Digital media consumption from childhood to pre-adolescence: the research-action "One Bit at a Time" in Italy for Digital Education among children/teachers and families[1]

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Abstract. The article outlines the results of a research and training project that examined the habits and patterns of digital device usage among 1,014 families with children aged 0-6 years and 7-11 years in the Liguria region. It analyzes the trends and developments in media consumption of smartphones, tablets, TVs, and video game consoles during the transition from preschool to elementary school. The project was conducted under "One Bit at a Time," an initiative promoted by the school in Finale Ligure. It involved families and teachers from the provinces of Savona, Imperia, and Genoa and featured quantitative data collection along with a training course aimed at teachers, as well as a question-and-answer session for families. Both training sessions employed a problematizing approach to explore the effects and functionality of digital devices and social media on children and adolescents, aiming to raise adult awareness about the necessity of incorporating Media Education and Digital Education activities from early childhood. The findings underscore the importance of shared responsibility among adults, both at home and school, to foster a positive engagement with digital media that enhances children's cognitive and exploratory skills.

Keywords. media education - digital education - digital well-being - digital competence - adolescents and social networks

1. Introduction

The project "One Bit at a Time" aims to investigate the habits and patterns of use of digital devices (TV, Smartphone, Tablet, PC and Console) and the perceived impact of these on the development of boys and girls within the family contexts of parents with

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children in the 0-6 years and 7-11 years age groups. The research was conducted by CED - Centro Educazione Digitale (Digital Education Center) - a nonprofit association founded in 2020, to conduct research, provide training and raise awareness about the relationship between children, youth and digital tools.

A total of 1014 questionnaires were collected in three different provinces in Liguria: Savona, Imperia and Genoa. The questionnaires administered to families were conducted in dialogue with the FORLILPSI Department of the University of Florence and structured according to the latest research conducted on the age of access to smartphones and digital devices (Di Bari & Mariani, 2018; Gui & al., 2020; Common Sense Media, 2020; Szadejko, 2022).

In parallel to the data collection, two training meetings dedicated to preschool teachers were launched, with didactic-educational proposals structured around the themes of media education and digital education, and a popular and informative meeting reserved for parents on the management of screens and digital devices within family contexts, with the aim of promoting awareness with respect to the issue and proposing a positive colonization of uses (Tisseron, 2016). Both training sessions were an opportunity to exchange and share questions, doubts and *best practices* to be adopted in school and family environments to foster healthy socialization of children with the world of screens and digital devices. This project is part of a path of research already initiated by CED in past years on the promotion of Digital Education in the Education System 0-6 (Di Bari & Lugaro, 2022) and aimed to integrate the quantitative research conducted on the digital habits of families in the 0-6 range with the habits of the 7-11 range.

2. Background

The present research was conducted as part of the regional project "One Bit at a Time" promoted and coordinated by the School of Finale Ligure. Within the project there were four distinct areas of intervention based on the school order involved. The present project acted in area 1, dedicated to Preschools, and saw the voluntary participation of families and teachers from the three Ligurian provinces of Savona, Imperia and Genoa.

It is important to point out that, as the CED - Centro Educazione Digitale is the referent for the project on the west coast of the Liguria Region, most of the questionnaires were received from the provinces of Savona and Imperia.

The three provinces involved in the research have a variable population: according to Istat data, updated to January 1, 2024, the province of Savona has 267,584 inhabitants, the province of Imperia has 208,844 inhabitants and the province of Genoa has 817,260 inhabitants[2].

In the permanent census of the Region Published by ISTAT on May 13, 2024, covering the year 2022, there is a new record of decrease in birth rate in the Liguria Region, as in the rest of the country (births are 8,479, -77 compared to 2021). Liguria is the oldest region in Italy: the average age in 2022 has slightly increased compared to 2021, from 49.4 to 49.5 years, La Spezia is the youngest province (48.9 years), Savona the oldest (50.1 years)[3].

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[2] http://dati.istat.it/index.aspx?queryid=18541, last consultation on 5 September 2024.
[3] https://www.istat.it/it/files//2024/04/Focus_CENSIMENTO-2022_Liguria.pdf, last consultation on 29 August 2024.

In this context, the population of boys and girls residing in Liguria as of January 1, 2024 in the 0-6 age group is 9306 children/years in the province of Imperia, 10,502 children/years in the province of Savona, and 34,919 in the province of Genoa. As for the 7-11 age group, the residents are 7902 children/y in the province of Imperia, 9,814 in the province of Savona, and 30,289 in the province of Genoa.

3. Theoretical Framework

Studies on the relationship between media and education, since the 1980, have focused on the importance of promoting educational and training actions that would lead children and young people to deal critically and creatively with the media (Postman, 1981; Masterman, 1985): since then, especially at the international level, the Media Education movement has gradually extended beyond the school and "formal" boundaries, to also contemplate nonformal and informal contexts, emphasizing the need to involve adults in this process as well. At the same time, Media Education has been called upon to confront technological evolution and the spread of the PC and the Web, all the way to Social Networks and, today, to algorithms and artificial intelligence. One of the most significant transformations is dictated by the diffusion of the same media even in early childhood: if Media Education, with Postman, Masterman and many other authors, had been configured for the school age, today it becomes urgent to reflect also on the 0-6 age group, given the recurring tendency of parents to allow the use of digital devices at an early age, often even before the age of two (the age indicated as the minimum by pediatric guidelines for exposure to screens).

In the face of a diffusion of content and tools that takes place without the appropriate problematization within the family and in the face of an increasing polarization within 0-6 educational services and schools, there is a need to promote organic reflections that take into account continuity in childhood development and that seek not to postpone digital education until when the child is alone with the screen for the first time (Tisseron, 2016; Marangi, 2023). One educational task is precisely to promote a gradual construction of digital competence, starting from childhood and mediated by adult accompaniment to more conscious, more responsible, and more critical uses (Kumpulainen, Sairanen, & Nordström, 2020; Kalabina & Progackaya, 2021). With a view to the data collection promoted by the "One Bit at a Time" research project, it was deemed relevant to investigate a sample of children from 0 to 11 years of age, that is from birth to the last year of elementary school. This choice is due to the awareness of the importance of considering the child's growth process in an educational continuity (not only in the 0-6 age group, but also throughout the first cycle of education): also with regard to the media content enjoyed by children, it is relevant to assess continuity and discontinuity of children's tastes and habits. The perspective is to understand how to lay early (in the family and at school) the foundations for building digital competence, without waiting for the arrival of the first smartphone to be used independently.

4. Methodologies

The research was conducted using a quantitative approach through a self-administered questionnaire. The study sample consisted of 1014 parents of children in the 0-11 age group. A questionnaire consisting of 42 questions was used to collect the data. The questionnaire was administered digitally through the Google Form format, allowing participants to answer the questions via electronic devices. The questions were designed to explore various aspects of the use of digital tools within family contexts and habits.

The construction of the questionnaire items was developed from a twofold matrix. A first matrix was developed proceeding from the research conducted by Common Sense Media (Rideout & Robb, 2020), on the use and activities carried out with media by children in the 0-8 age group, and by the Pew Research Center, which investigated the usage habits, perceptions, and educational relationships concerning screens between parents and children aged 0-11. A second fundamental matrix was developed in continuity with the data collection and teacher training work of nurseries, preschools, and elementary schools that CED carried out, in dialogue with the FORLILPSI Department of the University of Florence, between 2020 and 2024 (Di Bari & Lugaro, 2022; Lugaro, Di Bari & Ferro, 2023). Data collected over the years on how and how often adults use digital devices within family contexts made it possible to identify more effectively and pertinently the items for inclusion in the present questionnaire.

The questions were mainly closed-ended and included a scale of 1 to 5 to more effectively detect respondents' perceptions. Differently, question 24, which asked parents what shared rules in the family were given to the child/children on the frequency of use of technological tools and touchscreen devices, question 29, which asked parents how they felt the impact of the use of digital devices on children's development, and question 42, which asked parents how education on the use of digital tools should be done for families and children and who should do it (School, Institutions, Private) were open-ended.

Before administrating the questionnaire the participants were asked for informed consent, in accordance with ethical guidelines, and they were informed of the confidentiality and anonymity of the data collected. The questionnaire was administered during October and November 2023, supervised by a research team.

After collecting the data, a descriptive statistical analysis was conducted to examine participants' responses. Appropriate statistical methods were used to highlight significant patterns, trends and correlations in the collected data (Mortari, 2011; Trisciuzzi & Corchia, 1995).

Some limitations of this research are also noted: first, the sample was limited to families of children in the 0-11 range who voluntarily chose to participate in the data collection based on the information and solicitations from the school they attended, so the results may not be generalizable to a larger population. The participation of respondents from the various provinces involved was partial (747 questionnaires from the province of Savona, 202 from the province of Imperia, and 59 from the province of Genoa). Furthermore, the use of a self-administered questionnaire may have introduced the risk of inaccurate or contextually biased responses.

The teaching methodology used within the training meetings carried out with the teachers was that of the research community (Lipman, 2005), proceeding by generating

questions (Freire, 2011), shared reflections and laboratory activities. The teacher-researcher filled the role of facilitator of the learning process, proposing inputs and stimuli that would place the digital within the framework of the 100 languages of children (Edwards, Gandini, & Forman. 2017), in order to stimulate individual and collective reflections regarding the daily experiences lived by teachers in their educational services.

The goal was to stimulate a self-reflective practice concerning the formative experiences that teachers and children live in their daily learning environments to identify how, and if, digital can enter the curriculum of nurseries and preschools (Di Bari, 2016; Di Bari, 2023; Metastasio, 2021) as established by the National Guidelines for the Integrated System 06 (MIUR, 2021).

Finally, the dissemination meeting with families was an opportunity to illustrate the international pediatricians' guidelines on the use of digital devices in the family, to propose tips and good practices of use based on recent scientific publications (Académie des Sciences, 2016; Tisseron, 2016; Riva, 2019; Di Bari, 2023), and to respond to practical and daily educational urgencies.

5. Results of the quantitative survey

5.1 Demographics

From a demographic perspective, 54.4% of the responding parents are aged between 36 and 45, 14% between 31 and 35, and 16.8% between 46 and 50. Fifty percent of the responding households consisted of four people, 34.5 percent of three people, and 9.2 percent of five people. Most of the questionnaires, 81.4%, were filled out by women, 8.2% by both parents, and 9.8% by men only.

The questionnaires filled out by parents were for children in the 0-11 age group (53.8% male and 45.2% female), of these 43.9% were filled out by parents of children in the 0-6 age group and 55% by parents of children in the 7-11 age group.

73.9% of the completed questionnaires came from the province of Savona, 20% from the province of Imperia, and 5.7% from the province of Genoa.

5.2 Modes of use and digital well-being in the household

Regarding the mode of use of digital tools, almost all respondents (range 0-11) own smartphones (96.6%) and televisions (97.5%). 77.75% of households own a PC (fixed or portable), 66.3% own a tablet and 43.7% own a video game console. Analyzing the data divided by age group, it can be observed that 72.4% of families of children aged 7-11 own a tablet, in contrast to 60.4% of families 0-6, and 56% of families 7-11 own a video game console that is present in only 29.4% of families band 0-6. Thus, an increase in the presence of tablets and video game consoles in household settings can be observed as the children grow and enter elementary school.
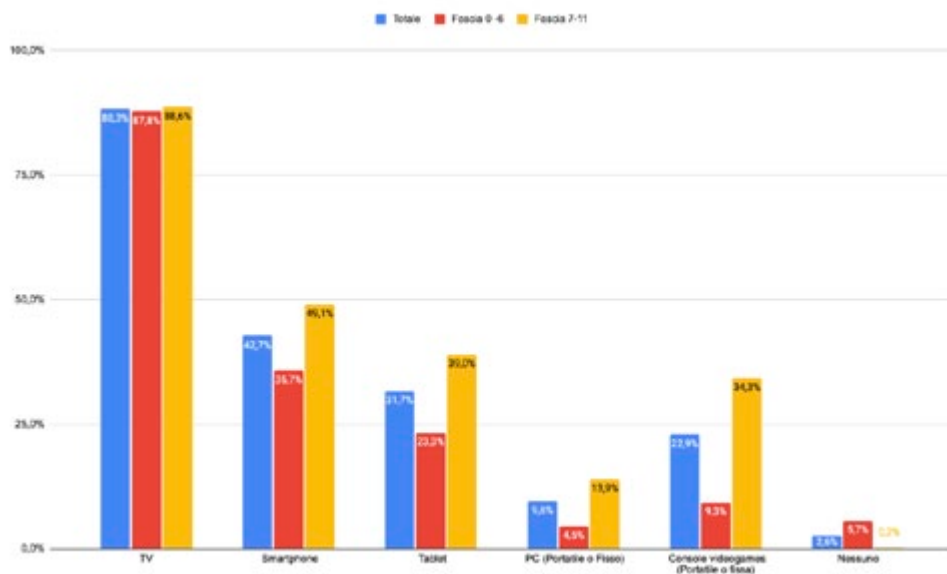
Image 1 – Question 5: Which devices are used at least once a week by your child (0-11 age group)? (multiple answers are allowed).

In investigating how children in the 0-11 bracket use digital devices, it is observed that television remains the most used screen (88.3%), followed by smartphones (42.7%), tablets (31.7%), video game consoles (22.9%) and PCs (9.6%). Unbundling and analyzing the responses divided into the two groups involved we observe how TV use remains constant in both while smartphone use rises from 35.7% use in children 0-6 (more than one in three) to 49.1% in children in the 7-11 bracket (almost one in two), an increase in use of 37.5%. Similarly, tablet use shows a 67% increase in the transition between 0-6 (23.3%) and 7-11 (39%), PC use increases by 207% (from 4.5% in 0-6 to 13.9% in 7-11), and video game console use shows a 270% increase (from 9.3% in 0-6 to 34.3% in 7-11). In the 7-11 range, about 40% of children/children use tablets and more than one in three (34.3%) use a video game console.

Observing the time of use of the various devices, we observe that more than 9 children out of 10 use TV on a daily basis with varying durations: 60.7% of children between 0-6 years old watch TV everyday up to 2 hours, a percentage that rises to 71% between 7-11 years old.
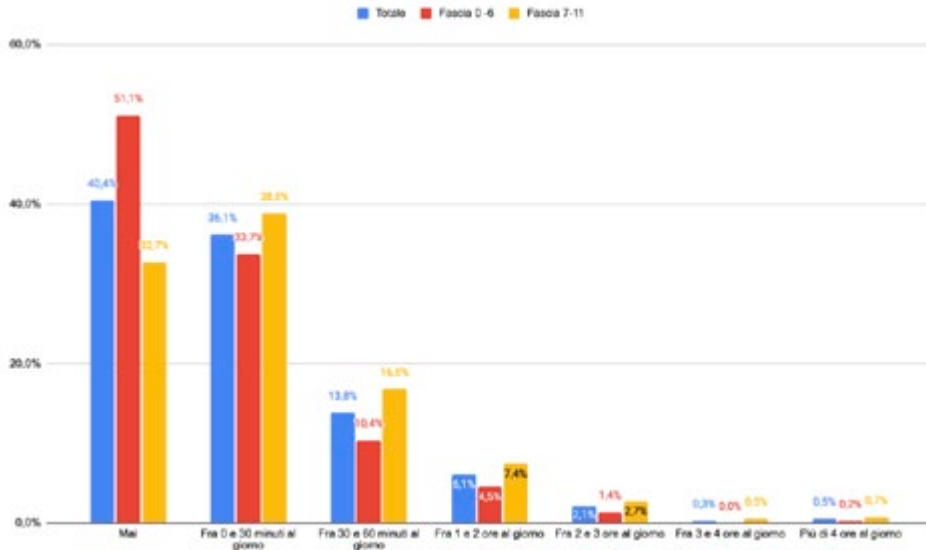
Image 2 - Question 8: How much time per day on average does your son/daughter use a smartphone?

44.1% of children in the 0-6 age group use smartphones between 0 and 60 minutes per day, a percentage that becomes 65.6% (almost two out of three children/children) in the 7-11 age group. Adding to these times of use those of households reporting daily smartphone use between one and two hours (4.5% in the 0-6 age group and 7.4% in the 7-11 age group) and between two and three hours (1.4% between 0 and 6 years and 2.7% between 7 and 11 years), we highlight how overall one in two children (50%) in the 0-6 age group use smartphones daily and more than three in four children/children (75.7%) in the 7-11 age group.

Analyzing the daily consumption of video games we observe that almost one in three (30.5%) children in the 7-11 age-group use a video game console between 30 minutes and two hours while the consumption in the same time frame for the 0-6 group stands at 5.4%.

23.1% of children in the 7-11 group and 10% in the 0-6 group use a video game console between 0 and 30 minutes everyday. Concerning daily consumption, only 44.2% of families say that their children in the 7-11 bracket never use video games, a percentage that reaches 85% in the 0-6 one.

Concerning watching cartoons, regardless of the device on which they are watched, there is a relative homogeneity in the responses of the two age groups involved: only 5.2% of families of children 0-6 and 3.4% of children 7-11 say that their children never watch them, while on average one in four children in the 0-11 group watch them between one and three hours a day and 43.3% between 30 and 60 minutes a day.
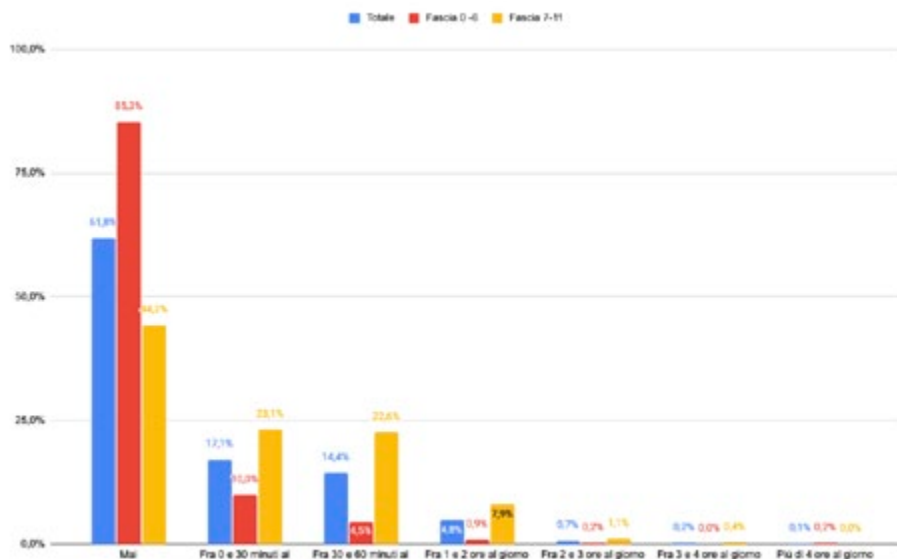
Image 3 - Question 14. On average, how much time per day does your son/daughter use a video game console (Laptop or stationary)?
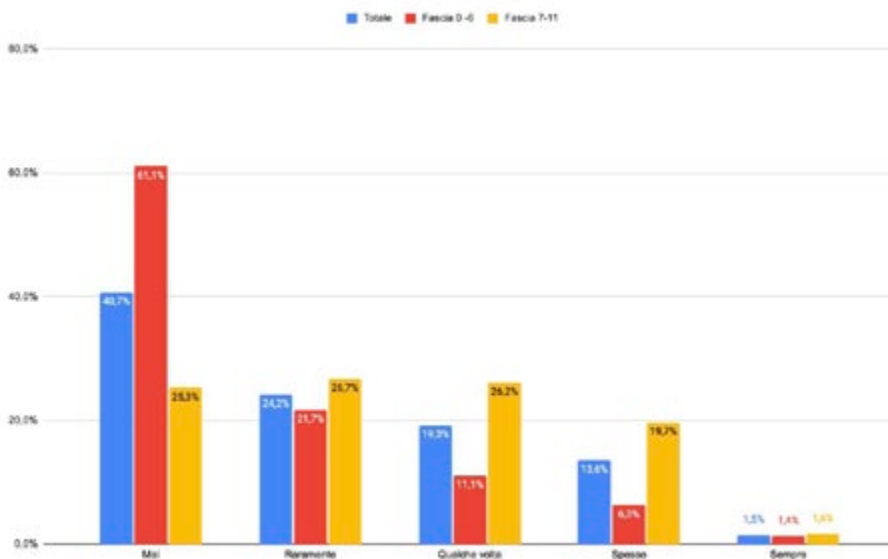

Image 4 - Question 19: Does your child use digital tools alone?

61.1% of families in the 0-6 range say their child never uses digital tools alone, unlike 25.3% of families of children/children in the 7-11 range. As the years go by, we observe more and more independent use of devices: 45.9% of children aged 7-11 use digital

tools sometimes or often on their own, compared to 17.4% in the 0-6 band (question 21). More than one in three children (33.9%) in the 7-11 age group watch videos on YouTube on their own via touchscreen devices (16.5% in 0-6), and more than one in two (57.6%) use children's apps and games on their own (used by 29% of children/and age group 0-6). 48.9% of children in the 0-6 range do not use touchscreen devices independently, a percentage that drops to 19% in children/children in the 7-11 range.

5.3 Perception of the phenomenon

Concerning a specific question about the presence of rules in the home for the use of technological tools and touchscreen devices, in general there is a certain amount of attention by parents: almost one out of two families in 0-11 define rules that are always respected, 27.8% in 0-6 and 37.4% in 7-11 establish rules even if they are not always respected, while 23.1% of families in 0-6 do not believe it is necessary to define rules for use or had never thought about it.

About the perceived usefulness of digital usage for children, 45.9% of parents in the 0-11 range say it is little or not at all educational while only 13.4% believe it is quite or very educational. These data are reflected in a follow-up question that asked families how risky they think it is for children to use digital devices: 68.4%, in the 0-11 range, answered that they are quite or very risky and only 8.4% answered not at all or not very risky.
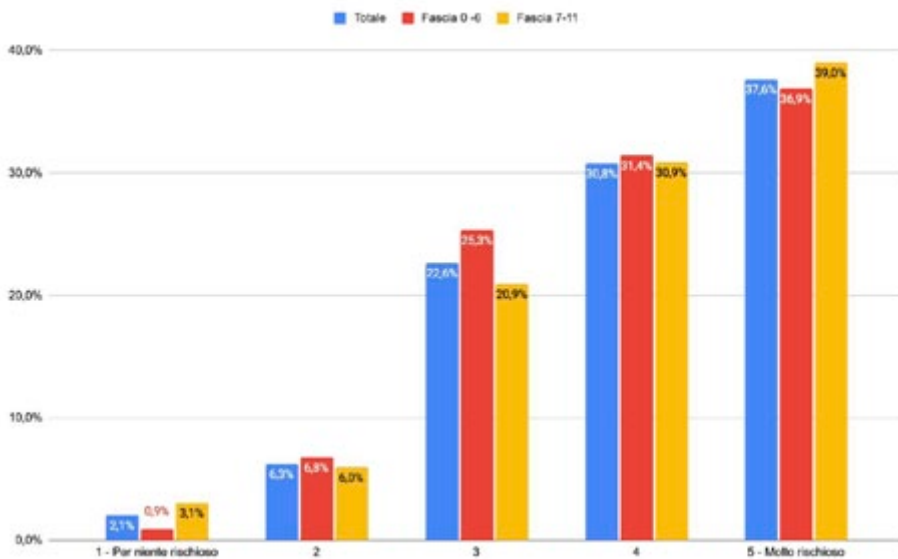

Image 5 - Question 27:. How risky do you think it is for children to use digital devices? 1 to 5

In addition to this, it can be noted that 48.1% of the families in the 0-11 range believe that digital devices do a lot of harm or enough harm to the child, while 42% placed themselves in the median position and only 9.4% indicated a maximum score, "does qui-

te or very good for the child." Finally, only 30% of parents surveyed said they had received education on the use of screens and digital, and 46.7% considered education on the use of technological tools with children that is carried out for new parents to be little or not at all adequate, compared with 26.7% who considered it adequate.

6. Training with teachers and awareness for families

As part of the project, two meetings were held with the teachers of the schools involved and one meeting with families. All meetings were conducted online in November and December 2023.

In the first meeting with the teachers, some self-analysis exercises on their own smartphone usage patterns were proposed and an anthropological overview was provided with respect to the spread of digital media in our society (Harari, 2014; Harari, 2017), promoting an active discussion among the participants concerning the critical issues on the childhood/digital relationship that emerge daily within educational services. The topic of the so-called "Digital Natives" was also addressed, approaching it from a neuroscientific and pedagogical perspective, and current data concerning the use, in Italy and abroad, of digital devices in the 0-6 and adolescent age group were examined in depth[4]. Subsequently, there was a focus on the functioning of social networks by delving into the mechanisms of *Attention Economy* and *Persuasive Technology* (Zuboff, 2019) to promote a self-reflective approach among teachers on their own digital device use habits, with particular attention to the smartphone and social.

During the second meeting, the need for screen education and media education from preschool onward was explored, following the perspectives of P.C. Rivoltella and C. Di Bari, proposing the concepts of reconceptualization and curricularization of screens and their possible implications. Reflections revolving around the themes of "book culture" and "screen culture" (Académie des Sciences, 2016; Tisseron, 2016) were then proposed and S.Tisseron's suggestions around the 3As (Self-Regulation, Alternation and Accompaniment) for screen education and recommendations 3-6-9-12 were exposed. The three-year project "Inside, Outside, Beyond," implemented by Francesca Salvo and Ileana Mel within the Finale Ligure school, which combined photography, media education and expressive theater, was also illustrated within the training course.

The meeting with families was conducted online and included an overview of national and international pediatric indications concerning the use of digital screens in childhood and preadolescence. It also explored S. Tisseron's 3-6-9-12 recommendations regarding digital media use in the family (Tisseron, 2006; Tisseron, 2016) and delved into the topic of social networks, how they work, and the impacts that are being seen in national contexts on adolescents who have received their first smartphone in elementary school. This meeting was also an opportunity to promote a question time, within which families shared their doubts and difficulties in managing use within family contexts, and a moment of self-analysis concerning the ways and the use that parents in the family make of the smartphone of screens in general.

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[4] Refering to the "Youth Toolkit" training modules produced by Center for Humane Technology and available at this site for a detailed discussion of the following topics: www.humanetech.com/youth

7. Discussion

The data emerging from this research conducted in Italy return a picture consistent with national and international data about the increasingly early use of digital devices and screens in childhood and preadolescence, and confirm the need to further investigate the phenomenon, which is in constant transformation, specifically taking into account what happens in the 0-11 year old segment.

Before primary school, children are exposed to screens of various types: television is used by more than nine children out of ten, one child out of two in the 0-6 age group use smartphones everyday, and almost one out of three use tablets. Fewer than one in ten children do not use devices.

Families' perceptions of devices also turn out to be of great interest: three families out of four perceive devices as risky for children's health, and about one in two families consider them to be rather or very harmful to development. About one in two families in the 0-11 range manage to implement rules in the family that are respected, while more than one in five families (23.1%) in the 0-6 range believe it is not necessary to establish rules on the use of technological tools and touchscreen devices or had never thought about it. In this regard, it is desirable to help families define rules from early childhood that are shared within the family and with the school, leading to forms of conscious self-regulation.

Also in line with various research conducted at the Italian and international level, the survey testifies to how screens are increasingly present within the everyday life of children: although it emerges that from 7 to 11 years of age the time of fruition increases consistently (tablet +67%, PC +207%), already during preschool age the presence is substantial. Gradually, along with exposure times, the variety of usage patterns also increases. Families with the oldest children in the 7-11 range have more devices in the home, specifically tablets and consoles used for video gaming (the presence of these tools is 270%, higher in the 7-11 years old group).

Confirming a very significant presence, the use of TV is extended to at least 9 out of 10 children regardless of age, and smartphones are used daily by one out of two children (48.9%) in the 0-6 age group and by two out of three children (67.3%) in the 7-11 age group.

Data show strong evidence that children start using digital devices from early age, often not accompanied by an adult. Such autonomous usage is also on the rise in the 7-11 age group: in fact, the percentage of children using tools accompanied by adults is halved compared to previous years. The data appear relevant also in the 0-6 age group. Thus, the tendency of many parents to favor autonomous use of the tool to be able to carry out other activities is confirmed; at the same time, the recurring autonomous use from the age of seven turns out to be a potential criticality, especially in the presence of tools (just like tablets and video game consoles) that can be used on the Web.

Connected to this finding is the fact that a substantial number of parents have never thought that rules may be needed when using screens, reflecting a general tendency to underestimate the reach of screens. This underestimation may relate as much to the dangers as to the potential: in this regard, a polarization emerges, between those who think it is dangerous (and thus ban any usage) and those who think it is not (and thus allow independent use).

8. Conclusions

This project investigated only part of the spectrum of variables, on a partial population sample that volunteered to compile. The elements investigated, which range from the time of use of the devices to their perception by families, make it possible to formulate some conclusions that can be an important starting point for interpreting, specifically in the Ligurian territory (but also about other research on the Italian and European territory), a reality that has developed globally at a very rapid speed and has remained, in many respects, outside the perimeter of awareness of families, school communities, administrations and educational policies.

Data on the use of digital tools in the early years point to the urgency of initiating specific educational actions. The research, published in 2023 by CED (Lugaro, Ferro & Di Bari, 2023), shows that half of the adolescents involved want to change how they experience digital. Specifically, they would like to use it less and do not know how to do it. Girls especially express discomfort and sense of inadequacy concerning the perception of their physical appearance related to the use of social media. In the United States over the past 15 years there has been a a 139% increase in anxiety disorders, a 106% increase in depressive disorders, a100% increase in eating disorders (anorexia), and a 72% increase in attention deficit hyperactivity disorder (ADHD) among adolescents (Haidt, 2024). It is safe to assume a higher risk for the younger generation from unregulated use of digital devices since childhood and adolescence.

These elements can be compared with the responses given by families regarding the digital education that has been offered to them: more than two out of three families stated that they had never received digital education, and almost one out of two families considers the digital education that is carried out for new parents to be inadequate or not at all.

It is therefore of utmost importance to connect the educational needs, explicit or not, of the families regarding the usage of digital devices and screen education, and the impacts of unregulated use of devices that are emerging in recent years on adolescents who have used them early. These elements call on the adult world to take responsibility for this educational challenge in the face of the exponential rise of digital devices in childhood and preadolescence.

Within this framework, the training meetings for teachers and parents carried out as part of the "Un Bit Alla Volta" project represent a starting point to promote awareness in the adult world with respect to good practices in approaching digital devices and digital education that can take place at home and at school.

Data emerging from research in recent years show an increasing use of digital devices by children in the 0-6 range. The app and video game landscape are also characterized by a rapid and continuous evolution, which requires the development of critical and conscious digital skills as early as the kindergarten stage.

The data presented and discussed compel further reflection concerning the inclusion of digital and media education skills as early as 0-6 and in continuity with 7-11. It is desirable, as early as nurseries and preschools, to talk with children about what they see on screens, using an approach aimed at active knowledge of the tools and the dynamics of their operation. It is also important that children, gradually with age and contextually

with their first experiences of screens, understand and question how a smartphone works, its functions, and what can be used for in their daily lives.

There is an urgent need to foster children's cognitive and exploratory abilities in the digital world: a smartphone is a multimedia tool that can allow them to take pictures, make videos, study a map, listen to music, do research, and more. An App can allow us to use a digital microscope, create a comic strip and compose music, draw, but also to spend many hours of our time passively in front of videos and photos that a social network's algorithm decides to show us to keep us glued to the screen and buy goods.

Relevant topics for the target group considered in the research are how to choose an application according to the activity to be performed; the actions performed with the device, distinguishing between active and passive ones; the awareness of the way the tool 'uses' the human being to collect data; the creation and sharing of rules for screen access. These are just some of the generative questions that can enable us to develop entire school curricula around media education and digital skills.

While we need to be pragmatic, it is crucial to set the horizon for the disciplinary inclusion of Media Education and Digital Education as vertical competencies from pre-school through secondary school and beyond, across the lifespan. In the meantime, it is relevant to work on teacher training through modular lessons that, starting from generative questions on which children can compare and answer, introduce and explain the didactic and exploratory uses and media operations of the tools that adults and children use daily.

At the same time, it is incumbent to promote, at the family level, an ongoing dialogue with children about what they see on screens, explaining to them what the discovery of digital has been like for us, starting from the time of VCRs, VHS and CRT TVs to the first computers, the first social networks and, finally, smartphones. Technology has accompanied our adult lives by constituting a foundational part of our experiences: sharing these experiences with childhood allows us to draw a historical temporality in our lives, with and in the digital, defining a before, a during and an after, breaking possible toxic "spells."

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