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PAPER

Technology in Childhood: Mobile Application for Managing Screen Time

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ABSTRACT

The paper examines the risks and benefits of digital technology affecting child development. A mobile application was created to help parents monitor and control their children's use of electronic devices. The methodology included interviews with a child psychologist, documentary research, the creation of the application, and questionnaires for parents before and after its implementation. The results indicated that after using the application, children experienced a 40% reduction in screen time and a 20% improvement in academic performance. Additionally, a positive change in children's attitudes toward technology was observed, resulting in greater interest in participating in physical activities and interactive games. The study concludes that mobile applications effectively promoted a more balanced use of digital technology in childhood, highlighting the role of parents and the need for ongoing education on how to use technology responsibly.

KEYWORDS

academic performance, child development, digital technology, mobile application, screen time

1 INTRODUCTION

Over time, technology has experienced notable growth and evolution, leaving a profound impact on society. Aveiga's paper mentions the impact of technology on people and how it encompasses both positive and negative aspects [1]. Nevertheless, technology has been permanently incorporated into everyone's lives in various forms and ways. The facilities provided by technology have led to numerous advances, such as in the health field. Technological advancement has created new medicines and devices of great utility in the health field. However, despite the benefits provided by technology, it is essential to recognize and consider the negative changes generated in people's lives.

V. Aveiga, J. Ostaiza, and X. Macias [1] also comment on the aspects of greater attention related to the impact on children's behaviors. The impact on the child group stands out in this context, where a primarily negative influence prevails.

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This influence has led to problems in their development, concentration, and overall health. Many children and young people are immersed in the world of technology, thus displacing essential coexistence activities for their growth. One of the predominant problems manifests in attention capacity; they commonly lose attention quickly, and their concentration level is diminished.

However, in the paper by L. Gavoto, D. Terceiro, and S. Terrasa [2], they mention the possibility of making proper use of digital technology, allowing this to impact children's development positively. The key lies in establishing clear limits to avoid turning the beneficial into something counterproductive. Limits should focus on regulating exposure time, selecting appropriate content, and balancing online and offline activities. Moreover, the role of parents and educators in guiding and supervising the use of technology and providing a safe and educational environment is crucial. Establishing rules of conduct and promoting social and physical interaction outside the screen becomes essential for healthy development in a digital environment. Children should also be educated about the responsible and safe use of technology, creating awareness about the importance of balancing the digital and real worlds for their integral development. In any part of the world, children represent the future of their respective countries and, more generally, the new and current generations of children represent the world's future. For this reason, it is considered important to pay attention to the havoc that digital technology causes to children, seeking to establish the necessary limitations to obtain only benefits from it. It is a reality that children must learn to relate to technology at an early age. However, if parents manage to take care of this relationship and guide it on the right path, it will benefit the child over technology; instead of affecting them, it will benefit them for their development by fostering new knowledge and curiosities about their ability to perform. In contrast, if we leave this situation to chance, future generations will likely face numerous difficulties, from health aspects to development with the environment surrounding them or their personality.

2 THEORETICAL FRAMEWORK

Currently, digitalization has become an essential component for various sectors of society, as evidenced by numerous studies. This shift drives significant transformations in social and labor dynamics through the incorporation of emerging technologies such as artificial intelligence, the Internet of Things, and process automation [3]. The impact of these innovations has been particularly noticeable in the educational field, fostering personalized and collaborative learning, referred to as Education 5.0. This approach aligns with the demands of a digitized society through dynamic and adaptable learning contexts [3].

In 2021 [4] emphasized that, despite technology enabling the creation of new educational paradigms, challenges related to accessibility and infrastructure still persist, as reflected in the digital divide observed in Colombia during the implementation of its Digital Transformation Plan [4] [5]. Furthermore, the plan highlights the need to strengthen digital culture and incorporate innovative tools into educational processes to ensure effective integration [5].

In [6], it mentions how the current world is characterized by the exponential expansion of digital technology, generating a transformation in society's social processes and altering how people interact, work, and live [6]. Constant connectivity has modified the dynamics of interpersonal relationships, allowing instant communication on a global scale. M. Area and J. Adell [4] also comment on how the

transformation has significantly influenced the labor structure, leading to the adoption of remote and flexible work models and allowing people to perform their tasks from anywhere with an internet connection.

In summary, technological evolution has revolutionized labor and educational processes by promoting methodologies based on the use of information and communication technologies (ICTs). However, it is imperative to continue working toward eliminating access barriers and fostering digital skills [3, 5].

2.1 Impact of technology on society

Technological progress has catalyzed a revolution in business operations, fostering a more adaptable and dynamic environment. Throughout the COVID-19 pandemic, remote work emerged as an essential strategy to preserve the operational continuity of organizations. Villagómez and Yugcha [7] noted that ICT played a crucial role in facilitating remote activities, allowing employees to manage their tasks through digital platforms. In the current landscape, training employees in the optimal use of these tools is essential to prevent disparities stemming from insufficient access or technological competencies.

Education and the digital divide. The educational sector has been one of the most impacted by implementing ICT. According to Cusme Vélez [8], virtual pedagogy gained significant importance during the pandemic, underscoring the need to overcome the digital divide to ensure equitable access. In 2024 [9] highlights how digital learning platforms democratize access to knowledge. However, they also emphasize the persistence of inequalities due to discrepancies in connectivity and access to devices, as noted by Gallegos Talavera.

Moreover, research findings by scholars [9] demonstrate that implementing educational applications fosters more interactive and engaging learning experiences for students, improving academic performance and promoting digital skills.

Social media and messaging platforms have radically transformed communication, enabling near-instant global connections. However, studies by Tello [10] and others indicate that excessive use of these technologies can negatively impact the quality of human interactions and personal privacy, as noted by [8, 9]. At the same time, collaboration platforms and virtual meetings have enhanced professional interactions, as evidenced by research conducted in educational contexts during the pandemic by [7].

One of the main challenges associated with implementing technology is the dependence on devices and the information overload they can cause. Research by [7] highlights that while digital tools foster collaborative learning, it is crucial to train users to prevent the misuse of these tools. Furthermore, educational and workplace policies must incorporate training strategies and equitable access to technology to mitigate the digital divide and promote genuine digital inclusion.

Automation has transformed fundamental sectors of the economy, replaced routine functions and creating new jobs focused on data management and technological innovation. Rodríguez-Torres (2023) emphasizes that this evolution necessitates continuous skills updating, particularly in developing nations, as noted by [9].

Technology exerts a multifaceted influence on contemporary society, spanning education, the labor market, and daily life. Despite its considerable benefits, such as the democratization of knowledge and increased productivity, challenges related to the digital divide and insufficient technological proficiency remain significant concerns. The key to the future lies in the formulation of inclusive policies that maximize technology's potential while minimizing its risks [9].

2.2 Importance of the childhood stage

In 2017, the World Health Organization (WHO) mentions that childhood is an essential stage in human development due to its importance in establishing the foundations for later stages in life [11]. According to [2], from childhood, people advance to adolescence, youth, adulthood, and, finally, old age. This early phase is vital for forming personality and developing social, emotional, and cognitive skills. Digital technology has advanced to a point where its use has increased, especially since the beginning of the pandemic. However, this has placed children in a unique position, where they must forge relationships with technology early, impacting their ability to develop competencies and skills necessary for healthy growth.

According to the WHO, we can refer to childhood as the "crucial period in human development, where the foundations are laid for the physical, cognitive, emotional, and social growth of every person." According to the WHO, childhood is defined as "the period from birth to 18 years of age. During this stage, children experience rapid growth and development in all aspects of their lives, highlighting the importance of paying attention to their health and well-being." In this sense, mental health is fundamental to child development, influencing how children think, feel, and behave [11].

The development of a child's brain and their mental well-being are intricately connected. External influences, including early life experiences and dietary factors, can significantly impact brain development and potentially elevate the likelihood of mental health issues. Consequently, it is crucial to create a secure and intellectually stimulating environment for children. Additionally, ensuring they receive proper nutrition is vital for fostering healthy brain growth and mitigating the risk of mental health challenges [12].

Using digital technologies with kids and teens has both pros and cons. It stresses the importance of knowing how to use technology safely and effectively. The perks include more chances to learn, better communication skills, and easier access to various information sources. The authors also talk about possible risks, like cyberbullying, seeing inappropriate material, and worries about privacy. It stresses how important it is for parents and teachers to guide their kids' digital lives and teach them safe ways to use technology; the author also stresses the importance of a healthy approach to technology use by urging people to limit their screen time and encourage them to do things away from their screens; and how digital technology affects mental health, social skills, and cognitive growth [13].

In summary, childhood is a crucial stage in human development, and mental health is the key aspect of this process. It is essential to pay attention to factors likely to affect children's mental health in their early childhood, and measures should be taken to promote emotional and social well-being. In addition, it is essential to consider the impact of technology on children's mental health and establish clear limits on its use to foster healthy development.

2.3 Risks of digital technology in children

The WHO emphasizes that children's use of digital technology entails numerous dangers that may affect their development. These dangers are classified into content-related, interaction-related, and behavior-related problems. Each category signifies distinct obstacles and hazards to children's mental, emotional, and physical welfare.

- Content-related risks: Children may encounter detrimental items, including sexual content, violent media, abusive language, and discriminatory content. This exposure may result in the normalization of hazardous behaviors. Research from UNICEF's Office reveals that digital environments frequently provide unregulated access to unsuitable content, heightening the risks of emotional turmoil and behavioral changes [14]. In 2019, [15] highlighted that excessive usage of digital devices is associated with cognitive and emotional difficulties, including attention issues and anxiety.

  Furthermore, the WHO emphasizes the significance of media literacy programs within preventative initiatives to assist children in identifying and filtering harmful content effectively [16].
- Interaction-related risks: Children's internet interactions may expose them to predators or individuals attempting to engage them in perilous or detrimental activities. The WHO studies identify grooming and online exploitation, especially sextortion, as significant threats. A UNICEF study indicates that peer-to-peer cyberbullying is a considerable concern, frequently resulting in social retreat and emotional distress [14]. Numerous studies have recommended active monitoring and educating youngsters on safe communication and identifying questionable behaviors [15, 17]. Engaging parents and educators in digital monitoring frameworks can enhance the safety of digital environments, mitigating interaction-related risks [18].
- Behavior-related risks: Children's Internet interactions may expose them to predators or individuals attempting to engage them in perilous or detrimental activities. The WHO studies identify grooming and online exploitation, especially sextortion, as significant threats. UNICEF study indicates that peer-to-peer cyberbullying is a considerable concern, frequently resulting in social retreat and emotional distress [15].

  UNICEF emphasizes the importance of supporting surroundings in alleviating such behaviors. Educational institutions adopting inclusive education techniques have observed a decline in aggressive behaviors and enhanced social relationships among students [17].

To combat these risks, the WHO and related research propose the following strategies:

- Parental involvement: Establishing clear usage rules for digital devices and promoting discussions about online safety [16].
- Education: Teaching children about the consequences of sharing personal information and the impact of their online actions [15].
- Monitoring: Supervising children's social media interactions to detect early signs of risky behavior [14].
- Safe technology use programs: Incorporating education on digital citizenship to build resilience and encourage responsible use [17].

These measures aim to foster an informed and cautious approach to digital technology use among children and adolescents.

Faced with these risks, parents and educators must promote responsible use of digital technologies by children and young people. The WHO document provides a series of guidelines to assist parents in achieving this purpose [19]:

- Establish appropriate and previously agreed limits of use for mobile devices.
- Instruct children's and young people on safeguarding their online privacy and not sharing personal information with strangers.

- Monitor children and young people's use of social networks and other online platforms.
- Teach children and young people to recognize and avoid inappropriate content online.
- Encourage open communication and dialogue between parents and children regarding digital technologies.

In summary, the risks associated with digital technology use by children highlight the importance of comprehensive prevention strategies. Content, interaction, and behavior-related risks necessitate a collaborative approach involving parents, educators, and policymakers. By implementing structured guidelines and fostering an environment of communication and trust, children can benefit from the opportunities provided by digital technology while minimizing exposure to its associated dangers.

2.4 Benefits of digital technology in children

According to [20], the key benefits of digital technology are:

Brain development: Digital technology plays a crucial role in shaping children's cognitive and neural capabilities. According to UNICEF, digital platforms offer significant educational advantages that stimulate cognitive engagement, such as increased access to interactive content. This access can contribute to enhanced cortical thickness in prefrontal areas, which is associated with improved executive functions such as decision-making and impulse control.

Cognitive development: Digital learning tools foster significant advancements in cognitive capabilities. Problem-solving skills are enhanced through exposure to scenario-based learning apps and video games that encourage critical thinking and decision-making.

Social-emotional development: Digital connectivity plays a pivotal role in fostering social connections among children and adolescents, especially those in remote or marginalized settings. Online communities provide spaces where users can form friendships and mutual support networks, contributing to enhanced empathy as they share experiences and offer emotional support. Digital interactions also present opportunities for identity exploration, where children experiment with self-expression in safe, creative ways. Platforms like social media and discussion forums help users refine their communication skills by engaging in conversations and collaborative projects.

Mental health and well-being: Digital tools can contribute to stress relief through interactive entertainment, meditation apps, and virtual social spaces. During challenging periods, such as isolation due to illness or natural disasters, digital platforms provide a sense of connectedness, offering children a way to maintain relationships and access mental health resources. Online communities also foster emotional growth, allowing users to process and express their emotions safely.

Additional positive outcomes: Digital technologies empower children by offering platforms for creativity development through content creation tools, such as blogs, digital art apps, and video editing software. Access to diverse learning platforms allows children to explore new areas of interest beyond traditional curricula. Digital ecosystems offer opportunities for skill-building in areas like coding, multimedia production, and foreign language acquisition.

Along the same lines, [21] emphasizes how ICT can improve the quality of education, increase student motivation and interest, and optimize the efficiency and effectiveness of educational processes in Latin America. Likewise, ICTs can contribute to overcoming geographical and socioeconomic barriers and promoting educational inclusion and equity.

However, [21] also emphasizes the need to plan and supervise the use of ICT in education meticulously. The challenges linked to infrastructure, teacher training, and the quality of digital educational content must be addressed to exploit the potential of ICT in the educational field fully. Regarding infrastructure, it is imperative to ensure ICT access in schools and students' homes, especially in rural areas and less favored communities. In addition, adequate equipment and software must be provided and kept up-to-date. Due to this concern for teacher training, the authors highlight the importance of providing training and coaching in effective use of ICT to allow teachers to integrate them into their educational practice effectively. Providing resources and technical assistance to support teachers in effectively using ICT is also essential. Regarding the quality of digital educational content, emphasis is placed on ensuring that the contents are relevant, accurate, and up-to-date and how they are adapted to the needs and characteristics of the students. In addition, tools and resources should be provided to allow students to create their digital educational content.

In summary, while ICTs may have a positive impact on education in Latin America, their implementation requires careful planning and supervision. To fully exploit ICT's potential in the educational field, challenges linked to infrastructure, teacher training, and the quality of digital educational content must be faced.

2.5 Cognitive development and digital technology

[22] shows how digital devices can affect a child's cognitive growth, especially when paying attention, remembering things, and thinking logically. Some studies show that educational apps and interactive digital experiences can improve problem-solving skills, cognitive flexibility, and visual-spatial abilities. However, too much time spent in front of a screen has been linked to attention problems and worse academic success. In the same way, digital tools can have mixed effects on memory. For example, games and engaging learning can help improve working memory. However, they can also make it easier to look up information online, making it harder to remember things.

Real learning happens when digital tools are used on purpose, in moderation, and with educational material appropriate for the child's age. It shows how important it is to have fun and interactive digital activities that improve cognitive skills, like educational games that help with thinking critically and fixing problems. It also shows how important it is to mix digital learning with traditional hands-on activities and face-to-face exchanges to ensure kids' minds thrive [22].

Also [22] indicates how important it is for teachers to know how to use digital devices in the classroom successfully. It talks about how important it is for teachers to get the proper training on the newest educational tools and best practices. The review says that teachers should use adaptive learning technologies, add digital tools to the lessons to keep students more interested, and make blended learning settings that can meet the needs of all their students. Teachers are also very important because they teach students how to be good digital citizens, keep an eye on what content they are using, and make sure that students do not use their devices too much while doing other important learning tasks.

2.6 Technology and social and emotional development in children

Digital technology plays a significant role in children's social and emotional development. Online interactions and social networks can influence their self-esteem and communication skills. Studies such as those by [23] highlight that younger children prefer face-to-face interaction with their peers. At the same time, adolescents seek validation and emotional connection through social media. However, the inappropriate use of technology can lead to situations of cyberbullying, addiction, and social isolation, affecting their emotional stability. Additionally, research by [24] underscores the risks of access to inappropriate content and screen dependency, reinforcing the need for proper parental supervision.

Studies show that the use of mobile devices is an emerging and global topic. [25] emphasize that consumption dynamics and family expectations regarding care and communication influence the use of these devices among children in Latin America. Based on Feenberg's proposal, this approach suggests that technology is not neutral but can become a space of conflict between entertainment and constructing emotional bonds at home. Similarly, in a post-digital context, as described by [24], the presence of technology in everyday life demands critical analysis and inclusive digital education.

The use of mobile devices also impacts family relationships. According to Carrasco Rivas et al., using devices can present an opportunity to share meaningful experiences between parents and children. However, it can also create conflicts due to excessive online time, which affects the quality of family interactions. This finding aligns with the study by [23], who state that children express greater emotional satisfaction when participating in supervised activities compared to independent use, which may lead to isolation.

The appropriate use of technology can foster key socio-emotional skills, such as empathy and conflict resolution. [24] highlight the educational benefits of mobile technologies, such as increased motivation and accessibility to learning, provided that their use is guided and controlled. [23] also report that children experience positive emotions when interacting safely on social networks, demonstrating a greater capacity for self-regulation when parents actively participate.

Parents play a fundamental role in regulating their children's use of mobile devices. A study by [25] emphasizes the importance of establishing clear limits regarding usage time and access to content and the need to implement effective parental control mechanisms. Also [24], add that parents must be informed about the risks and benefits of technology to make informed decisions about their children's digital education and promote responsible use from an early age.

2.7 Impact of technology on education (Academic performance)

Incorporating technology in education has revolutionized the learning process, presenting new opportunities and difficulties for children and adolescents. According to [8], asserts that online education, interactive resources, and educational platforms provide distinctive opportunities by fostering significant learning through engagement with dynamic and tailored content. Also [7] emphasizes that digital tools have facilitated novel instructional techniques, enhancing student autonomy and creativity.

Technology has facilitated instructional resource development, including films, games, and mobile applications, enhancing learning experiences and broadening

educational access for students in diverse locales. The document [9] indicates that applications like Google classroom and Khan Academy enable students to learn at their own pace, enhancing access to high-quality content. Likewise, digital educational resources have been crucial during the COVID-19 crisis, as virtual instruction became imperative to ensure academic continuity.

Technology not only enhances information accessibility but also fosters the development of essential cognitive abilities such as problem-solving, analytical thinking, and creativity. Research conducted by [8, 7] highlights that virtual environments and interactive games help enhance students' memory and attention, promoting active and participatory learning.

Notwithstanding its advantages, overreliance on technology can adversely affect children and adolescents' physical and mental well-being. According to [9], extended exposure to electronic gadgets may result in distractions, sedentary behavior, and impaired concentration. Consequently [7], underscore the necessity of monitoring screen time and the nature of content accessed by students to prevent adverse effects on their academic performance.

Training educators in using technology is crucial for its efficient incorporation into the teaching-learning process. The authors [8, 9] emphasize that educators require ongoing training to effectively utilize technological tools and instruct students in their responsible use.

Furthermore [7], accentuate that effective ICT adoption necessitates educational strategies that integrate conventional methodologies with digital innovations.

In summary, technology in education has demonstrated its efficacy as a significant resource for enhancing learning quality and mitigating access restrictions. To optimize its advantages, it is crucial to establish rules that guarantee fair access to ICT, provide teacher training, and oversee pupils' responsible utilization of technology. Technology can only effectively enhance the education of children and adolescents in this manner.

However, it is important that parents and educators supervise the use of technology by children and young people and establish clear limits regarding the time and type of content they can access. Additionally, it is important that teachers are trained to use technology effectively in the classroom and to teach children and young people to use technology responsibly and safely.

2.8 Digital parenting strategies

The paper by [26] emphasizes how parents and caregivers play a fundamental role in regulating children's use of technology. Digital parenting strategies, such as establishing screen time limits, content supervision, and promoting balanced use of technology, are important to mitigate potential risks and maximize the benefits of digital technology in children's development. Digital parental mediation is important today because children's use of technology has become increasingly common. Also, the author focuses on the need to think about and design accompanying, educational, and contextualized actions for using digital technologies during early childhood.

Also [26] presents a systematized review of studies conducted in digital parenting that specifically address children under 6 years of age. For this purpose, various search equations were used, such as "Digital Parenting" AND "Young Children" OR "preschool Children" OR "toddlers," "Screen time" AND "Young Children" OR "preschool Children" OR "toddlers," and "Digital parental mediation" AND "early childhood" OR "childhood" OR "children."

In the document [26], 32 studies published in papers, reports, conferences, and book chapters were analyzed where the inclusion criteria were followed. The results indicate that digital parental mediation is fundamental to ensure children's appropriate and safe use of technology. In this sense, parents should be aware of the importance of their role in their children's digital education and be willing to learn and adapt to new technologies. Furthermore, it is important that parents establish clear limits regarding the use of technology and that these limits are consistent with the needs and characteristics of each child.

The studies analyzed by [26] also highlight the importance of active parental mediation in internet use and online safety. In this sense, parents should be present and supervise their children's use of technology, explaining the risks and teaching them to navigate safely online. Additionally, parents should be role models for their children regarding the use of technology and should encourage the use of technology creatively and educationally. In this sense, parents must get involved in using technology with their children and use educational applications and games to promote learning and skill development.

Another important aspect mentioned by [26] is the need for parents to be informed about the latest trends and developments regarding children's use of technology. In this sense, parents must stay updated and seek information from reliable sources specialized in digital education. Regarding parenting styles, the studies highlight the importance of authoritative parenting, which combines support and control, to ensure appropriate and safe use of technology by children.

Furthermore, [26] emphasizes the importance of parents being flexible and adapting their parenting style to the needs and characteristics of each child. In conclusion, [26] emphasizes the importance of digital parental mediation in children's digital education in early childhood. Parents should be aware of their role in their children's digital education and should be willing to learn and adapt to new technologies. Additionally, it is important that parents establish clear limits regarding the use of technology and that these limits are consistent with the needs and characteristics of each child.

3 METHODOLOGY

3.1 Research and implementation techniques

- Documentary research: An extensive bibliographic and documentary review was carried out. This included consulting scientific studies, books, government reports, and academic literature related to childhood, the influence of digital technology, and best practices in the use of mobile applications for parental monitoring. This stage aimed to establish a solid knowledge base and understand the trends, risks, and benefits associated with using digital technology in children.
- Development of a mobile application: In this phase, a specific mobile application was designed and developed to allow parents to monitor and manage their children's time spent in front of electronic devices, such as tablets and mobile phones. Multiple iterations of design and development were carried out to ensure the application's usability, security, and accessibility.
- Parent questionnaires—first stage: Before implementing the application, questionnaires (see Figure 1) were administered to parents to evaluate their perceptions, concerns, and expectations related to their children's use of digital technology. These questionnaires allowed us to understand the challenges faced by parents and collect valuable input to customize the application according to their needs and expectations.

Fig. 1. Questionnaire developed for parents (pre-test)

Source: Figure of own authorship, 2023.

The figure shows the header and title of the questionnaire, which was created with the intention of gathering information from parents to know their opinion about the topic and in turn, about their interest in an application focused on the topic. Field Implementation: The application was implemented in the practical environment. A group of 15 children participated in this phase, and the application was installed on their electronic devices. During the implementation period, children's behavior regarding the use of electronic devices and the impact of the application on their daily routine were observed and recorded (see Figure 2).

Fig. 2. Juan José de los Reyes Martínez "El pípila" primary school

Source: Figure of own authorship, 2023.

The Figure 2 shows the main entrance of the primary school where permission was requested to apply the research in the field, taking as a sample a child belonging to the school.

Previous design of the software interface. In Figure 3, the views elaborated for registration within the application can be visualized.

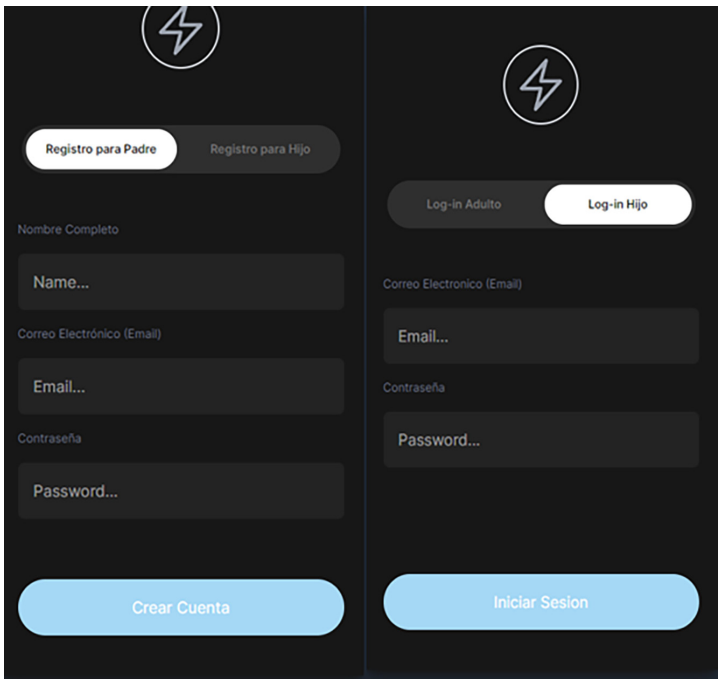

Fig. 3. Mockup of the registration screen

Note: The figure shows the design created for registration or login for both parents and children. (Figure of own authorship, 2023).

In Figure 4, the view of the application can be seen once registration and entry have been made by the tutor. As can be observed within the application the tutor will be able to see the children registered in the application, as well as perform real-time monitoring.

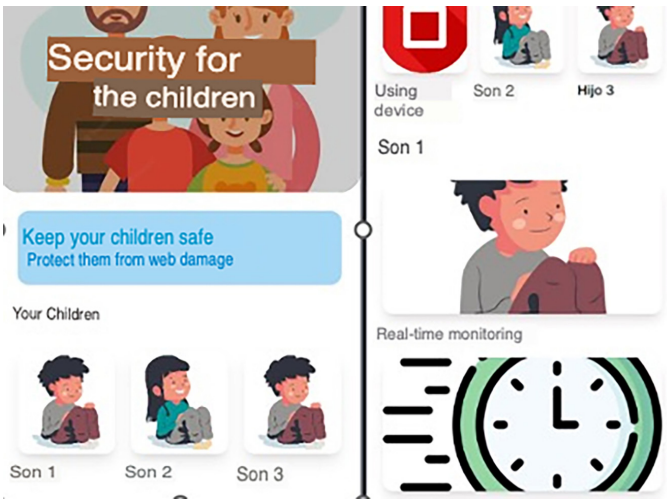

Fig. 4. Mockup of the app entry screen

Source: Figure of own authorship, 2025.

The figure shows the design created for the view once inside the application, where we can see some of the options available within the application.

Final design of the application. Final content of the developed application iBalanceKid. The design of the login screen for both parents and children are shown (see Figure 5).

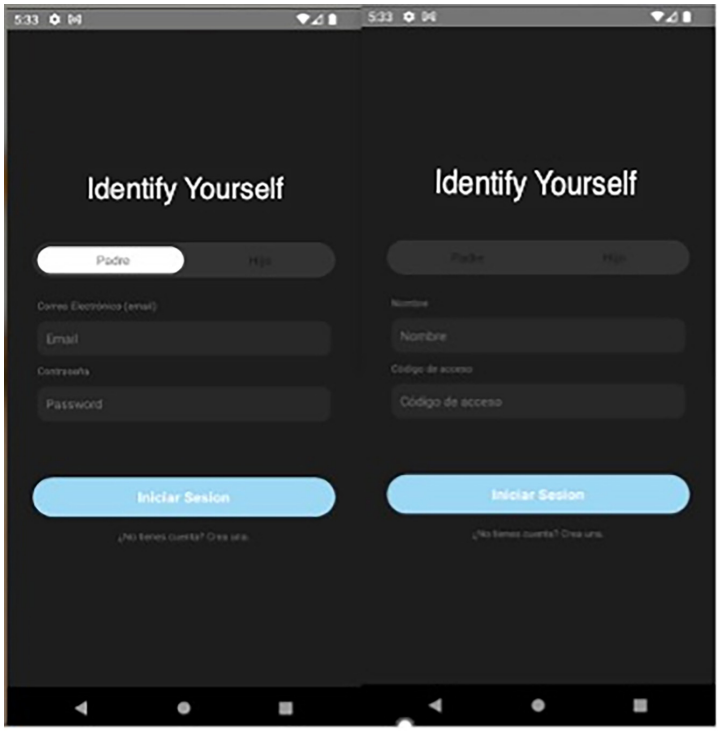

Fig. 5. Final design of registration in iBalanceKid

Source: Figure of own authorship, 2025.

The figure shows the final design developed for the application for the registration section.

Content of the registration screen (see Figure 6) in which the data required to generate an account are observed.

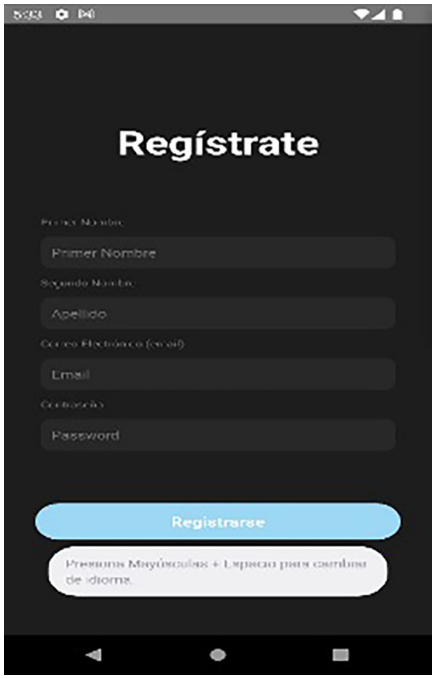

Fig. 6. Final design of the content within the registration screen in iBalanceKid

The figure shows the data requested to be able to register within iBalanceKid. View within the application once the parent's account has been generated and the moment when device linking begins (see Figure 7).

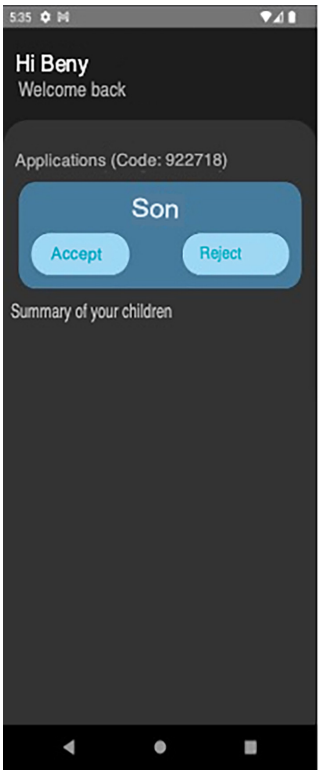

Fig. 7. View of the parent's entry in iBalanceKid

Source: Figure of own authorship, 2023.

The figure shows the view from the parent's session, and in it, it is observed that there is a linking request. Device linking waiting process. The device used by the child or children's devices is linked to the parents' electronic device (see Figure 8) once the linking has been accepted and the required code has been entered.

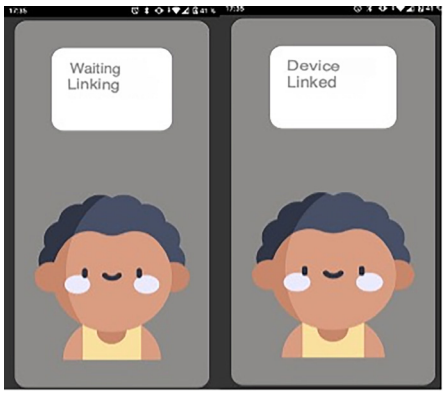

Fig. 8. View of the parent's entry in iBalanceKid

Source: Figure of own authorship, 2023.

The figure shows the main entrance of the primary school where permission was requested to apply the research in the field, taking as a sample child belonging to

the school. View now of accepting the link with the electronic device that the child will be using and with which they will be monitored (see Figure 9).

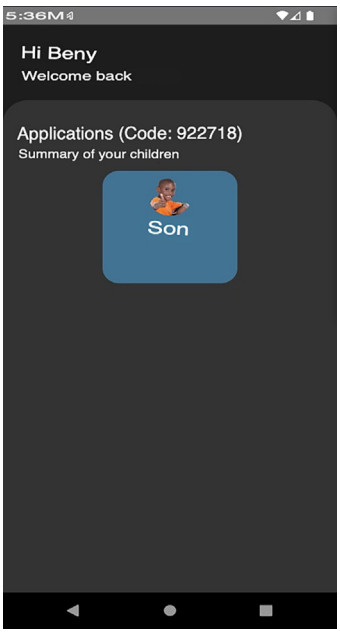

Fig. 9. The request code and summary of registered children are shown

Source: Figure of own authorship, 2023.

The figure shows the summary of the children who are registered within the application, as well as the request code. View of the screen where information about the applications used by the child and which are detected by the application is displayed (see Figure 10).

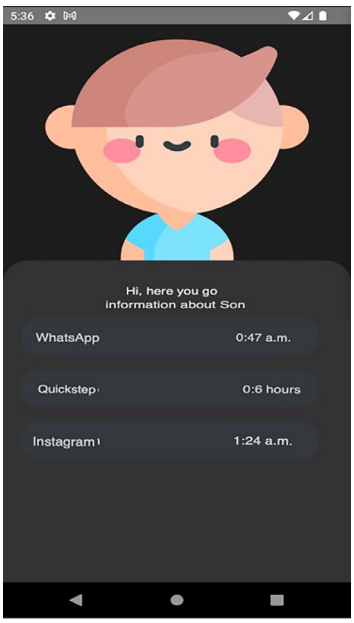

Fig. 10. View of the child's information related to the applications used

Note: The figure shows all the information regarding the time of the applications, which the application detects as active and which the child is using on their respective electronic device where they are interacting. (Figure of own authorship, 2023).

Logo design made with the intention of presenting a friendly, eye-catching image of interest to the public (see Figure 11).

- Second parent questionnaire–subsequent evaluation: Once the implementation period was completed, questionnaires were administered to parents again. These questionnaires focused on evaluating parents' perception regarding the usefulness of the application, any perceived improvement in children's behavior and performance, and whether the application had a positive impact on family dynamics.
- Questionnaire to a child psychology expert: To obtain a professional and specialized perspective on the project, an interview was conducted with a child psychology expert. The purpose was to evaluate the effectiveness of the approach and obtain recommendations based on the expert's experience and knowledge.

  According to psychologist Antonio Gómez, the influence of digital technology on children's cognitive and emotional development can be considerable. He mentions that exposure to electronic devices and digital media provides significant opportunities for learning and developing cognitive skills, such as problem-solving and creativity. However, he emphasizes how excessive or inappropriate use could lead to negative effects on children's emotional development, such as decreased face-to-face social interaction and exposure to inappropriate content.

  Gómez raises concerns about the long-term implications of intensive digital technology use on children's academic and creative development. He underscores the importance of balanced technology use and promoting activities outside of it to ensure children's holistic development. Finally, the expert emphasizes the importance of establishing clear rules and time limits for the use of electronic devices at home. He suggests creating technology-free areas and active parental participation in technology use alongside children to foster a supervised and shared experience.
- Statistical analysis and graphics: Data analysis and graphical representation techniques were used to summarize and visualize the results of the questionnaires. This included bar graphs and pie charts to clearly and effectively show parents' perceptions and the impact on children.

  In summary, the methodology was based on rigorous documentary research, the development of a specific mobile application, interaction with parents and children, and consultation with a child psychology expert. These approaches allowed for a comprehensive evaluation of the project and supported the conclusion that the mobile application proved to be an effective tool for addressing digital technology use in childhood and promoting a more balanced and healthy approach.
- Evaluation instruments:
  - **a)** Questionnaires for parents. The questionnaires were designed to measure parents' initial opinions regarding their children's use of technology. These questionnaires also allowed for the evaluation of their perceptions after the implementation of the mobile application.
  - **b)** Field test data. quantitative data was collected detailing the time spent by children in front of screens before and after the introduction of the application. To facilitate analysis, this data was graphically represented. Data collection

was done through Google Forms, obtaining the potential benefit of automatic generation of response percentages in graph forms.

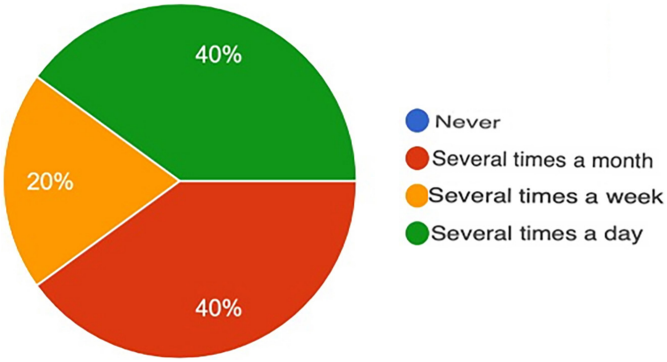

Fig. 11. How often do children use electronic devices (tablets, mobile phones, computers, video game consoles)?

Source: Figure of own authorship, 2023.

The graph shows the results obtained from the question asked and already plotted in a pie chart, which displays the percentages of responses obtained. Figure 11 visually details the percentage of frequency of electronic device use by children. According to the percentages, 20% of children use electronic devices several times a week, 40% use them several times a month, and the other 40% use them several times a day. 0% of the group never uses them.

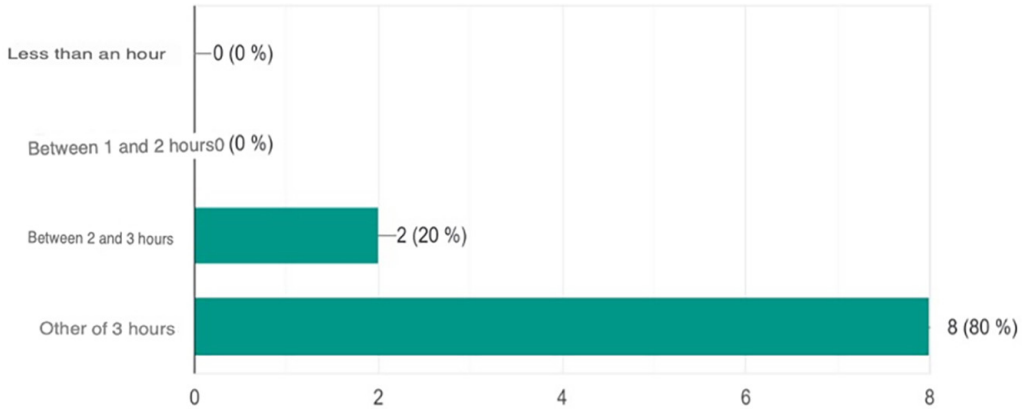

Fig. 12. How much time per day do children use electronic devices?

Note: The graph shows the average number of hours children spend using electronic devices, where the maximum number of hours used can be seen, being more than three hours. (Figure of own authorship, 2023).

Figure 12 visually details the percentage of how much time per day children use electronic devices. According to the percentages, 0% of children use them for less than one hour, 0% use them between one and two hours; on the other hand, 20% of the group uses them between two and three hours, and finally, 80% use them for more than three hours.

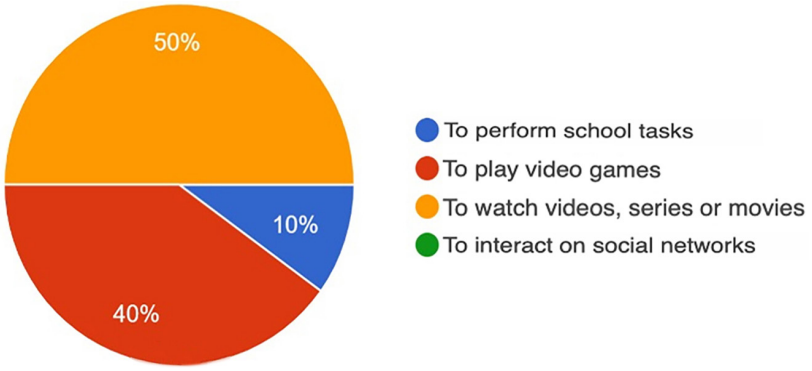

Fig. 13. For what purpose do children use electronic devices?

Source: Figure of own authorship, 2023.

The graph shows the reasons for use for which an infant requires using an electronic device. Figure 13 visually details the percentage of parents who establish time limits regarding the use of electronic devices. According to the percentages, 10% of parents do implement time restrictions; however, 90% of parents do not implement this restriction due to different reasons, some of which range from work-related issues to household chores or simply for the infant's entertainment. The situation presented in this case is concerning due to the parents' authority and awareness of the risk situations for the infant from spending excessive periods with these devices.

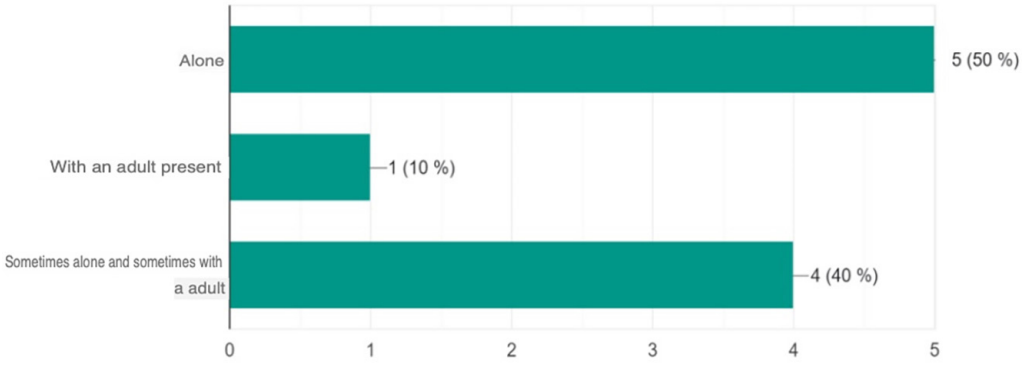

Fig. 14. For what purpose do children use electronic devices?

Figure 14 shows the percentage of parents who are supervising when their child is using an electronic device.

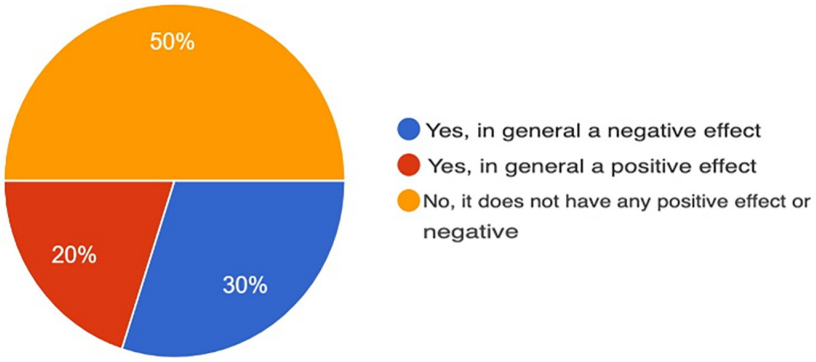

Fig. 15. Do you think the use of electronic devices has any effect on children's behavior?

The graph shows parents' opinions on the use of electronic devices by children. Figures 15 and 16 may show a relationship where both mention whether these devices can cause any type of effect on the child. Figure 15, the percentages are shown regarding whether parents consider the use of these devices to be harmful, positive, or have no impact at all. On the other hand, Figure 16 shows parents' opinions on whether the use of these devices has any impact within the school environment. In Figure 15, 50% considered the use of these devices as neutral, with neither benefits nor harm. In contrast, in Figure 16, 60% considered the use of these devices as beneficial for the child's school performance.

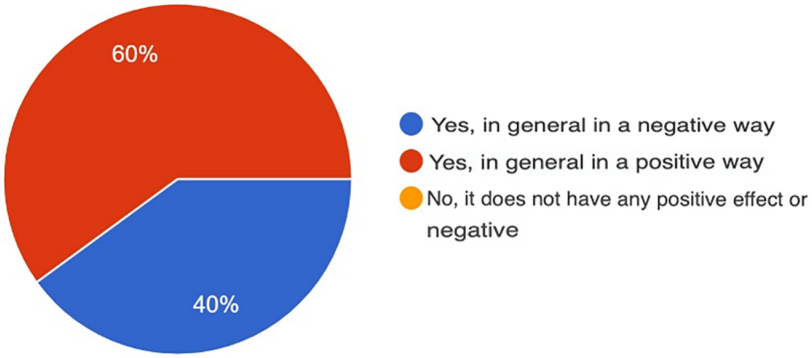

Fig. 16. Do you think the use of electronic devices can affect children's school performance?
Source: Figure of own authorship, 2023.

The graph shows parents' opinions when asked about the impact of these devices on school performance. In Figures 17 and 18, there is a coincidence of 50% and 50%. Figure 17, which addresses whether children have access to inappropriate content, 50% of parents were aware that they do not, while the other 50% were unsure. Figure 18 mentions whether parents or guardians should have greater control over the use of these devices, and similarly, 50% opted for yes and the other 50% opted for no.

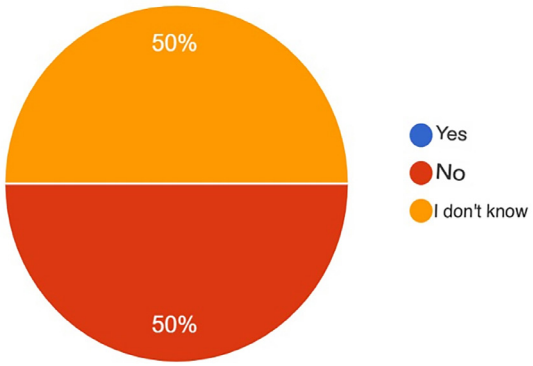

Fig. 17. Do you think the use of electronic devices can affect children's school performance?

The graph shows the percentage of parents' knowledge regarding the content visited by their children.

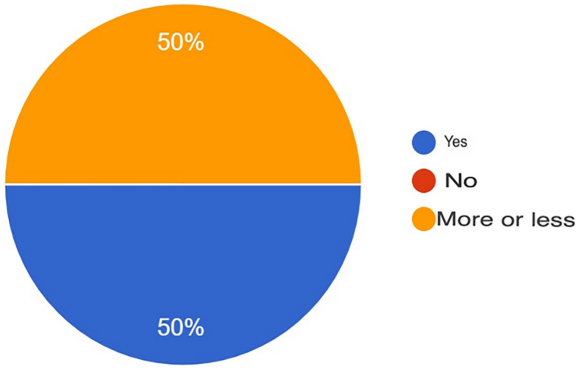

Fig. 18. Do you think parents or guardians should have more control over children's use of electronic devices?

The Figure 18 shows the parents' stance on whether they should have greater control over the use of electronic devices when their children are using them. The results show that 50% consider yes and the other 50% consider the opposite, that is, supervision should be very moderate, almost non-existent.

In Figure 19, according to the percentages shown in the graph, 10% preferred to engage in artistic and cultural activities, another 10% opted for outdoor activities, 20% selected board games, another 20% chose physical activities, and lastly, 40% decided on all of the above as their answer.

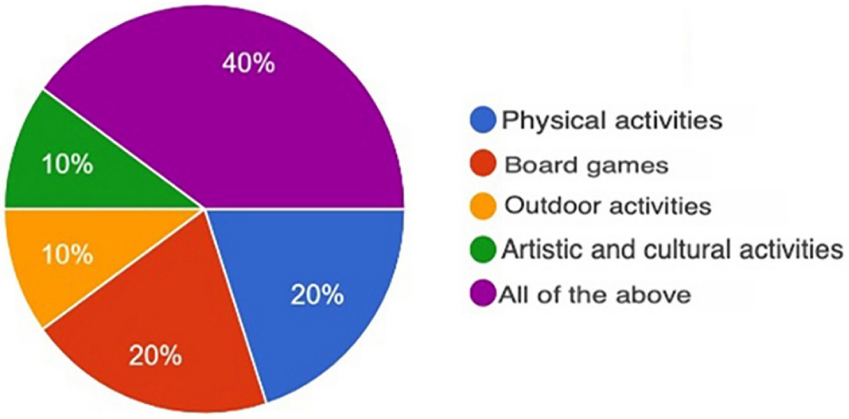

Fig. 19. What activities do you think could be done instead of using electronic devices to promote children's development?

The Figure 19 shows parents' opinions on carrying out other activities with the intention of reducing the use of electronic devices by their children. The interview with the expert in child psychology was conducted with the aim of obtaining high-value qualitative information on the psychological aspects surrounding children's development in relation to digital technology.

4 RESULTS

The implementation and execution of the project "The Influence of Digital Technology on Children's Development" yielded notable results and provided a more comprehensive view of its impact. The detailed results are presented below:

4.1 Technology use monitoring

The developed mobile application allowed parents to accurately track the time their children spent in front of electronic devices. This monitoring revealed that, on average, children reduced their screen time by 40% compared to the period before the application's implementation. This decrease in screen time suggests that the application was effective in controlling and reducing excessive use of electronic devices.

4.2 Improvement in school performance

Parents reported an average improvement of 20% in their children's school performance after using the application. This could be due to the fact that children spent less time in front of screens and more time dedicated to learning activities (see Figures 20 and 21).

Fig. 20. Physical performance within the school

The figure shows children being active and engaging in a recreational and physical activity, which promotes their social interaction and prevents sedentary behavior.

Fig. 21. Physical performance within the school

The figure shows the recess period where children are observed in social interaction without the need for the presence of any electronic device. The established social relationships are also appreciated.

4.3 Change in attitude towards technology

The application also influenced children's attitudes towards digital technology. A reduction in dependence on electronic devices was observed, with an increase in participation in physical activities, reading, and interactive games. Parents noticed a more balanced and healthier attitude towards technology in their children.

4.4 Expert opinions

The interview with the child psychology expert supported the obtained results. The expert agreed on the benefit of the application in providing an effective approach to control and manage children's screen time, which can contribute to healthy development.

4.5 Graphs and statistical data

The collected data was effectively presented through graphs and statistics. The graphs clearly demonstrated the reduction in screen time and improvement in school performance, which allowed for a more accessible visualization of the results for parents and other interested parties. Overall, there was a 60% benefit in the effectiveness of the application in terms of its use with children, as well as general improvements in the child across various areas (see Figure 22).

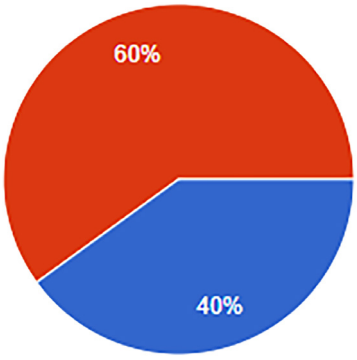

Fig. 22. Did you find the use of the application helpful?

The graph shows the results obtained after the period of field application of the app. The results show that 40% of parents did not find the application very useful. However, 60% show the complete opposite, finding the application useful and noticing improvements in their children.

These combined results suggest how the mobile application played a fundamental role in promoting a healthier and more balanced approach to digital technology in childhood. It provided parents with an effective tool to monitor and manage their children's screen time, which resulted in a decrease in excessive use of electronic

devices, improvements in school performance, and healthier attitudes towards technology in general. The statistical data and expert opinion supported and validated these results, highlighting the usefulness and relevance of the application in the lives of children and their families.

5 CONCLUSION

The project "Technology in Childhood: Mobile Application for Managing Screen Time" provided a deeper understanding of the relationship between digital technology and childhood and the effectiveness of the mobile application developed to address this issue. The conclusions derived from this study shed light on several fundamental aspects:

Positive impact of the mobile application. The results obtained after implementing the mobile application revealed a positive impact on children's development. The ability to monitor and limit screen time translated into a decrease in excessive use of electronic devices, which had a direct effect on school performance and children's attitude towards technology. This balanced approach is essential to promote healthy development in childhood.

Promotion of mental health and well-being. The project highlighted the importance of fostering children's mental health and well-being from an early age. The mobile application helped reduce screen time and influenced children's quality of life by increasing their participation in physical activities, interactive games, and reading. These changes contributed to developing social, emotional, and cognitive skills.

Fundamental role of parents. Parents play a crucial role in regulating screen time and technology use by their children. The mobile application empowered parents with an effective tool to monitor and control screen time. The positive opinions of parents who participated in the project reinforce their importance in the upbringing and development of their children.

Community response. The project's success rate, where approximately 70% of children and parents reported significant benefits, suggests that the community recognizes the need to address the influence of digital technology in childhood. This project could be a model for future initiatives to promote balanced and healthy use of technology in children's lives.

Need for continuous education. While the mobile application proved effective, the conclusions also highlight the importance of continuous education on technology use. Parents and caregivers should receive guidance and additional resources to proactively address the influence of technology in their children's lives.

Benefits of interdisciplinary research. The project's inclusion of a child psychology perspective, through the interview with an expert, enriched the understanding of the psychological aspects of children's development through digital technology. This interdisciplinary approach can be applied to future research projects to obtain a more comprehensive view of issues related to childhood and technology.

The project has conclusively demonstrated that digital technology significantly impacts children's development. The mobile application proved to be an effective tool for addressing this challenge and promoting the balanced use of technology. Furthermore, it highlights the importance of continuous education, active parental involvement, and the need to consider children's well-being in the digital age. These conclusions offer a solid foundation for future research and efforts to ensure healthy childhood development in an increasingly technological world.

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