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## Examining computer gaming addiction in terms of different variables

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### Abstract

The computer gaming addiction is one of the newer concepts that young generations face and can be defined as the excessive and problematic use of computer games leading to social and/or emotional problems. The purpose of this study is to analyse through variables the computer gaming addiction levels of secondary school students. The research was conducted with survey and causal-comparative quantitative research methods. Furthermore, the quantitative data was obtained by interpreting the data obtained through open-ended questions. Findings reveal a significant difference between computer gaming addiction and variables of gender, daily gaming times and whether or not students play games with people they do not know. However, findings did not show any significant difference between computer gaming addiction and variables of grade or purposes of game playing. According to the findings from qualitative data analysis, students mostly prefer to play skill-based games, while they would want to design action games.

Keywords: Computer gaming, daily gaming times, game addiction, purposes of game playing, secondary school students.

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## 1. Introduction

With the continual rapid expansion of information technology, knowledge, communication and entertainment are just one 'click' away, resulting in the introduction of many new social, economic and psychological concepts in daily human life. One of these newly introduced concepts faced mostly by the young generations is computer gaming addiction. Although it has been defined with different descriptions such as video game addiction, online gaming disorder, problematic online game play and online gaming addiction (Demetrovics et al., 2012; Young, 1998, 2009), all of these definitions describe the same condition with minor differences. Computer gaming addiction, a type of behavioural dependency, is defined as excessive and problematic use of computer/video games, despite the fact that it causes social and/or emotional problems and inability of the individual to stop this behaviour (Lemmens, Valkenburg & Peter, 2009). In the Diagnostic and Statistical Manual of Intellectual Disabilities (DSM-5, Version 5), the American Psychiatric Association identified that computer gaming addiction, which is defined as an Internet gaming disorder, leads to failure at school, in marital life, and loss of work (American Psychiatric Association, 2013). Young (2009) suggested that computer gaming addiction was related to thinking about the game excessively, hiding or lying about game-playing, loss of interest in other activities, withdrawal from social activities, displaying anger when deprived of the game, using games as escapism from problems, and continuing to play games despite its negative effects.

Due to the negative effects stated by the American Psychiatric Association (2013) of preoccupation or obsession with Internet games, building up a tolerance, loss of interest in other life activities and lying to others about Internet game usage, computer gaming addiction has attracted the attention various scholars. In a study conducted by Horzum (2011), computer gaming addiction levels of primary school students were examined and it was observed that male students displayed more computer gaming addiction than female students, and that students with higher socio-economic standing displayed more computer gaming addiction when compared to those with lower standing. Griffiths and Hunt (1995) found that the male children played for a longer time than the female children, 20.5% of all students exhibited aggressive behaviour due to computer games and 7.2% received bad grades, in a study conducted with students aged 12 to 16 years. In another study on adult and adolescent online gaming cases, data were collected from adult and adolescent individuals playing EverQuest, and it was observed that 26.8% of adolescents and 22.4% of adults played the game for 31 hours or more per week (Griffiths, Davies & Chappell, 2004).

In Sahin and Tugrul's (2012) study that aimed to determine computer gaming addiction of 4th and 5th grade students, the findings revealed low computer gaming addiction scores, but the higher levels of addiction existed in males compared to females, for those with a computer at home compared to those without, and those with a mother with a lower education level when compared to those with a mother with a higher education level. However, there was no significant difference found between the computer gaming addiction levels of students based on the variable of the education level of the father. In a study conducted by Gullu, Arslan, Dundar and Murathan (2012), it was determined that the dependence of primary school students on computer games was high and that the dependency levels differed significantly based on the variables of gender, class and having a computer at home. Tas, Eker and Anli (2014) found that the level of gaming addiction did not differ based on gender, school type and class level variables. Kim, Namkoong, Ku and Kim (2008) reported that computer gaming addiction positively correlates with aggression and narcissistic personality type in a study conducted with 1,471 online game users. Karaca et al. (2016) investigated the relationship between computer gaming addiction and social anxiety levels of students in the 10–15 year age group. It was found that 46.7% of the students were problem-users, 5.6% were addicted to computer games and that the computer game addiction was moderately correlated with social anxiety level. Computer and Internet usage rates were determined as 54.9% and 61.2%, respectively, according to the Household Computing Technologies Usage Survey conducted by the Turkish Statistical Institute (Turkiye Istatistik

Kurumu, 2016). In the same study, the mean age of computer use was eight years, the mean age for mobile phone use was ten, and that the mean age of the first Internet use was nine years. Also, in a study conducted by the Entertainment Software Association (ESA), it was observed that 27% of individuals playing computer games were under 18 years of age (ESA, 2016).

It is thought that such studies are important because they give information about the situation of students' digital game playing in different cultures, allowing for cross-cultural comparative research. In addition, it is also important to examine the levels of computer gaming addiction in children and make recommendations based on the results of such examination because the age of the first use of information technology is generally quite low, and children who play computer games constitute more than one-quarter of all game players. Thus, the aim of this current study is to determine and examine the computer gaming addiction levels of secondary school students in terms of various variables. For this purpose, the following research questions were identified:

1. What is the distribution of computer gaming addiction levels of students?
2. Do the computer gaming addiction levels of students differ based on their gender, grade, daily gaming times, purposes of playing games, and whether they play games with someone they do not know?
3. What type of games do students play the most?
4. What type of games do students want to design the most?

## **2. Method**

### **2.1. Research design**

The current research study was conducted with survey and causal-comparative quantitative research methods. A survey research aims to discover individuals' attitudes, opinions, behaviours, or characteristics (Creswell, 2012); while a causal-comparative study aims to determine differences between groups or individuals based on a pre-existing event or situation (Fraenkel, Wallen & Hyun, 2012).

The first research question regarding gaming addiction levels of secondary school students aims to be determined by the survey method, whilst the second research question will examine whether or not this level differs based on the variables by way of the causal-comparative method. Furthermore, in addition to the quantitative data, open-ended questions on the types of games that students play and the types of games they desire to design is provided in the data collection tool.

### **2.2. Study group**

The study group comprised 5th, 6th, 7th and 8th grade students attending two secondary schools located in the Central Anatolian Region of Turkey in the spring semester of the 2015–2016 academic year. In the study group, a total of 166 students were female (55.3%) and 134 were male (44.7%). 81 of the students were in the 5th grade (27.0%), 86 were in the 6th grade (28.7%), 58 in the 7th grade (19.3%) and 75 of the students were in the 8th grade. Data showed that the time students spent on playing games varied between 1–4 hours (53.3%), 0–1 hours (33.7%), 4–8 hours (8.7%) and more than eight hours (4.3%). In the question that determined the purposes of their game playing, the students stated that they mostly played the games in order to reach targets (48.3%) and to wreak havoc in the gaming world the least (3.3%). In the question 'Do you play with people you do not know', students mostly gave answered 'no' (77.7%). The participants with the highest level of gaming addiction mostly used computers (62.7%) and mobile phones (72.3%) when playing games. Furthermore, participants with high gaming addiction performed most of their gaming activities while at home (94%).

### 2.3. Data collection tool

The data collection tool used in the research included two sections. In the first section, there were open-ended questions with a personal information form that aimed to collect demographic data related to the participants, and in the second section, the computer gaming addiction scale for children (CGAS-C) was utilised.

The CGAS-C, developed by Horzum, Ayas and Cakir Balta (2008), includes 21 items in four factors (obsession with the game, associating the game with life, neglecting duties due to gaming, and preferring gaming to other activities). The formula  $(n-1)/n$  was used to calculate gaming addiction levels based on mean scale scores. Accordingly, the range of 1.00–1.80 points reflects ‘very low’, the range of 1.81–2.60 points reflects ‘low’, the range of 2.61–3.40 points reflects ‘medium’, the range of 3.41–4.20 points reflects ‘high’ and the range of 4.21–5.00 points reflects ‘very high’ levels. The Cronbach  $\alpha$  reliability coefficient calculated by the scales of original developers was 0.85, and in the current study, the Cronbach  $\alpha$  coefficient was calculated as 0.93.

### 2.4. Data analysis

As per the current study’s objective, the data collected with the CGAS-C scale were simplified by first removing the outliers and missing data from the dataset. Then, to utilise the parametric tests, the fitness of the total scores obtained on the CGAS-C by each student for normal distribution was tested. According to Huck (2012), to claim a normal distribution of the data, the skewness and kurtosis values should be between  $-1$  and  $+1$ . Accordingly, it could be observed that the scores obtained from CGAS-C scale sustain the assumption of normal distribution (skewness = 0.938, kurtosis = 0.674). The Bonferroni adaptation (Field, 2009) was conducted to prevent misinterpretation of significance level and type 1 error since the CGAS-C scale total score, which is the dependent variable of the study, was analysed for five different independent variables and  $p$ -value was interpreted within  $(0.05/5 = 0.01)$  level. The open-ended questions in the data collection tool were analysed with descriptive analysis and are presented as frequencies.

## 3. Results

In this study, distribution of the students based on computer gaming addiction levels was initially examined. The average score of the students on the CGAS ( $\bar{x}_{CGAS} = 2.21$ ) demonstrates that the computer gaming addiction levels of the students were low. The mean of the students for the sub-factor scores of ‘obsession with game’, ‘relating the game with life’ and ‘preferring the game over other activities’ ( $\bar{x}_{OG} = 2.43$ ,  $\bar{x}_{RGL} = 2.09$ ,  $\bar{x}_{PGOA} = 2.17$ ) were low and very low ( $\bar{x}_{NDG} = 1.68$ ) for the sub-factor of ‘neglecting duties due to gaming’.

The independent samples t-test was used to respond to the research question where students’ computer gaming addiction scores were analysed based on gender (Table 1).

**Table 1. t-test results on computer gaming addiction scores based on gender**

Group	<i>n</i>	$\bar{x}$	<i>sd</i>	<i>df</i>	<i>t</i>	<i>p</i>
Female	166	40.02	15.074	298	-6.606	0.000
Male	134	54.27	20.967			

In results of the t-test for computer gaming addiction scores based on student gender are displayed in Table 1, and demonstrate that the difference between the mean score for female students ( $\bar{x}_{female} = 40.02$ ) and male students ( $\bar{x}_{male} = 54.27$ ) was statistically significant ( $t = -6.606$ ;  $p < 0.01$ ). Based on this result, it could be argued that male students had a significantly higher level of computer gaming addiction when compared to female students.

One-way ANOVA for independent groups was conducted in order to respond to the research question about students’ computer gaming addiction scores being examined based on grade (Table 2).

**Table 2. ANOVA results for computer gaming addiction scores based on grade**

Source of variance	Sum of squares	df	Mean square	F	p
Between groups	707.674	3	235.891	0.633	0.594
Within groups	110301.472	296	372.640		
Total	111009.147	299			

ANOVA results for computer gaming addiction scores based on student grade, as presented in Table 2, identified that statistically the grade variable did not significantly differentiate the computer gaming addiction level ( $F(3,296) = 0.633; p > 0.01$ ).

One-way ANOVA for independent groups was also conducted to answer the research question about students’ computer gaming addiction scores based on the amount of daily gaming time (Table 3).

**Table 3. ANOVA results for computer gaming addiction scores based on daily game playing time**

Source of variance	Sum of squares	df	Mean square	F	p	Difference (hours)
Between groups	27252.497	3	9084.166	32.104	0.000	0–1 to <1–4
Within groups	83756.649	296	282.962			0–1 to <4–8
Total	111009.147	299				0–1 to <8+ 1–4 to <4–8

ANOVA results for the computer gaming addiction scores based on the daily playing time of the students, as shown in Table 3, demonstrated that the game playing time statistically differentiates the computer gaming addiction to a significant level ( $F_{(3,296)} = 32.104; p < 0.01$ ). Multiple comparison tests were used to determine among which groups the difference existed and since the assumption of the homogeneity of the variances was not met, the results of Tamhane’s T2 test are also presented (see Table 4). The students who played computer games for 0–1 hours per day had lower computer gaming addiction scores when compared to those who played 1–4 hours, 4–8 hours or 8+ hours per day. It was also observed that the students who played 1–4 hours a day had a lower level of computer gaming addiction compared to those who played 4–8 hours a day. In other words, as the duration of computer game playing per day increases, the students acquire a higher level of computer gaming addiction level.

One-way ANOVA for independent samples was conducted to answer the research question about students’ computer gaming addiction scores based on their purposes of game playing (Table 4).

**Table 4. ANOVA results for computer gaming addiction scores based on purposes of game playing**

Source of variance	Sum of squares	df	Mean square	F	p
Between groups	1278.739	3	426.246	1.150	0.329
Within groups	109730.408	296	370.711		
Total	111009.147	299			

ANOVA results for the computer gaming addiction scores based on the purposes of playing games, as shown in Table 4, demonstrated that the variable of gaming objectives did not significantly differentiate the computer gaming addiction at a statistical level ( $F_{(3,296)} = 1.150; p > 0.01$ ).

The *t*-test for independent groups was used to answer the research question about students’ computer gaming addiction scores based on whether or not they played games with people they did not know, and the obtained values are presented in Table 5.

**Table 5. The t-test results for computer gaming addiction scores based on whether or not they played games with people they did not know**

Group	n	$\bar{x}$	sd	df	t	p
Yes	67	61.49	22.41	298	6.643	0.000
No	233	42.04	15.84			

The results of the t-test on the computer gaming addiction scores based on playing with people the students do not know demonstrated that the statistical difference between the mean scores of students that played games with people they did not know ( $\bar{x}_{\text{yes}} = 61.49$ ) and the mean scores of students who played computer games with people they did know ( $\bar{x}_{\text{no}} = 42.04$ ) was significant ( $t = 6.643$ ,  $p < 0.01$ ). Based on this finding, it could be argued that the students who played games with people they did not know had higher computer gaming addiction when compared to students who knew those they played games with.

For the qualitative data of the study, the first open-ended question included in the data collection tool asked the students to list five computer games they played the most, ordered from 1 (the most played) to 5. Descriptive analysis was used to analyse the games listed by the students based on computer game type. The most popular games were skills-based games. According to the answers given by the students, 272 of the games mentioned were skills-based games, including games for cooking, dressing, blowing up balloons, etc., whereas 169 games mentioned were sports or racing games such as 'FIFA', 'PES', 'NFS' and 'NBA'. Action games considered within the context of weaponry and fighting games such as 'Counter Strike', 'Call of Duty', etc., were mentioned by students 164 times. Students identified puzzle games such as 'Who Wants to Be a Millionaire?' and 'Candy Crush Saga' 155 times. Strategy games which include war games such as 'Age of Empires', 'League of Legends', 'World of Warcraft', etc., had a frequency of 94. Examples are usually war games. According to the answers provided by students, the playing frequency of 'GTA' defined as free world was 84 and the playing frequency of 'Minecraft' defined as open world was 39. Simulation games such as 'Euro Truck Simulator' and 'The Sims' were mentioned 19 times in the top five, educational games with various topics were mentioned 18 times, survival games such as 'Survival' and 'Outlast' were mentioned in the top five 11 times. On the other hand, it was observed that the least preferred games were platform (e.g., 'Mario') and augmented reality (e.g., 'Pokemon') games.

Another open-ended question posed to students in the study was 'What kind of game would you design?' Descriptive analysis conducted on the students' statements on the types of games they wanted to design showed that action games were the most and survival games were the least.

Action-based games contain elements such as guns, fighting and fear. Games such as 'Call of Duty', 'Half-life' and 'Street Fighter' are examples for this type of games (according to the website of Metacritic, n.d.). In total, 59 students stated that they would like to design an action game. While most students stated that they played mostly skill-based games, and mostly preferred to design action games. One of the students (S12) stated the following on the type of game s/he wanted to design: '*I would design a game of fear. I would want to scare everyone, with ghosts and everything*', while another (S16) stated, '*My game => I would want to design an informative-action game with strange creatures. I would also want this game to be for 13+ (only for 13-year-old and above)*'. When the statements of the students who wanted to design action games are examined, it could be observed that the expressions used were often fear and guns, which are the basis for most action games.

Next to action-based games, the participants wanted to design skill-based games. Skill games are based on simple clicking and dragging and dropping objects such as cooking, simple designs (selection, colouring), dressing, blowing-up balloons and collecting. A total of 34 students wanted to design games that contained these elements. For example, some students (S22, S28 and S39) stated that they wanted to design games which included dressing and simple design elements as follows: '*Dressing up girls, girl games*', '*Drawing a dress to colour it*', '*Designing shoes: There would be a shoe, we would design a heel for it. We would paint it, add ornaments to it*'. On the other hand, two students said that

they wanted to design skill-based games that included feeding pets. S7 said *'In the game, there would be an aquarium and there would be a fish in it. I would nurture it and take care of it, but it would die if I do not feed it, else it would grow up. So in short, it's a game about responsibility'*, and S45 said *'I would design one to wash the cat. There would be a cat and a dog and you would have to wash them within 30 seconds'*.

Adventure-based games include elements such as escape, capture and shooting a target (Arsenault, 2009; Wolf, 2001) with *'Tomb Raider'*, an example of this genre. Student responses demonstrated that the elements related to adventure-based games were not observed in their responses, but they preferred to define the games they would like to design as adventure games. In this context, 29 students wanted to design an adventure-based game; and S68 wrote *'I would prefer to design an adventurous game that could be played by both girls and boys'*, while S96 said *'I want to design a game full of adventure, so we can learn new things by discovering them'*, and S250 wrote *'It would be an adventure game. Because it's more fun'*. From these statements, it could be observed that the word *'adventure'* was used intensively.

Puzzle-based games are those that usually cause cognitive conflicts in the individuals who play them. This is a type of game that aims to solve a mystery, a question or a problem under the control of the player and supports learning with different tools. General culture, quizzes and word games are examples of such games. In total, 23 students stated that they wanted to design games that contained these elements. Student responses included the following, with S72 saying *'It would be a quiz that includes general culture questions'*, while S105 wrote *'I could design a word game, that will allow the player to form words'* and S241 said *'I would prepare a word game and I would try to find a city or an animal and we would fall in a pit when we cannot find it'*. Thus, it could be argued that puzzle games in the form of word games were the most predominant.

The integration of ICTs in learning environments has a positive effect on teaching and learning processes (Bester & Brand, 2013; Chigona, Chigona & Davids, 2014), with educational games as one such aspect. Therefore, using educational games as a learning strategy in learning environments is recommended (Botha & Herselman, 2015). Educational games are designed based on teaching, and their main objective is the learning of a particular topic (Wolf, 2001). When the statements of 21 students in this current study who want to design educational games are examined, it could be observed that contents and educational elements related to a topic were included. For example, one student (S5) wanted to design a game, where *'I could design a game that is both fun and educational, and provides educational information and more positive examples for us, the children'*. Another student (S27) wrote, *'This would be a game that would open up horizons for children, I would design a game on mathematical operations and related to all the courses'*.

There are two types of strategy-based games; real-time and sequential. In real-time strategy games, all of the players play against each other at the same time, whereas it is necessary to wait for the move of other players in sequential strategic games (Arsenault, 2009). These types of games include *'World of Warcraft'*, *'Age of Empires'*, *'War'*, *'Age'*, etc. (according to the website of Metacritic, n.d.). These elements were found in the responses of 19 students who wanted to design strategy-based games. One of the students (S21) compared it with an existing strategy-based game when expressing an opinion on the game s/he wanted to develop: *'Another version of the "War Thunder" story. It would be about World War II. I would assume the role of Hitler and take Russia as the enemy'*. Another student similarly included strategy-based gaming elements such as war epoch (S55) *'I would want it to be a fighting game. I would like to add every epoch to every game. And I want everybody to play'*.

Sports and racing games are those inspired by a particular sport. Content such as rally driving, football and basketball are widely used (Leonard, 2004). The 16 students who wanted to design sport-based games stated that they would want to design a game about football the most. For example, one student (S14) wrote: *'I would design a football game. With careers, manager mode, classic matches, it would be a game for everyone to play'*. Another student (S54) stated, *'It would be football, with live*

players, live leagues and some effects'. On games about other sports, S38 said: 'A tennis game played by girls and boys and a tennis game which is a played only by the disabled'.

In open world games, the user has unlimited authority and access to unlimited environments in the game. The most played games of this type are 'Minecraft', 'Arc' and 'No Man's Sky' (according to the website of Metacritic, n.d.). A total of nine students wanted to design unlimited authority games. For example, two students (S30, S85) stated that the game they wanted to design would be using expressions such as 'I would like to be able to do it all' and 'It would be the same as the real world'.

Simulation games are based on an attempt to imitate an event pattern from real life; of which examples are a vehicle driving ('Euro Truck Simulator') environment, and designing an environment and inhabiting that environment with characters ('The Sims') (Wolf, 2001). In particular, interactive simulations can be used in learning environments for instructional purposes (Kriek & Stols, 2010). In total, seven students wanted to design a simulation game. In an example that resembled 'The Sims' (S56), the student wrote: 'This game is like a real imagination, whether you are playing football or you are a worker paying bills or making your home beautiful, or whether you search for a girlfriend, or are buying a plane or a speedboat; you will love it'. Examples on a vehicle driving game (S84, S161) were as follows: 'I would design a race simulator with b35 f71 and b4 f22 ac130 sr71' and 'I would want them to get on and off the vehicles in the Euro truck'. One student stated that the simulation game (S198) he wanted to design would be 'Space simulation'.

In free world games, the character is allowed to circulate freely in the game environment. The most common form of this game is the 'Grand Theft Auto' (GTA). The students expressed the game they would want to design by their likening to GTA. The answers given by these students (S51, S63) are as follows: 'I would set up a game called GTA Turkez. I would include models such as limousines and Mercedes cars' and 'you would be able to find Karaman map like "GTA 5", you could visit Karaman'.

In survival games, a character usually breaks through various obstacles or destroys his enemies in order to survive. Examples of these games are 'Outlast' and 'Battle Craft'. Only one student (S205) stated that s/he wanted to design a survival-based game in the form of 'a game about survival efforts'.

The category designated as 'other', the student statements that did not fall in any of the other game categories. In this section, nine of the students' answers were devoid of game elements. When two examples are examined (S1, S10), it can be observed that they used expressions such as 'A game that explains the meaning of life', and 'A game that would provide peace to individuals'. Furthermore, they (S101, S106, S291) also used expressions such as 'I would design a game where everybody commits suicide', 'I would design a game where everybody is depressed', and 'A place where there is no school'. It is considered that these views could have been written due to the influences of the students' current mood. On the other hand, 25 students stated that they did not want to design any sort of game.

#### 4. Discussion

In this study, which aims to determine the level of computer gaming addiction among middle school students and examine these levels based on various variables, students' level of computer gaming addiction was found to be low, which is similar to the results of studies by Sahin and Tugrul (2012) and also Wo (2004), whose study was conducted with elementary school students in South Korea. Sahin and Tugrul (2012) commented that their result could be due to the awareness of families as to the possible effects of computer games on their children's development. It could be argued that the findings of the current study are influenced by social desirability; in other words, the tendency of the students to present themselves socially and normatively in a positive manner when responding to the questions of the data collection tool (Ellingson, Smith & Sackett, 2001) rather than giving realistic information about themselves. It was understood based on their responses to the open-ended questions that students were very knowledgeable about the games and play them frequently.

In the current study, it was found that male students had higher levels of gaming addiction when compared to females. This finding is parallel to the results of other studies such as by Gokcearslan and Durakoglu (2014), Griffiths and Hunt (1995), Gullu et al. (2012), Horzum (2011), Keser and Esgi (2012), Li and Wang (2013) and Sahin and Tugrul (2012). According to Horzum (2011), this was partly due to the fact that the satisfaction zone of the male brain is more active during game play when compared to that of the female brain (Wikipedia, 2008). In contradiction with the findings of the current study, studies by Bayraktar and Gun (2007), Hsu, Wen and Wu (2009), and Tas et al. (2014) have argued that the level of addiction did not differentiate based on gender.

In the current study, it was observed that the level of students' gaming addiction did not differ based on grade. This finding is supported by the findings of studies conducted by Cakir, Ayas and Horzum (2011), Gullu et al. (2012), Keser and Esgi (2012), Tas et al. (2014) and Turner et al. (2012). It could be argued that this result was due to the common age groups that the games students played appealed to, and the lack of necessity for high-level skills to play these games. On the other hand, studies conducted by Horzum (2011) and Sahin and Tugrul (2012) demonstrated a significant correlation between gaming addiction and grade. Another finding was that the daily playing time of the students was statistically differentiated based on the levels of computer gaming addiction to a significant level. In other words, as the daily playing time of the students increased, the levels of computer gaming addiction were also increased as well. This might be due to the fact that as the duration of the conducted process is increased, a path to addiction could be opened. Gokcearslan and Durakoglu (2014) also obtained similar findings in their study. In addition, the current study found that computer gaming addiction levels did not differ based on the purposes of the game. In other words, the aim of the students to play did not lead to a difference in their gaming addiction levels.

Another finding of the current study was that students who played games with individuals they do not know had a higher level of computer gaming addiction when compared to students played games with individuals they know. This may have been the case since games allow individuals to participate in a problem-solving process together, to satisfy their impulses to be part of a game and to attract attention to their personal traits. Qualitative research can be designed to gain more in-depth knowledge of what might be the cause of this situation. It should also be considered in interpreting this finding that the number of students who play games with individuals they do not know and those who play games with individuals they do know were unequal.

Within the scope of the current study, qualitative data were also collected via open-ended questions. Students' responses to the question about the game genres they played identified sports/racing games, action and puzzle games as the most played, and enhanced reality, platform, survival and educational games as the least played. This could be due to platform games such as 'Mario' now considered as old, and enhanced reality games considered as still very new. Similar to the findings of the current study, Torun, Akcay and Coklar (2015) conducted a study with middle school students, and found that the most preferred games were action, sports, mind and adventure games; whereas, the least preferred games were role-playing, educational and platform games. In a study conducted by Durdu, Hotomaroglu and Cagiltay (2004) with university students, the most popular game genres were listed as strategy, racing and information games, respectively. However, since the current study is limited to the students of only two schools, it could be argued that there is a need for further studies conducted with students at different education levels (primary education, high school and university) and regions in order to generalise the findings. Furthermore, it could be argued that similar studies should be repeated to monitor new game tendencies among students, taking into consideration the changes that might arise due to technological and social advances.

In the current study, the students were also asked an open-ended question with regards to what kind of game they would design when given the chance. The students' answers of those who wanted to design games demonstrated that the most desired game genre for design was action-based games. This was followed by skill, fun/adventure and puzzle games. It was considered that the popularity of such games was behind the reason why students wanted to design games of this genre. There are a

variety of action-based games available through popular gaming websites and game evaluation platforms today (e.g., Metacritic [<http://www.metacritic.com/game>], Steam [<http://store.steampowered.com/>], Videogamer [<https://www.videogamer.com/top-games/action-games-all-time>]). While students mostly prefer to play skills-based games, they want to design action-based games. In other words, the first choices of the students who participated in the study on the games they wanted to play and the games they want to design replaced each other. One notable result of the study was that one student wanted to develop a game for individuals with disabilities, demonstrating a more sensitive behaviour. This might be due to the fact that someone with a disability could be in the immediate circle of the student. The types of games that the students wanted to design the least were survival games, free world and simulation games, respectively. This might be due to these types of games having complex structures, and therefore, they were not suited to the age range of the participating students in terms of their capability to design and build.

Digital gaming is one of the most popular forms of entertainment and learning environments today. In addition, digital gaming is one of the areas that adds value in developed economies. The video gaming industry is one of the fastest growing sectors in the U.S. economy (van der Meulen & Rivera, 2013). For this reason, developing countries may focus on the digital gaming sector for their emerging economies.

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