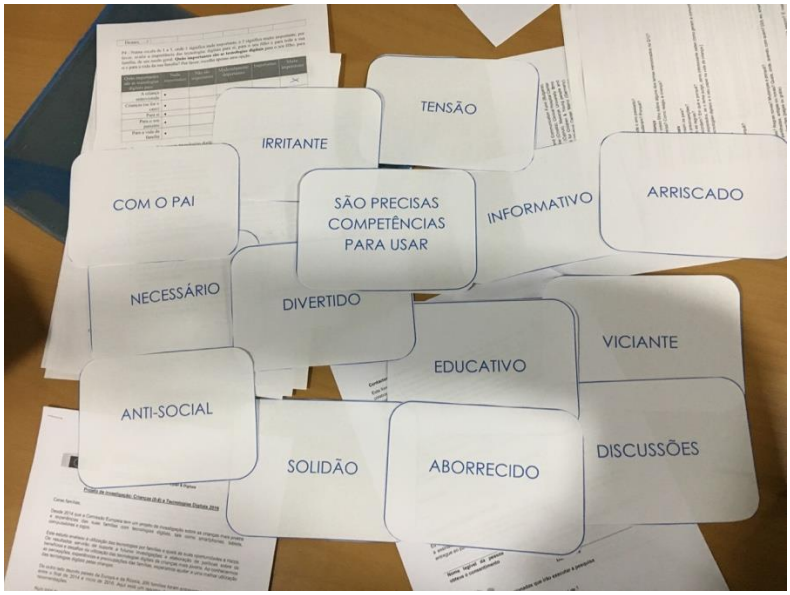
Two families chose to be interviewed in the institutions where they were first approached, whereas the remaining interviews were conducted at the families' homes.

Both visits were structured in four moments:

1) Introduction, and presentation of the interview's purpose (5-10 min): this first phase took place in the living room (exception made to both families that were not interviewed at home), where the family (parents and children) gathered with the researchers. In both phases, we explained the procedures of the visit: during the first phase, we presented the study and, in the second phase, we clarified the cause of this second round. Informed consents were handed out and signed.

2) "Ice Breaking" activities (25-30 min): these activities were undertaken with parents and children separately. In both phases, play activities were proposed to the children, such as worksheets with stickers or a game with two sets of images (a set of applications' icons referring to games, social networks, browsers, among others, and another set with emoticons referring to emotions, such as *angry, sad, happy*, among others) in which children had to relate emotions and apps (Figure 1). Ice breaking activities were useful, as they let the children at ease (Brito & Dias, 2017). In the second phase of interviews, conversation and information sharing was easier given that they were already familiar with us.

Figure 1: Set of images given to the children in the second phase for them to group according to the emotions they evoke.



In the second phase, parents were given a set of words (Figure 2) and they were asked to related pick the ones they associate to digital media and to add a short explanation for their choice. The words were the following: *addictive, annoying, antisocial, argument, bored, challenge, curious, distraction, easy, educational, family activity, fun, hard, informative, interesting, joint exploration, loneliness necessary, risky, skills are needed to be used, social, tension, useful, with the mother, with the father*.

Figure 2: Set of words given to the parents, in the second phase, to relate to technologies.

3) Semi-structured interview (25-45 min): After these ice breaking activities, the interviews followed. Whenever there were siblings, the children were interviewed together, being the opinions of the target child highlighted. Interviews were conducted in different rooms with parents and children, simultaneously. We intended to understand the digital activities of children, which digital devices they use and their favorite applications. We also wanted to learn about the perceptions of parents concerning the use of technology by their children.

4) Conclusion (10-15 min): In the end of the interviews, we thanked the families for the availability to participate in the project.

Implementation of the analysis protocol

The interviews were integrally transcribed. Questions such as changes in pitch level or laughter were also registered. Colloquial language was not corrected, so the presented transcriptions are original.

As mentioned, the interviews were posteriorly codified according to theme analysis, using categories that emerged from the interviews themselves and also based on our initial research questions – following a Grounded Theory methodology.

For the data analysis, the thematic criterion was also used, consisting in a categorization strategy of qualitative data. Therefore, we stemmed from a broad reading of data regarding the discovery of patterns and the development of themes (Boyatzis, 1998).

Data presentation and analysis

Devices used by the family

In both moments, we observed that children enjoy digital technologies greatly. When they play, they do it with satisfaction, being completely immersed in the activity.

The more common devices in the homes, besides the television, are smartphones, tablets, and laptops. In one year, the main changes were related to some devices that had broken in between, like Vicente's [PT1b8] PlayStation, Joaquim's [PT4b3] tablet, or Ana [PT9g8] and Laura's [PT10g7] tablet. Concerning new devices, some of the broken tablets were replaced, like Vincente's [PT1b8], Mateus' [PT6b8], and Ana's [PT9g8]. New tablets have more processing power.

Parents who do not have favorable perceptions about technologies did not replace their children's broken devices. However, other family members ended up doing it, as Vicente's [PT1b8] grandfather and Mateus' [PT6b8] father, who had already bought the first ones against the mother's' wishes. Some children that received new tablets, like Mateus [PT6b8] and Ana [PT9g8] have parents with positive perceptions regarding the usage of technologies by children.

Activities with digital devices

Regarding children's digital practices, there are no remarkable changes apparently, as the favorite activities with the tablet continue to be playing games and watching videos on YouTube. However, their interests on the types of content and preferred games and videos changed considerably. In the previous year, we observed that practices were different according to the child's gender, as boys preferred videos and games related to their most-loved characters from fictional universes and toys like Lego and superheroes, whereas girls were more inclined to Disney princesses and Barbie. Besides that, boys preferred sports and fighting games, whereas girls preferred to dress princesses, take care of pets and play with make-up. This year, the preferences regarding games are more uniform, with boys and girls enjoying construction and creative games. Minecraft was the most popular game (for António [PT2b9], Mateus [PT6b8], Gonçalo [PT7b7], and Laura [PT10g7]) as well as the programming software Scratch, used by António [PT2b9], who learned how to use it with his teacher at school, in IT class.

Paulo [PT2f41]: There was one thing that evolved. I believe it is somehow interesting that, last year, he took IT classes, and the teacher taught them how to program using Scratch. He often asks for my computer to access Scratch and plays with it. I think it is beneficial, given it is a programming language and he ends up developing skills I would like him to develop.

We have verified, however, that girls present behaviors closer to those of pre-adolescence, enjoying to watch pop music clips on YouTube and showing great interest in social networks and owning a smartphone, to be able to "(…) chat with friends (…)" [Leonor, PT3g8], something that happens less frequently with boys. Boys and girls know some vloggers that they follow on YouTube, like Gonçalo [PT7b7] and António

[PT2b9] who like to browse a channel with "very funny videos" [António, PT2b9] or Mateus [PTb6b8] who enjoys watching videos about Minecraft to learn how to play, "There are videos I like and there always new videos" [Mateus, PT6b8].

Increase of reading and writing skills vs. digital activities

The greatest change we observed was related to search skills. Since all children were more competent with reading and writing by the time of our second visit, they developed their search skills, whether on YouTube or on search engines such as Google. Some performed such activities using the browser on their tablet, but the majority did it in apps. Children are capable of searching about their interests and curiosities, and when they want to search content in English, such as titles of songs or artists, they ask their parents for help. Girls like watching video tutorials on how to put on makeup, and they seem to spend even more time watching pop music videos (Leonor [PT3g8], Laura [PT10g7]). Boys like to watch videos related to their preferences, for example favorite games, what they watch on television or that they share with friends from school.

João [PT7f44]: The biggest change from last year, I believe, is that he watches much more YouTube videos. Teresa [PT7m40]: As he writes and searches more easily, his dependence is lower. Many times, in the beginning, he asked us to write things for him to search about. Nowadays, he doesn't ask for help. He stays there, tries, fails, goes back, goes back and forward, but he manages it.

Last year, Gonçalo's [PT7b7] parents shared that he became extremely nervous when he played, especially when he was not able to move on to higher levels. This situation has changed, because Gonçalo goes on YouTube to learn how to move on and learns how to solve the problem on his own.

The resurgence of computer uses for pedagogic questions

On both visits, it was verified that children prefer the tablet. However, on our second visit, some children reported a new interest in the use of laptops. This may have emerged from the improvement of their fine motor skills in parallel with the progress on their reading and writing skills. But this interest depends on the school's role that might or might not stimulate searches and homework resorting to the Web. The majority uses their parents' computers. We verified that the tablet is identified by parents and children as "play" or "entertainment", and, because of that, is the object of more rules regarding its use. Although parents' participation has different variables in different families, children in general use technologies in common spaces of the house, which facilitates parent supervision and family interaction.

Concerning the use of digital technologies at school, the majority of children, like in the previous year, refers having a computer and an interactive board in their classroom. Sporadically, they perform tasks in the interactive board, but the computer is of teachers' exclusive use, children are not allowed to use it. Although they use technologies in school, some teachers ask children to do their homework resorting to technologies.

Although nearly half the children do these searches in conjunction with school, the other half is not stimulated to do it. The majority researches autonomously and by their own initiative, resorting to the help of adults solely when they cannot overcome difficulties.
Parents also have an important role in this use, as they stimulate their kids to search online about their interests and curiosities. That is what happens in Paulo [PT2f40] and his son António's [PT2b9] case.

Interviewer: Does the school stimulate searching for content and knowledge on the Internet?
Clara [PT2m41]: Concerning school, I think it does not. We're the ones with a tendency to search the Web, whenever we do not know something.

In the previous year, Laura [PT10g7] had access to virtual textbooks and, according to her mother, she liked to use it assiduously. This year she no longer has access to that, but her mother found an alternative: websites with activity worksheets for her daughter.

Maria [PT10m42]: I have discovered may websites with some worksheets and stuff and, once in a while, during a period of tests, if I cannot study with her, she already has a lot of worksheets and she goes there and opens them and does the exercises alone.

Laura [PTg10] also uses the computer to search about themes of her interest, for example "the human body", a subject that is being explored in school at the moment.
Parents João [PT7f44] and Teresa [PT7m40] refer that technologies could be interesting for scholar use, but assume they do little stimulation of their son on this matter. On the other side, they agree that it is not the role of the school to provide this incentive to children.

João [PT7f44]: They do not need to be stimulated to use new technologies. I believe they need to be pointed in another direction. And there we fail big time.
Teresa [PT7m40]: Well, if the school told us, for example, which games to use for which kind of work…
João [PT7f44]: School does not need to do everything. (...) I think there is no follow-up from school on that matter.

Parents with an average or high socioeconomic level and with more digital skills are the ones who have more favorable perceptions about the use of technologies at a pedagogic level.
Besides parents, children also acknowledge Google as a useful tool for their searches.
Maria [PT10m42]: Sometimes a word she does not know the meaning or an object she wants to buy… She goes there and looks up.

This type of search is also related with the parents' positive perspectives about technologies, stimulating, on their turn, their kids.
Other parents assume that they do not encourage this scholar or pedagogical use, although they recognize its' importance to access information, like Cristina [PT6m42], Vanessa [PT4m29] and Susana [PT1m38], mothers with a lower socioeconomic level and with less positive perceptions about the use of technologies

by their kids.

Interviewer: Do you think technologies are important for Mateus at school?
Cristina [PT6m42]: No, I think the teacher is there and does that job. (…) The teacher is there to teach.

Mothers Vanessa [PT4m29] and Cristina [PT6m42] also disagree about school communication being made via email. Mother Vanessa [PT4m29] does not have digital devices for her kids and has to access the Internet having limited mobile data on her smartphone, and mother Cristina [PT6m42] has limited technological skills. She ends up accessing the Web on her son's tablet.

Vanessa [PT4m29]: Soraia's [PT4g10] *teacher starts to work more like that* [using technologies to communicate with the family]*, and that annoys me a little. Books are barely there, everything is by email, even homework are sent via email (…) I sent a message explaining that to her* [Soraia, PT4g10] *she has to do it in a different way, because I do not have Internet at home, my husband uses what he has to work and it is enough for him* [mobile data on the smartphone] *(…) because I do not even have a computer – it's is broken and I did not buy a new one.*

Children tend not to perceive the tablet and the smartphone as pertinent for school use. Parents do so too, as they tell their kids to use the computer to do school work.

Interviewer: Do you use your tablet to search and do homework?
Leonor [PT3g8]: On the computer.
Interviewer: For homework searches you only use the computer? And the tablet?
Leonor [PT3g8]: No.
Interviewer: Why not?
Leonor [PT3g8]: There is no Wikipedia.
Interviewer: Have you tried to look for Wikipedia on your tablet?
Leonor [PT3g8]: No, but my father always tells me to work on the computer.

It is among children who are not that stimulated by the school nor the parents that it is still verified a great disinterest regarding the computer, especially for school search activities, like Vicente [PT1b8] or Timóteo [PT4b7].
Boys assume to like to watch violent videos on YouTube, like Timóteo [PT4b7] and Gonçalo [PT7b7].
Concerning shared practices with their parents, we observed that these have become, in general, more frequent. Between mothers and girls, it is frequent searching for music clips and sharing singing and dancing moments, many times while mothers do other tasks like cleaning and cooking (for example, between mother Marisa [PT3m41] and her daughter Leonor [PT3g8] and between mother Maria [PT10m42] and her daughter Laura [PT10g7]). Fathers gain more expression in supporting scholar tasks and researches (for example, between father Paulo [PT2f40] and his son António [PT2b9]).

Conclusion

We have decided to conduct a longitudinal study precisely to understand up to which extent the acquisition of reading and writing skills are determinant in the digital practices of children.

In general, technologies are more integrated in the daily routines of families. All the children have become more proficient when it comes to searching on the internet, and that allows them new exploration horizons for their interests and learning, but they still make a mainly passive use of technologies.

Technologies not being perceived merely as toys and the recognition of their educational and pedagogic potential were the greatest changes observed. For children, the role of technology evolved from a mere toy and entertainment source to a knowledge one. This step is extremely important, as this limited perception was one of the biggest obstacles we found, during our first visit, to the exploration of the educational potential of these devices by the families. It is also interesting to verify they have not dissociated learning from entertainment, giving importance to the pedagogic potential of digital technologies that derives from their play character. Still, the tablet is most associated with entertainment and play, and the laptop with learning and study. We consider that what surprised us the most last year was the educational potential of technologies being ignored by parents, although this year they have started to recognize it and explore it more.

During this second visit, the perceptions and attitudes of parents were more pondered and less extreme. They are more conscious of the opportunities and the risks, especially of the responsibility given to them in the decision-making process on how to use technologies. Such is evident not only on the self-regulation revealed by the children, but also on the parental mediation styles. Therefore, parents reveal a greater conscience on the role of human agency and regard technologies as tools that have potential to be what we make of them.

Schools started to stimulate the use of digital technologies on homework, especially searches. This stimulation shows parents that it is time for the children to start using technologies as a support of their learning, and consequently they have been investing in helping their children and mediating this use. As children grow up, we verified that parents have become more present in digital activities and joint usage.

It is also to be noted that parents who provide their kids access to technology, with adequate mediation (as an authorized style) have a better family environment (Kraut, Brynin & Kiesler, 2006). The study by Dwyer and Saunders in 2005 about the use of technology and family relations shows that families who embraced technology in a "correct" way are those whose family environment is healthier (Dwyer & Saunders, 2005). The "correct" way means parents use technologies on a regular basis and perceive the positive aspects, as well as the negative ones, of their use by children. If correctly used, there are several technological tools that can facilitate and reinforce the development of an appropriate family environment.

With our longitudinal study, we verified that the families that we followed have taken a step ahead in the perception and conceptualization of digital devices and now focus not only on entertainment but also on learning. We observed that the critical thinking has increased in both parents and children, and all seek the best way to manage the technologies present in their daily routines. We hope this study has contributed for them to find this path and make more informed choices.

The results of this study are not only important for parents, but also for teachers. It's important to know the environment and the digital experiences of children at home, as these will have an impact on their

attitudes and development.

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