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Adaptation of the Digital Learning Games Scale Into Turkish and Examining the Attitudes of Primary School Teachers Towards the Digital Learning Games

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ORIGINAL RESEARCH

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Abstract

This study's objectives are to translate the scale to Turkish, conduct a validity and reliability analysis of the "Digital Learning Games Scale (DLGS)" produced by Mukh et al. (2021), and assess the scale in terms of numerous variables. The survey model, a quantitative research technique, was employed in the study to achieve this goal. Primary school instructors employed in Malatya throughout the 2022–2023 academic year make up the study's universe. Following the scale's conversion to Turkish, the data were analyzed using SPSS 2.0 and AMOS statistical programs. The scale scores derived from the field data collection were evaluated using descriptive statistical approaches, such as mean and standard deviation. When comparing quantitative continuous data between two independent groups, the t-test was used, and when comparing quantitative continuous data between more than two independent groups, the One-way Anova test was employed. There is a significant difference according to seniority, digital game playing status, digital game use status in lessons, and the infrastructure of the school they work in. Teachers were found to have educational digital games in general, developing social skills, developing cognitive skills, learning by having fun, developing affective skills, encouraging creativity, and developing psychomotor skills. However, there was no discernible difference between digital game production and training when the gender variable was taken into account.

Keywords: Educational Digital Game, Scale Adaptation, Primary School Teacher.

Eğitici Dijital Oyunlar Ölçeğinin Türkçeye Uyarlanması ve Sınıf Öğretmenlerinin Eğitici Dijital Oyunlara İlişkin Tutumlarının İncelenmesi

Öz

Bu araştırmanın amacı, Mukh ve diğerleri (2021) tarafından geliştirilen "Digital Learning Games Scale (DLGS)" adlı ölçeğin geçerlilik güvenirlilik analizini yapmak, ölçeği Türkçeye uyarlamak ve çeşitli değişkenler açısından incelemektir. Araştırma nicel yöntem tarama modeli ile yürütülmüştür. 2022-2023 eğitim-öğretim yılında Malatya ilinde görev yapmakta olan sınıf öğretmenleri araştırmanın evrenini oluşturmaktadır. Ölçeğin Türkçeye uyarlama süreci ardından verilerin analiz aşamasında SPSS 2.0. ve AMOS istatistik programlarından yararlanılmıştır. Sahadan toplanan verilerden elde edilen ölçek puanlarının değerlendirilmesinde tanımlayıcı istatistiksel yöntemler olarak ortalama, standart sapma kullanılmıştır. İki bağımsız grup arasında niceliksel sürekli verilerin karşılaştırılmasında t-testi, ikiden fazla bağımsız grup arasında niceliksel sürekli verilerin karşılaştırılmasında Tek yönlü (One-way) Anova testi kullanılmıştır.Araştırmadan elde edilen bulgular incelendiğinde öğretmenlerin eğitici dijital oyun genel, sosyal becerileri geliştirme, bilişsel becerileri geliştirme, eğlenerek öğrenme, duyuşsal becerileri geliştirme, yaratıcılığı teşvik etme, psikomotor becerileri geliştirme puanlarında; kıdem, dijital oyun oynama durumları, derslerde dijital oyun kullanma durumları ve çalıştıkları okulun alt yapısına göre anlamlı bir farklılık görülmektedir. Ancak cinsiyet değişkenine göre, dijital oyun geliştirme ve dijital oyun ile ilgili eğitim alma durumlarında anlamlı bir farklılık görülmemiştir.

Anahtar kelimeler: Eğitici Dijital Oyun, Ölçek Uyarlama, Sınıf Öğretmeni.

Introduction

Technology advancements have also impacted how games are played. Technology has enabled the emergence of novel techniques that are independent of physical place and rely on materials other than textbooks (Kılıç, 2021). To ensure that pupils learn effectively and permanently, the methods and strategies utilized in lessons are crucial. Students participate more actively in the process, the lesson is less repetitive, and comprehension is made simpler as a result of the various tactics and techniques used (Erkan, 2019).

Digital educational games are one of the other approaches that may be used in learning environments. In addition to the skills relevant to the lessons, cognitive abilities are also improved, events and phenomena are better understood thanks to embodied data, and complicated issues and structures can be solved more readily thanks to instructional digital games. Students have the chance to engage in cooperative learning as well, thanks to the availability of multiplayer games. In educational exercises using these games, students are extremely motivated. Additionally, offering several game kinds (action, simulation, etc.) and employing various teaching strategies gives students a variety of learning options. A more effective and long-lasting learning outcome can be achieved by combining the usage of educational digital games, one of the most efficient methods of hidden learning (Ağırgöl, 2020).

In online games that give players a good time, competitiveness, and entertainment draw players in, and their desire to win and desire to avoid losing draws them further into the game. The player crafts plans and methods to win and uses all his or her strength to do so. Adrenaline is released during this process, and blood flow quickens. The chance of success drives and fulfills the player, and the game allows them to temporarily escape the monotony and stress of everyday life (Sağlam, 2019). When used properly, digital games, which captivate and amuse even adults, are a fantastic entertainment tool for today's kids and an educational resource for instructors. Due of the Covid-19 pandemic process' acceleration of the game's transformation, teachers should consider using digital games in their classrooms even though they already utilize games in the classroom. As a response to the current crisis, distance education has made it possible for instructors and students to become more and more accustomed to technology (Telli and Aydın, 2021).

When it comes to the evolution of the game today, it can be said that educational video games utilized in classrooms are resources that support active learning, social learning, and motivation. These games are created and utilized for educational purposes, taking curriculum into account. It supports the notion that digital games can be used for educational objectives, particularly when taking into account the interests of the younger generation, their preference for amusement, and their feeling

of curiosity. The primary benefit of these games over traditional teaching methods is that they promote learning, achieve lasting and effective learning, improve motivation, entertain, and so help students create a good attitude toward the subject (Bağ, 2002). Considering these circumstances, a scale that can assess the effects of instructional video games and be applied to research is required. Scales are used to gather data in academic research across many disciplines, particularly in the field of education. The researcher can create the data gathering tool themselves, or they can opt to use a scale that has already been created. It is important to be clear about what will be measured, the theoretical framework, the item pool, and the format of the measuring tool throughout the development phase of the scales used to assess traits of people that cannot be directly observed. The scale should be applied, the items should be reviewed, and the scale should be concluded after item validity has been confirmed (Şahin and Boztunç Öztürk, 2018). A measurement tool ought to be accurate, valid, sensitive, and reliable (Çapık et al., 2018).

There are a few things to take into account while adapting a scale from another culture. Prior to determining whether a scale is appropriate for the task at hand, it is important to consider whether a good scale for the topic is available. The steps that must be taken in the scale adaptation process are as follows: translation from the original language into the target language, gathering semantic data, getting professional opinions, translating back to the original language, conducting a pilot study and cognitive analysis, getting the final version, printing the scale, and using it (Çapık et al., 2018). The researcher who decides to adapt a scale for a subject should first translate into the target language and then back into the original language after obtaining the necessary permissions from the scale owner. The translation of the scales to be adapted must be done by experts in the field (Güngör, 2016).

As a result of the literature review, it was concluded that there was no scale about Educational Digital Games for the use of teachers, so there was a need to develop such a scale and the problems of the research were formed as follows:

1. Is the "Digital Learning Games Scale (DLGS)" scale valid and reliable for primary school teachers?
2. Do primary school teachers' scores from the educational digital games scale differ according to descriptive variables?

Tools and Method

In this study, it is aimed to examine and adapt into Turkish a scale developed by Mukh et al. (2021) to measure the opinions of primary school teachers about the contribution of educational digital games to the teaching process in terms of gender, seniority, grade taught, playing digital games, and using digital games in lessons, and the technological infrastructure of the schools where

teachers work. For this purpose, relational survey model, one of the quantitative research designs, was used in the study. In the survey model, a data collection tool is usually created using an interview method or scale, and the collected data are used to examine the relationships between variables or for specific purposes. Survey studies allow data to be collected from many participants in a short time (Hocaoğlu & Akkaş Baysal, 2019).

Study Group

The study's population consists of primary school teachers working in Malatya Province throughout the 2022-2023 academic year. The participants in the study were chosen using the criterion sampling methodology, which is one of the deliberate sampling methods. The criterion used in the criterion sampling method is primary school teachers who are employed as primary school teachers in Malatya Province during the 2022-2023 academic year and have adequate technical equipment (smart board, projection, computer, etc.) in their classrooms.

Table 1

Distribution of Teachers According to Descriptive Characteristics

Groups	Frequency(n)	Percent (%)
Gender		
Female	214	70,6
Male	89	29,4
Seniority		
1-5 years	111	36,6
6-10 years	69	22,8
11-15 years	36	11,9
16-20 years	43	14,2
21 years and over	44	14,5
Grade taught		
1	102	33,7
2	54	17,8
3	65	21,5
4	82	27,1
Digital Gaming Status		
Yes	167	55,1
No	136	44,9
The Use of Digital Games in Lessons		
Yes	200	66,0
No	103	34,0
Status of Receiving Training on Digital Game Development		
Yes	58	19,1
No	245	80,9
The Infrastructure Status of the School in terms of Digital Game Development		
Insufficient	145	47,9
A little sufficient	101	33,3
Sufficient	57	18,8

Data Collection Tools

Original Scale: Digital Learning Games Scale (DLGS)

The "Digital Learning Games Scale (DLGS)" created by Mukh et al. (2021) is being translated into Turkish as part of this study. Turkish speakers might refer to the scale as the Educational Digital Games Scale (DLGS). The original scale developers sought to investigate how instructional video games affect learning from the viewpoint of Palestine's primary school teachers. The scale was designed to determine the responses of the participants using a five-point Likert-type rating scale and was organized as strongly disagree (1), disagree (2), undecided (3), agree (4), and strongly agree (5). In order to assess the assessment tool's validity and reliability, a survey was given to 280 teachers employed in Palestine's primary schools during the 2020–2021 academic year. The validity and reliability investigation revealed that there were 47 items. Stepwise linear regression analysis supported the scale's six-dimensional structure. Cronbach's alpha internal consistency coefficient was assessed to measure the reliability of the scale, and a value of 0.914 was found.

Adaptation of the scale into Turkish and implementation process

Some ethical principles must be followed while adapting the scale (Erkuş & Selvi, 2019). First of all, when the measurement tool to be adapted is selected, written permission must be obtained from the researcher who developed the scale. For this reason, Aysha Abd-Rabo, one of the researchers who developed the scale, was contacted via e-mail. After providing information about the research, the necessary permission for the use of the scale was obtained.

If the person who will adapt the scale does not have sufficient equipment, it is necessary to work with experts in the field. In this context, expert opinion was taken during the translation of the scale from the original to Turkish. The structure of the original scale should be generally faithful, and necessary explanations should be made if changes need to be made during the application. After the scale is adapted, the validity and reliability of the scale should be tested on a new sample. The stages followed in the scale adaptation process in the research can be summarized as follows:

Data analysis

SPSS 22.0 and AMOS statistical tools were used in a computer setting to examine the study's data. Kurtosis and Skewness values were analyzed to determine whether the scale items were normally distributed. In the relevant literature, the results of the kurtosis and skewness values of the variables between +1.5 and -1.5 (Tabachnick, Fidell & Ullman, 2013), +2.0 and -2.0 (George, & Mallery, 2010) are accepted as normal distribution. It was determined that the scale items showed a

normal distribution. Confirmatory factor analysis was conducted for the construct validity of the scale. Scale reliability was tested with Cronbach's alpha. Internal consistency was tested with item analysis. Convergent validity and divergent validity were examined with CR - composite reliability and Average Variance Explained (AVE - average variance extracted) values. Scale discrimination was analyzed with independent samples t-test between the lower and upper 27% groups.

Mean and standard deviation were used as descriptive statistical methods in the evaluation of the scale scores obtained from the data collected from the field. The t-test was used to compare quantitative continuous data between two independent groups, and the One-way Anova test was used to compare quantitative continuous data between more than two independent groups.

Normal Distribution Data

To ascertain if the scale items were regularly distributed, data for kurtosis and skewness were examined. The findings of the variables with kurtosis and skewness values between +1.5 and -1.5 (Tabachnick, Fidell & Ullman, 2013) and +2.0 and -2.0 (George, & Mallery, 2010) are considered to have a normal distribution in the associated literature. The scale items were found to have a normal distribution.

Table 2

Kurtosis and Skewness Values

	Kurtosis	Skewness
DLGS1	-0,568	-0,422
DLGS2	-0,617	-0,456
DLGS3	-0,934	-0,221
DLGS4	0,219	-0,840
DLGS5	-0,510	-0,555
DLGS6	-0,768	-0,282
DLGS7	-0,164	-0,698
DLGS8	0,368	-0,871
DLGS9	1,113	-1,134
DLGS10	-0,474	-0,514
DLGS11	2,071	-1,242
DLGS12	1,718	-0,977
DLGS13	2,552	-1,237
DLGS14	1,695	-1,099
DLGS15	1,971	-1,178
DLGS16	1,605	-0,960
DLGS17	2,996	-1,324
DLGS18	1,163	-0,891
DLGS19	2,645	-1,204
DLGS20	1,723	-1,122
DLGS21	3,232	-1,375
DLGS22	1,434	-0,955
DLGS23	0,111	-0,719
DLGS24	3,271	-1,351
DLGS25	3,330	-1,409
DLGS26	1,394	-1,038

DLGS27	1,478	-0,995
DLGS28	0,017	-0,740
DLGS29	2,504	-1,219
DLGS30	0,221	-0,730
DLGS31	2,377	-1,292
DLGS32	1,485	-1,142
DLGS33	0,234	-0,798
DLGS34	0,087	-0,657
DLGS35	0,373	-0,852
DLGS36	-0,205	-0,688
DLGS37	-0,078	-0,632
DLGS38	1,028	-0,976
DLGS39	0,807	-0,920
DLGS40	1,573	-0,968
DLGS41	1,802	-1,046
DLGS42	-0,436	-0,602
DLGS43	2,097	-1,076
DLGS44	0,129	-0,763
DLGS45	-0,876	-0,374
DLGS46	0,703	-0,961
DLGS47	-0,278	-0,594

Ethics of Research

The 2022/12-11 Inonu University Social and Humanities Scientific Research Ethical Committee granted approval for this study.

Results

Results Regarding the Adaptation of the Educational Digital Games Scale into Turkish

To measure the construct validity of the adapted scale, exploratory and confirmatory factor analysis was applied to the scale. Factor analysis is a statistical technique in which a sample is created by considering the relationships in terms of the variables used in the research and the items are associated with different variables through this example (Koğar, 2021).

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis is a continuation of exploratory factor analysis. While exploratory factor analysis involves determining factors and creating hypotheses; In confirmatory factor analysis, the level of relationship between the factors, whether the factors are independent of each other, the relationship of the variables with the factors are used to evaluate the adequacy of the factors to clearly reveal the model being studied. When developing a scale, confirmatory factor analysis can be used as the second step to test the suitability of previously determined items to the structure. When adapting a scale developed abroad to Turkish, confirmatory factor analysis can be used to test whether the construct validity is provided to the language and culture to be adapted (Batdı and Oral, 2020). The link between observable variables and latent variables can be measured using

the structural equation model (SEM) technique known as confirmatory factor analysis (CFA) (Brown, 2006). The study made use of the goodness-of-fit indicators that are most frequently utilized in studies that can be found in the literature. Below is a schematic for confirmatory factor analysis.

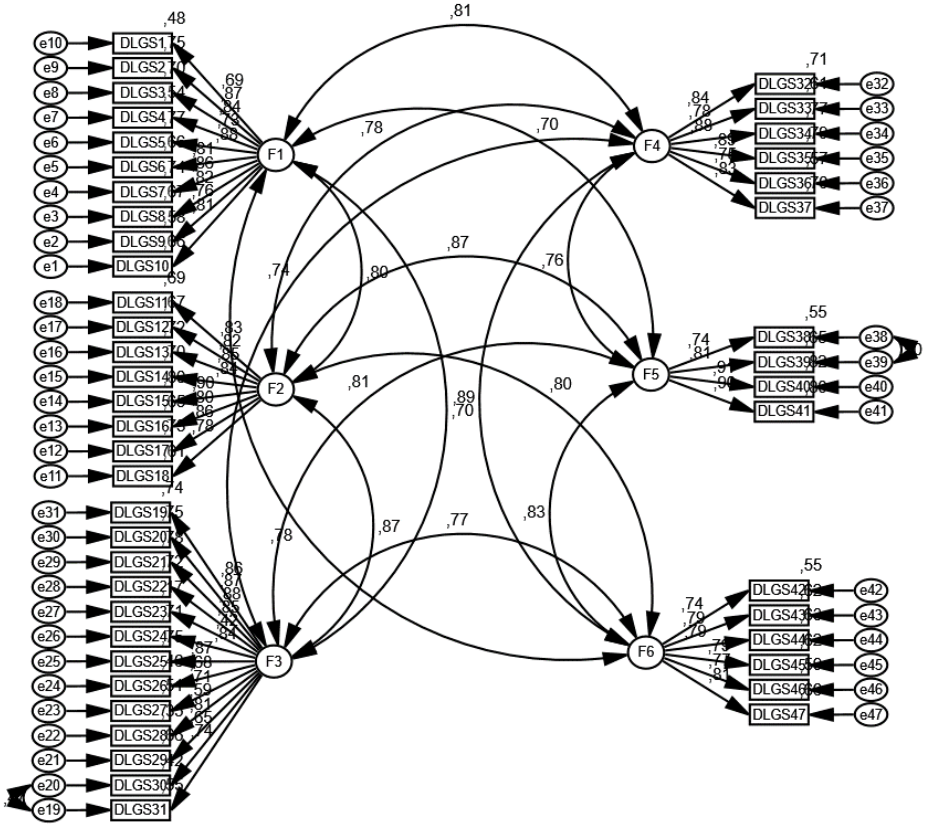

Figure 1. Diagram for Confirmatory Factor Analysis

Goodness of fit criteria for confirmatory factor analysis are given below.

Table 3

Confirmatory Factor Analysis Index Values

Index	Normal Value*	Acceptable Value**	Value
χ^2/sd	<2	<5	2.64
GFI	>0.95	>0.90	0.90
AGFI	>0.95	>0.90	0.90
CFI	>0.95	>0.90	0.90
RMSEA	<0.05	<0.08	0.07
RMR	<0.05	<0.08	0.05

*, ** References: (Şimşek, 2007; Hooper, Coughlan & Mullen, 2008; Schumacker & Lomax, 2010; Waltz, Strcikland & Lenz 2010; Wang & Wang, 2012; Sümer, 2000; Tabachnick, Fidell & Ullman, 2013).

The analysis's findings showed that the fit statistics derived from confirmatory factor analysis were at an acceptable degree of compatibility with the scale's previously identified factor structure. The following table includes t values and standardized factor loadings.

Table 4

Factor Loads

Substances and Factors			β	Std. β	SE	t	p
DLGS10	<---	F1	1,000	,815			
DLGS9	<---	F1	,885	,765	,058	15,380	p<0,001
DLGS8	<---	F1	,945	,819	,056	16,978	p<0,001
DLGS7	<---	F1	1,060	,861	,058	18,317	p<0,001
DLGS6	<---	F1	1,032	,810	,062	16,696	p<0,001
DLGS5	<---	F1	1,118	,879	,059	18,900	p<0,001
DLGS4	<---	F1	,844	,732	,058	14,473	p<0,001
DLGS3	<---	F1	1,087	,837	,062	17,537	p<0,001
DLGS2	<---	F1	1,096	,867	,059	18,487	p<0,001
DLGS1	<---	F1	,888	,689	,066	13,379	p<0,001
DLGS18	<---	F2	1,000	,779			
DLGS17	<---	F2	1,083	,857	,064	16,889	p<0,001
DLGS16	<---	F2	,995	,803	,064	15,529	p<0,001
DLGS15	<---	F2	1,180	,895	,066	17,932	p<0,001
DLGS14	<---	F2	1,130	,838	,069	16,394	p<0,001
DLGS13	<---	F2	1,043	,847	,063	16,634	p<0,001
DLGS12	<---	F2	1,021	,817	,064	15,882	p<0,001
DLGS11	<---	F2	1,107	,832	,068	16,257	p<0,001
DLGS31	<---	F3	1,000	,745			
DLGS30	<---	F3	1,010	,652	,064	15,756	p<0,001
DLGS29	<---	F3	1,060	,811	,072	14,792	p<0,001
DLGS28	<---	F3	,976	,595	,093	10,508	p<0,001
DLGS27	<---	F3	,966	,711	,076	12,760	p<0,001
DLGS26	<---	F3	,965	,677	,080	12,097	p<0,001
DLGS25	<---	F3	1,142	,868	,071	16,000	p<0,001
DLGS24	<---	F3	1,078	,845	,070	15,503	p<0,001
DLGS23	<---	F3	,641	,416	,089	7,220	p<0,001
DLGS22	<---	F3	1,112	,850	,071	15,607	p<0,001
DLGS21	<---	F3	1,139	,881	,070	16,289	p<0,001
DLGS20	<---	F3	1,155	,867	,072	15,976	p<0,001
DLGS19	<---	F3	1,033	,861	,065	15,847	p<0,001
DLGS32	<---	F4	1,000	,843			
DLGS33	<---	F4	1,036	,784	,063	16,531	p<0,001
DLGS34	<---	F4	1,146	,880	,057	20,030	p<0,001
DLGS35	<---	F4	1,146	,890	,056	20,422	p<0,001
DLGS36	<---	F4	1,075	,754	,069	15,589	p<0,001
DLGS37	<---	F4	1,107	,835	,061	18,274	p<0,001
DLGS38	<---	F5	1,000	,740			
DLGS39	<---	F5	1,051	,809	,053	19,994	p<0,001
DLGS40	<---	F5	1,059	,907	,065	16,187	p<0,001
DLGS41	<---	F5	1,065	,896	,067	16,002	p<0,001
DLGS42	<---	F6	1,000	,743			
DLGS43	<---	F6	,767	,785	,055	13,926	p<0,001
DLGS44	<---	F6	,994	,795	,070	14,117	p<0,001
DLGS45	<---	F6	1,147	,788	,082	13,982	p<0,001
DLGS46	<---	F6	,900	,767	,066	13,576	p<0,001
DLGS47	<---	F6	1,099	,810	,076	14,411	p<0,001

When the standardized coefficients were analyzed, the factor loadings were found to be high, the standard error values to be low, and the t values to be significant. These findings support the construct validity of the previously identified factor structure.

Reliability and Item Analysis

To determine the scale's internal consistency, reliability analysis was used. The results of a reliability analysis demonstrate if the scale's items are consistent with one another and with the overall scale. Additionally, it establishes whether all of the individuals comprehend the scale expressions. The consistency of participants' replies to scale items is referred to as reliability (Büyüköztürk, 2011). The reliability (internal consistency) of the scale is frequently assessed using Cronbach's Alpha coefficient in the literature. The Cronbach's Alpha Coefficient was evaluated using the following criteria: "0.00 0.40, the scale is not reliable," "0.40 0.60, the scale is low reliability," and "0.60 0.80." According to Özdamar (2004), "If 0.80 1.00, the scale is highly reliable." Reliability analysis of the scale was applied, and the Alpha coefficient was found to be 0.981. Item analysis regarding the effects of the items on internal consistency is given below.

Table 5

Item Analysis

	Scale score when item is deleted	**Variance when item is deleted**	**Item-total correlation**	**Cronbach's Alpha when item is deleted**
DLGS1	172,28	923,069	,630	,981
DLGS2	172,31	915,889	,758	,981
DLGS3	172,44	917,035	,719	,981
DLGS4	172,05	923,593	,698	,981
DLGS5	172,18	914,376	,778	,981
DLGS6	172,34	920,172	,683	,981
DLGS7	172,09	917,912	,746	,981
DLGS8	172,00	922,123	,724	,981
DLGS9	171,84	919,898	,761	,981
DLGS10	172,23	919,183	,727	,981
DLGS11	171,85	924,767	,788	,981
DLGS12	171,80	929,508	,738	,981
DLGS13	171,73	928,885	,763	,981
DLGS14	171,81	925,634	,759	,981
DLGS15	171,76	923,950	,812	,981
DLGS16	171,75	928,725	,761	,981
DLGS17	171,72	927,158	,779	,981
DLGS18	171,89	927,431	,761	,981
DLGS19	171,47	932,581	,715	,981
DLGS20	171,53	928,581	,724	,981
DLGS21	171,48	928,211	,755	,981
DLGS22	171,62	928,203	,745	,981
DLGS23	171,91	944,733	,336	,982
DLGS24	171,58	930,622	,713	,981
DLGS25	171,56	928,168	,742	,981
DLGS26	171,77	930,803	,632	,981
DLGS27	171,87	929,300	,695	,981
DLGS28	172,08	923,474	,668	,981
DLGS29	171,68	926,862	,775	,981

DLGS30	172,07	922,426	,728	,981
DLGS31	171,82	925,246	,787	,981
DLGS32	171,94	922,292	,810	,981
DLGS33	172,09	923,721	,698	,981
DLGS34	172,17	919,781	,781	,981
DLGS35	172,03	919,817	,788	,981
DLGS36	172,09	920,885	,692	,981
DLGS37	172,18	919,679	,768	,981
DLGS38	171,87	926,088	,702	,981
DLGS39	171,86	926,460	,723	,981
DLGS40	171,76	927,321	,789	,981
DLGS41	171,78	927,524	,771	,981
DLGS42	172,24	922,336	,668	,981
DLGS43	171,75	930,796	,740	,981
DLGS44	171,99	922,629	,716	,981
DLGS45	172,27	919,286	,661	,981
DLGS46	171,88	924,612	,728	,981
DLGS47	172,13	917,225	,746	,981

Responses to the items are expected to have a positive correlation between the items and with the scale total. This shows that the participants understood the propositions correctly and responded objectively. The correlation coefficient of an item in the scale with the total of the items is 0.3 or above, indicating that its discrimination is high (Büyüköztürk, 2011; Tavşancıl, 2002).

Table 6. Reliability Coefficients for Sub-Dimensions

Sub-Dimensions	**Cronbach Alfa**
Development of social skills	0,949
Development of mental cognitive processes	0,948
Learning with fun and entertainment	0,942
Development of emotional affective skills	0,929
Stimulating creativity	0,914
Development of motor skills	0,901

Reliability analysis was performed on the scale sub-dimensions and Alpha coefficients were found to be high.

Distinctiveness

The scale is expected to clearly distinguish individuals in lower and upper groups (Tezbaşaran, 2008). Another method used in item analysis is to divide the total score of the scale into groups as Lower 27% and Upper 27% and determine the significant difference between the groups. A difference between two groups is an indicator of discrimination. The fact that there is no difference between the two groups shows that the range of lowest and highest scores is small.

Table 7

Differentiation of Scale Scores According to Lower-Upper 27% Groups

Groups	Lower %27 (n=82)		Upper %27 (n=82)		t	df	p
	Avg	Sd	Avg	Sd			
DLGS	2,918	0,565	4,427	0,315	-21,140	162	**0,000**
Development of social skills	2,506	0,658	4,284	0,530	-19,061	162	**0,000**
Development of mental cognitive processes	3,148	0,745	4,497	0,394	-14,491	162	**0,000**
Learning with fun and entertainment	3,245	0,694	4,563	0,315	-15,653	162	**0,000**
Development of emotional affective skills	2,640	0,721	4,270	0,506	-16,751	162	**0,000**
Stimulating creativity	3,110	0,773	4,500	0,470	-13,919	162	**0,000**
Development of motor skills	2,740	0,614	4,386	0,493	-18,944	162	**0,000**

Independent Groups T-Test

It was determined that the scale showed a significant difference between the Lower 27% and Upper 27% groups ($p < 0.05$). According to these results, it was determined that the scale provides sensitive measurements to distinguish.

Convergent Validity and Discriminant Validity

To test the construct validity of the variables included in the measurement model, construct reliability (CR - composite reliability) and Average Explained Variance (AVE - average variance extracted) values were examined. AVE (average variance extracted) is found by dividing the sum of the squares of the standardized factor loadings by the number of items. If this condition is met, convergent validity is achieved (Fornell and Larckers, 1981). Composite reliability (CR) value being higher than 0.7 is another indicator of convergent validity (Hair et al., 2014). For convergent validity, the CR values of the scale are expected to be greater than the AVE values and the AVE value is expected to be greater than 0.5.

Table 8. CR, AVE, Correlation Analysis

	CR	AVE
Development of social skills	0,823	0,625
Development of mental cognitive processes	0,863	0,629
Learning with fun and entertainment	0,891	0,648
Development of emotional affective skills	0,918	0,693
Stimulating creativity	0,888	0,669
Development of motor skills	0,874	0,608

As seen in the table above, CR values are greater than AVE values and AVE values are greater than 0.5. Convergent validity for the scale was achieved. The square root of the AVE value of each

factor was greater than the correlation values of that factor with other factors. Accordingly, it can be said that discriminant validity is in question.

Results Regarding the Differentiation of Primary School Teachers' Scores from the DLGS According to Descriptive Variables

In this heading, the scores obtained by primary school teachers from the educational digital games scale are evaluated according to gender, seniority, grade level taught, teachers' digital game playing status, teachers' use of digital games in their lessons, teachers' training for digital game development and whether the school where teachers work has infrastructure for digital game development. Results regarding the state variables are given.

Results Regarding the Differentiation of Primary School Teachers' Scores from the DLGS *According to Gender Variable*

Independent groups t test results regarding the differentiation of the scores received by primary school teachers from the educational digital games scale according to the gender variable are given in the table.

Table 9

Differentiation of DLGS Scores by Gender

	Group	N	Avg	Sd	t	df	p
DLGS	Female	214	3,750	0,634	0,499	301	0,618
	Male	89	3,708	0,725			
Development of social skills	Female	214	3,526	0,787	1,226	301	0,221
	Male	89	3,396	0,962			
Development of mental cognitive processes	Female	214	3,890	0,665	0,586	301	0,558
	Male	89	3,840	0,716			
Learning with fun and entertainment	Female	214	3,957	0,623	0,736	301	0,462
	Male	89	3,897	0,690			
Development of emotional affective skills	Female	214	3,606	0,755	0,855	301	0,433
	Male	89	3,519	0,925			
Stimulating creativity	Female	214	3,796	0,728	-1,876	301	0,062
	Male	89	3,969	0,746			
Development of motor skills	Female	214	3,601	0,780	-0,589	301	0,556
	Male	89	3,659	0,812			

Independent Groups T-Test

Teachers' general educational digital game scores, developing social skills, developing cognitive skills, learning with fun, developing affective skills, encouraging creativity, and developing psychomotor skills do not differ significantly according to gender ($p>0.05$).

Results Regarding the Differentiation of Primary School Teachers' Scores from the* DLGS *According to the Seniority Variable

The results of One-way analysis of variance regarding the differentiation of the scores received by primary school teachers from the educational digital games scale according to the seniority variable are given in the table.

Table 10

Difference in Educational Digital Game Scores According to Seniority

	Group	N	Avg	Sd	F	p	Difference
DLGS	**1.**1-5	111	3,859	0,718	2,363	0,053	
	2.6-10	69	3,735	0,597			
	3.11-15	36	3,754	0,594			
	4.16-20	43	3,625	0,653			
	5.21 and over	44	3,532	0,624			
Development of social skills	**1.**1-5	111	3,658	0,872	2,882	**0,023**	**1>5** **2>5**
	2.6-10	69	3,512	0,807			
	3.11-15	36	3,417	0,781			
	4.16-20	43	3,379	0,761			
	5. 21 and over	44	3,184	0,875			
Development of mental cognitive processes	**1.**1-5	111	3,969	0,734	2,895	**0,022**	**1>4** **2>4** **3>4** **1>5** **2>5** **3>5**
	2.6-10	69	3,937	0,537			
	3.11-15	36	3,969	0,615			
	4.16-20	43	3,669	0,730			
	5. 21 and over	44	3,671	0,678			
Learning with fun and entertainment	**1.**1-5	111	4,051	0,712	2,347	0,055	
	2.6-10	69	3,926	0,576			
	3.11-15	36	3,968	0,528			
	4.16-20	43	3,880	0,651			
	5. 21 and over	44	3,713	0,593			
Development of emotional affective skills	**1.**1-5	111	3,697	0,820	1,647	0,162	
	2.6-10	69	3,536	0,811			
	3.11-15	36	3,671	0,722			
	4.16-20	43	3,492	0,789			
	5. 21 and over	44	3,367	0,831			
Stimulating creativity	**1.**1-5	111	3,921	0,834	0,819	0,514	
	2.6-10	69	3,851	0,622			
	3.11-15	36	3,840	0,768			
	4.16-20	43	3,686	0,697			
	5. 21 and over	44	3,813	0,650			
Development of motor skills	**1.**1-5	111	3,755	0,841	1,397	0,235	
	2.6-10	69	3,544	0,753			
	3.11-15	36	3,588	0,814			
	4.16-20	43	3,516	0,743			
	5. 21 and over	44	3,511	0,709			

Teachers' social skills development scores differed significantly according to seniority ($F_{(4, 298)}$=2.882; p=0.023<0.05). The reason for the difference; The social skills development scores of those with 1-5 years ($\bar{x}$=3.658) are higher than the social skills development scores of those with seniority of 21 and above ($\bar{x}$=3.184). The social skills development scores of those with 6-10 years ($\bar{x}$=3.512) were higher than the social skills development scores of those with seniority of 21 and above ($\bar{x}$=3.184).

Teachers' cognitive skills development scores differed significantly according to seniority ($F_{(4, 298)}$=2.895; p=0.022<0.05). The reason for the difference; The cognitive skills development scores of those who were 1-5 years ($\bar{x}$=3.969) were higher than the cognitive skills development scores of those who were 16-20 years ($\bar{x}$=3.669). The cognitive skills development scores of those who were 6-10 years ($\bar{x}$=3.937) were higher than the cognitive skills development scores of those who were 16-20 years ($\bar{x}$=3.669). The cognitive skills development scores of those who are 11-15 years ($\bar{x}$=3.969) are higher than the cognitive skills development scores of those who are 16-20 years ($\bar{x}$=3.669). The cognitive skills development scores of those with 1-5 years ($\bar{x}$=3.969) were higher than the cognitive skills development scores of those with seniority of 21 and above ($\bar{x}$=3.671). The cognitive skills development scores of those with 6-10 years ($\bar{x}$=3.937) were higher than the cognitive skills development scores of those with seniority of 21 and above ($\bar{x}$=3.671). The cognitive skills development scores of those with 11-15 years ($\bar{x}$=3.969) were higher than the cognitive skills development scores of those with seniority of 21 and above ($\bar{x}$=3.671). Teachers' educational digital game general, learning with fun, developing affective skills, encouraging creativity, and developing psychomotor skills scores did not differ significantly according to seniority (p>0.05).

Results Regarding the Differentiation of Primary School Teachers' Scores from the DLGS *According to the Grade Level Variable*

The results of One-way analysis of variance regarding the differentiation of the scores received by primary school teachers from the educational digital games scale according to the grade level variable are given in the table.

Table 11

Difference in Educational Digital Game Scores According to Grade Taught

	Group	N	Avg	Sd	F	p
DLGS	1	102	3,709	0,632	0,490	0,689
	2	54	3,734	0,699		
	3	65	3,824	0,667		
	4	82	3,707	0,672		
Development of social skills	1	102	3,396	0,900	1,546	0,203
	2	54	3,448	0,871		
	3	65	3,677	0,747		

	4	82	3,477	0,813		
Development of mental cognitive processes	1	102	3,901	0,606	0,232	0,874
	2	54	3,852	0,781		
	3	65	3,910	0,713		
	4	82	3,832	0,679		
Learning with fun and entertainment	1	102	3,945	0,595	0,129	0,943
	2	54	3,940	0,688		
	3	65	3,972	0,673		
	4	82	3,906	0,657		
Development of emotional affective skills	1	102	3,543	0,827	0,436	0,728
	2	54	3,633	0,810		
	3	65	3,656	0,734		
	4	82	3,533	0,846		
Stimulating creativity	1	102	3,838	0,626	1,432	0,234
	2	54	3,736	0,799		
	3	65	4,000	0,794		
	4	82	3,808	0,767		
Development of motor skills	1	102	3,543	0,736	0,707	0,548
	2	54	3,707	0,789		
	3	65	3,685	0,825		
	4	82	3,600	0,827		

One-Way ANOVA

Teachers' general educational digital game scores, developing social skills, developing cognitive skills, learning with fun, developing affective skills, encouraging creativity, and developing psychomotor skills do not differ significantly depending on the grade taught ($p>0.05$).

Results Regarding the Differentiation of Primary School Teachers' Scores from the DLGS *According to the Variable of Digital Game Playing Status*

Independent groups t test results regarding the differentiation of the scores received by primary school teachers from the educational digital games scale according to the variable of digital game playing situations are given in the table.

Table 12

Difference in Educational Digital Game Scores According to Digital Game Playing Status

	Group	**N**	**Avg**	**Sd**	**t**	**df**	**p**
DLGS	1.Yes	167	3,858	0,589	3,571	301	**0,001**
	2.No	136	3,590	0,715			
Development of social skills	1.Yes	167	3,619	0,788	3,041	301	**0,003**
	2.No	136	3,327	0,883			
Development of mental cognitive processes	1.Yes	167	4,003	0,614	3,695	301	**0,000**
	2.No	136	3,719	0,725			
Learning with fun and entertainment	1.Yes	167	4,061	0,555	3,735	301	**0,000**
	2.No	136	3,790	0,711			
Development of emotional affective skills	1.Yes	167	3,720	0,748	3,382	301	**0,001**
	2.No	136	3,409	0,848			

Stimulating creativity	1.Yes	167	3,933	0,647	2,271	301	**0,028**
	2.No	136	3,741	0,823			
Development of motor skills	1.Yes	167	3,709	0,759	2,237	301	**0,026**
	2.No	136	3,506	0,813			

Independent Groups T-Test

Educational digital game general scores differ significantly depending on teachers' digital game playing status (t(301)=3.571; p=0.001<0.05). The educational digital game general scores of those who played digital games ($\bar{x}$=3.858) were found to be higher than the educational digital game general scores of those who did not play digital games ($\bar{x}$=3.590).

Teachers' social skills development scores show a significant difference depending on whether they play digital games (t(301)=3.041; p=0.003<0.05). The social skills development scores of those who played digital games ($\bar{x}$=3.619) were found to be higher than the social skills development scores of those who did not play digital games ($\bar{x}$=3.327).

Teachers' cognitive skills development scores show a significant difference depending on whether they play digital games (t(301)=3.695; p=0.000<0.05). The cognitive skills development scores of those who played digital games ($\bar{x}$=4.003) were found to be higher than the cognitive skills development scores of those who did not play digital games ($\bar{x}$=3.719).

Teachers' fun learning scores show a significant difference depending on whether they play digital games (t(301)=3.735; p=0.000<0.05). The fun learning scores of those who played digital games ($\bar{x}$=4.061) were found to be higher than the fun learning scores of those who did not play digital games ($\bar{x}$=3.790).

Teachers' affective skills development scores show a significant difference depending on whether they play digital games (t(301)=3.382; p=0.001<0.05). The affective skills development scores of those who played digital games ($\bar{x}$=3.720) were found to be higher than the affective skills development scores of those who did not play digital games ($\bar{x}$=3.409).

Teachers' creativity encouragement scores show a significant difference depending on whether they play digital games (t(301)=2.271; p=0.028<0.05). The creativity promotion scores of those who played digital games ($\bar{x}$=3.933) were found to be higher than the creativity promotion scores of those who did not play digital games ($\bar{x}$=3.741).

Teachers' psychomotor skills development scores show a significant difference depending on whether they play digital games (t(301)=2.237; p=0.026<0.05). The psychomotor skills development scores of those who played digital games ($\bar{x}$=3.709) were found to be higher than the psychomotor skills development scores of those who did not play digital games ($\bar{x}$=3.506).

Results Regarding the Differentiation of Primary School Teachers' Scores from the* DLGS *According to the Variable of Their Use of Digital Games in Lessons

Independent groups t test results regarding the differentiation of the scores received by primary school teachers from the educational digital games scale according to the variable of their use of digital games in lessons are given in the table.

Table 13

Difference in Educational Digital Game Scores According to Using Digital Games in Lessons

	Grup	N	Avg	Sd	t	df	p
DLGS	1.Yes	200	3,881	0,543	5,506	301	**0,000**
	2.No	103	3,459	0,775			
Development of social skills	1.Yes	200	3,623	0,733	3,980	301	**0,000**
	2.No	103	3,225	0,974			
Development of mental cognitive processes	1.Yes	200	4,014	0,587	5,139	301	**0,000**
	2.No	103	3,607	0,765			
Learning with fun and entertainment	1.Yes	200	4,095	0,506	6,246	301	**0,000**
	2.No	103	3,636	0,764			
Development of emotional affective skills	1.Yes	200	3,733	0,692	4,756	301	**0,000**
	2.No	103	3,283	0,930			
Stimulating creativity	1.Yes	200	3,970	0,645	4,176	301	**0,000**
	2.No	103	3,607	0,840			
Development of motor skills	1.Yes	200	3,757	0,720	4,401	301	**0,000**
	2.No	103	3,348	0,848			

Independent Groups T-Test

Educational digital game general scores differ significantly depending on whether teachers use digital games in lessons (t(301)=5.506; p=0.000<0.05). The educational digital game general scores of those who used digital games in lessons ($\bar{x}$=3.881) were found to be higher than the educational digital game general scores of those who did not use digital games in lessons ($\bar{x}$=3.459).

Social skills development scores show a significant difference depending on whether teachers use digital games in lessons (t(301)=3.980; p=0.000<0.05). The social skills development scores of those who used digital games in lessons ($\bar{x}$=3.623) were found to be higher than the social skills development scores of those who did not use digital games in lessons ($\bar{x}$=3.225).

Cognitive skills development scores show a significant difference depending on whether teachers use digital games in lessons (t(301)=5.139; p=0.000<0.05). The cognitive skills development scores of those who used digital games in lessons ($\bar{x}$=4.014) were found to be higher than the cognitive skills development scores of those who did not use digital games in lessons ($\bar{x}$=3.607).

Fun learning scores show a significant difference depending on whether teachers use digital games in lessons (t(301)=6.246; p=0.000<0.05). The fun learning scores of those who used digital

games in classes ($\bar{x}$=4.095) were found to be higher than the fun learning scores of those who did not use digital games in classes ($\bar{x}$=3.636).

Affective skills development scores show a significant difference depending on whether teachers use digital games in lessons (t(301)=4.756; p=0.000<0.05). The affective skills development scores of those who used digital games in lessons ($\bar{x}$=3.733) were found to be higher than the affective skills development scores of those who did not use digital games in lessons ($\bar{x}$=3.283).

There is a significant difference in teachers' creativity promotion scores depending on whether they use digital games in lessons (t(301)=4.176; p=0.000<0.05). The creativity promotion scores of those who used digital games in lessons ($\bar{x}$=3.970) were found to be higher than the creativity promotion scores of those who did not use digital games in lessons ($\bar{x}$=3.607).

Psychomotor skills development scores show a significant difference depending on whether teachers use digital games in lessons (t(301)=4.401; p=0.000<0.05). The psychomotor skills development scores of those who used digital games in lessons ($\bar{x}$=3.757) were found to be higher than the psychomotor skills development scores of those who did not use digital games in lessons ($\bar{x}$=3.348).

Results Regarding the Differentiation of Primary School Teachers' Scores from the DLGS *According to the Variable of Their Receiving Training on Digital Game Development*

Independent groups t test results regarding the differentiation of the scores received by primary school teachers from the educational digital games scale according to the variable of whether they received training on digital game development are given in the table.

Table 14

Differentiation of Educational Digital Game Scores According to the Status of Receiving Training on Digital Game Development

	Group	N	Avg	Sd	t	df	p
DLGS	1.Yes	58	3,851	0,564	1,458	301	0,146
	2.No	245	3,711	0,680			
Development of social skills	1.Yes	58	3,626	0,773	1,393	301	0,165
	2.No	245	3,455	0,857			
Development of mental cognitive processes	1.Yes	58	3,987	0,646	1,393	301	0,165
	2.No	245	3,849	0,686			
Learning with fun and entertainment	1.Yes	58	4,082	0,529	1,890	301	0,060
	2.No	245	3,906	0,664			
Development of emotional affective skills	1.Yes	58	3,695	0,667	1,208	301	0,168
	2.No	245	3,553	0,837			
Stimulating creativity	1.Yes	58	3,931	0,642	0,972	301	0,332
	2.No	245	3,827	0,757			
Development of motor skills	1.Yes	58	3,647	0,728	0,309	301	0,757

	2.No	245	3,611	0,804		

Independent Groups T-Test

Teachers' general educational digital game scores, developing social skills, developing cognitive skills, learning with fun, developing affective skills, encouraging creativity, and developing psychomotor skills do not differ significantly depending on whether they received training on digital game development (p>0.05).

Results Regarding the Differentiation of Primary School Teachers' Scores from the* DLGS *According to the Variable of Ownership of the Digital Game Development Infrastructure of the School Where They Work

The results of One-way analysis of variance regarding the differentiation of the scores received by primary school teachers from the educational digital games scale according to the variable of ownership of the digital game development infrastructure of the school where the teachers work are given in the table.

Table 17

Differentiation of Educational Digital Game Scores According to the Infrastructure of the School in terms of Digital Game Development

	Group	**N**	**Avg**	**Sd**	**F**	**p**	**Difference**
DLGS	1.Insufficient	145	3,649	0,697	3,779	**0,024**	**3>1**
	2.A little sufficient	101	3,758	0,604			
	3.Sufficient	57	3,927	0,632			
Development of social skills	1.Insufficient	145	3,352	0,870	4,499	**0,012**	**3>1**
	2.A little sufficient	101	3,547	0,740			
	3.Sufficient	57	3,726	0,892			
Development of mental cognitive processes	1.Insufficient	145	3,794	0,703	2,919	0,056	
	2.A little sufficient	101	3,896	0,627			
	3.Sufficient	57	4,046	0,689			
Learning with fun and entertainment	1.Insufficient	145	3,881	0,679	1,510	0,223	
	2.A little sufficient	101	3,961	0,606			
	3.Sufficient	57	4,050	0,604			
Development of emotional affective skills	1.Insufficient	145	3,459	0,883	3,836	**0,023**	**3>1**
	2.A little sufficient	101	3,639	0,727			
	3.Sufficient	57	3,787	0,696			
Stimulating creativity	1.Insufficient	145	3,783	0,786	2,183	0,114	
	2.A little sufficient	101	3,839	0,706			
	3.Sufficient	57	4,022	0,636			
Development of motor skills	1.Insufficient	145	3,546	0,823	5,132	**0,006**	**3>1**

	2.A little sufficient	101	3,553	0,773	**3>2**
	3.Sufficient	57	3,915	0,662	

One-Way ANOVA

The general scores of educational digital games differ significantly depending on the infrastructure of the school in terms of teachers' ability to develop digital games ($F(2, 300)=3.779$; $p=0.024<0.05$). The reason for the difference is; The educational digital game general scores of those who are proficient ($\bar{x}=3.927$) are higher than the educational digital game general scores of those who are inadequate ($\bar{x}=3.649$).

Teachers' social skills development scores in terms of being able to develop digital games vary significantly depending on the school's infrastructure ($F(2, 300)=4.499$; $p=0.012<0.05$). The reason for the difference is; The social skills development scores of those who are proficient ($\bar{x}=3.726$) are higher than the social skills development scores of those who are inadequate ($\bar{x}=3.352$).

Teachers' affective skills development scores in terms of being able to develop digital games vary significantly depending on the school's infrastructure ($F(2, 300)=3.836$; $p=0.023<0.05$). The reason for the difference is; The affective skills development scores of those who are proficient ($\bar{x}=3.787$) are higher than the affective skills development scores of those who are inadequate ($\bar{x}=3.459$).

Teachers' psychomotor skills development scores in terms of being able to develop digital games differ significantly depending on the school's infrastructure ($F(2, 300)=5.132$; $p=0.006<0.05$). The reason for the difference is; The psychomotor skills development scores of those who are proficient ($\bar{x}=3.915$) are higher than the psychomotor skills development scores of those who are inadequate ($\bar{x}=3.546$). The psychomotor skills development scores of those who are proficient ($\bar{x}=3.915$) are higher than the psychomotor skills development scores of those who are slightly proficient ($\bar{x}=3.553$).

Teachers' scores on improving cognitive skills, learning with fun, and encouraging creativity do not differ significantly according to the school's infrastructure in terms of being able to develop digital games ($p>0.05$).

Discussion and Conclusion, Recommendations

Discussion and Conclusion

According to the study's results, the confirmatory factor analysis showed that the scale had a high degree of distinctiveness, was structurally valid, and was compatible with the previously identified factor structure at an acceptable level. It was determined that the educational digital games scale is a viable and trustworthy measurement tool in this context. There was no discernible variation in the overall scale or the scale's sub-dimensions when the scores received by elementary school

teachers from the DLGS were investigated according to the gender variable. Altun (2021), Baltacı (2022), and Yılmaz (2022) all conducted investigations, and it is clear that there is no discernible difference in terms of gender.

There was no statistically significant difference in the overall scale and the sub-dimensions of learning with fun, developing affective skills, encouraging creativity, and developing psychomotor skills when the scores received by primary school teachers from DLGS were examined according to the seniority variable. It can be noticed that there is no discernible variation in the scores teachers receive according to the variable of seniority in the research done by Kılıç (2022) and Yılmaz (2022). However, a substantial difference may be found when the results from the sub-dimensions of social and cognitive skills development are compared. It was shown that the scores of teachers who worked for 1–5 years and those who worked for 6–10 years were higher than those of teachers who worked for 21 years or more in the sub-dimension for the development of social skills. It was shown that the scores of teachers who worked for 1–5 years, 6–10 years, and 11–15 years were higher than the scores of instructors who worked for 16–20 years and 21 years or more in the sub-dimension for the development of cognitive skills. Based on this result, it can be concluded that younger teachers believe that digital games improve social and cognitive abilities.

When the scores received by primary school teachers from the DLGS were examined according to the grade level variable, no significant difference was observed both in the overall scale and in the sub-dimensions of the scale.

There was no discernible variation in the primary school teachers' DLGS scores when they were assessed according to the grade level variable for both the overall scale and its sub-dimensions. Examining the scores that primary school teachers received from DLGS in relation to the digital game playing status variable reveals a substantial difference in both the overall scale and the scale's sub-dimensions. This distinction benefits those who play video games. It can be said that the attitudes of teachers who play digital games towards educational digital games are more positive.

There is a noticeable variation in the overall scale as well as the sub-dimensions of the scale when the scores that primary school teachers received from DLGS are investigated according to the variable of their use of digital games in classes. This distinction benefits teachers who incorporate video games into their lessons. It is clear that teachers who incorporate digital games into their classes receive greater grades than those who do not. It may be claimed that teachers who incorporate digital games into their lessons have a more favorable attitude toward these games.

When the scores received by primary school teachers from the DLGS were examined according to the variable of whether they received training on digital game development, no significant difference was observed both in the overall scale and in the sub-dimensions of the scale.

The sub-dimensions of enhancing cognitive skills, promoting fun learning, and fostering creativity did not significantly differ when the scores received by primary school teachers from DLGS were examined according to the variable of the School's Ownership of Digital Game Development Infrastructure. However, a significant difference was seen when the scores of educational digital games development of general and social skills, development of affective skills, and development of psychomotor skills were compared. It was found that in the subdimensions of educational digital game development of general and social abilities and development of affective skills, instructors with appropriate school infrastructure scored higher than teachers with insufficient infrastructure. In the sub-dimension of developing psychomotor skills, it was observed that the scores of teachers with adequate schools' infrastructure were higher than the scores of teachers with slightly adequate and insufficient infrastructure.

As a result, there is a significant difference in teachers' scores on educational digital game general, developing social skills, developing cognitive skills, learning with fun, developing affective skills, encouraging creativity, and developing psychomotor skills depending on their seniority, their level of gaming experience, how often they use digital games in the classroom, and the facilities at the school they work at. The gender, development, and training for digital games, however, did not differ much from one another.

Recommendations

- The scale adapted in the research is limited to the primary school teaching branch. The scale can also be used in other areas.
- The adapted scale can be used after determining and implementing any lesson and the digital game for this lesson.
- The adapted scale can also be examined according to the residential unit (village school, city center) variable.
- The adapted scale can also be examined according to the institution type (private school, public school) variable.
- Teachers should be informed about digital content and encouraged to use digital content.
- Teacher candidates can be trained to raise awareness in education faculties about the use of educational digital content in courses.

- There are still interactive whiteboards etc. in our country. There are schools where technological equipment and internet infrastructure are inadequate. For this reason, the deficiencies should be eliminated by the Ministry of Education in order to ensure equal opportunity in education.

Ethics Committee Permission Information

Ethics review board: İnönü University, Scientific Research and Ethics Board

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Researcher's Contribution

The processes related to the theoretical research, data collection reporting, measurement tool adaptation part of the research were carried out by the first author, the processes related to the thesis reporting, measurement tool adaptation part were carried out by the second author, and the processes related to the measurement tool adaptation and digital learning game scale items control part were carried out by the third author.

Conflict of Interest

The author does not have a statement of conflict regarding the research.

References

Ağırgöl, M. (2020). *Fen bilgisi öğretiminde eğitsel dijital oyun kullanımının öğrenci akademik başarısına, bilgi kalıcılığına ve tutumuna etkisi*. Yayınlanmamış Yüksek Lisans Tezi, Binali Yıldırım Üniversitesi, Fen Bilimleri Enstitüsü, Erzincan.

Altun, A. (2021). *Sosyal bilgiler dersinde dijital oyunlardan yararlanmaya ilişkin öğretmen tutum ve görüşleri üzerine bir inceleme*. Yayımlanmamış Yüksek Lisans Tezi, Yüzüncü Yıl Üniversitesi, Eğitim Bilimleri Enstitüsü, Van.

Bağ, H. (2020). *Eğitsel bir dijital oyun yardımıyla kavramsal anlama düzeylerinin, bilimsel düşünme alışkanlıklarının ve argümantasyon becerilerinin gelişiminin incelenmesi*. Doktora Tezi, Trabzon Üniversitesi, Lisansüstü Eğitim enstitüsü, Trabzon.

Baltacı, B. N. (2022). *Sınıf öğretmenlerinin derslerinde dijital oyunları kullanmaları ile ilgili tutum ve görüşleri*. Yayımlanmamış Yüksek Lisans Tezi, Trabzon Üniversitesi, Lisansüstü Eğitim Enstitüsü, Trabzon.

Büyüköztürk, Ş. (2011). *Sosyal bilimler için veri analizi el kitabı.* Ankara. Pegem A Yayıncılık.

Çapık, C., Gözüm S., & Aksayan S. (2018). Kültürlerarası ölçek uyarlama aşamaları, dil ve kültür uyarlaması: güncellenmiş rehber. *Florence Nightingale Hemşirelik Dergisi* 26(3):199–210. doi: 10.26650/fnjn397481.

Erkan, A. (2019). *İlkokul 4. sınıf sosyal bilgiler dersinde kullanılan eğitsel oyun ve dijital oyun öğretiminin öğrencilerin başarı ve tutumlarına etkisi*. Yayımlanmamış Yüksek Lisans Tezi, Fırat Üniversitesi, Eğitim Bilimleri Enstitüsü, Elâzığ.

Erkuş, A., & Selvi, H. (2019). *Psikolojide ölçme ve ölçek geliştirme*. (1. Baskı). PEGEM Akademi. Ankara.

George, D., & Mallery, M. (2010*). spss for windows step by step: a simple guide and reference, 17.0 update* (10a ed.) Boston: Pearson

Güngör, D. (2016). Psikolojide ölçme araçlarının geliştirilmesi ve uyarlanması kılavuzu. *Türk Psikoloji Yazıları, 19*(38), 104–12.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). Multivariate data analysis: A global perspective (7th ed.). Upper Saddle River, NJ: Pearson.

Hocaoğlu, N., & Akkaş Baysal, E. (2019). Eğitimde bilimsel araştırma yöntemleri. (1. Baskı). PEGEM Akademi, Ankara.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53-60.

Kılıç, M. (2021). Pandemi döneminde dijital eğitim teknolojisinin dönüştürücü etkisi bağlamında eğitim hakkı ve eğitim politikaları. *Yükseköğretim Dergisi 11*(1), 25–37. doi: 10.2399/yod.20.012000.

Koğar, H. (2021). *R ile geçerlik ve güvenirlik analizleri*. (2. Baskı). PEGEM Akademi, Ankara.

Mukh, Y. A., Hashaikeh, S., & Abd-Rabo, A. (2021). Digital learning games scale (DLGS): a scale development study. *International Journal of Emerging Technologies in Learning (iJET), 16*(11), 140-159.

Özdamar, K. (2004). *Paket programlar ile istatistiksel veri analizi*. Eskişehir. Kaan Kitabevi. s.36.

Sağlam, M. (2019). *Dijital oyunların öznel iyi oluşa etkisi y kuşağına yönelik bir araştırma*. Doktora Tezi, Ege üniversitesi, Sosyal Bilimler Enstitüsü, İzmir.

Schumacker, R. E., & Lomax, R. G. (2004). A *beginner's guide to structural equation modeling.* New Jersey: Taylor & Francis.

Sümer, N. (2000). Yapısal eşitlik modelleri. *Türk Psikoloji Yazıları.* No.3.

Şahin, M. G., & Boztunç Öztürk, N. (2018). Eğitim alanında ölçek geliştirme süreci: bir içerik analizi çalışması. *Kastamonu Üniversitesi Kastamonu Eğitim Dergisi* 26(1):191–207. doi: 10.24106/kefdergi.375863.

Şimşek, O. F. (2007). *Yapısal eşitlik modellemesine giris: Temel ilkeler ve LISREL uygulamalari*. Ankara: Ekinoks.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2013). *Using multivariate statistics* (Vol. 6, pp. 497-516). Boston, MA: pearson.

Tavşancıl, E. (2002), *Tutumların ölçülmesi ve spss ile veri analizi,* Ankara: Nobel Yayıncılık.

Telli, S. G., & Aydın, S. (2021). Covid-19 sonrası dönemde işletme bölümlerinin Dijital Çağ'a yönelik hazır bulunuşluğu: Türkiye Örneği. *Yükseköğretim Dergisi*, *11*(1), 123-138.

Tezbaşaran, A. A. (2008). *Likert tipi ölçek hazırlama kılavuzu (e-kitap).* Http:// www.academia.edu/1288035/LikertTipiÖlçekHazırlamaKılavuzu adresinden erişilmiştir.

Waltz, C. F., Strcickland, O. L., & Lenz, E.R. (2010). *Measurement in nursing and health research.* New York: Springer Publishing Company.

Wang, J., & Wang, X. (2012). *Structural equation modeling: applications using mplus: methods and applications.* West Susex: John Wiley & Sons.

Yılmaz, A. (2022). *5. sınıf ingilizce dersinde dijital oyun tabanlı öğrenmenin akademik başarı ve tutum üzerine etkisi.* Yayımlanmamış Yüksek Lisans Tezi, Ondokuz Mayıs Üniversitesi, Lisansüstü Eğitim Enstitüsü, Samsun.

Appendices

Appendix-1: DLGS Adapted to Turkish form for Primary School Teachers

	Maddeler	**Kesinlikle Katılmıyorum (1)**	**Katılmıyorum (2)**	**Kararsızım(3)**	**Katılıyorum (4)**	**Kesinlikle Katılıyorum (5)**
1	Eğitici dijital oyunlar, öğrencinin yeni arkadaşlar edinme şansını artırır.					
2	Eğitici dijital oyunlar, öğrencinin sosyal uyum şansını artırır.					
3	Eğitici dijital oyunlar, öğrencinin sosyal olgunluğunu artırır.					
4	Eğitici dijital oyunlar, öğrenciye yeni değerlerin kazandırılmasını sağlar.					
5	Eğitici dijital oyunlar, öğrencinin akranları ile etkileşim kurmasını sağlar.					
6	Eğitici dijital oyunlar, öğrencilerin etik toplumsal değerleri öğrenmesinde katkıda bulunur.					
7	Öğrenci, eğitici dijital oyun oynarken işbirliği yapmayı öğrenir.					
8	Öğrenci, eğitici dijital oyunları oynarken rol dağılımı yapmayı öğrenir.					
9	Eğitici dijital oyunlar, öğrencinin okuma talimatları ile etkileşimini arttırır.					
10	Eğitici dijital oyunlar, öğrencinin sosyal ilişkilerde kendi kendini kontrol etmesini sağlar.					
11	Eğitici dijital oyunlar, öğrencinin değerlendirme becerisini geliştirir.					
12	Eğitici dijital oyunlar, öğrencinin kurulum becerisini geliştirir.					
13	Eğitici dijital oyunlar, öğrencinin uygulama becerisini geliştirir.					
14	Eğitici dijital oyunlar, öğrencinin planlama becerisini geliştirir.					
15	Eğitici dijital oyunlar öğrencinin organize düşünme becerisinin gelişimine katkıda bulunur.					
16	Eğitici dijital oyunlar, öğrencinin yaşadığı önceki olayları ve deneyimleri temsil eden zihinsel görüntüleri hatırlamasına katkıda bulunur.					
17	Eğitici dijital oyunlar öğrencilerin mantıksal düşünme becerilerini geliştirir.					
18	Eğitici dijital oyunlar öğrencinin tümdengelim becerisini geliştirir.					
19	Eğitici dijital oyunlar, eğitim ortamında öğrenciye eğlenceli ve keyifli bir ortam sağlar.					
20	Eğitici dijital oyunlar öğrencinin öğrenme motivasyonunu arttırır.					
21	Eğitici dijital oyunlar, öğrenmelerin tekrar edilmesi sırasında eğlence şansını artırır.					
22	Eğitici dijital oyunlar, öğrenmeyi kalıcı hale getiren eğlenceli duyusal uyaranları kullanır.					
23	Eğitici dijital oyunlar, bir öğrencinin geleneksel öğrenme rutinini azaltır.					
24	Eğitici dijital oyunların mevcudiyeti; öğrenciye anında ve eğlenceli geri bildirim olanağı sağlar.					
25	Eğitici dijital oyunlar, öğrenci için kendi kendine öğrenmeyi eğlenceli hale getirir.					

26	Eğitici dijital oyunlar öğrenmede zamandan ve emekten tasarruf sağlar.					
27	Eğitici dijital oyunlar sıralı eğitim içeriği sağlar.					
28	Eğitici dijital oyunlar, öğrenci için gerçeğe yakın deneyimler sağlar.					
29	Eğitici dijital oyunlar, özellikle mücadeleyi kazandığında öğrenci için hoş bir duygusal deneyim sağlar.					
30	Eğitici dijital oyunlar, öğrenciye düzene, kurallara ve yasalara bağlılığın öğretilmesine katkıda bulunur.					
31	Öğrenci, eğitici dijital oyunlar aracılığıyla sorunları çözmenin yeni yollarını edinir.					
32	Eğitici dijital oyunlar, öğrencinin kendine güvenini ve bağımsızlık duygusunu geliştirir.					
33	Eğitici dijital oyunlar, bazı öğrencilerde aşırı utangaçlık hissini azaltır.					
34	Eğitici dijital oyunlar, öğrencinin kişiliğini güçlendirmesine katkıda bulunur.					
35	Eğitici dijital oyunlar öğrencinin özgüvenini artırır.					
36	Eğitici dijital oyunlar, öğrencinin duygularını oyun yoluyla açığa çıkararak fazla enerjisini azaltır.					
37	Eğitici dijital oyunlar, öğrencilerin sinir olgunluğunu artırmaya yardımcı olur.					
38	Eğitici dijital oyunlar, öğrencinin hayal gücünü geliştirir.					
39	Eğitici dijital oyunlar, yaratıcı düşünme becerisini geliştirir.					
40	Eğitici dijital oyunlar, öğrencinin problem çözme becerisini geliştirir					
41	Eğitici dijital oyunlar, öğrencinin analitik düşünme becerisini geliştirir.					
42	Eğitici dijital oyunlar, öğrencinin hareket duygusu için sinerji sağlar.					
43	Eğitici dijital oyunlar, el ve göz arasındaki sinerjiyi artırır					
44	Eğitici dijital oyunlar, öğrencinin duyuları ile kas koordinasyonu sağlar.					
45	Eğitici dijital oyunlar, öğrencinin hareket hızını geliştirir.					
46	Eğitici dijital oyunlar, öğrencinin görsel dikkatinin verimli bir şekilde dağıtılmasını sağlar.					
47	Eğitici dijital oyunlar, öğrenciye duygularını özgürce ifade etme fırsatı sunar.