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Mobile Technologies in Education: Parents' Preferences for Tools Supporting Children's Development

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Abstract

Aim: The aim of the article is to analyse parents' preferences regarding the use of mobile applications in children's education and to identify the key features of applications that they consider most valuable.

Methodology: The study was conducted using an online survey targeting parents of children in grades 1-8 (N = 121, pilot study), exploring their preferences for educational apps and mobile technology.

Results: Over 60% of children use mobile devices every day mainly for entertainment purposes, less often for educational purposes. Parents point out the importance of applications that develop logical thinking, creativity and manual skills.

Implications and recommendations: Mobile apps have the potential to support children's development, provided they are tailored to their age and needs. Teachers' and parents' awareness of the effective use of these tools should also be raised.

Originality/value: The survey provides unique data on parents' preferences and perceptions of technology, which can help design more effective educational applications.

Keywords: mobile technology, education and child development, educational apps, gamification

1. Introduction

The rapid development of mobile technologies and their integration into education has significantly changed the way children acquire knowledge and develop skills. Mobile devices such as smartphones and tablets have become ubiquitous in everyday life and their potential for teaching and learning is of increasing interest to researchers, educators, parents and developers of modern educational tools. Mobile solutions supporting education are part of the EdTech sector, which encompasses innovative technologies related to educational processes, e.g. e-learning platforms, digital tools, hardware, software, which facilitate teaching and the development of soft and hard competences among audiences. Related to the above is the concept of STEAM (Science, Technology, Engineering, Art, Mathematics), a learning model that takes the form of projects and workshops, provides for creating new things, checking, testing and drawing conclusions and seeking solutions (Stream Education). The European EdTech market, valued at \$20 billion, is expanding at 14% annually and is projected to reach \$60 billion by 2027, according to Brighteye Ventures (Dziewit, 2021).

Analysing the impact of mobile technologies on the development of school-age children and diagnosing the preferences of users — especially parents — is an important element and challenge in the design of educational tools. This article attempts to fill the gap in the aforementioned area and provide key information regarding the role of mobile apps in the learning process and their impact on the development of children's cognitive, manual and social competences.

This paper aims to analyse parents' perspectives on the use of mobile technologies and educational applications in primary education. It focuses on their preferences, key features they consider important in apps, and the frequency of their children's mobile device usage. The research questions focus on identifying the factors that determine the effectiveness of mobile technologies in education, as well as understanding how gamification mechanisms and opportunities to interact with physical reality influence students' engagement in learning.

The structure of the article includes an analysis of the literature on the subject, a description of the methodology used and presentation of the results of the survey conducted among parents of children attending grades 1-8 (N = 121, pilot study). The discussion section discusses the relevance of the results obtained in the context of designing modern educational tools. The article concludes with recommendations for educational practitioners and directions for further research in this area.

The study presented here is based on current national and international reports and key theoretical work. The article points out the potential of mobile apps as tools to support education, while emphasising the need to adapt them appropriately to the needs of students and their families.

2. Literature Review

Technological advances, particularly in mobile devices, educational apps, and digital teaching tools, are transforming education. Smartphones, due to their versatility, can effectively support learning. Integrating mobile technologies improves access to knowledge and allows for flexible, personalised learning. However, responsible use is essential to minimise risks such as digital addiction and social isolation (Musiał, 2018).

Chomiak-Orsa and Smoląg (2022) stress the need to balance educational content delivery with student interaction in remote learning. Effective e-learning requires careful management of synchronised and asynchronised methods, particularly in crises like COVID-19. This highlights the adaptability needed in modern educational technologies.

Parental involvement is crucial in guiding children's responsible use of digital tools (Jaroszewska, 2023). While parents see the benefits of educational apps, limited access to professional resources hinders

effective guidance. Media literacy education is vital for both children and caregivers to ensure safe and meaningful technology use (Jaroszewska, 2023).

Digital technologies play a major role in STEM and STEAM education. Research shows that interactive computer games enhance creativity, critical thinking, and problem-solving. These games support both science and artistic development, proving effective but requiring further adaptation to young learners' needs (Mińkowska, 2021).

Curyło and Ciesielka (2024) have further explored the potential of gamification in primary education, especially in teaching programming. Their research demonstrates how gamified online platforms can significantly boost student engagement and motivation. By incorporating game-like elements such as rewards, challenges, and storytelling, these tools transform the learning process into an engaging experience, particularly for younger learners. The results suggest that gamification is an effective strategy for fostering digital skills in children (Curyło & Ciesielka, 2024).

Mobile applications further support cognitive development. These apps provide interactive content and help build analytical and organisational skills. Algorithm-based tools, such as simulators, foster logical thinking and problem-solving, which are essential in STEM fields. Al-driven apps adjust difficulty levels, enhancing personalisation and learning effectiveness (Słaby, 2014).

Another solution used in learning is e-learning, a rapidly developing form of learning that offers unique opportunities in the context of remote and hybrid learning. Research studies signal that e-learning supports multi-sensory learning, which allows for a more effective acquisition of knowledge. A key advantage of this method is its adaptability to individual learners' needs and its time and space flexibility. At the same time, the need for further research into the effectiveness of this approach is highlighted, especially in the context of developing 21st-century skills such as critical thinking or problem solving (Kolasińska-Morawska & Pytel, 2017).

Empirical studies on the impact of educational apps on children's development were also conducted by Falloon (2019) and Papadakis (2020). Their results indicate that the effectiveness of apps increases when they are used in a moderated way by teachers or parents, which suggests the need to consider social and pedagogical factors in the design of educational apps. Additionally, research by Kim and Reeves (2007) shows that apps using gamification mechanisms, such as points, badges, and challenges, can increase children's engagement in learning, provided that they are tailored to their skill level and interests.

The COVID-19 pandemic accelerated the adoption of digital education. Research by Sułkowski et al. (2022) highlights how e-learning platforms not only improved learning outcomes but also developed digital competencies crucial for the workforce.

Despite benefits, digital technology poses risks such as electronic aggression and addiction. Łukawska (2021) emphasises the need to teach children constructive technology use. Developing interpersonal skills, empathy, and conflict resolution abilities is crucial. Teachers and parents must actively guide children through the digital world to mitigate negative effects on mental and social well-being.

Finally, Podemska-Kałuża (2018) highlights the potential of gamification not only in STEM education but also in teaching humanities such as literature. Her research shows that incorporating gamified elements into traditional curricula can enhance student engagement and foster a deeper connection with the material. This aligns with the broader trend of using gamification as a cross-disciplinary educational tool.

The research literature clearly points to the potential of modern technology in the educational process. Mobile devices, e-learning, computer games and educational applications offer opportunities for personalisation, interactivity and support for lifelong learning. However, the effectiveness of their use depends on adequate infrastructural preparation, teacher training and further research into their impact on students' competence development.

3. Methodology

The aim of the study was to examine the impact of modern mobile technologies on the learning processes of children in primary school (grades 1-8), with a particular focus on parental preferences regarding educational tools and their effectiveness. The study employed a quantitative approach, using an online survey completed by 121 parents. The sample was purposive, meaning the results are not fully representative of the broader population. Respondents were primarily recruited via online forums and social media groups related to education, which may have influenced their profile, particularly in terms of their interest in educational technologies. Participation in the study was voluntary and respondents were informed of the anonymity and purpose of the study before completing the questionnaire.

The survey remained open for three months (August-October 2024), and participation was voluntary and anonymous. The questionnaire comprised three main sections: demographic data (age, gender, place of residence, number of children), mobile technology preferences and usage (types of devices, most frequently used applications, frequency of educational tool usage), and an assessment of their effectiveness. The relatively small sample size and the lack of random sampling limit the generalisability of the findings, particularly concerning parents with lower digital literacy or those who use educational applications less frequently. Detailed characteristics of the research sample are presented in Table 1.

Table 1. Characteristics of the research sample

| Category | Subcategory | Number of respondents | Percentage | |
|--------------------|-------------------------|-----------------------|------------|--|
| Age | 28-34 years | 31 | 24.6 | |
| | 34-39 years | 37 | 29.4 | |
| | 39-45 years | 22 | 17.5 | |
| | 45-50 years | 20 | 15.9 | |
| | 50-56 years | 4 | 3.2 | |
| | 56-61 years | 7 | 5.6 | |
| Sex | women | 67 | 55.37 | |
| | men | 51 | 42.15 | |
| | I do not want to answer | 3 | 2.48 | |
| Place of residence | village | 22 | 18.2 | |
| | city up to 20,000 | 21 | 17.4 | |
| | city of 20,000-100,000 | 25 | 20.7 | |
| | city 100,000-250,000 | 16 | 13.2 | |
| | city over 250,000 | 23 | 19 | |
| | suburbs | 14 | 11.6 | |
| Number of children | 0 | 22 | 18.2 | |
| in grades 1-3 | 1 | 76 | 62.8 | |
| | 2 | 17 | 14 | |
| | 3 | 3 | 2.5 | |
| | 4 | 2 | 1.6 | |
| | 6 | 1 | 0.8 | |
| Number of children | 0 | 25 | 20.7 | |
| in grades 4-8 | 1 | 81 | 66.9 | |
| | 2 | 12 | 9.9 | |
| | 3 | 2 | 1.6 | |
| | 6 | 1 | 0.8 | |

Source: own elaboration based on the survey.

The largest group of respondents in the survey were those aged 34-39 (29.4%), followed by those aged 28-34 (24.6%), indicating a significant predominance of respondents under 40 years of age. In terms of gender analysis, women predominated, accounting for 55.37% of the sample, while men represented

42.15% and only 2.48% of people did not wish to disclose their gender. In terms of place of residence, the largest group were residents of cities with a population of 20,000-100,000 (20.7%), followed by residents of cities with a population over 250,000 (19%) and rural areas (18.2%). The vast majority of respondents had one child in primary school grades 1-3 (62.8%), while 18.2% of respondents had no children in this age group. A similar trend applied to children in grades 4-8, where 66.9% of parents indicated having one child in this range, while 20.7% of respondents had no children in this group.

The collected data were statistically analysed using Microsoft Excel and SPSS. The analysis included:

- calculating basic descriptive statistics,
- · creating graphs and tables to illustrate key relationships,
- comparison of results across selected demographic groups.

The methodology adopted allows for results that will inform conclusions about the impact of mobile technology on the way primary school-aged children learn.

4. Results

Figure 1 shows the relationship between children's mobile device usage frequency and their primary activities. The results show that games and entertainment dominate, especially among daily users (61 responses) and those using devices several times a week (22). Entertainment remains prevalent regardless of frequency. Listening to music is another common activity, mostly done daily (42) or several times a week (13), with minimal engagement from infrequent users.

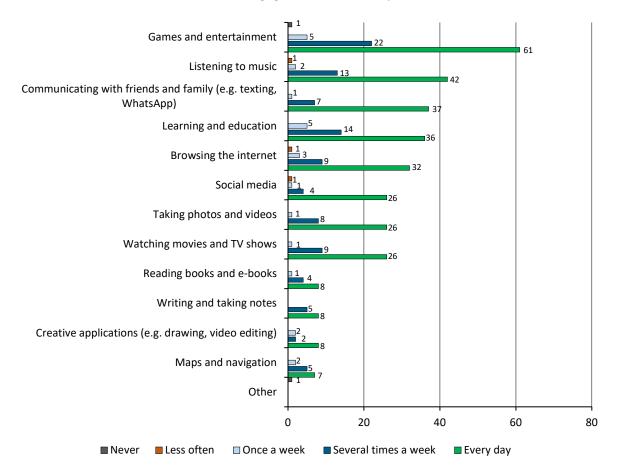


Fig. 1. Relationships between the frequency of children's use of mobile devices and the purposes for which they most often use them

Source: own elaboration based on the survey.

Communication via SMS or apps like WhatsApp is a primary activity for daily users (37), decreasing significantly among those who use devices less often. Learning and education follow a similar pattern, mainly used daily (36) or several times a week (14), suggesting that educational tools are incorporated into structured activities. Browsing the internet mirrors this trend, with 32 responses for daily use and 9 for several times a week. Watching films, taking photos, and recording videos are equally popular among daily users (26 each) and those using devices several times a week (9 and 8). Social media is most frequently used by daily users (26), with minimal engagement from those using devices less frequently. Creative tasks, such as drawing, video editing, and note-taking, are less common, mainly occurring daily (8 each) or several times a week (2-5). Reading books, maps, and navigation apps also show declining use with less frequent access. Overall, mobile devices are primarily used for entertainment and communication, especially among daily users. Educational and creative applications, while valued, are less common and strongly linked to device usage frequency. These findings indicate that the regularity of mobile device use directly impacts the range and type of activities children engage in.

Figure 2 shows which educational aspects are most important for parents in games used by their children. The most frequently indicated value was self-development and creativity – as many as 64 people considered this aspect to be crucial. The development of manual skills was also important, as indicated by 63 respondents, which may indicate that parents are very interested in developing their children's technical and creative skills. Developing logical thinking and problem-solving skills was indicated by 50 people, which shows that parents value games that develop intellectual skills. Learning mathematics and counting skills as well as developing language skills were also important aspects – both of these areas were selected by 44 respondents. Other educational aspects, such as learning foreign languages (40 responses), learning programming and algorithmic thinking (28 responses) and developing creativity and artistic abilities (27 responses), were also important for some of the respondents. Lesser importance was attributed to aspects such as financial education (17 responses) or environmental education (22 responses).

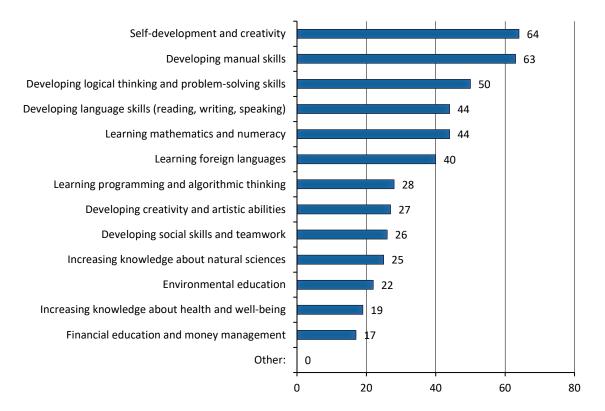


Fig. 2. What educational aspects are most important to you in the games your child uses?

Source: own elaboration based on the survey.

Figure 3 illustrates the relationship between the perceived importance of application content influencing physical objects and the effectiveness of gamification in engaging children. Among parents who believe gamification "definitely increases" engagement, most (18) rated this feature as "very important," indicating a strong link between gamification and interactive physical elements. Few in this group considered it "not important" or "not very important," reinforcing their preference for applications with tangible interactions. Parents who think gamification "rather increases" engagement also largely rated physical interaction as "important" (32), though some (6) viewed it as "not very important," showing some variation in opinions. Neutral respondents were divided, with most responses falling into "important" (16) and "not very important" (12), suggesting a more moderate stance. Sceptics ("rather not" or "definitely not") generally still found physical interactions "important" (3 in each group), with a minority rating them "very important" (1). In general, those who see value in gamification tend to prioritise interactive physical elements. While positive respondents ("rather yes" and "definitely yes") strongly favour these features, neutral and sceptical groups show more mixed opinions. The findings highlight a synergy between application interactivity and gamification in enhancing children's learning engagement.

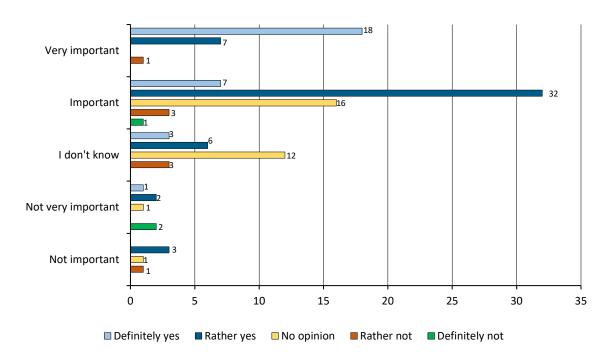


Fig. 3. The relationship between the assessment of the importance of the impact of application content on physical objects created by the child and the perception of the effectiveness of gamification elements in increasing children's engagement in learning

Source: own elaboration based on the survey.

The data in Figure 4 shows that the most important criterion when choosing educational games for parents is educational value – indicated by 71 respondents. The second key factor is price (52 people), followed by content security (44 people). Also important are ease of use and visual appeal (30 indications each), as well as adaptation to the child's age (28 people). Other important criteria include user opinions (24 people), a variety of difficulty levels and the lack of advertising (20 indications each). Less important, but still significant, were, for example, the ability to play offline and in multiplayer mode (17 indications each). The least frequently selected criteria are personalization options (11 people) and well-known brands or recommendations (6 people). To sum up, the most important criteria for parents are primarily educational value, price, content security, as well as ease of use and visual appeal. Aspects such as personalization or institutional recommendations are less important, which indicates that parents focus mainly on the practical and educational aspects of games.

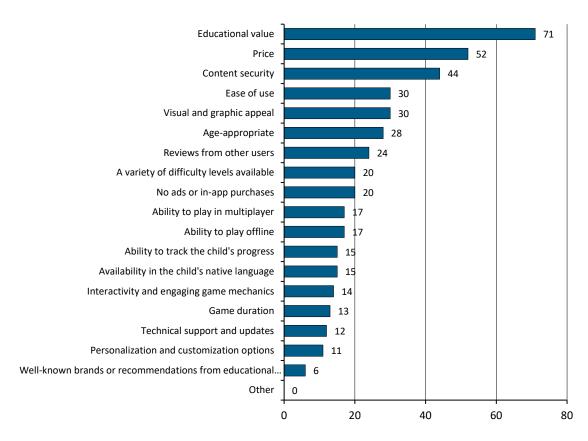


Fig. 4. What criteria are most important to you when choosing mobile educational games for your child? (select up to five)

Source: own elaboration based on the survey.

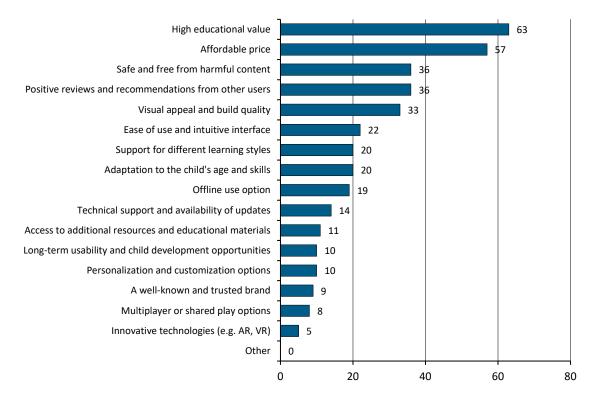


Fig. 5. What aspects of an educational app most encourage you to purchase it? (select up to five) Source: own elaboration based on the survey.

The data presented in Fig. 5 show that the most important aspects that encourage parents to purchase an educational application are high educational value (63 responses) and affordable price (57 responses) (each respondent could select a maximum of 5 responses). These two categories clearly dominate, which shows that parents place great emphasis on the educational nature of the application and its affordability. Other important factors include safety and lack of harmful content, as well as positive opinions and recommendations from other users (36 responses each). Visual attractiveness and quality of workmanship were important for 33 respondents, which indicates that aesthetics and quality of the interface also play a significant role in making a purchase decision. Ease of use and intuitive interface, as well as adaptation to the child's age and skills (20 and 22 responses each) are also important to parents. Less popular were aspects such as the possibility of offline use (19 responses), technical support (14 responses), and access to additional educational resources (11 responses).

Additionally, a comparative analysis of descriptive statistics of women and men in the responses was conducted to determine differences in their attitudes and behaviours regarding the use of mobile devices and involvement in children's education (see Table 2). Women and men show different trends in the frequency of activities and opinions about education and technology.

| Tahla 22 | Descriptive | ctatictics | for so | lactad | augstions |
|-----------|-------------|------------|--------|--------|-----------|
| Table 22. | Descriptive | statistics | 101 36 | iecteu | questions |

| | How often does your child use mobile devices? | | How often do you look for new educational tools for your child? | | Do you think that gamification elements (points, levels, rewards) increase your child's engagement in learning? | | How often do you engage in your child's educational activities? | |
|--------------------|---|-------|--|-------|---|-------|--|------|
| | woman | man | woman | man | woman | man | woman | man |
| N | 67 | 51 | 67 | 51 | 67 | 51 | 67 | 51 |
| Mean | 1.49 | 1.53 | 2.46 | 2.57 | 2.13 | 2.31 | 1.61 | 1.90 |
| Median | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 2 |
| Standard deviation | 0.84 | 0.64 | 0.97 | 1.14 | 0.89 | 1.09 | 0.83 | 0.85 |
| Variance | 0.71 | 0.41 | 0.95 | 1.29 | 0.78 | 1.18 | 0.70 | 0.73 |
| Kurtosis | 4.32 | -0.32 | 0.00 | -0.22 | 0.61 | -0.17 | 3.45 | 0.20 |
| Skewness | 1.99 | 0.82 | 0.46 | 0.42 | 0.67 | 0.60 | 1.65 | 0.79 |

Source: own elaboration based on the survey.

Women report more frequent mobile device use by children (mean 1.49) than men (1.53), with a median of 1 for both, indicating daily use. Women show greater response variation (SD 0.84 vs. 0.64) and a stronger concentration on frequent use (kurtosis 4.32). Managing children's screen time remains challenging, especially post-pandemic, as technology plays a central role in education and entertainment. Women are more active in searching for educational tools (mean 2.46 vs. 2.57; median 2 vs. 3), reflecting their primary caregiver role. Research shows mothers are more involved in children's STEM education (Thomas et al., 2020). They also participate more in educational activities (mean 1.61 vs. 1.90; median 1 vs. 2). While women rate gamification slightly higher (mean 2.13 vs. 2.31), the difference is minor. Studies indicate gamification boosts motivation, particularly with parental support (Šimunović & Babarović, 2020). The key challenge remains the sustainable use of technology. Parents can foster digital skills like coding and computational thinking, essential in today's world. The COVID-19 pandemic reinforced the importance of parental involvement in technology education and collaboration with teachers to support children's learning (Yılmaz et al., 2018).

5. Discussion and Conclusions

This study highlights the significant potential of mobile technologies in enhancing children's education, particularly in developing cognitive and manual skills. Parents recognise the value of educational applications that support logical thinking, creativity, and practical abilities. However, the preference

for entertainment apps over educational ones suggests a lack of awareness or limited availability of engaging, high-quality learning tools. These findings align with prior research (Curyło & Ciesielka, 2024; Mińkowska, 2021), which emphasises the role of gamification and personalisation in boosting student engagement and learning outcomes.

The study examined parents' perspectives on mobile technologies in primary education, identifying key factors influencing their choices, such as a preference for creativity-enhancing apps and the importance of gamification. Findings indicate a need for better communication on the educational benefits of these tools and improved access to high-quality applications. This supports previous research (Chomiak-Orsa & Smoląg, 2022) highlighting parents' crucial role in facilitating children's effective technology use.

Over 60% of children use mobile devices daily, mainly for entertainment. Parents value applications that foster creativity (45%), logical thinking (40%), and practical skills (35%). Gamification features, such as rewards and challenges, are important for 55% of parents, while 40% stress the role of personalisation. However, 60% of parents struggle to find suitable educational apps, and 70% rely on informal recommendations, often leading to choices that do not fully meet children's educational needs (Jaroszewska, 2023).

Balancing educational and entertainment use of mobile devices remains challenging. Unstructured, excessive screen time can lead to negative effects such as electronic aggression and reduced social interactions (Łukawska, 2021). Future applications should incorporate features that promote structured learning and responsible technology use.

As a pilot study, this research provides preliminary insights but requires further validation on a larger, more diverse sample. The findings cannot be generalised across all parent groups. Future studies should include a broader demographic to better assess the impact of educational applications on children's cognitive and social development.

Further research should explore the long-term effects of educational applications on social and emotional competencies, evaluate different approaches to content personalisation, and assess the role of emerging technologies such as augmented reality (AR) and artificial intelligence (AI) in optimising learning. Additionally, investigating teachers' influence in recommending and integrating digital tools into formal education remains crucial.

In conclusion, mobile technologies offer great potential in education, but their successful integration requires thoughtful design, informed parental involvement, and collaboration among stakeholders. Emphasising personalisation, gamification, and parental engagement can bridge the gap between entertainment and education, ensuring a more enriching digital learning experience for children.

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Technologie mobilne w edukacji: preferencje rodziców dotyczące narzędzi wspierających rozwój dzieci

Streszczenie

Cel: Celem artykułu jest analiza preferencji rodziców dotyczących wykorzystania aplikacji mobilnych w edukacji dzieci oraz identyfikacja kluczowych cech aplikacji, które są dla nich najbardziej wartościowe.

Metodyka: Badanie przeprowadzono przy użyciu ankiety *online* skierowanej do rodziców dzieci w klasach 1-8 (*N* = 121, badania pilotażowe), badając ich preferencje dotyczące aplikacji edukacyjnych i technologii mobilnych.

Wyniki: Ponad 60% dzieci codziennie korzysta z urządzeń mobilnych głównie w celach rozrywkowych, rzadziej edukacyjnych. Rodzice wskazują znaczenie aplikacji rozwijających myślenie logiczne, kreatywność i umiejętności manualne.

Implikacje i rekomendacje: Aplikacje mobilne mają potencjał wspierania rozwoju dzieci, pod warunkiem ich dostosowania do wieku i potrzeb. Należy również zwiększyć świadomość nauczycieli i rodziców w zakresie efektywnego wykorzystywania tych narzędzi.

Oryginalność/wartość: Badanie dostarcza unikalnych danych o preferencjach rodziców i ich postrzeganiu technologii, co może pomóc w projektowaniu bardziej efektywnych aplikacji edukacyjnych.

Słowa kluczowe: technologie mobilne, edukacja i rozwój dzieci, aplikacje edukacyjne, grywalizacja