RESEARCH ARTICLE

Greek parents' profile concerning the use of smart mobile devices and their educational applications by preschool and elementary school children

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Abstract: This study examines Greek parents' attitudes towards using smart mobile devices and their educational applications by children aged 4-7 in an informal learning context. The research sample comprised parents whose children attended Crete's public kindergartens and primary schools during 2020-2021. A 30-item Likert-scale questionnaire assessed parents' attitudes toward smartphones and their educational applications. The factor and cluster analyses were conducted, and three parent profiles emerged: neutral, sceptical, and optimistic. Neutral parents value the use of educational applications by their children. Sceptical parents are the ones who attach great importance to the adverse effects that the use of digital technology can have on their children. Optimistic parents are the ones who consider the use of educational applications essential but also are the ones setting ground rules regarding its use. Parents' views regarding smart mobile devices' use are of immense importance, as well as their general perspective, commitment, and support towards their children, as they greatly influence the latter's learning experiences at home.

Keywords: Greek parents, smart portable devices, kindergarten, primary school

1 Introduction

The beginning of the 21st century signalled a radical change in children's upbringing. Digital technologies are becoming increasingly popular and attractive to children (Athanassopoulos et al., 2023; Hadlington et al., 2019; Ipek et al., 2023). Additionally, despite their preference, children are often introduced to the environment and experience of such technologies very early (Kervin et al., 2018; Burns & Gottschalk, 2019; Zourmpakis et al., 2023a; 2023b). The popularity of tablets in young children's homes proliferates (Chaudron et al., 2018; Jurayev, 2023). In many parts of the world, the use of smart touchscreen mobile devices has become an integral part of the family's everyday routine, as it constitutes an activity that adults and young children can indulge in at home (Marsh et al., 2018; Kirkonian & Pempek, 2013). Despite their recreational nature, mobile applications also provide an exceptional opportunity for informal learning when designed in appropriate educational ways (Hirsh-Pasek et al., 2015).

Neumann (2018) also highlights that parents play a crucial role in children's smartphone interaction. Several research studies have examined the impact of touchscreen tablets on young children's learning (Neumann & Neumann, 2014). In general, tablets positively impact children's motivation (Mac Callum & Bell, 2019), literacy (Neumann, 2014; Clarke & Abbott, 2016), mathematical skills (Papadakis et al., 2018; Outhwaite et al., 2017), problem-solving and self-efficacy (Herodotou, 2017; Zourmpakis et al., 2022).

Parental involvement in children's education is deemed vital, as it can assist in the construction of an encouraging environment for home learning (Desforges & Abouchaar, 2003). Parents and educators face whether, when, and what kind of digital content they should provide preschoolers. Parents are inevitably faced with making choices about their children's access to digital devices. Indeed, the first years of children's lives play a crucial role in choosing and using the proper digital applications for them (Rideout & Hamel, 2006; Wright et al., 2001).

2 Theoretical framework

2.1 Use of smart mobile devices by children at home

Digital devices have become increasingly more available and accessible, as related to the past, resulting in a subsequent drop in the age of the children that use them within their homes (Kervin et al., 2018). Ofcom report (Ofcom, 2019) showed that 42% of children aged 5-7 have

their tablets, young children watch TV on other devices – tablets (30% for 3-4-year-old and 44% for ages 5-7-year-old) while over 60% of 3-7-year-old use tablets to connect on the Internet.

Children mostly use these devices to play games (63%), watch videos (43%) and only a few for educational purposes (30%) like reading (Rideout, 2013). In a study of 6-year-old in Jordan (Oliemat et al., 2018), almost 50% of the sample reported spending one to two hours a day on their tablet while using it with their parents or older siblings.

Neumann (2018) highlights that the majority of the children aged 3.5 years in Australia use tablets at home to play games (84%) and literacy-related applications (82%). While 40% of children played entertainment games daily, about a third of the children participating in the research could write on their own using a tablet.

A study conducted in the USA concluded that 75% of children under eight use smartphones, which is on the rise (Rideout, 2013). Studies about children's smartphone use in North America have shown that early experiences, within the first five years of life, and their interactions with touchscreen devices can lead to subsequent academic success (Melhuish et al., 2015; Sylva et al., 2014) and socio-emotional development (Melhuish et al., 2017).

2.2   Parents' attitude towards smart mobile devices

The time of tablet use by children is mainly influenced by parents' perceptions and attitudes (Sanchez et al., 2017). It has been found that children's skills and activities related to digital technologies are more connected to their parents' mediation style than to the child's age (Nikken & Schols, 2015; Sanchez et al., 2017). Parents' attitudes towards digital technologies affect their strategies regarding their children's digital skills development and use of digital tools (Chaudron et al., 2018; Karakose et al., 2023b; 2023c).

The socioeconomic status of families also has an impact on children's use of smart mobile devices. An interrelation is found between children's and parents' beliefs towards smart devices; parents significantly affect their children's relation to smart devices (Correa, 2015; Katz et al., 2018). Studies conducted in different cultural backgrounds (Hargittai, 2010; Valcke et al., 2010; Määttä et al., 2017) found that families with high socioeconomic status tend to view their children's exposure to digital media as needing careful regulation and distribution. Mothers are more careful than fathers in implementing such an arrangement, especially when the child is young (Jiménez-Iglesias et al., 2015).

Research in the USA has shown that parents' beliefs regarding digital applications play a vital role in transmitting information and knowledge among them and their children, primarily when the use is associated with education (Chaudron et al., 2015; Plowman & McPake, 2013).

Studies also highlight the concern of most parents for reduced physical activity and online privacy resulting from using smart portable media (Barmomanesh & Vodanovich, 2017; Isikoglu et al., 2019).

In a recent study, 166 parents of children under 6 considered using digital applications necessary for the latter's entertainment (Barmomanesh & Vodanovich, 2017). Additionally, they argued that using smart mobile devices can act as a "digital pacifier", which can function as a distraction tool so parents can simultaneously engage with their other commitments (Chaudron et al., 2015).

2.3   Research questions

The present study examined parents' perceptions regarding the pedagogical value of smart mobile devices in a formal and informal environment. More specifically, we examined the following research questions:

a) Can we categorize parents according to their attitudes toward using smartphones and their educational applications?

b) What are the parents' beliefs about using smart mobile devices and their educational applications?

c) How do variables such as parents 'socioeconomic status, age and educational level affect parents' beliefs about smartphones and their educational applications?

3   Methodology

The present study followed an exploratory approach to create the typology of parents regarding the characteristics of their attitude towards smart mobile devices and their applications (Petousi & Sifaki, 2020). In order to examine those, as mentioned earlier, the statistical tools of factor analysis and cluster analysis were utilized. The statistical analysis was conducted using the statistical software IBM SPSS statistics version 23. A questionnaire for data collection was created (Table 1). These questions were measured on a 5-point Likert scale ranging

from 1 (strongly disagree) to 5 (strongly agree). The completion of the questionnaire took approximately 15 minutes.

Parents from Crete participated in the research regarding the use of smart mobile devices by children aged 4 to 7. A total of 302 questionnaires were completed. The majority of the participating parents in the sample were women (77.4%), and most of them belonged to the age group 31-40 (66.6%) followed by the age group 41-50 (26.8%). Regarding the parents' nationality, 95.4% were Greek, 3.6% Albanian, and the remaining 1% were of other nationalities. About 31% of these parents had a compulsory or secondary education level, 55% graduated from a higher education institute, while the remaining 14% held additional degrees such as a master's or doctorate. Lastly, there has been a wide divergence regarding the subject and nature of parent's studies and professions.

The classification of parents' attitudes towards smart mobile devices and their applications was achieved through factor and cluster analysis. Table 1 contains all the questions used to perform the factor analysis procedure.

Table 1 Questionnaire on parents' attitudes towards using smart mobile devices and their applications

No	Variable	Description
The use of educational applications/games by children		
1	a1	Can make learning fun
2	a2	Can teach basic technological skills
3	a3	Can promote curiosity and creativity
4	a4	Allows them to express themselves
5	a5	Can teach problem-solving
6	a6	Allows them to relax
7	a7	Can teach reading and writing
8	a8	Can teach mathematical concepts
9	a9	Can teach concepts from the field of Natural Sciences
10	a10	Can teach foreign languages
11	a11	Can teach programming /coding
The use of digital technology		
12	b1	It damages children's brains
13	b2	It is detrimental to children's development
14	b3	Children do not need to know how to use digital technologies for their education.
15	b4	Traditional educational materials are better than digital educational materials.
16	b5	Digital educational materials do not support children's learning
17	b6	My child may be exposed to inappropriate content using digital technology.
18	b7	Distracts children from other experiences that are important for their development.
19	b8	This leads my child to less social contact with other children.
20	b9	Using digital technology can make my child overweight
Technology comparison		
21	c1	The use of digital technology damages children's brains.
22	c2	The use of digital technology is detrimental to children's development.
23	c3	Children do not need to know how to use digital technologies for their education.
24	c4	Traditional educational material is better than digital educational material.
25	c5	Digital educational materials do not support children's learning.
26	c6	My child may be exposed to inappropriate content using digital technology.
Information		
27	d1	I want more information from experts on finding educational applications for mobile devices that can support my child's learning.
28	d2	I want more information about how long my child has been using mobile applications to be useful for his/her development.
29	d3	I want more information on the age at which my child should be allowed to use mobile devices.
30	d4	I want mobile devices to be introduced in the School and used in my child's education.

4   Results

4.1   Factor analysis

The Kaiser Meyer Olkin (KMO) test was used in the sample to test the suitability of the selected variables for factor analysis. The KMO test resulted in a value of 0.881, which was greater than the recommended minimum value of 0.5 for sample adequacy, and the Bartlett test also showed very good sphericity ($x^2 = 4516.312$, df = 435, $p < 0.001$) correlations between

the variables allowed the application of factor analysis. Factor analysis was used to extract the main components of parental attitudes in the 30-item questionnaires.

Varimax factor analysis with Kaiser Normalization was applied to ensure that the factors extracted differed. Table 2 shows the factor analysis results and the division of the question into factors. The selected factors were 7, formed by the questions whose values were greater than one. The factors mentioned above explained 65.014% of the total variance.

Table 2   Factor analysis results

No	Question number	Variable	Cronbach's α
F1	7, 8, 9, 10, 11, 21, 22, 23	The use of technology to teach children various skills.	0.882
F2	1, 2, 3, 4, 5	The use of educational applications.	0.828
F3	17, 18, 19, 20	The negative health effects of using digital technology.	0.813
F4	27, 28, 29, 30	Information on the use of smart mobile devices.	0.809
F5	24, 25	The importance of technology.	0.669
F6	12, 13	The failures of digital technology.	0.870
F7	6, 14, 15, 16, 26,	The child's stimuli from educational applications and learning.	0.094

More specifically, Table 2 showcases the number of the factor in the first column, the number of questions that characterize this factor as well as the variable characterizing the formed factor in the second and third column, respectively, and Cronbach's alpha value in the fourth column, to set the degree of reliability of these questions.

Factor 1 included eight questions about computer use for educational purposes, to teach children various essential skills, and had a Cronbach's alpha value of 0.882. Factor 2 included five questions about using educational applications, displaying a Cronbach's alpha of 0.828. Factor 3 included four questions concerning the harmful effects of digital technology use on children, with a Cronbach's alpha value of 0.813. Factor 4 included four questions about the information the child receives from electronic devices with a Cronbach's alpha value of 0.809. Questions about the importance of technology are factor 5, with a Cronbach's alpha value of 0.669. Factor 6 included two questions about the failures of digital technology, meaning the times technology failed to meet parents' expectations, with a Cronbach's alpha value of 0.870. Finally, factor 7 included the other five questions that relate educational applications and learning to the stimuli the child receives with a Cronbach's alpha value of 0.094/ Although the last factor's reliability is low. Cronbach's alpha value of the 30-item questionnaire (Table 1) remained high at 0.716.

4.2   Cluster analysis

The k-means clustering algorithm was applied to the sample for three separate classifications for the parents, further named according to the final central position (Table 3) to each of the seven factors exported earlier. The three clusters for the parents were (a) group one, the neutrals; (b) group two, the sceptics; and (c) group three, the optimists, as shown in Figure 1

Table 3   The final table of cluster centres

Variable No.	Cluster		
	Neutral	Skeptics	Optimistic
1	0.02802	0.27587	-0.56418
2	0.26862	-0.44572	0.10998
3	-0.46827	0.66315	0.01157
4	0.44020	0.21047	-1,49994
5	-0.18145	0.35579	-0.17199
6	-0.00036	0.00156	-0.00187
7	-0.33438	0.58343	-0.18797

The neutral parents: The first type of parents attach great importance to the information they hold regarding smart mobile devices (Figure 1). This type also considers the use of educational applications critical (Table 3). One hundred forty-three parents were included in this type, representing 49.8% of the respondents. 70.6% of the parents belonged to the age group of 31-40, with 58.04% having a moderate education.

The sceptical parents: The second type of parents attached great importance to the adverse effects of digital technology use on children and the stimuli children receive from learning applications. One hundred parents were included in this type, representing 33.4% of the respondents. Furthermore, in this case, most parents belonged to the age group of 31-40 (62%), 41% belonged to a low education level and 52% to a middle one.

The optimistic parents: The last type of parents considered the use of educational applications critical but also controlled the stimuli and harms caused by their use (Figure 1). There were
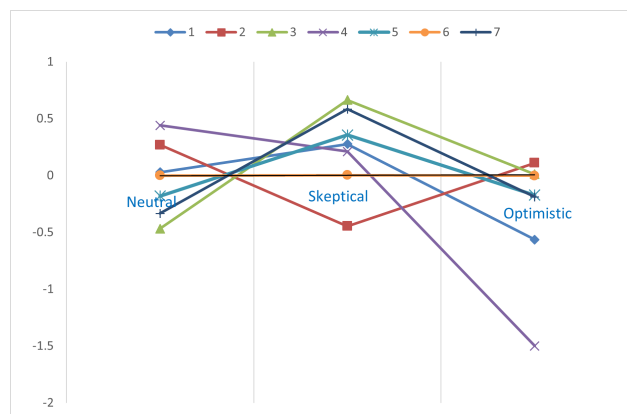
Figure 1   Classification of parents' attitudes towards using smart mobile devices and their applications

56 parents in this type, representing 16.8% of the respondents. In this category, 56% have a medium level of education, with 21.4% having a high one.

Finally, the data were compared to examine further the parent groups' characteristics regarding their demographic characteristics. ANOVA was used to explore whether there was a difference between the means of the three groups and their characteristics. The analysis found that there is a relationship between the groups and the level of parents' education ($f(296) = 6.590$, $p < 0.01$).

Anova was also used to test whether there was a correlation between gender and age regarding mobile device use among the three groups. The analysis found a relationship between the parents' group and the age group and gender variables. ($f(296) = 0.898$, $p > 0.05$; $f(296) = 1.064$, $p > 0.05$).

5   Discussion

The cluster analysis results formed three parents' profiles, which classified parents according to their beliefs regarding the use of smart mobile devices and, consequently, the use of mobile applications by children aged 4 to 7. These aforementioned formed parents' profiles positively answer our first research question.

Continuing the categorization that occurred, we should examine the parents' profiles and individual characteristics in further detail. More specifically, neutral parents value the use of educational applications by their children. They would like further information from experts on finding suitable educational applications for mobile devices that could support their children's learning. They would also like more information regarding the age at which they should allow their children to use mobile devices and the time limits set during that use so that digital use will solely benefit their children's development. Most parents in this category are in the age group of 31-40. They have a moderate education, meaning they graduate from a high school or a technical university.

Sceptical parents are the ones who attach great importance to the adverse effects that the use of digital technology can have on their children (Karakose et al., 2022; 2023a). They believe their children can be exposed to inappropriate content using digital technology. Furthermore, they highlight that using mobile devices contributes to less social contact with other children while distracting them from other vital experiences for their development. They also link the use of mobile devices to obesity. Most parents in this category are 31-40 years old, and most are moderately educated.

Optimistic parents are the ones who consider the use of educational applications essential but also are the ones setting ground rules regarding its use. This kind of parent values the use of digital means while monitoring possible detrimental consequences that could result from it. Specifically, these parents believe technology is vital for their children's school success and future career choices. The analysis above, regarding the individual views of each parent profile, sheds light on our second and third research questions.

This present study highlighted that Greek parents question the use of mobile devices and request a coordinated orientation on how they can support and facilitate their children's learning while using mobile devices and selecting appropriate educational digital applications. Additionally, the results of this study also shed light on the optimal children's age for mobile device introduction and duration of use (Katsaris & Vidakis, 2021). By providing parents with the above information, we can enhance the use of mobile devices by selecting appropriate

applications; we can reinforce their positive attitude towards mobile device use while appeasing their biases towards concealed digital perils. Moreover, training parents in selecting appropriate educational applications will further support the creation of a positive attitude towards digital use while diminishing possible negative experiences, such as exposure to inappropriate material (Papadakis et al., 2023a; 2023b).

Conflicts of interest

The authors declare that they have no conflict of interest.

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