Examining the Prediction of Digital Game Addiction Awareness on Digital Educational Game Usage

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ABSTRACT

Background: Individuals need to be conscious and aware not to experience the negative effects of digital games and identify the difference between dijital games and digital educational games. The use of digital educational games has four sub-dimensions. These are the "affective approach", the "perceived usefulness," "perceived control," and "behavioral approach" (Sarıgöz, Bolat, & Alkan, 2018). In this study, these sub-dimensions analyzed in the frame of digital game addiction awareness.
Purposes: This study examines the predictors of pre-service teachers' awareness of digital game addiction and their use of digital educational games.
Methodology/Approach: The data of this study, in which the correlational predictive research method was used, were collected through the Digital Game Addiction Awareness Scale and the Digital Educational Game Use Scale.
Findings: As a result of the study in which 246 pre-service teachers participated; there is a negative relationship between pre-service teachers' awareness of digital game addiction and their emotional approach towards their use of digital educational games, their perceived usefulness of digital educational games, their perceived control in digital educational games using and their behavioral approaches to digital educational game use, which expresses the preference of digital educational games over other games, and the relationship between digital educational game playing situations are determined. In addition, it was determined that all of these relationships were predictive.
Discussion: Digital educational games are played to learn. While it is expected that teacher candidates' awareness of digital game addictions will increase, it is recommended to raise awareness of the benefits of digital educational games so that they do not have negative feelings about digital educational games.

INTRODUCTION

Digital games have an important place in human life thanks to the developing game technologies (e.g., mobile devices, game consoles, virtual reality, etc.). From 2015 to 2020, the number of individuals playing active digital games increased from 1.99 billion to 3.00 billion (Newzoo, 2021). A study conducted in 2020 predicted that 3.07 billion people will actively play digital games by 2023 (Clement, 2021). Therefore, it can be said that approximately one out of every two people in the world will actively play digital games for up to a few years. There are multiple reasons for this situation to occur. People play digital games to meet new people, adapt to the outside world, relax, have fun, and improve their problem-solving and logical thinking (Entertainment Software Association, 2021; Sağlam & Topsümer, 2019). In addition, digital games increase attention and improve task change skills (Benoit et al., 2020; Cardoso-Leite et al., 2016). Considering all these positive situations, it can be said that the use of digital games will increase even more, and they will have an important place in human life. The widespread use of digital games, the prediction that this use will increase in the future, and the positive thoughts of individuals about these games bring to mind digital game addiction.

Digital game addiction is defined as the result of individuals playing uncontrolled, excessive (long) digital games, not being able to stop the urge to play, integrating the game with their daily real life, inability to find time to fulfill their responsibilities due to excessive use, preferring to play games instead of real lives, and these negative behaviors, the inability to solve the problems in daily life and the aggressive behavior (Eni, 2017; Lemmens et al., 2011). Contrary to the positive situations mentioned above, individuals with addiction to digital games may experience negative situations caused by digital games. It is seen that this phenomenon is included as "Internet Gaming Disorder" in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) book published by the American Psychiatric Association (APA) (American Psychiatric Association, 2013).

Uncontrolled digital gameplay by individuals addicted to digital games exposes individuals to various negative situations caused by digital games. It is seen that these are grouped into two categories as psychological and physical effects. Psychological effects: There are mental disorders such as the increased tendency to bullying, anxiety level disorders, depression, increased tendency to display aggressive/violent behavior, exhibiting asocial behaviors, and feeling of loneliness. Physical negative effects are; development due to excessive use is expressed as sleep quality and nutritional irregularities, waist-neck pain, postural deformation, dry eyes, pain and redness in the eyes, carpal tunnel syndrome, obesity, neglect in self-care skills (Akçayır, 2013; Ballard et al.,

2009; Brown & Bobkowski, 2011; Bruni et al., 2015; Gentile et al., 2012; Kılıç, 2019; Lemmens et al., 2011; Mentzoni et al., 2011; Mustafaoğlu & Yasacı, 2018; Nazlıgül et al., 2018; Ögel, 2012; Republic of Turkey Ministry of Health, 2018; Wack & Tantleff-Dunn, 2009). These situations caused by digital games draw attention to individuals' digital game playing behaviors and digital game addiction.

Individuals need to be conscious and aware not to experience the negative effects of digital games. In the examinations made according to the demographic characteristics of the individuals, it is seen that the age range of the majority is from adolescence to adulthood (Turkish Statistical Institude, 2018, 2020). In another study conducted in all age groups, it was stated that 80% of individuals who play digital games are 18 years or older (Entertainment Software Association, 2021). It is thought that individuals who play digital games are at a young age and may be exposed to addictive use due to their age (Canoğulları, 2014; Yalçın-Irmak & Erdoğan, 2015). Considering that the number of young and child individuals in Turkey's population is high, it is essential to pay attention to the risks that digital games may cause and take all kinds of precautions to prevent these risks (Turkish Statistical Institude, 2021).

Some duties and responsibilities fall on both their families and teachers at the point of determining the digital game addiction status of young people. It is thought that the determination of these negative use cases by teachers, especially in school environments where their families cannot observe, may allow earlier measures to be taken against the negative behaviors of young individuals and the behavior not to progress further. In other words, it is thought that digital game addiction situations can be prevented thanks to teachers who can be a support mechanism for their students at this point. The essential need for this is for teachers to gain the necessary knowledge and skills to understand, internalize, and detect digital game addiction.

In addition to the teachers' awareness of digital game addiction. Digital educational games help students increase their motivation in their learning processes, provide engagement, and realize effective learning (Huang, 2011; Jackson et al., 2018; Papastergiou, 2009; Prensky, 2003; Sánchez-Mena et al., 2017). In addition, it helps students to develop their cognitive, spatial and motor skills together with their information and communication technologies skills in their learning processes (Felicia, 2009). As stated above, digital games, which have an addiction and negative effects, can facilitate teachers' tasks and create an enjoyable learning environment for students when used for educational purposes (Kapidere, 2021). Arising due to their current use; It is seen that digital games that cause negative effects such as addiction, aggressive behaviors and health problems are not educational-purposed (Anderson et al., 2010; Gentile, 2011; Kuss, 2013). The studies state that the negative effects of digital games such as addiction and aggressive behaviors are exaggerated in educational-oriented use, and the positive effects they will provide in their use as educational tools are ignored (Bösche & Kattner, 2013). Therefore, teachers' awareness of non-educational digital game addiction may cause them to ignore or not distinguish the positive effects that may occur against educational digital games, have prejudices and negative thoughts, reduce their use in educational environments, and even not to use them. It is essential to examine pre-service teachers' awareness of educational digital games within their usage trends.

This research examines the predictor of digital educational game use by pre-service teachers' awareness of digital game addiction. The use of digital educational games is defined in four sub-dimensions. These are the "emotional approach," which is defined as the state of experiencing negative feelings such as fear and anxiety before and while playing the game, the "perceived usefulness" which is defined as acting by believing that educational games are beneficial depending on the advantages offered, and the game by acting emotionally and reactively while playing the educational game. It is "perceived control," which is defined as the perception of taking control in terms of completing tasks and helping other players, and "behavioral approach," which expresses positive behavior towards playing educational digital games instead of playing non-educational digital games (Sarıgöz et al., 2018). In addition, their awareness of digital game addiction in predicting their use of digital educational games, in general, was also examined. In this direction, answers to the following questions were sought:

1. Does pre-service teachers' awareness of digital game addiction predict their emotional approach to educational digital game use?
2. Does pre-service teachers' awareness of digital game addiction predict their perception of usefulness in the use of educational digital games?
3. Does pre-service teachers' awareness of digital game addiction predict their perception of controlling in educational digital game use?
4. Does pre-service teachers' awareness of digital game addiction predict their behavioral approach to educational digital game use?
5. Does pre-service teachers' awareness of digital game addiction predict their use of digital games?

METHOD

Research Design

This study examined whether pre-service teachers' digital game addiction awareness predicted their educational digital game use. The correlational predictive research method, one of the quantitative research methods, was used as a research design in the study. Correlational predictive research methods refer to estimating the other by having information about one of the characteristics of individuals who have at least two variables known to be related (Fraenkel et al., 2012).

Participants

The research was carried out at the Faculty of Education of a state university located north of Turkey. 274 pre-service teachers participated in the study. 13 of the students refused to participate in the study during data collection. 15 students stated that they have never played digital educational games in their lives. Valid data were obtained from 246 pre-service teachers. Demographic information of the participants is given in Table 1.

Table 1. Demographic information of the participants

		n	%
Gender	Woman	192	78.0
	Man	54	22.0
Department	Primary Education	40	16.3
	Science Education	15	6.1
	Elementary Mathematics Teaching	22	8.9
	Fine Arts Teaching	13	5.3
	Pre-School Teaching	66	26.8
	Social Studies Teaching	45	18.3
	Turkish Language Teaching	45	18.3
Age	17-18	41	16.7
	19-20	156	63.4
	21-22	32	13.0
	23+	17	6.9
Personal Computer Ownership	No Computer	101	41.1
	1-3 Year	55	22.4
	4-6 Year	30	12.2
	7-9 Year	18	7.3
	10+ Year	42	16.9
Other Types of Digital Games Played by Participants	Role Play (Example: The Sims etc.)	48	19.5
	Strategy (Example: Age of Empires etc.)	48	19.5
	War (Example: Call of Duty etc.)	85	34.6
	Fight (Example: Street Fighter etc.)	38	15.4
	Adventure (Example: Grand Theft Auto etc.)	57	23.2
	Massive (Example: Counter Strike etc.)	49	19.9
	Sports (Example: Pro Evolution Soccer etc.)	46	18.7
	Riddle/Puzzle (Example: Tetris etc.)	131	53.3

As seen in Table 1, 192 (78.0%) of the students participating in the research were female, and 54 (22.0%) were male. 40 (16.3%) of the participants were from the Department of Primary Education, 15 (6.1%) from the Department of Science Education, 22 (8.9%) from the Department of Primary Education Mathematics Teaching, 13 (5.3%) from the Department of Fine Arts Education, 66 (26.8%) from the Department of Pre-school Education, 45 (18.3%) students from Social Studies Teaching and 45 (18.3%) students from Turkish Language Teaching departments participated. 41 (16.7%) of the students were at the age of 17-18, 156 (63.4%) were at 19-20, 32 (13.0%) were 21-22 years old and 17 (6.9%) students were at the age of 23 and over. 101 (41.1%) of the students stated that they did not have a personal computer. 55 (22.4%) of them had a personal computer for 1-3 years, 30 (12.2%) for 4-6 years, and 18 (7.3%) for 7-9 years. The number of students who have had a personal computer for 10 years or more is 42 (=6.9%). When digital games played by participants were examined, it is seen that 48 (19.5%) of them were playing role-playing games, 48 (19.5%) of them were playing strategy games, 85 (34.6%) of them were playing war games, 38 (15.4%) of them were playing fighting, 57 (23.2%) stated that they preferred adventure games, 49 (19.9%) massive, 46 (18.7%) sports and 131 (53.3%) riddle/puzzle type digital games.

Data Collecting Tools

Digital Game Addiction Awareness Scale: In the study, the "Digital Game Addiction Awareness Scale" developed by Tekkurşun Demir and Cicioğlu (2020) was used to determine pre-service teachers' awareness of digital game addiction. The scale was developed in a 5-point Likert format (1=Strongly Disagree, 5=Strongly Agree) with individuals aged 18-43, and consists of 12 items and 2 factors (Internal Awareness, External Awareness). The Cronbach Alpha Coefficient of the overall scale is .88. Similarly, the Cronbach Alpha Coefficient calculated in this study is .90.

Digital Educational Game Usage Scale: In the study, the "Digital Educational Game Usage Scale" was developed by Bonanno and Kommers (2008) and adapted into Turkish by Sarıgöz, Bolat, and Alkan (2018) was used to determine pre-service teachers' use of digital educational games. The scale was developed in a 5-point Likert format (1=I totally disagree, 5=I totally agree) with the students studying at the education faculty. The scale has 21 items with 4 factors: Affective Component (α=.79), Perceived Usefulness (α=.77), Perceived Control (α=.79), and Behavioral Components (α=.80). The Cronbach Alpha Coefficient for the overall scale is .78. In this study, the Cronbach Alpha Coefficient is .81 for overall scale. In addition, the Cronbach alpha coefficient of the sub-

factors of the scale are .80 for Affective Component, .79 for Perceived Usefulness, .83 for Perceived Control, and .80 for Behavioral Components in this study.

Data Collection and Analysis

Demographic information, "Digital Game Addiction Awareness Scale," and "Digital Educational Game Usage Scale" are included in the measurement tool created to collect data. Scale forms were transferred to the web environment via Google Forms. The students of the Faculty of Education were informed about the study. The weblink of the scales was shared with the students who volunteered to participate in the research. A preliminary analysis was made with the collected data, and the data set formed by the valid data was determined. The "Emotional Approach" sub-dimension of the Digital Educational Game Usage Scale was reverse scored for ease of interpretation.

In the data analysis, the Simple Linear Regression Model was used to examine the pre-service teachers' general awareness of digital game addiction to predict their use of digital educational games. Before proceeding to the analysis, the relationships between the variables were examined to estimate the models. Pearson Product Moments Correlation Coefficient was used to determine the relationships. Before applying the regression models, sufficient participants, normal distribution, linear relationship between dependent and independent variables, and homogeneous distribution of variances were examined for the Simple Linear Regression Model. The assumption of sufficient participants was examined because the number of observations stated by Alpar (2013) was 20 times the number of variables. The assumption that the distribution is normal was examined with histogram plots of the residuals. The assumptions of the linearity of the relationship between the variables and the homogeneity of the variances were examined with the scatter plot of the residuals.

FINDINGS

The study examined the predictors of teacher candidates' digital game addiction awareness levels and its sub-dimensions on digital educational game use. The findings obtained in this direction are presented below.

The study examined the predictive status of pre-service teachers' awareness of digital game addiction (ADGA) on their digital educational games uses (DEGU). Descriptive analyses, Pearson Product Moments Correlation and simple linear regression analysis, were performed while conducting this study. In the analysis, the relationship between the variables was examined to estimate descriptive statistics and the regression model (Table 2).

Table 2. The Correlation Coefficient Analysis Results

	Pearson Moments Correlation Coefficient					$\bar{X}$	Ss	Min.	Max.
	EA	PU	PC	BA	DEGU				
ADGA	-.23*	-.14**	-.26*	-.20*	-.29*	3.76	.73	1.25	5.00

** p<.01; ** p<.05; **EA:** Emotional Approach, **PU:** Perceived Usefulness, **PC:** Perceived Control, **BA:** Behavioral Approach, **DEGU:** Digital Educational Game Uses*

When Table 2 is examined, there is a significant negative correlations between the pre-service teachers' ADGAs ($\bar{X}$=3.60; Sd=.84; Min=1.00; Max=5.00) and their emotional approach (r=-.23, p<.01), their perceived usefulness. (r=-.14, p<.05), perceived controls (r=-.26, p<.01), behavioral approaches (r=-.20, p<.01), and general conditions (r=-. 29, p<.01). Considering these relationships, a simple linear regression analysis was performed.

Assumptions are tested before performing a simple linear regression analysis. The assumption of normal distribution of the data was examined with histogram plots of residual values (Figure 1).
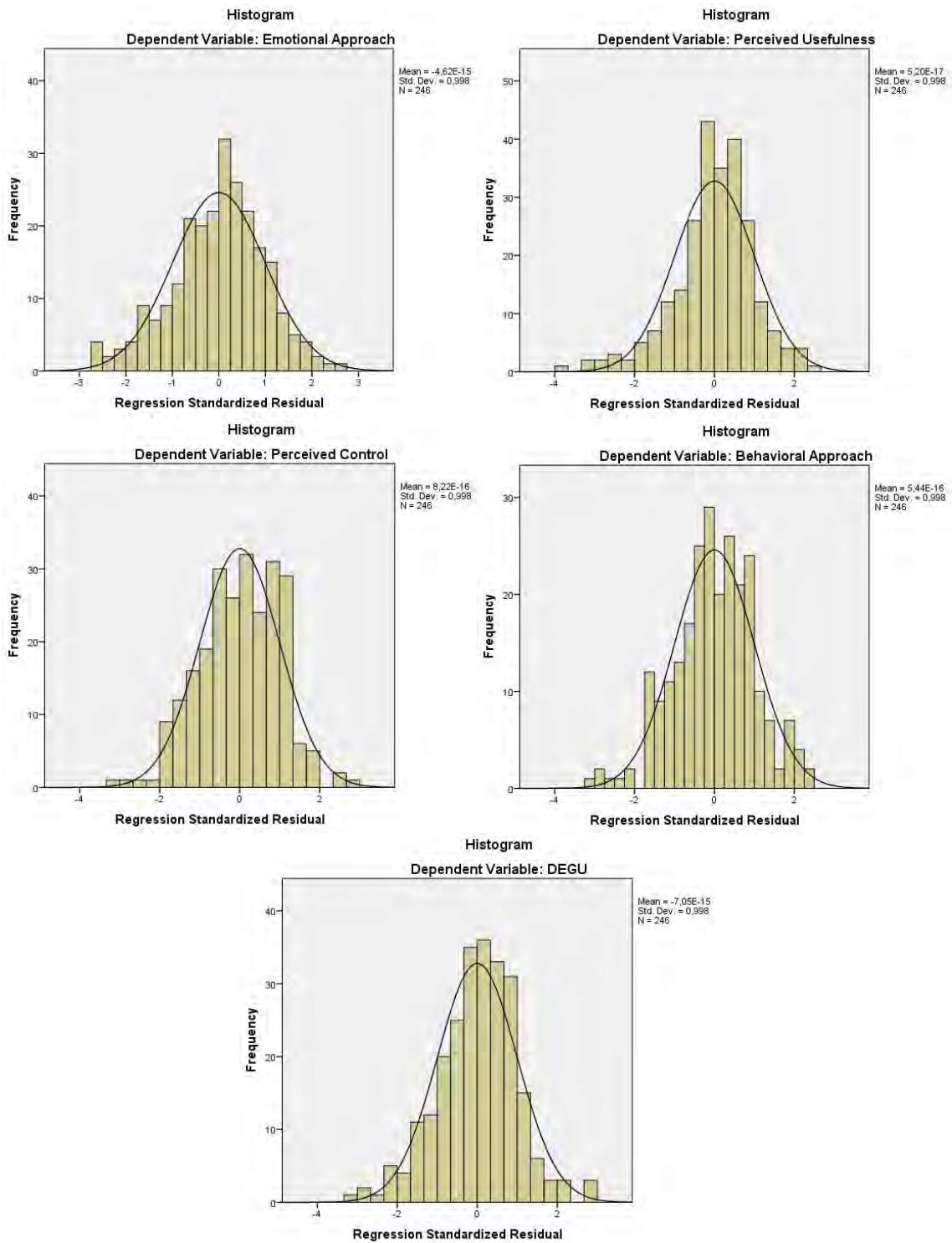
Figure 1. Histogram Plots of Standardized Residuals of a Simple Linear Regression Model

As can be seen in Figure 1, it is seen that the distributions of the residuals formed after the regression analysis are close to normal. The assumptions of linearity of data and homogeneity of variances were examined with scatter plots of residuals and predicted values (Figure 2).
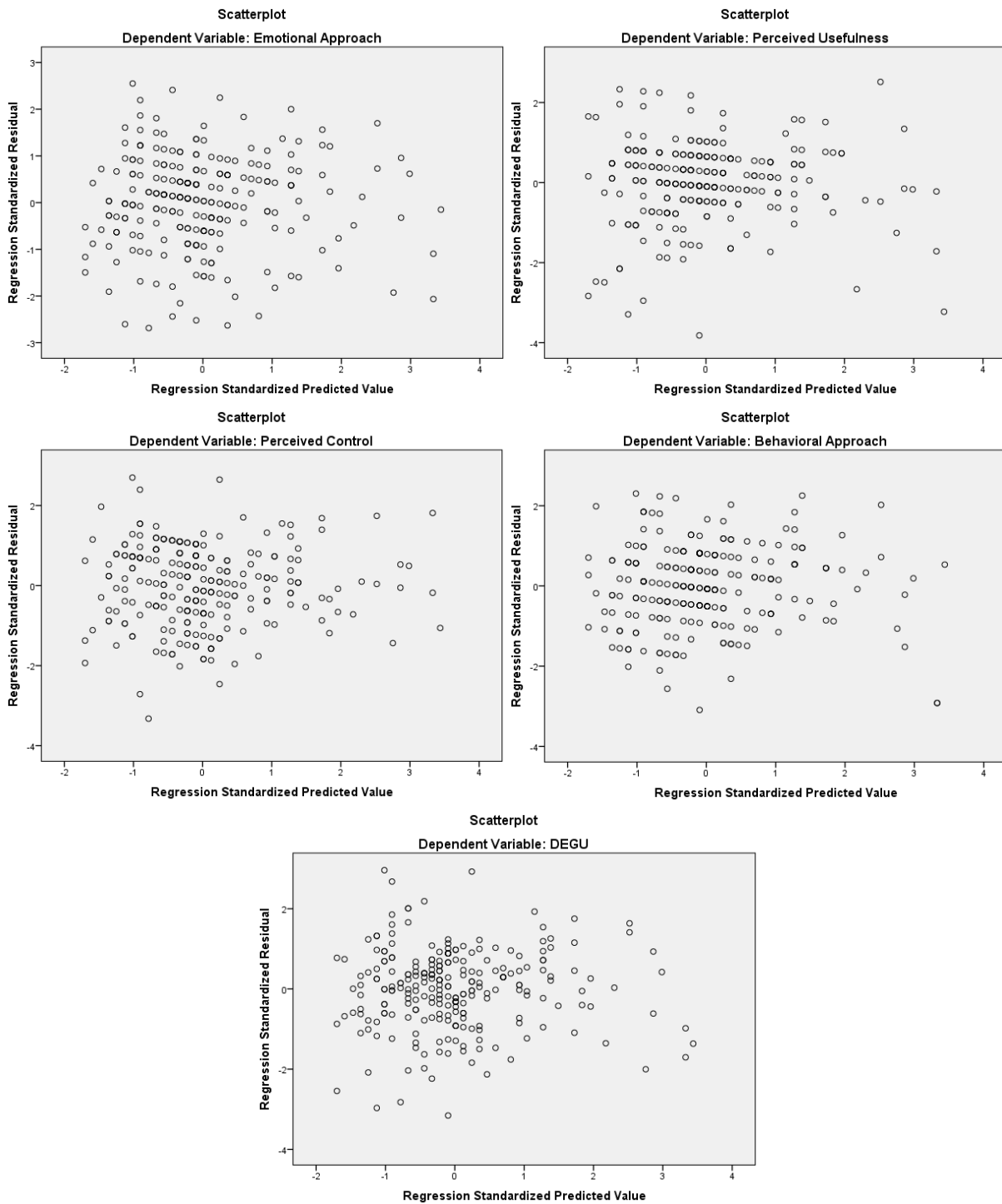
Figure 2. Scatterplots of Standardized Residuals and Standardized Predicted Values of a Simple Linear Regression Model

In the scatter plots of the standardized residuals and standardized predicted values examined in Figure 2, it is seen that the assumptions of the linearity of the data and the homogeneity of the variances are met. Accordingly, the simple linear regression analysis results in which the pre-service teachers' ADGAs' predictiveness of DEGU were examined below (Table 3).

Table 3. Simple Linear Regression Analysis Results

		b_j	$S(b_j)$	β	t	p
EA	(Constant)	3.62	.17	-	20.95	.00*
	ADGA	-.17	.04	-.23	-3.76	.00*
PU	(Constant)	3.66	.18	-	20.42	.00*
	ADGA	-.11	.04	-.15	-2.34	.00*
PC	(Constant)	4.22	.19	-	21.46	.00*
	ADGA	-.22	.05	-.26	-4.23	.00*
BA	(Constant)	3.89	.19	-	20.16	.00*
	ADGA	-.16	.05	-.20	-3.17	.00*
DEGU	(Constant)	3.85	.13	-	28.69	.00*
	ADGA	-.16	.03	.29	-4.76	.00*

EA: n=246, R=.23, R^2=.05, F=14.18, p<.01; **PU:** n=246, R=.15, R^2=.02, F=5.48, p<.05; **PC:** n=246, R=.26, R^2=.06, F=17.92, p<.01; **BA:** n=246, R=.20, R^2=.04, F=10.07, p<.01; **DEGU:** n=246, R=.29, R^2=.08, F=22.70, p<.01

* p<.01

When Table 3 is examined, it is seen that the simple linear regression model predicting their emotional approach towards DEGU is significant (F=14.18, p<.01). According to this, it was seen that the ADGAs of the teacher candidates were a predictor of their emotional approach towards DEGU (t=-3.76, p<.01). This model explains 5% of the pre-service teachers' emotional approaches to DEGU. It can be said that each standard deviation increase in ADGA will cause a decrease of -.17 level in their emotional approach towards DEGU.

It was determined that the simple linear regression model predicting the perceived usefulness of prospective teachers for DEGU was significant (F=5.48, p<.05). As a result of the analysis, it was seen that the pre-service teachers' ADGAs significantly predicted their perceived usefulness towards DEGU (t=-2.34, p<.01). 2% of the perceived usefulness differences of prospective teachers towards DEGU can be explained with this model. According to this, it can be said that each standard deviation increase in ADGA will cause a decrease of -.11 in the perceived usefulness of the prospective teachers towards DEGU.

It was seen that the regression model, which predicted the pre-service teachers' perceived control of DEGU, was significant (F=17.92, p<.01). According to this, it was seen that the pre-service teachers' ADGAs significantly predicted their perceived control of DEGU (t=-4.23, p<.01). The model explains 6% of their perceived control of DEGU. According to this, each standard deviation increase in the ADGAs of the pre-service teachers will cause a decrease of -.22 in their perceived control of the DEGU.

It was determined that the simple linear regression model predicting the behavioral approaches of prospective teachers towards DEGU was significant (F=10.07, p<.01). It has been seen that the prospective teachers' ADGAs are a significant predictor of their behavioral approaches towards DEGU (t=-3.17, p<.01). This model explains 4% of pre-service teachers' behavioral approaches to DEGU. Accordingly, it can be said that each standard deviation increase in the ADGA of the pre-service teachers will cause a decrease of -.16 in their behavioral approach towards DEGU.

It was determined that the regression model, in which the pre-service teachers' prediction of DEGU was examined, was significant (F=22.70, p<.01). Accordingly, it was seen that the ADGAs of the teacher candidates were a significant predictor of the DEGU (t=-4.76, p<.01). The model explains 8% of the differences in the prospective teachers' DEGU. Accordingly, it can be said that each standard deviation increase in the ADGAs of the teacher candidates will decrease the DEGU at the level of -.16.

CONCLUSION AND DISCUSSION

This study examined whether pre-service teachers' awareness about digital game addiction predicted their use of digital educational games. The results and discussion obtained from the research findings are presented below.

As a result of the research, it was seen that there is a weak negative relationship between pre-service teachers' awareness of digital game addiction and their emotional approach to their use of digital educational games. According to this result, as pre-service teachers' awareness about the negative effects of digital game addiction increases, individuals' positive emotional approaches towards digital educational games decrease. When the pre-service teachers' awareness of digital game addiction was examined, it was determined that it was a predictor of their emotional approach to digital educational game use, albeit at a low level. This situation shows the possibility that the pre-service teachers' feelings and thoughts about non-educational digital games may also be valid for educational digital games. It is seen that this inference is included in the studies conducted by Dönmez (2018) and Keskin (2019), in which the relationship between mindfulness and digital game addiction is examined, and there is an inverse relationship between the level of consciousness and digital game addiction. Studies examining non-educational computer games have determined that there is a positive relationship between addiction and a positive emotional approach to games (Jeong & Kim, 2011; Wong & Lam, 2016; Yılmaz et al., 2020). Addiction situations of individuals can provide a positive emotional approach to games. On the other hand, it is normal for an individual aware of the negative effects of digital games on people's daily lives to have negative feelings towards games. However, in the study conducted by Kneer et al. (2014) with gamers, it was determined that they were aware of the risks from digital game addiction but were not in a negative mood despite these risks. It can be said that this result is due to the

characteristics of the study participants. When the literature is examined, it is seen that although there are studies (Sarıgöz, 2019) in which pre-service teachers' opinions are presented, similar to this situation, that digital educational games will not cause any negative situation, it is seen that the view given in these studies is not evaluated in the context of digital game addiction awareness. As a result, it can be said that pre-service teachers reflect their negative feelings about digital games to digital educational games as well.

The study examined the relationship between pre-service teachers' awareness of digital game addiction and their perceived usefulness of using digital educational games. As a result of the examination, it was seen that there was a fragile negative relationship between them. Accordingly, as teacher candidates' awareness of digital game addiction increases, their perceived usefulness from digital educational games will decrease. Pre-service teachers' awareness of digital game addiction as a predictor of their perceived usefulness from digital educational games was investigated. As a result of the examination, it was a low-level predictor. Similar to the previous sub-factor, it shows that the possibility that pre-service teachers' feelings and thoughts about non-educational digital games may also be valid for educational digital games may also be valid for this factor. As an important proof of this, it can be shown that when digital games are used in educational environments, although the permanence of learning (Natale, 2002), the motivation of students and their participation in the lesson increase (Alaswad & Nadolny, 2015; Spires, 2015; Tural-Sönmez & Dinç-Artut, 2012), and the content is beneficial for the development of different types of cognitive skills (Akcaoglu, 2013; Baek, 2010; Sitzmann, 2011; Spires, 2015; Uttal et al., 2013), pre-service teachers have a negative tendency towards the usefulness of digital educational games. Bösche and Kattner (2013) explained this situation as the negative effects of games are exaggerated, and therefore their benefits are ignored. Contrary to the finding obtained in the research, it is seen in the literature that although the pre-service teachers know that digital games have negative effects and problematic sides, there is also a study (Sarıgöz, 2019) in which the views that students will learn easily and quickly with the correct use of them in educational environments. However, the presentation of this opinion by only one participant reduces the generalizability of the result. As a result, it can be said that the perceived benefits of digital educational games by pre-service teachers with awareness of digital game addiction are lower.

The relationship between pre-service teachers' awareness of digital game addiction and perceived control of digital educational game use, which expresses their perceptions of emotional and behavioral control in the game, was examined. It was determined that there was a weak negative relationship between them. In addition, the predictive status of this relationship was examined, and it was determined that awareness of digital game addiction was a low predictor of perceptions of control in digital educational games. Accordingly, it can be said that with the increase of pre-service teachers' awareness of digital game addiction, the control behaviors perceived by individuals in digital educational games will decrease. Regarding this result, it is stated that individuals with high control perceptions increase their digital game-playing behaviors (Hartmann & Klimmt, 2006). However, in a study examining digital game playing behaviors, it is stated that individuals who experience introversion and emotional instability, which are the effects of addiction, have difficulty in controlling their digital game behaviors (Yang & Tung, 2007). On the contrary, in a study conducted with gamers, it was determined that players have low awareness of the risks of playing digital games and have high control behaviors (Wong & Lam, 2016). Based on these studies, it can be thought that digital game addiction has different views on the loss of control in individuals. However, the striking point in all studies is that the participants have different characteristics and the focused games are not educational. In the study conducted by Sarıgöz (2019), pre-service teachers stated that they might need help while playing the digital educational game and encounter a problem, so it is difficult to control. However, the findings obtained in this study were not evaluated considering the awareness of digital game addiction.

The study examined the relationship between pre-service teachers' awareness of digital game addiction and their behavioral approaches to digital educational game use, which expresses their preference for digital educational games over other games. As a result of the examination, it was seen that there was a weak and negative relationship between them. According to this relationship, the increase in pre-service teachers' awareness of digital game addiction means that their behavioral approaches towards digital educational game use will decrease. The predictive status of this relationship was examined. It was observed that pre-service teachers' awareness about digital game addiction predicted their behavior of choosing digital educational games at a low level. According to a study conducted by Topçu et al. (2014); Although the pre-service teachers know that digital educational games are helpful in educational environments, they stated that they could not use them due to difficulties in classroom management, the possibility of not providing the software and hardware support that may be needed for the game, and lack of technical knowledge. In a study conducted by Sarıgöz (2019), pre-service teachers stated that although they are conscious of the benefits of digital educational games, they avoid playing digital games, hesitate, and only play when they are told they will play when they have sufficient knowledge. It has been stated that the reason for this situation is that the long time spent in front of the computer will reveal the addiction situations. It can be said that individuals who are aware of this situation will not prefer digital educational games to other digital games and their behavioral approaches are similar.

In the study, the relationship between pre-service teachers' awareness of digital game addiction and their digital educational game playing status was examined. As a result of the examination, it was seen that there was a weak negative relationship between them. This relationship indicates that with the increase in pre-service teachers' awareness of digital game addiction, their playing digital educational games decreases. The predictive status of this situation was examined, and it was seen that pre-service teachers' awareness about digital game addictions predicted their digital educational playing behaviors at a low level. Teacher candidates who are aware of the negative effects of digital game addiction are expected to have a negative attitude towards these games. It has been determined that attitude has a mediating role in predicting the behavior of awareness towards a non-educational game addiction (Hussein et al., 2017). In various studies (Camilleri & Camilleri, 2019; Huang, 2019; Panagiotarou et al., 2020; Sánchez-Mena et al., 2017), handled according to the Technology Acceptance Model and the Planned Behavior Theory, which is a model that explains the use of technologies, have been determined that a positive attitude towards educational games is a positive predictor of their use

of educational digital games. Accordingly, it can be said that pre-service teachers' attitudes towards non-educational digital games, who are aware of the negative effects of digital game addiction, reflect on their educational digital game use.

Limitations of the Study and Recommendations

This study examined whether the awareness of pre-service teachers about digital game addiction predicted the use of digital educational games. The results obtained in the study contain some limitations. The data obtained in the research are limited to the participants' self-perceptions. Researching with pre-service teachers in an education faculty reduces its external validity. It is essential to evaluate the research results within the framework of these limitations. Considering the limitations of the research, suggestions were made for practice and research in line with the results obtained.

The most important feature of digital educational games that distinguishes them from other types of digital games is not that they are played for purposes such as having fun and passing the time. Digital educational games are played to learn. While it is expected that teacher candidates' awareness of digital game addictions will increase, it is recommended to raise awareness of the benefits of digital educational games so that they do not have negative feelings about digital educational games. Pre-service teachers should be informed about the different aspects of digital educational games from other types of digital games. Regarding this situation, it is recommended to reveal the differences between the game types, determine the addiction situations, determine the addictive elements, and establish criteria for their use in the selection of digital educational games, rather than the purposes of using the games.

Conflicts of interest and authorship: Authors have no conflicts of interest to declare.

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