



# Digital games pre-schoolers play: parental mediation and examination of educational content

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Received: 18 April 2020 / Accepted: 9 November 2020 / Published online: 6 January 2021 / Published in print: 6 January 2021  
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## Abstract

The aim of this study is to examine mediations of parents who make digital games played by 60–72 months old children accessible, and the contents of the digital games played by children educationally. In this research the convergent parallel mixed research method that include both qualitative and quantitative research methods was used. The study group of the research consists of 109 parents. In the research, two data collection tools as a survey and a questionnaire were used. The data collection tools were developed by the researchers. Qualitative data of the research consist of parents' opinions and the digital games their children play. Quantitative data were collected with the questionnaire form. As a consequence of combining quantitative and qualitative data and evaluating them as a meaningful whole, it was established that children of parents using a parental mediation consciously play digital games with educational content. Yet, this rate is below 10%. It was determined that 90% of the parents do not use a mediation strategy consciously. In fact, children who are not applied a mediation play digital games with violent and neutral content. According to the findings, it is another significant result that parents using a mediation strategy consciously choose digital games with educational content by taking expert opinions. The results of the research were discussed in consideration of the literature in terms of both parental mediation and educational content of digital games.

**Keywords** Parental mediation · Digital game · Preschool education · Digital learning environments · Communication

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## 1 Introduction

The increase of use and influences of digital devices at school, at home and in society, which are products of the digital culture, are easily observed (Rideout and Saphir 2011). As from the moment children are born, their living quarters are surrounded by technology. In a world where digital devices are widely used, children interact with their environment according to the effect of digital culture (Saracho 2015). Especially, the interest in touch-ready games is increasing each passing day (Stephen and Edwards 2018). Since the fine motor skills of early childhood children are not sufficiently developed, they cannot use mouse and keyboard, which are the external hardware units of traditional computers. However, the display surfaces of tablets and smart mobile devices make it easier for children to use digital applications. This has made the use of digital applications with educational content eligible for children (Zaranis et al. 2013; Blackwell et al. 2016). Such an increase in the practicality of digital devices also leads to the increase in the number of educational mobile applications (Lee and Cherner 2015; Papadakis and Kalogiannakis 2017; Papadakis et al. 2016a, 2016b).

Applications with educational content for early childhood children in technology application stores and various websites are among the top of the most accessed or purchased application categories (Bouck et al. 2016; Cardenal and Lopez 2015; Hutchison et al. 2012). It has been determined by many studies (Guernsey et al. 2012; Larkin 2013; Namukasa et al. 2016; Papadakis et al. 2018; Yelland et al. 2017) that the educational contents of digital applications are insufficient. Parents who want to support developments of their children can choose digital applications by examining the application statements, user ratings and reviews. However, according to researches (Ozeke 2018; Papadakis et al. 2018;), the reviews, star ratings and educational explanations of many applications do not coincide with the desired educational content level. It is actually not easy for parents to evaluate these applications to meet the educational needs of their children. As a matter of fact, it has been found that even professional early childhood teachers have difficulty in choosing educational digital applications that really support children's learning (Hirsh-Pasek et al. 2015; Papadakis and Kalogiannakis 2017). The reason for this may be the lack of scientific research-based criteria to evaluate the educational content of digital applications (Kucirkova 2014). Even so, parents may realize whether these educational applications contribute to their children's learning in the progress of time (Higgins et al. 2005). It has been determined that many digital applications developed for early childhood children aim to entertain them rather than support their education (Higgins et al. 2005; Papadakis et al. 2016a). Parents need to guide their children in order to determine if their learning is supported through the digital applications. During this guidance process, parents can observe whether the digital applications their children use are educational or not (Gözüm and Kandır 2020).

Most of the educational applications consist of interactive repetitive digital games whose content cannot be intervened by the user, worksheets or puzzles (Flewitt et al. 2015). Applications in digital game format can be observed by gamifying digital applications with educational content such as science, literacy, and mathematics (Guernsey et al. 2012; Larkin 2013; Yelland et al. 2017; Larkin 2013; Papadakis et al. 2016b). Even though digital games with educational content offer children a learning environment, there are also researches (Wack and Tantleff-Dunn 2009;

Bluemke et al. 2010) on the adverse impacts of the games with non-educational or violent content. Moreover, depending on the increase of the time in which children play digital games, parental opinions regarding the harmful effects of the digital games on children's development are also common (Gee 2007; Steinkuehler 2010).

From this point of view, this research aims to examine the educational contents of digital games played by children on tablets or smart mobile devices in early childhood and the mediation strategies parents use in the process their children play digital game. In accordance with this purpose, firstly parental mediations, then digital applications and their educational values are explained under the title of literature review.

## 2 Literature review

### 2.1 Parental mediation

In today's world conditions, the home environments are turning into learning environments where children continue their learning process using the technology (Plowman et al. 2012). Palaiologou (2014, p. 1) states that in early childhood, children playing digital games on digital devices at home are in the learning process. As the parents want their children to play digital games supporting their learning, they use parental mediation strategies to reduce the negative effects of these games (Clark 2011, p. 325; Kirwil 2009, p. 395). The restrictions, supervisions, viewing or guidance by the parents in the process children use technological tools are defined as "*parental mediation*" (Warren 2001, p. 212). Parents are more likely to use mediation strategies in their children's early childhood years. As a result of the use of parental mediation strategies, children are less likely to face online risks (Kirwil 2009, s. 405). In early childhood, parents use active and restrictive mediation strategies to protect their children from online risks (Piotrowski 2017). It is called *active mediation* that children play with their parents on digital media tools and discuss with their parents about these activities. On the other hand, setting rules for the use of digital media or introducing various prohibitions is called *restricted mediation* (Livingstone et al. 2015, p. 4).

It has been determined that especially parents with 3–6 years old children use several parental mediation strategies for different media tools (Beyens et al. 2019). Mediation strategies for the technological tools such as digital games (Nikken and Jansz 2014), internet (Eastin et al. 2006, p. 486), television (Valkenburg et al. 1999, p.53) are different from each other. When the mediation strategies for digital games were examined within the scope of the research; in a study conducted by Nikken and Jansz (2014), it was found that parents apply restrictive, active, and co-playing mediation strategies for the digital games their children play. Although the mediation strategies that parents implement to their children are considered as different strategies, it is possible to use them together (Blum-Ross and Livingstone 2016, s. 11). For instance, in order to support their children's development, education, and learning through digital games, parents can use active and co-playing mediation strategies together. Parents can use co-playing mediation strategy to support their children's education while keeping them away from the online risks by playing together. (Nikken and Jansz 2014; Hasebrink et al. 2011; Livingstone and Helsper 2008).

In the study conducted by Gözümlü and Kandır (2020), the scale of mediation strategies of Turkish parents for digital games played by 48–72 months old children was developed. The factor structure including viewing, laissez faire, technical, restrictive, active, and co-playing mediation strategies was specified as a result of the research. In this context, the laissez faire mediation which does not actually meet the definition of parental mediation but observed among mediation strategies was identified. However, due to low effort to raise children, work intensity and various cultural reasons, parents may neglect using mediation strategies and let their children be exposed the negative sides of media tools (Lwin et al. 2008). Parents may give their digital device to their children to let them spend time while doing their own business, driving a car, or eating at a restaurant. In this case, “*pass-back effect*” increases after the child recognizes and accesses the digital device, thus the accessibility of the digital device gets easy (Chiong and Shuler 2010; Guernesey and Levine 2016). Parents may use digital devices as a “*digital pacifier*” that they offer as a reward for their children’s good behaviors (Kabali et al. 2015). However, the impact of the “digital pacifiers” on early childhood children is highly controversial. Thusly, until October 2016, the American Academy of Pediatrics had given advices supporting the restrictive mediation strategy of parents to ban access of children up to the age of 2 to digital media. Yet, the AAP now approves children to play digital games with high quality educational content and supports parents to use an active co-playing mediation strategy (American Academy of Pediatrics [AAP], 2013). In the study conducted by Papadakis and Kalogiannakis (2017), examinations were made on mobile education applications designed for children, and information about the applications was presented to parents and educators. As a result of the research, it was determined that most of the applications prepared for children did not have any educational features, on the contrary they were prepared to entertain them. AAP’s recommendation to parents and the research result of Papadakis and Kalogiannakis (2017) reveal two important problem status in the educational features of digital games. Research questions were set by evaluating these problem statuses respectively.

The first problem status is the guidance process parents wanting to support their children’s education will do for digital applications with high quality educational content. In this process, parents are expected to learn about the features such as the objective and content of the digital games their children play. However, the guidance provided by the parents should not remain only at the level of knowledge. They need to observe their children while playing and communicate with them about the game by accompanying. In this context, parents not only have knowledge about digital games but also use a mediation strategy as a behavior. As a result of this guidance in terms of knowledge and behavior, they can also evaluate the positive and negative effects of digital games. In this case, it can be said that parents will consciously provide guidance to their children.

As in the AAP recommendation, parents can prefer digital games with high quality educational content for their children, and if they play with their children, they can use active co-playing which is a conscious mediation for their children. But do all parents use a mediation consciously? Or do the parents leave the digital games played by their children to chance while doing their work, as in laissez faire mediation? In order to answer these questions, the research will seek to answer the questions about parental mediation with the question “to what extent do parents making digital games accessible to children provide guidance?”

The second problem status is the content of digital games. What content do children play digital games? Do they play educational digital games that support their development positively? Or do they play violent digital games with entertainment purposes, which do not contribute to their development, or even affect them adversely? When these questions are examined in line with the purpose of the research, the analysis results of the content of digital games played by children will enable the identification of both educational and non-educational games. Digital games without an educational content are important indicators to determine the mediation strategy used by parents.

Parents may be supposed to choose games with educational content as a result of a conscious guidance. However, in the research conducted by (Papadakis et al. 2016a; Papadakis et al. 2016c), they found that it is not easy for parents to choose a digital application with educational content. As a matter of fact, parents can make their children play a digital game that claims to have an educational content. However, it is also a matter of debate whether the educational digital applications that extol themselves have any educational value or not. This question of debate that clarifies the second problem status is explained under the title of digital applications and their educational values.

## 2.2 Digital applications and their educational values

Technology has a considerable impact on children's learning by exploring the world. It has been determined that smart mobile devices and tablets have a positive effect on children's learning (for example, on the development of mathematics, literacy, and concept learning skills) (Clements and Sarama 2007; Kyriakides et al. 2016; Neumann and Neumann 2017; Plowman et al. 2010). Children communicate with their immediate surroundings about their physical, emotional and social experiences as a result of using smart mobile devices and tablets. Vygotsky's (1986) learning theory based on social interaction also sheds light on the learning process that children have entered with technology. According to Vygotsky (1978), adults can use digital devices used by children in today's world as scaffolding tools. As a result of using digital devices as scaffolding tools, changes in the proximal zone of children may occur and their learning can be supported. It is supposed that digital applications, which are the scaffolding tools supporting children's learning, have educational contents to meet the needs of them.

Children cannot be expected to choose technological tools and applications with educational content suitable for themselves as a conscious technology user in early childhood years. However, parents can be expected to choose an appropriate digital scaffolding tool to support their children's development (Schofield Clark 2011). In fact, there are many software programs with "educational" titles for parents to meet the educational needs of their children. However, they do not provide necessary information and support to parents and educators to make decisions about the applications they will choose for children (Vaala et al. 2015). Whether the content of educational digital applications to be offered to children is truly educational or not is a difficult and controversial situation. What is easy is the deficiencies that can be detected in digital applications (Papadakis and Kalogiannakis 2020). Papadakis and Kalogiannakis (2020) examined the studies on the educational value of digital applications between 2011 and 2019. According to the results, it was determined that very few of the applications

claiming to be educational had the effect of improving children's intelligence and supporting their learning. In the research by Papadakis et al. (2018), the researchers examined the digital applications for Greek preschool children, which claimed to have content and design that support their cognitive development, and were indicated to be suitable for child development. In the study conducted by the researchers, it was determined that there were only 40 applications with the appropriate content and design features specified by the applications. When they examined these applications by using a specially developed evaluation tool, it was found that 95% of the applications were gathered under the category of "drill & practice". In addition, it was found that there was an inadequacy in the application explanations. They mostly encouraged learning by heart, and did not contain open-ended practices. Another important result determined by the study is that the relationship between the star-rating with comments of the individuals using the applications and the score of application evaluation tool are incompatible. In this context, educational digital applications parents choose to support their children's education by considering their statements, comments and star-ratings may not be suitable for their purposes. In the study conducted by Bratitsis (2018), 248 digital applications were examined and 39 digital applications were found to be not suitable for the specified age group. While almost half of the applications evaluated had the contents for language and mathematics learning, the rest were found to have no educational value. 44 applications with educational Turkish language content were analyzed by Ozeke (2018). As a result of scoring the applications designed to support the development of children between the ages of five and six with an assessment tool, it was determined that these scores were in the middle and low range in terms of educational practices. In addition, a significant statistical relationship was not found between the user ratings, comments, the number of downloads and the scoring rubric of the applications.

Applications developed for early childhood children were examined by researchers in terms of different subject contents. Educational applications for STEM by Yelland et al. (2017), mathematics applications for integers by Namukasa et al. (2016), applications for mathematics content by Larkin (2013), and educational practices that support literacy skills were examined by Guernsey et al. (2012). According to the results of the studies (Guernsey et al. 2012; Larkin 2013; Namukasa et al. 2016; Papadakis et al. 2018; Yelland et al. 2017) very few digital applications support children's educational development. Moreover, evaluating the most popular digital applications in four different countries (Hungary, Turkey, Greece and the Netherlands), Sari et al. (2017) found that advertisements targeting children mostly focus on early childhood period. While the educational value of digital applications is found pretty low by many studies, it is understood that digital applications target the young age group. In this context, it is necessary to evaluate the contents of the applications targeting the early childhood period. From this point on, "to what extent do children encounter educational content while playing digital games?" is the second question of the research. In line with this research question, both educational and non-educational digital games will be specified. In this way, it will enable us to see the percentage distribution of educational and non-educational games played by children and to what extent children encounter any educational content.

This research is highly important as it discusses and compares both parents' mediation strategies and the contents of digital games together because the quality of

the guidance parents provide according to their strategy can be interpreted through the educational content of digital games children play. The results of the research are expected to make significant contributions to the literature.

### 3 Method

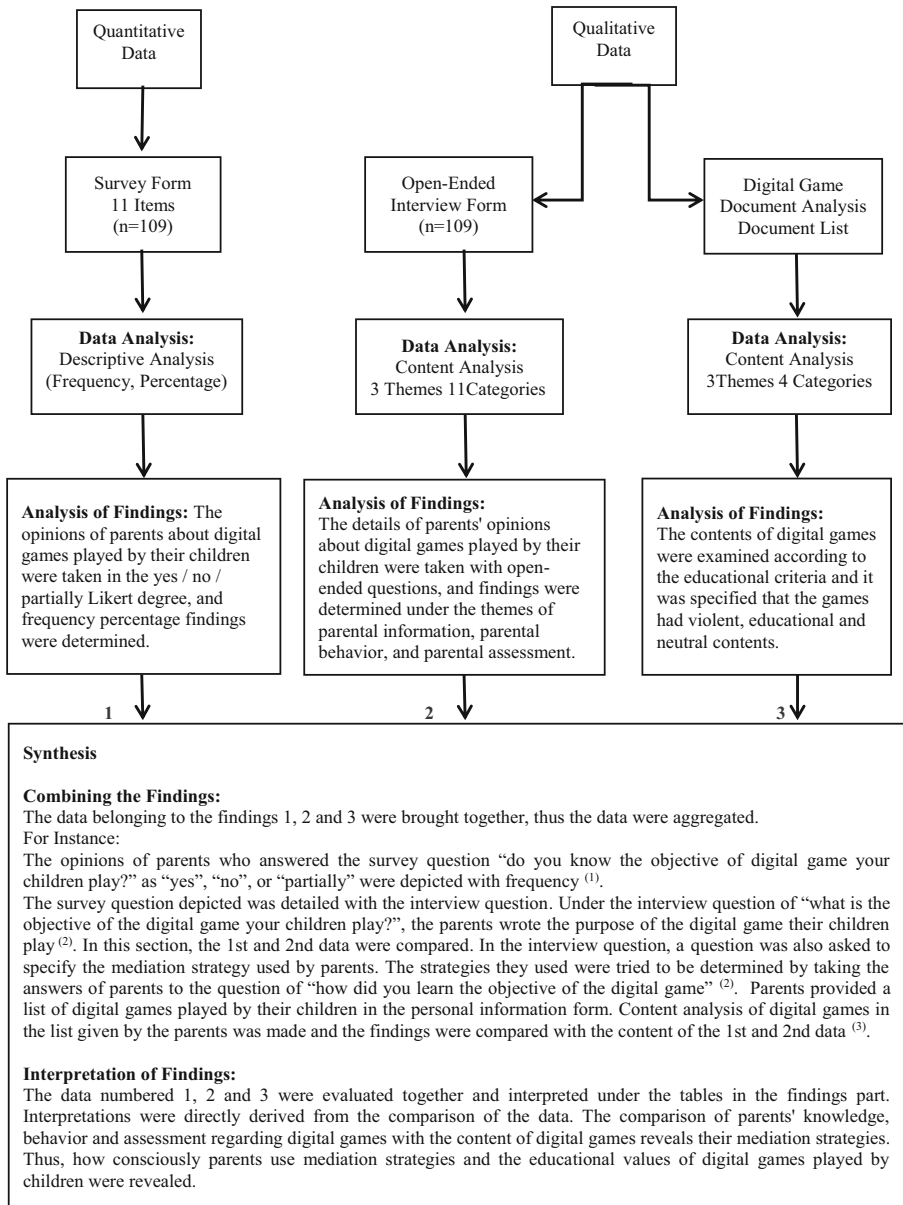
In this research the convergent parallel mixed research method that include both qualitative and quantitative research methods was used. The convergent parallel mixed research method is one of the mixed research methods in which the qualitative and quantitative data of the research are combined or integrated to form a basis for a detailed data analysis process related to the research problem (see fig. 1) (Creswell and Plano Clark 2011). In line with this purpose, the quantitative data was collected with the “*Parental Guidance in the Process Children Play Digital Game*” survey form. Qualitative data of the research were collected with the questionnaire form and document analysis methods. Different data collection methods such as interview and document analysis can be applied in qualitative researches (Yıldırım and Şimşek 2005). Parents were asked open-ended questions about digital games and their opinions were taken with the interview form. Another data collection technique used in the research is document analysis. The digital games played by the children and specified by the parents form a document.

*The criteria for the documents to be selected for digital games played by children are as follows: Belonging to preschool age group, available for free or trial version, containing Turkish content. There is no limitation for the operating system (IOS and Android) or digital game application stores (App Store or Google Store). Digital games that can be installed on both smartphones and tablets or downloaded from the web browsers of these devices create the document list.*

The data analysis of the “*Parental Guidance in the Process that Children Play Digital Game*” survey, the questionnaire form prepared for the digital game playing process, and the contents of the digital games that form documents were carried out separately. The inference that comes out as a result of combining the qualitative and quantitative data obtained was tried to be discovered. It was tried to be specified to what extent parents use the mediation strategies for their children and what content children are exposed in digital games by explaining the contradiction or nonoverlapping findings that result from the quantitative and qualitative data fusion (Creswell and Plano Clark 2011).

#### 3.1 Study group

In the research, the study group consists of the parents of 109 children who are 60–72 months old and attending the official independent preschool education institution in Kars City Centre in 2017–2018 school year. The conditions “*that children continuing early childhood education play digital games*” and “*having 60-72 months old children*” were set out in the study group to obtain the qualitative data of the research. Parents need to meet these two criteria in order to obtain the quantitative data of the



**Fig. 1** Mixed methods analysis follows a parallel convergent approach

study. In this regard, convenience sampling method which is one of the non-random sampling techniques was used for the parents who voluntarily participated in the research. The study group determined by the convenience sampling method consists of 109 volunteer parents with 60–72 months old children who play digital games and continue early childhood education. In quantitative researches where convenience sampling method is used, it is technically not possible to generalize such a population consisting of 60–72 months old children. Therefore, defining the characteristics of the



research sample and determining the criteria can strengthen the sample on which the research can be generalized (Johnson and Christensen 2007).

When the characteristics of the study group are analyzed, 91 of the parents are women and 18 of them are men. The average age of women is 32.96 and the average age of men is 36.67. Considering the statements of the women participants, while 33 of them are constantly working full-time, 58 of them are not working anywhere. When it comes to the men participants, 15 of them are constantly working full-time, while 3 of them are not working anywhere. When the number of children each parent has is analyzed, 27 parents have one child, 61 parents have two children and 21 parents have three children. When the birth order of the 60–72 months-old children playing digital games is analyzed, it has been specified that 61 children are first-born, 44 children are second-born and 4 children are-third born. When the genders of the children participants in the study are analyzed, 44 of them are girls and 65 of them are boys. It has been determined that the children are on average of 65,27 months. When the educational backgrounds of the female parents are analyzed, 3 parents are primary school graduates, 8 parents are secondary school graduates, 37 parents are high school graduates, 41 parents have bachelor's degree and 2 parents have doctor's degree. When it comes to the male parents, 4 parents are high school graduates, 3 parents have associate's degree, 10 parents have bachelor's degree and 1 parent has master's degree. Considering parents' income levels, it has been determined that 41 parents have an income between 2000 and 3000 TL, 28 parents have an income between 3001 and 4000 TL, 19 parents have an income between 4001 and 5000 TL, 11 parents have an income between 500 and 6000 TL, and 10 parents had an income 6001 TL and above.

### 3.2 Data collection tools

Three different data collection tools were used in the study. These are the personal information form, the close-ended survey form, and the open-ended questionnaire.

**Personal information form** It was prepared by the researchers in order to collect data about personal information of the parents and children participating in the research. The purpose of the research was explained in the form. Parents were asked to mark the sections of the fact that they wanted to participate in the research voluntarily, they wanted to attend the meetings conducted with the participation of the parents, their children played digital games and that their children were 60–72 months old. This form was filled out by the parents. It consists of two parts. In the first part, the personal information of the parents and in the second part, personal information of the children was obtained.

- The first part: The questions about personal information of the parents such as their gender, age, education level, occupation, whether they play digital games, the names of the digital games they play, and time period they play digital games are asked.
- The second part: The questions about personal information of the children such as their gender, age, whether they play digital games, the names of the digital games they play, and the time period they play digital games are asked.

**Parental guidance in the process children play digital game survey form** This survey form was developed by the researchers to collect data about the parental mediations in the process children play digital games. The survey form consisted of 11 questions that parents could answer as yes / partially / no. The questions in the survey form were coded as (S1., S2., ...) and included in the results section.

**Parental guidance in the process children play digital game questionnaire form** It was prepared by the researchers in order to collect detailed data about the process in which children play digital games and the parental mediations. The questions in the questionnaire form were prepared to determine the details of the questions in the survey form. The open-ended questionnaire form was created by adding the question words “*What?*”, “*How?*” and “*Why?*” to the questions on the survey form. The questions on the open-ended questionnaire form were coded as (Q1.1., Q1.2., ...) and included in the results section.

### 3.2.1 Validity of data collection tools

The close-ended survey and open-ended questionnaire forms were developed to examine the guidance of the parents for digital games, who make the digital games played by 60–72 months old children accessible, and to analyze the content of these games educationally. The validity studies of the survey form are explained below.

The items of “*Parental Guidance in the Process Children Play Digital Game Survey Form*” were prepared by following the steps given below.

- In the first stage, the literature review (Valkenburg et al. 1999; Hasebrink et al. 2011; Livingstone and Helsper 2008; Livingstone et al. 2015; Lwin et al. 2008; Nikken and Jansz 2014; Cabello-Hutt et al. 2018) was carried out for digital games and parental mediations. An unstructured interview form consisting of open-ended questions was prepared based on the data obtained.
- In the second stage, 5 women and 5 men with different socioeconomic and educational levels were interviewed through the interview form about the digital games. During the interviews, the data were collected by asking permission to record their sounds and the sound files were stored provided that they would not be shared with third parties.
- In the third stage, the transcript of the interview was made and the items of the survey were created as a result of the content analysis.
- In the fourth stage, for their functional check, the items on the survey were applied to the families with different socioeconomic and educational levels, their opinions were taken, and short-term observations were made in the home environment.
- In the fifth stage, the survey items were prepared by examining the theoretical information in body of literature, the opinions that obtained from the interview, and the survey form consisting of the interview form.
- *In the sixth stage, 5 pre-school specialists and 5 computer and software experts were asked for their opinions on the content validity of the items in the survey form and the progressive data of the survey preparation process.*

In the content validity study based on expert opinion, content validity ratio (CVR = Content Validity Ratio) and content validity index (CVI = Content Validity Index) values, which were used by Lawshe (1975) for content validity, were

calculated. They were asked to fill the expert evaluation form that consists of 11 closed-ended survey questions, in accordance with the three-point Likert-type evaluation criteria such as “Suitable- (3 Points)”, “Appropriate but Should Be Corrected (2 Points)”, “Should be Removed (1 Point)”. In addition to Lawshe’s (1975) rating technique, the experts were asked to express their opinions for each item through the questions “If the item should be corrected, what is your suggestion about how it should be?” and “If the item should be removed, why?” on the expert evaluation form. The minimum CVR value determined by Ayre and Scally (2014) was taken as criteria in the content validity studies based on expert opinion. The CVR value determined by 10 experts should be at least .800 at the level of  $\alpha = 0.05$  significance. When the CVR values of the items were examined, it was found that the CVR values of all items were 1. It was determined that the CVI value calculated by taking the average of the CVR values was 1. In this context, the content validity of the survey form is at a statistically significant level.

- *In the seventh stage, the application form of the “Parental Guidance in the Process Children Play Digital Game Survey”, whose content validity was specified was prepared. The understandability of the items of the application form was examined by 1 linguist. The form was examined by 1 assessment and evaluation expert in terms of face validity. After the examinations, it was determined that the survey form had scope and face validity.*
- *In the eighth stage, reliability analyzes of the data set consisting of 109 parents were made. In the reliability analysis, Cronbach’s Alpha ( $\alpha$ ) which is the internal consistency coefficient was calculated. The internal consistency coefficient of the whole survey form is  $\alpha = .890$ . The internal consistency coefficient of the “parental knowledge” section of the survey form is  $\alpha = .830$ . The internal consistency coefficient of the “parental behavior” section of the survey form is  $\alpha = .815$ . The internal consistency coefficient of the “parental assessment” section of the survey form is  $\alpha = .780$ . Since the reliability values of the survey form are higher than .70, it can be said that it is a reliable data collection tool.*

### 3.3 Data collection

The application permission of the data collection tool was obtained from the National Education Directorate of Kars in order to collect data. After obtaining the necessary permissions, 4 kindergarten administrators in the center of Kars were contacted and informed about the purpose of the study.

The data of the research were collected in three stages. The first stage of the data collection process of the research was to apply the personal information form. The second stage was to conduct Parental Guidance in the Process Children Play Digital Game Survey Form. In the second stage, quantitative data were collected. The third stage was the open-ended questionnaire application for parental guidance in the process children play digital games. In this stage, qualitative data were collected.

*The First Stage - Collecting Personal Information:* In order to form the study group of the research, personal information form was sent to 200 parents who had 60–72 months old children in 4 different kindergartens. As a result of the application of the personal information form, 50 parents stated that they did not want to participate in

the research. Personal information of 150 parents and their children was obtained with the personal information form. The digital games played by children were specified by the parents in the personal information form.

*The second stage - collecting quantitative data:* Quantitative data were obtained with “*Parental Guidance in the Process Children Play Digital Game Survey Form*”. A parents’ meeting was organized by the researchers for the application of the survey form on January 8, 2018. Since they did not attend the meeting, 30 parents were excluded from the study group. The survey form was applied to 120 parents. The questions of the parents during the application were answered by the researchers.

*The third stage - collecting qualitative data:* In the study, qualitative data were obtained with “*Parental Guidance in the Process Children Play Digital Game Questionnaire form*”. A parents’ meeting was organized by the researchers for the application of the interview form on January 12, 2018. The qualitative data were collected from 120 parents. Documents related to the digital games, which parents stated in the personal information form, were collected by the researchers in a digital environment through document analysis method.

### 3.4 Data analysis

Data analysis of the research comprises of quantitative and qualitative data analyses. The quantitative and qualitative data analyses are explained below.

**Quantitative data analysis** When the “*Parental Guidance in the Process Children Play Digital Game Survey Form*” was analyzed, which was applied to the parents participating in the research, the data of 11 parents were removed from the data set since it was determined that they marked the same option and left the open-ended questions blank. Descriptive statistics such as frequency and percentage were made, using the data of 109 parents who remained in the data set.

**Qualitative data analysis** The qualitative data analysis of the research consists of the content analyses of the data collected from “*Parental Guidance in the Process Children Play Digital Game Questionnaire Form*” and the “*Personal Information Form*” by which the data about digital games played by the children were collected.

The questionnaire, in which parents’ opinions were taken, and the digital games played by children were established as documents, and the content analysis of the data was made according to the document analysis method. Four criteria were used in the analysis of documents concerning digital games and parental opinions. These criteria are that the document is “*authentic*”, “*credible to include accuracy*”, “*free from imitation*” and “*the fact that it includes the current meaning*” (Scott 2014). In this context, the document obtained from the questionnaire, whose content analysis will be made, resides the assumption that the parents have participated voluntarily and given their objective opinions. The document of digital games played by children is up-to-date, real and free from imitation. In this context, it is assumed that the research document meets the four criteria.

When the data analysis of the “*Parental Guidance in the Process Children Play Digital Game Questionnaire Form*” was examined, parents’ opinions were divided into codes with the content analysis and tried to be explained under the themes according to

the categories formed by the codes. Parental guidance consists of three themes in line with the opinions of the parents. These themes are respectively; parental knowledge, parental behavior, and parental assessment. A total of 11 sub-themes were created under these themes. Themes and sub-themes for parental opinions are given in Table 1.

The other qualitative data analyzed in the research is the digital games the parents stated that their children play. The data were collected using document analysis technique. The number of digital games played by children is 981. Since the same games played by children could not be analyzed again, the content analyses of 450 different digital games were carried out. The learning outcomes in the Turkish Ministry of National Education 2013 Preschool Education Program were determined as criteria and the educational contents of digital games were analyzed according to these outcomes (MEB 2013). The digital games were categorized according to their objectives. Each game was examined by the researchers one by one. The games with violent content were not put to the educational content analysis. Their contents were analyzed using codes such as “*sharp objects*”, “*gun*”, “*blood*”, “*fight*”, “*war*”, “*perpetration*”, “*discussion*”, “*swearing*”. According to the types and contents of non-violent games, the “*games with educational content*” theme was created. Digital games with educational content were analyzed according to the National Education Ministry 2013 Pre-School Education Program (MEB 2013). Non-violent games that did not contain educational content created the theme of neutral games. The themes and sub-themes for digital games are given in Table 1.

### 3.4.1 Qualitative data analysis reliability

As a result of the content analysis, 2 faculty members in the field of computer and instructional technologies and 2 faculty members in the field of pre-school education examined the codes and themes that were specified. This phase lasted approximately

**Table 1** Themes and sub-themes resulting from data analysis

| Themes and Subthemes of Parental Opinions                          | Themes and Sub-Themes of Digital Games   |
|--|--|
| 1. The digital game children play: “ <i>Parental Knowledge</i> ”   | 1. Games with Educational Content        |
| 1.1. The objective of the digital game                             | 1.1. Platform-Based Attention Games      |
| 1.2. The content of the digital game                               | 1.2. Casual Math Games                   |
| 1.3. That the digital game is violent                              | 1.3. Art Games Developing the Creativity |
| 1.4. That the digital game is safe                                 | 1.4. Interactive Intelligence Games      |
| 2. Playing process of digital games: “ <i>Parental Behaviour</i> ” | 2. Violent Games                         |
| 2.1. Observing children  | 3. Neutral Games                         |
| 2.2. Detection of communication                                    |  |
| 2.3. Co-playing  |  |
| 2.4. Prevention of aggressive behaviour                            |  |
| 3. The effects of digital game: “ <i>Parental Assessment</i> ”     |  |
| 3.1. The impacts of digital game                                   |  |
| 3.2. Taking expert opinion   |  |
| 3.3. Educational Support of the Digital Games                      |  |

12 months. The percentage of agreement formula of Miles and Huberman (2016, p.64) was used to determine the reliability of the content analysis. According to the formula " $Reliability = Agreement / (Agreement + Disagreement) \times 100$ "; It was determined that the agreement percentage of "*parental knowledge*" was 0.93, "*parental behavior*" was 0.92, and "*parental assessment*" was 0.91. When examined the agreement percentage of the themes intended for the contents of the educational games, it was determined that the agreement percentage of the "*violent games*" was 0.98, the games with "*educational content*" was 0.90 and "*neutral games*" was 0.94.

Consistencies between the quantitative and qualitative data of the study were examined and reported under the sub-themes. The reporting period lasted approximately 6 months.

## 4 Results

In this study, the parents' knowledge, behavior and assessments were compared with the contents of the digital games. Combining the qualitative and quantitative data, the meaning that emerges in itself was evaluated holistically. Contradictory situations between quantitative and qualitative data were interpreted by considering the method of the research in the holistic evaluation.

The findings of the research are explained according to the themes and sub-themes determined as a result of the data analysis in Table 1.

### 4.1 Themes and subthemes of parental opinions

The themes (*parental knowledge*, *parental behavior*, *parental assessment*) and sub-themes determined according to the parental opinions are respectively explained below.

#### 4.1.1 Theme 1. The digital game children play: "Parental Knowledge".

Findings belonging to the theme "*parental knowledge about the digital game their children play*" are given under the sub-themes. The sub-theme "*the objective of the digital game*" is given in Table 2, "*the content of the digital game*" is given in Table 3, "*that the digital game is violent*" is given in Table 4, and "*safeness of the digital game*" is given in Table 5.

#### 4.1.2 Objective of the digital game

When Table 2 is examined, 78.8% of the parents, who participated in the study, stated that they knew the objective of the digital games. It was determined from their direct quotations that they used *viewing*, *restrictive* and *co-playing mediation* strategies while learning the objectives of digital games their children play (Livingstone et al. 2015, p. 4). When the findings obtained by comparing the analysis of quantitative and qualitative data were examined; 76 of the parents know the objective of only one of the games their children play. 20 parents know the objectives of two games. The objectives of the digital games differ from those stated by the parents.

**Table 2** Parental knowledge about the objectives of digital games and content analysis of the games*S.1. Do you know the objective of the digital game your children play?*

While 86 of the parents expressed that they knew, 13 parents replied that they did not know the objectives of the games played by their children.

*Q.1.1. What is the objective of the digital game your children play?*

Parents defined the objectives of the games as follows: “*fun, competition, intelligence development, education, matching, fighting, making a cake, dressing up, feeding animals and plant nutrition, baby care, beautifying, painting, doing a jigsaw, drawing, solving puzzle*”

*Q.1.2. How did you learn the objective of the digital game your children play?*

Parents learned the objectives of the digital games in the following ways; “*I checked the digital game after the playing process*”, “*my child plays the games I appoint*”, “*I know the objectives of the games because we play together*”

*Content analysis of the digital games:* When the content analysis of the digital games was performed, the objectives of the games were coded as “*design, feeding living things, self-care skills, intelligence, attention, memory, fighting, throwing, catching, releasing, watching, carrying, putting in order, classification, piece-whole, competition and cause-effect relationship*”.

### 4.1.3 Content of the digital game

When Table 3 is examined, 79.8% of the parents who participated in the study stated that they knew the content of the digital games. 87 of the parents, who stated that they knew the content of the digital game, shared their knowledge about the game contents. Parents who stated that they partially knew did not specify the contents of the digital games. Parents use parental mediation strategies for digital games listed in Table 2 to learn the contents of the digital games. However, they also stated that they learned the content of the game during a communication with their big siblings. When the findings obtained by comparing the analysis of quantitative and qualitative data were examined, 67 parents expressed the content of only one of the games played by their children. 15 parents expressed the content of two games, and 5 parents stated more than two. There were differences between the contents of the digital games specified by the parents and

**Table 3** Parental knowledge about the content of digital games and content analysis of games*S.2. Do you know the content of the digital game your children play?*

While 87 of the parents stated that knew, 12 parents stated that they did not know the content of the digital games. 11 Parents stated that they partially knew the content of the digital game played by their children.

*Q.2.1. What is the content of the digital game your children play?*

Parents expressed the contents of the games as follows (“*car racing, doing jigsaw, cooking and baking a cake, shooting arrows, dressing up, drawing and painting, solving riddles, watching videos, raising babies, animals and plants, putting on makeup, placing the organs of the body, founding the state, watching dinosaurs, shooting birds, fishing, fighting interplanetary, putting the ball in the nest, recognizing colours, numbers and geometric concepts, repeating songs ...*”).

*Q.2.2. How did you learn the content of the digital game your children play?*

Parents learned the contents of the digital games in the following ways; “*I learned while the big siblings were talking about*”, “*I know because we play together*”, “*My child plays the games I choose*”.

*Content analysis of the digital games:* When the content analysis of digital games was performed, besides the codes of the parents, new codes were determined in the contents of the games such as “*using weapons, committing a crime by car, getting involved in a crime, taking instructions from a centre, insult and swearing*”.

**Table 4** Parental knowledge about the violent content of digital games and content analysis of the games*S.3. Does the digital game your children play contain violence?*

While 19 of the parents stated that the digital games their children play contain violence, 90 parents replied that they do not contain violence.

*Q.3.1. How did you find out the violent content of the digital game?*

Parents found out the violent contents of the digital games in the following ways; “After the game, my child started doing gun gestures”, “During the game I saw things like crime and extortion in its content”, “I found out because of the gunfire sound coming from the mobile phone”, “I found out that my child played a fight and abusive game while I was checking the game on my mobile phone”.

*Q.3.2. What did you do after you found out that the digital game your child played was violent?*

After the parents learned about the violent content of the digital games, they took precautions against digital games with violent content by using such practices as “I prevented my child from playing digital games”, “I asked my child’s sibling to inform me if my child plays violent games”, “I only allowed for those apart from the violent games”, “I was viewing my child not to play such games”.

Content analysis of the digital games: When the contents of digital games were analysed, it was determined that the children play games that are directly observable in the context of “piercing and cutting tools”, “weapons”, “blood”, “fight”, “war”, “committing crime”, “dispute”.

those determined by the researchers. Parents did not specify the content of any violent games. It was determined that a child played an average of 9 different digital games.

#### 4.1.4 That the digital game is violent

When Table 4 is examined, 17.4% of the parents who participated in the study stated that the digital game played by their children contained violence. Parents found out the violence content by using *viewing mediation* strategy. Parents stated that they used the *restrictive mediation* strategy after detecting the violence content of the digital games (Livingstone et al. 2015, p. 4). Yet it was found that some of the parents monitored the digital game with the support of some family members who did not take part in the research literature. When the findings obtained by comparing the analysis of

**Table 5** Parental knowledge about the safe gaming environment and content analysis of the game*S.4. Do you find the digital game environment in which your children play safe?*

While 55 of the parents replied yes, 34 replied no. 20 parents found the digital game environment partially safe.

*Q.4.1. How do you know whether the digital game your child play is safe or not?*

Parents explained the reason why they find the digital games safe as follows: “it is the game I play”, “I observe the playing process”, “I know the dangerous games from the news”. Parents stated that “games containing violence”, “games with communication”, “games with unclear objective” are not safe.

*Q.4.2. What do you do when you realized that the environment in which your children play is not safe?*

Parents stated that they would ban and check the games (“I check whether my child plays the same game”, “I prohibit the games that I do not consider reliable.”) if they realized that the digital game their children played was not safe.

Content analysis of digital games: When analysing the content of digital games, it was determined that the codes were determined under the category of “safe gaming environment” and “unsafe gaming environment” where the games contain different contents. Any “violence” and “sexual” content, as well as “one-way communication” and “two-way communication” are not established in a safe gaming environment.



quantitative and qualitative data were examined, considering the content of the digital games played by children of 19 parents, it was determined that they all played violent games. According to 90 parents, the games their children play were non-violent. Yet in the content analysis of the digital games, it was determined that 75 children played violent digital games. When the gender of children playing violent digital games was examined, 50 of 94 children were male and 44 of them were female.

#### 4.1.5 That the digital game is safe

When Table 4 is examined, 50.4% of the parents who participated in the study thought that the digital game played by their children was safe. Parents thought that the games are safe because they use co-playing and viewing mediation strategies (Livingstone et al. 2015, p. 4). As a result of content analysis of the digital games made by researchers; Children play the games coded as “*piercing and cutting tools*”, “*weapon*”, “*blood*”, “*fight*”, “*war*”, “*commit crime*”, which are under the category of games containing “*violence*”. Children also play the games in the category of “*sexual*” content due to the “*sexuality in advertising icons*” and “*sexually explicit visuals*”, which appear during the game. Moreover, children play games under the category of “*communication*”, as part of the “*one-way communication*” including directives from a center in the game and “*two-way communication*” codes among the players within the game. When the findings obtained by comparing the analysis of quantitative and qualitative data were examined, it was determined that the number of children playing games in an environment containing “*violence*”, “*sexual*” content and “*communication*” is 90. While the children of 35 parents from 49 parents thought that the games were safe, it was determined that the games that were also played by their children had “*violent*”, “*sexual*” and “*communicational*” contents. Moreover, despite the fact that the digital games played by 5 children of the 34 parents, who thought that it was not played in a safe gaming environment, were played in a safe gaming environment, but the parents did not find the gaming environment safe.

#### 4.1.6 Theme 2. Playing process of digital games: “Parental Behavior”.

Findings belonging to the theme “parental behaviors in the process that their children play digital games” are given under the sub-themes. The “observing children” sub-theme is given in Table 6, “detection of communication” sub-theme is given in Table 7, “co-playing” sub-theme is given in Table 8, and “prevention of aggressive behavior” sub-theme is given in Table 9.

#### 4.1.7 Observing children

When Table 6 is examined, 86.2% of the parents who participated in the study stated that they observed their children playing digital games. It was established that parents used viewing mediation strategy to protect their children from online risks. It was determined that while parents sharing the positive contents of the digital games, they did not share the content such as “*using weapons*”, “*committing a crime by car*”, “*getting involved in a crime*”, “*harming the living creatures*”, “*committing a crime to win*”, “*getting instructions from a center*”, “*insult*”. When the findings obtained by

**Table 6** Parental behaviors in observing their children and content analysis of the game

S.5. Do you observe your child playing digital games?

94 Parents replied yes, 10 partly and 5 no.

Q.5.1. What is your purpose of observation while your child is playing digital games?

Parents explained the purposes of observation as follows: “I observe to keep my child safe from dangerous things”, “I especially observe in the playing process because there are dangerous games.”, “I hear dangerous games from the news, so I observe”. “I observe when my child plays a game that I do not know” “When my child’s game is over, I check which game my child played on the cell phone.”

Q.5.2. According to your observations, what are the contents of the digital games your children play?

The contents of the games that the parents observe while their children are playing are as follows: “car racing”, “jigsaw puzzle”, “cooking food and cake”, “shooting arrows”, “dressing up”, “drawing-painting”, “solving riddles”, “watching videos”, “growing babies, animals and plants”, “putting on makeup”, “placing body organs”, “founding a state”, “watching dinosaurs”, “fishing”, “interplanetary construction”, “putting a ball in a hole”, “recognizing colours, numbers, geometric concepts”, “repeating songs...”

Content analysis of the digital games: When the content analysis of the digital games was carried out, although coded games related to the content of the games observed by the parents were determined, codes such as “using weapons”, “committing a crime with the car”, “getting involved in crime”, “damaging the living”, “committing a crime to win”, “getting instructions from a centre”, “insulting” were also specified.

comparing the analysis of quantitative and qualitative data were examined; 50 of the parents, who stated that they observed their children playing, gave information about the content of only one of the digital games. While 30 parents gave information about the content of two digital games, 15 parents gave information about three digital games. When the educational status and gender of 5 parents who did not observe their children were examined, it was determined that they were female parents who were primary and secondary school graduates. Although the expressions shared by female parents were compatible with the content of the games, it could be said that they had limited information, considering each child plays more than one game.

#### 4.1.8 Detection of communication

When Table 7 is examined, 82.5% of the parents who participated in the study stated that they controlled whether their children were contacted through the digital game or

**Table 7** Parental behavior for communicating through the digital game and content analysis of the game

S.6. Have you ever checked if your child is communicating with others in the digital game?

90 of the parents replied yes, 10 partially, and 9 no.

Q.6.1. How did you check if your child was communicating with others in the digital game?

Parents used the following expressions: “I played the game my child played,” I observed my child playing”, “I asked my child to explain the game”. The expressions were coded exactly.

Q.6.2. What do you do when you notice that your child is contacted in the game?

Parents expressed their behaviours when they noticed that their children are contacted through the game as follows: “I tell that the same game should not be played again”, “I forbid the games my child plays”, “I do not give my cell phone if my child plays the same game”, “If I think that the game too dangerous, I will ban it, if not, my child can continue playing”

Content analysis of digital games: The codes determined for digital games are collected in 3 categories. These categories are “non-verbal communication”, “one-way communication”, “two-way communication”.

**Table 8** Parental behavior of playing digital games with their children and content analysis of games

S.7. Do you play digital games with your child together?

49 of the parents replied yes, 20 partially, and 50 no.

Q.7.1. What is the reason for playing the digital game with your child?

The parents stated the reason why they play digital games with their children together as follows: “to support their education”, “it is more fun to spend time together”, “I prevent the dangers for my child”.

Q.7.2. What is the content of the digital game you play with your children?

Parents stated the contents of the games as follows: “replacing the stones from big to small”, “car racing”, “jigsaw”, “establishing a state”, “landscape”, “growing plants”, “feeding animals”, “baby care”, “dressing”, “matching the stones”, “hitting the target”, “fighting interplanetary”. The expressions were coded with the exact quotations.

Content analysis of digital games: When analysing the content of the digital games, beside the codes stated by the parents, those such as “using weapons”, “committing a crime by car”, “getting involved in crime”, “damaging living things”, “committing a crime to win”, “getting instructions from a centre”, “insulting” were determined.

not. Parents stated that they used *active* and *viewing mediation* strategies for strangers communicating with their children through digital games. The parents stated that they use *active*, *viewing and restrictive mediation* strategies when they notice that their children are contacted by strangers. When the findings obtained by comparing the analysis of quantitative and qualitative data were examined; considering the content analyses of the digital games, in the digital game played by 60 children, it was determined that they were exposed to “*advertisement and visual message*” contents and so they were contacted through “*non-verbal communication*”. It was determined that in the digital games played by 20 children, they were contacted by a center through “*one-way communication*”. In the digital games played by 15 children, “*two-way communication*” was established, which are played in interaction with other players or the game center.

**Table 9** Parental behavior for children’s aggressive behaviors while playing and content analysis of digital games

S.8. Does your child behave aggressively while playing digital games?

30 of the parents replied yes, 20 partially and 59 no.

Q.8.1. What is the reason your child behaves aggressively while playing digital games?

According to the parents’ opinions, the reasons why their children are getting angry while playing digital games are “losing the car race”, “the explosion of the planet”, “losing the war”, “inability to hit the target”, and they added “throwing the phone to the ground when because of failing in the game”. The expressions were coded exactly.

Q.8.2. What do you do to eliminate your children from being aggressive while playing digital games?

Parents stated the ways to eliminate the aggressive behaviours of the children during playing as follows, “I take the smartphone and do not give back”, “I take the tablet if my child hits it the table”, “I set new rules”.

Content analysis of digital game: According to the content analysis of the games that cause children to exhibit aggressive behaviour, children play games with the directly observable contents such as “piercing and cutting tools”, “weapons”, “blood”, “fight”, “war”, “commit crime” and games with “two-way communication”.

#### 4.1.9 Co-playing

When Table 8 is examined, 45.0% of the parents, who participated in the study, stated that they played the digital games with their children. It was determined that parents play together with their children to protect them from various risks and have fun while supporting their education.

When the findings obtained by comparing the analysis of quantitative and qualitative data were examined; 49 of the parents, who stated that they play the digital games their children play, played only one of the digital games played by their children. It was determined that 29 of the parents who played the same game with their children were male and according to these parents, the games they played with their male children were those coded with the content of *“hitting the target, car racing, establishing a state, fighting interplanetary”*. The female parents playing digital games with their children stated that they play games coded with the content of *“growing plants, feeding animals, baby care, make-up, dressing, matching the stones”*. When the content analysis of the games played by male parents was performed, it was determined that there were game contents with the codes of *“using weapons, committing a crime with a car, getting involved in a crime, damaging the living creatures, committing a crime to win, getting instructions from a center, insults”*. When the number of games played by the children was examined, it was also determined that the parents played one of the games played by their children and they commented on the content of the game according to their own perspectives.

#### 4.1.10 Prevention of aggressive behavior

When Table 9 is examined, 27.5% of the parents, who participated in the study, stated that their children behaved aggressively during the digital game. Parents stated that they used restrictive mediation strategy to eliminate their children’s aggressive behavior. When the findings obtained by comparing the analysis of quantitative and qualitative data were examined; As a result of the content analysis carried out by the researchers, it was determined that the digital games that made children angry were under the category of *“violence”*. When the contents of the digital games played by the children of 30 parents were examined, it was determined that they all played violent games. As a result of the content analysis of the digital games, they were coded as *“piercing and cutting tools”, “gun”, “blood”, “fight”, “war”, “commit crime”, “discussion”*. Parents stated that their children get angry if they cannot achieve the targeted success in the game. Expressions about the contents of the games were stated as the reasons for the anger. These statements were coded exactly as *“when the children lose the car race”, “when the child’s planet in the game explode”, “when the child lose the war”, “when the child cannot hit the target”*.

#### 4.1.11 Theme 3. The effects of digital game: “Parental Assessment”.

**The impacts of digital game** When Table 10 is examined, 70.6% of the parents who participated in the study stated that they had an idea about the effects of digital games. Parents argued that digital games had both positive and negative effects. It was understood that parents used *restrictive mediation* strategies to eliminate the effects they considered negatively. As a matter of fact, it was determined that parents used *restrictive mediation* strategies to eliminate the aggressive behavior which is under the negative effect category.

**Table 10** Parental assessment on the effects of digital games and content analysis of the games

*S.9. Do you have any idea about the effects of the digital game your children play?*

77 of the parents replied yes, 12 partially, and 20 no.

*Q.9.1. What are the effects of the digital game your children play?*

The parents stated that the digital games had both positive and negative effects. They stated that the positive effects were the fact that their children “*had fun*”, “*use technology*”, “*learn new information*” and “*improve their intelligence*”. Parents highlighted the negative effects of digital games as follows: “*Technology addiction*”, “*time wasting*”, “*overweight*” and “*frustrated*”.

*Q.9.2. What do you do to eliminate the negative effects?*

Parents expressed that they took the following precautions to eliminate the negative effects of digital games: “*I determine playing times*”, “*My child can play just for 15 min not to get overweight*”, “*I do not give my child the cell phone not to get addicted to the technology*”

Content analysis of digital games: The digital games that the parents indicated were divided into three sub-categories in terms of their impact on the children. These categories are: “*positive impact*”, “*negative impact*”, and “*neutral category*” that was neither positive nor negative. Children play digital games under these three categories determined.

When the findings obtained by comparing the analysis of quantitative and qualitative data were examined; The games under the “*positive*” and “*negative*” category were coded as “*violence*”, “*sexuality*” and “*mutual communication*” and they were set under the category of negative effects. The games remaining after this coding were thought to support the development of children and contribute to their learning. These games were included in the positive category. Some digital games, although they were not in negative coding, were included in the neutral category, since they were not considered to be educational. In this context, 74% of the games played by children were under the negative category, while 18% were under the positive category. On the other hand, 8% of the digital games were under the neutral category because they were not under the positive or negative category.

**Taking expert opinion** When Table 11 is examined, 9.2% of the parents who participated in the study stated that they received expert support for the digital game played by their children. The reason why parents received expert opinion was to support the education of their children and to keep them away from digital games that might be harmful to them. In this context, it was determined that parents asked experts’ opinion to use mediation strategies effectively.

**Table 11** Parental assessment of getting expert opinion about the digital game and content analysis of the games

*S.10. Have you ever taken any expert opinion for the digital game your children play?*

10 of the parents replied yes and 99 replied no.

*Q.10.1. What is the reason of yours for getting or not getting expert opinion about the digital game your children play?*

When the reasons of parents for getting or not getting expert opinion are examined; the exact quotes for getting were “*Letting the children play digital games recommended by experts*”, “*supporting their education*”, “*avoiding harmful content*” and the exact quote for not getting expert opinion was the fact that “*there are no experts on digital games*”. The quotes were coded exactly.

Content analysis of digital games: When the contents of the games played by the children of the parents who took expert opinions were examined, it was found that the games did not contain “*violence*”, and they were the games that support children’s “*piece-whole*”, “*cause and effect*”, “*memory*” and “*problem solving*” skills.

When the findings obtained by comparing the analysis of quantitative and qualitative data were examined; It was determined that the digital games played with expert opinion, for all 10 parents, were supporting the skills of children such as “*piece-whole*”, “*cause-effect*”, “*memory*” and “*problem solving*”. The education levels of the parents who took the opinions of experts were doctorate and bachelor’s degree.

**Educational support of digital games** When Table 12 is examined, 49.5% of the parents who participated in the study thought that the digital games contribute to their children’s education. Parents practiced *co-playing*, *active and viewing mediation* strategies for digital games to support their children’s education.

When the findings obtained by comparing the analysis of quantitative and qualitative data were examined; The reason why parents thought that the games contributed to the education of their children was the fact that children could get knowledge about “*numbers*”, “*colors*” and “*daily life*” through the digital games. It was coded by making one-to-one quotes that parents also expressed that digital games played by children improved their “*dream world*”. It was understood from the exact quotations that the digital games played by children had “*intelligence developing*” and “*problem solving*” features. According to the content analysis of the digital games specified by 54 parents, it was found that only the children of 10 parents did not play violent games. All of the 10 parents stated that they received expert support for digital games. The educational backgrounds of the parents, who thought that digital games could support the education of children, were doctorate, bachelors’ and high school graduates. It was determined that the parents who received expert support used *co-playing*, *active*, and *viewing mediation* strategies for the digital games.

## 4.2 Themes and sub-themes of digital games

Within the scope of the research, only the theme and sub-themes of educational digital games are explained. In this context, the 2nd (violent games) and 3rd (neutral games) themes are not explained.

**Table 12** Parental assessment of educational support of digital games and content analysis of games

S.11. Do you think that the digital game your children play contributes to their education?

54 of the parents answered yes, 30 partially, and 25 no.

Q.11.1. What is the content of the digital game that you think contributes to the education of the children?

Parents think that digital games contribute to the education of children due to their qualities of “*problem solving*”, “*learning numbers*”, “*learning colours*”, “*learning concept*”, “*intelligence developer*”, “*imagination*” and “*life-oriented information*”

Q.11.2. What do you do to make your children play supportive digital games for their education?

Parents stated that they did the followings to make their children play digital games that support their education: “*I play with my child*”, “*I ask what can be learnt in the game*”, “*My child tells me what s/he experiences in the game*”, “*I observe my child playing and make my child play educational games*”

Content analysis of digital games: Non-violent, digital games specified by parents were gathered under four sub-themes when content analysis was made according to educational achievements. These themes are: “*platform-based attention games*”, “*casual math games*”, “*art games developing the creativity*”, and “*interactive intelligence games*”.

#### 4.2.1 Theme 1. Games with Educational Content.

When the contents of the digital games played by children are examined by the researchers, the digital games are divided into four sub-themes according to the body of literature. These sub-themes are explained one by one below.

#### 4.2.2 Platform-based attention games

The platform games are a type of game in which the primary objective requires movement and furthering between platforms built with two- or three-dimensional graphics at different heights (Wolf 2001, p.128). Platform games are divided into four themes according to their content. The themes are named as “*jumping*”, “*holding*”, “*dropping*”, “*tracking*”. It was determined that under these themes there are supportive contents where children focus on objects or living things, make predictions, match, remember the situations they perceive, classify, compare, sort, improve their visual literacy, and improve their gross and fine muscle skills. Since this game category allows focusing on a certain stimulus and keeping other stimuli under control, it provides focusing and maintaining the attention. When the body of literature (Feng et al. 2007; Green and Bavelier 2003, 2006, 2007) is analyzed, it has been determined that the digital games coded as “*jump*”, “*hold*”, “*drop*”, “*follow*”, which have spatial tracking and movement, improve visual perception and attention skills. As a matter of fact, it has been determined that the children having distractibility improve their school and social life qualities due to the digital games (Griffiths 2002).

#### 4.2.3 Casual math games

Casual games are flash browser games that can be played even on a low-equipped computer. They are the most-liked and played games by children because they are short and simple and usually found on social networking sites. Since these games are not difficult, they are also easily played by children who do not have digital game experience (Juul 2010, p. 8). The games in this game category are divided into seven themes. The themes are named as “*classification*”, “*sorting*”, “*nutrition*”, “*piece-whole*”, “*matching*”, “*counting*”, “*comparison*”. When these themes are analyzed, the contents that can support children’s “*classification*”, “*sorting*”, “*piece-whole*”, “*matching*” skills for an object or living thing are observed. While a child is playing games in the theme of “*nutrition*”, the daily amount of food to be given a creature should be measured. In the “*comparison*” theme, the child pays attention to two stimuli while passing a stick through a hole and comparing the diameters of the stick and the hole. These skills also improve focusing ability on a particular object or living thing. “*Counting numbers*” by matching objects with different colors can contribute to learning numbers as symbols. It has been determined that the digital games, which include a “*piece-whole*” relationship, where three boards are brought together and a gap is covered, improve children’s addition and subtraction skills. Digital games played by children in early childhood can be useful in developing their math, visual literacy and language skills (Griffiths 2002). According to the researches on the effects of digital games on children requiring special education, the games have effects on developing mathematical, spatial (Masendorf 1993; Okolo 1992), and problem-solving (Hollingsworth and Woodward 1993) skills.

#### 4.2.4 Art games developing the creativity

Art games are those providing the opportunity to paint, draw or design certain objects in digital environment. In the art games, drawings, colors and the configurations of the character develop the sense of aesthetics (Parker 2013, p.41). That the children dress up models, construct a garden, and make drawings on a field have been evaluated under the category of art games. The games in this category are divided into five themes and named as “*painting*”, “*block design*”, “*dress design*”, “*landscape*”, and “*drawing*”. It is observed that the games in this category have a content that can develop especially “*art and aesthetics*” understandings of children. Children can express themselves “*in creative ways*” through the games under this category. The games in which it is required to repaint the object that is given in a particular color, the ability to “*match*” objects or living things according to their characteristics is supported. Such as “*block design*” by bringing together similar blocks, “*landscape*” by placing different items in a space, *grouping, comparing, sorting, planning about space-location, measuring objects, creating patterns*, etc. observed to support skills. It is observed that the games providing opportunities of “*block design*” by bringing together similar blocks, “*landscape*” by placing different items in a place, “*drawing*” by completing the locations of missing items support skills such as *classification, comparison, sorting, space planning, object measurement, forming patterns*. Themes under this category are also thought to include practices to support *fine motor skills*. Aguilera and Mendiz (2003) argue that digital games support children’s cognitive development, such as *concentration, problem solving, decision making, and creativity*. Indeed, art games can contribute to the development of creativity by supporting many cognitive skills of children.

#### 4.2.5 Interactive intelligence games

Interaction-based games are those that are categorized according to the way they are played. An interaction-based game includes expressions about what player does and needs to do in the playing process to maintain the function of the game (Schell 2008, p.41). The games in this category are divided into three themes and named as “*question-answer*”, “*instruction*” and “*imitation*”. The answers given by children to the questions in this category are under the theme of “*question-answer*”. This theme includes typing or touching an answer in response to the question. In this process, the answers given by children for the “*concepts*” they know or do not know have been examined and at the same time children learn different concepts. It has been observed that being “*instructed*” on the items that need to be picked up in a certain place and perceiving these stimuli are supportive in “*developing the implementation of the instructions given in a certain place*” and “*solution offers to the problems encountered*”. Children may need to use the “*problem solving*” technique learned in the previous level at other levels in order to advance in the game. There may also be games involving “*imitating*” the commands given for the missions to be carried out by an animal or a dream hero. It has been observed that these games support the development of the awareness of “*self-care abilities*” in daily life such as *cleaning, tooth brushing, hand washing, feeding, sleeping*. When the body of literature is analyzed, according to Oblinger (2004), the knowledge learned previously is used to advance in educational digital games. In this process, children test the assumptions and receive interactive



feedback as a result of their applications. According to Boot et al. (2008), digital games that provide specific feedback support children's development of attention, control, planning, remembering and executive functions. Therefore, as a result of supporting cognitive development, children's intelligence development is also supported.

## 5 Discussion

The study in which the mediation strategies of parents and the educational contents of the digital games are examined, it has been determined that parents use co-playing, viewing, and active mediation strategies in the process their children play digital games with educational content. In the research, it has been specified that parents who receive expert opinions handle the digital games consciously and aim to provide educational support while protecting their children from negative effects. This result shows that while applying the mediation strategies, before any adverse effect occur, a pre-planned mediation is used consciously to support the development of the children. The relationship between the education levels of the parents who consciously practice parental mediation has been determined. It has been found that the parents cannot apply the mediation strategies sufficiently at lower education levels. In the light of the findings of the research, in the process of learning about digital games, parents think that their children play in a safe gaming environment in consequence of applying *co-playing* and *viewing mediation* strategies. It has been determined that they try to protect their children from digital risks by applying *restrictive mediation* strategy in case of any negative content such as violence in the digital games. Although the contents and the objectives of the digital games expressed by the parents are similar to the actual contents, considering that each child play an average of nine games, it has been concluded that the parents do not know about the contents of the other games their children play. For this reason, it can be said that parents do not have enough knowledge about the objectives and contents of the digital games their children play. In this context, it is prominent that parents are conscious due to their education levels in the correct application of mediation strategies and how consciously the parents practice a mediation strategy is an important matter of opinion.

According to Gentile (2003), only one third of parents know the names of the digital games their children play. It has been established that since the parents do not know about their content and objective, they let their children play digital games that may cause negative effects. This situation has very important factors in the emergence of adverse effects of the digital games.

The fact that parents know about the objective and content of the digital games is considered as an indicator of conscious mediation strategy practice. As a matter of fact, mediation strategies that are practiced unconsciously may turn into *laissez faire* mediation that is not considered as a mediation strategy (Lwin et al. 2008). Parents who neglect their children as a result of unconscious practice of mediation strategies may leave them alone with the risks of digital games. In researches on the risks of digital games, it was determined that violent games may cause loneliness and obesity (Wack and Tantleff-Dunn 2009), depression and anxiety disorder (Mentzoni et al. 2011), and aggressive behaviors (Bluemke et al. 2010). Parents who will be a model to the conscious use of digital games in preschool time may lead to the positive contribution

of digital games to children's development. According to Fox and Schirmacher (2012), technology contributes to preschool children preparing for school if used consciously. Moreover, with the correct use, the open-ended effect of technological tools on children's natural curiosity can support their learning and development. For instance, in today's world where children play digital games on smartphones, the features such as photographing, voice and video recording can be used effectively in their learning process (Aral and Doğan Keskin 2018). When the results of the related studies are examined, it is apparent that parents' technology awareness and the application of effective mediation strategies will increase children's utilization of the technology. In this context, parents' use of viewing, active, and restrictive mediation strategies in playing process will lead children to be influenced by the digital games positively. In fact, parents prefer active and restrictive mediation strategies in early childhood period (Piotrowski 2017). It is extremely important that children in early childhood have a higher tendency to accept mediations than adolescents (Ho et al. 2017, p. 77). As a matter of fact, in the study conducted by Genç (2014), it has been found that children, who take their parents as a model, are negatively affected by the use of technology in the event that the parents do not behave consciously towards it. In this context, considering the twenty-first century conditions, the conscious behaviors of the parents towards digital games in the early childhood may lead children build their future of technology use.

When the behavior of the parents in the process that their children play digital games is examined in the light of the findings of the research, it has been determined that they cannot use the *restrictive* and *viewing mediation* strategies for the negative contents. As a matter of fact, it has been determined that children play a large number of violent digital games. In the research conducted by Gentile and Walsh (2002), the question "*How often can you put on time limits on the digital games your children play?*" was asked, and 55% of the parents replied "always", while 40% of parents stated that they set criteria and a time limit before buying or renting the games, and check their children in line with those criteria. According to Gentile (2003, p.131), the majority of children prefer violent games. From this point on, parents can detect the violent games by using viewing mediation strategy. However, according to Çalışkan and Özbay (2015), it was determined that children in primary school play digital games when their parents watch television. In other words, it is understood that children develop a playing strategy against the strategies of the parents. As a result of the research conducted by Toran et al. (2016), children play digital games for a long time and parents cannot express the certain period of this time. In this context, the fact that the parents do not know exactly the time in which their children play is an indication of their insufficient observations. However, what is critical in this process is the effect of the time children spend with negative content on themselves. At this point, parents should be aware of the necessity of playing digital games that will provide educational support for children in early childhood, when the neural development is critical.

In the light of the findings of the research, 74% of the digital games played by children are in the negative category. It has been determined that different digital games with positive and negative effects are played spontaneously without a systematic plan to support the development areas of children. When the researches which have been concluded that the educational contents of these games support the development of children are examined; In the study conducted by Kim and Smith (2017), it was stated

that digital games support problem solving, reasoning, analyzing, decision making and prediction skills. In the studies on the effect of digital games in supporting hand-eye coordination and motor development of children conducted by Marco et al. (2012) and Marco et al. (2009), it was found that digital games have a positive impact on motor development and hand-eye coordination. It was determined in related researches (Sarama and Clements 2002, 2004; Clements and Sarama 2007, 2008) that digital games designed to support the cognitive development support not only children's cognitive but also math skills in primary school and later. However, the parents, who participated in the study, stated that besides digital games that have positive impacts on the development of their children, violent games with negative effects are also played. As a result of the content analysis of the digital games, it has been determined that children play at least one violent game. In this context, as a result of playing not only violent but unchecked digital games; it is observed in the research conducted by Fischer et al. (2010) that children's tendency to violence increases, and in the research conducted by Gentile et al. (2012) they have attention problems and exhibit impulsive behaviors. Moreover, when the playing period of time is not controlled, musculoskeletal system problems (Jacobs et al. 2009), obesity as a result of gaining excess weight (Ballard et al. 2009), disturbed sleep patterns and habituation (King et al. 2013) may occur. It has been specified that although parents are aware that digital games with negative effects and violent games are not suitable for their children, they cannot provide guidance on the use of technology expectedly. This result of the study overlaps with the result of Nikken et al. (2007).

According to the content analysis results of the digital games, 18% ( $n = 81$ ) of them are educational games in the positive category. Even though the detected games have educational contents, digital games claiming to be educational have been discussed contextually in literature. According to Papadakis and Kalogiannakis (2020), a small number of digital games that claim to be educational actually have the effect of improving children's intelligence and supporting their learning. In the study conducted by Papadakis et al. (2018), when the educational values of digital applications supporting cognitive development of Greek preschool children were examined, it was determined that the games mostly encouraged rote learning and were in the drill & practice category. Some studies (Gentile et al. 2012; Larkin 2013; Namukasa et al. 2016; Papadakis et al. 2018; Yelland et al. 2017) in literature shows that digital games claiming to be educational are insufficient in terms of educational content and the number of digital applications that support children's education is limited. According to Papadakis and Kalogiannakis (2017), parents and educators have difficulties in identifying digital applications that support children's education. This is mainly due to the inadequacy of criteria and evaluation tools to evaluate digital games. It has been determined that the descriptions of digital applications declaring that they are educational are either insufficient or do not coincide with the desired content. In addition, it was determined that the relationship between star-rating reviews of the applications and their educational value is incompatible (Papadakis et al. 2018; Ozeke 2018). Although parents play a significant role in children's use of digital applications, it is an important fact that they cannot interfere in the content of digital games. In this case, while developing effective digital applications for children, the digital application designers should pay attention to the educational value that does not contain violent elements, is appropriate for children's ages, and does not include cultural, ethnic and gender

stereotypes (Chau 2014; Goodwin and Highfield 2012). In research, 8% ( $n = 36$ ) of the digital games whose content analysis has been conducted are neutral games that are neither in positive nor negative category. These games are digital applications that do not have any educational content but designed to entertain children. This result of the research is similar to the results of related (Higgins et al. 2005; Papadakis et al. 2016b) studies. In the light of the literature, negative conditions such as the inadequacy of the educational design of digital applications and the difficulty of parents to evaluate digital applications have been identified. As a matter of fact, these results coincide with the results of the research. However, according to the results of the study, it has been determined that the digital games played by the children of parents who have received expert opinion have educational content. In this context, while the production of digital applications focusing on children is rapidly increasing, the opinions and suggestions of experts regarding these applications should not only be taken by parents. At the same time, the situation arises that digital application designers should definitely seek expert opinion as well.

In the light of all these results, if parents provide effective guidance, the development of children who play digital games, which have become the necessity of the age, can be positively supported even without focusing on the content of the games. However, in order to support children's development positively, parents should use mediation strategies consciously. Therefore, first of all, parents should be expressed how to communicate with their children. Technology-oriented education should be given to parents who are far from technology. Finally, parents should be educated on how they should behave in the process their children play digital game.

In order for digital games to contribute to their development, digital games with educational content suitable for children in early childhood years should be designed. It should be ensured that the designed digital games become applicable according to the flexibility principle of training programs. Thus, family education can be supported too with family participation activities in education programs of early childhood years.

## 6 Conclusion

According to the consistency that emerged as a result of combining quantitative and qualitative data in the study, the rate of parents who provide conscious guidance to their children about digital games is approximately ( $n = 10$ ) 9%. These parents consciously take expert opinions and use the viewing and active co-playing mediation strategy to support their children's development. The rate of parents who do not provide conscious guidance to their children is approximately ( $n = 99$ ) 91%. Parents who do not provide conscious guidance use the restrictive mediation strategy when they observe any adverse effect of digital games on their children. According to the findings of the research, it has been determined that the act of providing conscious guidance is directly related to the education levels of the parents. Parents with a high level of education use active and co-playing mediation strategies. While 18% of the digital games whose content analysis has been conducted in the research are educational, 74% are violent and 8% are neutral digital games that are not educational and do not contain violence. From this point of view, it has been determined that children play mostly violent or entertainment games instead of educational digital games. As a result, parental

guidance alone is not enough to support children's education through digital games in early childhood. Educators, digital game developers and researchers should contribute to the development of qualified digital games by setting design standards that are suitable for the nature and philosophy of early childhood education. Thus, technological tools can turn into safe learning tools in early childhood.

## 7 Limitations

This research on digital games played by early childhood children has limitations in terms of both the target audience being children and the complexity of digital games that are the subject of research. Since the children did not participate in this study, the findings were limited to the opinions of the parents. Digital gaming experiences of children could have been observed and they could have been interviewed about the games. While digital games played by children were limited to smart mobile devices and tablets, other technological devices could not be included in the study. The digital games examined in the study are free or trial versions. However, by comparing them with paid digital games, a comparison could have been made for paid and free games. While evaluating the educational contents of digital games, their features such as sound, software, graphics, image quality, etc., were not examined. In evaluation of digital games, the learning outcomes in the Ministry of National Education 2013 Preschool Education Program were taken as a reference. However, a more detailed rubric could have been used to evaluate the digital games.

## 8 Further research

Due to the limitations of the research, some suggestions for further research have been made. In researches about digital games, observation technique should be used to obtain data from the environment where the child interacts with the game. In Turkey, in order to evaluate the digital games played by children, digital game evaluation tools should be developed or the developed tools should be adapted. What researchers should focus on is developing sample designs for qualified educational digital applications for early childhood children and testing them with experimental studies.

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**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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