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THE DEVELOPMENT OF AN ATTITUDE SCALE FOR EDUCATIONAL GAMES: THE STUDY OF VALIDITY AND RELIABILITY[*]

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ABSTRACT

This study aims to develop an attitude scale for the measurement of classroom and pre-school teachers' attitudes towards educational games. Using a five-point Likert scale, a final form consisting of 48 items were applied to 405 different pre-School and classroom Teachers working in different cities of Turkey. Exploratory and Confirmatory Factor Analysis were conducted on the data in order to prove construct validity of the scale. Exploratory Factor Analysis demonstrated that the scale had a construct with two sub-factors. The first sub-factor consisting of 14 items explains 46.09% of the variance for the related attitude variable, while the second sub-factor consisting of 6 items explains 13.42% of the variance for the related attitude variable. Both sub-factors explain 59.51% of the variance for the related attitude variable. These factors were named as "positive attitude" and "negative attitude" by the authors. In addition, item test correlation was performed in order to prove item validity, and it was observed that item test correlations varied between 0.55 and 0.81. Confirmatory factor analysis was also performed to verify the construct obtained from exploratory factor analysis, and it was calculated as [x2/df=3.54 (p=.000); RMSEA=0.079; NFI=0.96; CFI=0.98; AGFI=0.84; GFI=0.87; SRMR=0.035; NNFI= 0.97]. Furthermore, Cronbach Alpha reliability coefficient was also tested in order to prove scale reliability, and Cra

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reliability coefficient was calculated as .92, .95 and .82 for the whole scale, first sub-factor and second sub-factor, respectively. These findings suggest that the scale is valid and reliable for the measurement of attitude towards educational games.

STRUCTURED ABSTRACT

Introduction

In educational research and applications, the term "educational game" is often used instead of the word "game" (Varışoğlu, Şeref, Gedik and Yılmaz, 2013). Similar to the definition of game, educational game can be defined as a game which "provides an individual with freedom to a certain extent, enables children to enjoy and be entertained in class environment, fulfills the purposes and outcomes of an educational program, help children repeat what they have learned, influences affective, behavioral, cognitive, physical and psycho-motor dimensions, attracts students' attention thanks to its funny and enjoyable aspects, and improves children's problem-solving skills (Aytaş and Uysal, 2017; Bayırtepe and Tüzün, 2007; Çangır, 2008; Demirel et al., 2003; Dönmez, 1999; Gedik and Tekin, 2015; Hazar, 2005; Önen et al., 2012). Therefore, the use of educational games in class environment will influence children's development positively.

In today's world, teachers' attitudes and views are important in terms of designing classroom activities in a modern constructivist and flexible educational program. Attitude was first defined by Baldwin (1901-1905) as "preparation for a series of actions or attention". On the other hand, although he argues that attitude contained multiple sub-dimensions, Thurstone (1931) brings the affective dimension to the forefront and defines attitude as "the degree of an individual's positive and negative emotions towards a psychological object". Although attitude has so far been defined in specific ways in the social sciences, it is generally acknowledged that it is related to an individual's tendency to negatively or positively react against external stimuli (Beyer, Bizub, Szabo, Heller, Kistner, Shawgo and Zetts, 2015). It was Smith (1947) who gave a tripartite definition of attitude with three components. Similarly, according to Middlebrook (1974), attitude consists of three components as cognitive, affective and behavioral. Brecker (1984) states that cognitive component includes perceptual reactions and ideas and information structures, affective component includes emotions and emotive reactions, and behavioral component includes explicit performance and behavioral tendencies (cited in Erkuş, 2003).

Few scales were developed by researchers for the determination of attitudes towards educational games in Turkey. The scale developed by Varışoğlu et al. (2013), Attitude Scale for Educational Games in Turkish Language Classes, contains 12 items. The scale has a three-dimensional construct and consists of three factors as Valuing Educational Games, Teacher's Motivation for the Educational Games and Internal Motivation for Educational Games. The sample on which the validity and reliability of the scale was tested consisted of 339 primary school second grade students. In addition, Hazar (2015) developed Gaming Scale for measuring attitudes of individuals aged between 18 and 22 towards games with physical activities. The scale

was applied to 533 students aged between 18 and 22. Consisting of 25 items, the scale had a five-factor construct as passion for games, risk taking, social adaptation, gaming desire and enjoying games. No scale was found in the international literature for the determination of attitudes towards educational games.

It must be noted that the above-mentioned studies were applied to secondary school, high school and undergraduate students. Therefore, this study mainly focuses on the development of a new scale for the measurement of teachers' attitudes towards educational games in early childhood education.

Methodology and Study Group

This is a scale development study. The study group consists of 405 pre-school and classroom teachers who graduated from the departments of pre-school teaching and classroom teaching and currently work in different cities in Turkey. Female and male teachers comprised 62.5% (n=253) and 37.5% (n=152) of the study group, respectively. In addition, while 53.5% (n=216) of the participants were classroom teachers, 46.5% of them (n=189) were pre-school teachers.

Scale Development Process

The related literature was reviewed before developing Attitude Scale for Educational Games (ASFEG) in order to determine possible items in the designed scale. In addition, various scales developed by various researchers for teachers in different disciplines were also used to create items for this attitude scale. Items were written by taking theoretical framework on attitude and its sub-components (cognitive, affective and behavioral) into consideration. Consisting of 55 items in total, the scale item pool contains 16 items for cognitive sub-component (I2, I4, I6, I10, I11, I14, I15, I23, I25, I28, I30, I34, I38, I43, I48 and I52), 18 items for affective sub-component (I1, I7, I9, I12, I13, I17, I18, I21, I29, I32, I35, I41, I45, I47, I49, I51, I54 and I55) and 21 items for behavioral sub-component (I3, I5, I8, I16, I19, I20, I22, I24, I26, I27, I31, I33, I36, I37, I39, I40, I42, I44, I46, I50 and I53). Additionally, taking the degree of positive and negative emotions (Thurstone, 1931) as a definition of attitude, we created 25 items for negative emotions and 30 items for positive emotions. Afterwards, 5 specialist were asked for advice on these, and in parallel with their views, 7 ambiguous items which expressed more than one statement were omitted from the scale to create a final test form with 48 items. Finally, scale items were graded with five-point Likert scale (Strongly Disagree=1, Disagree=2, Do not Know=3, Agree=4, Strongly Agree=5).

Data Collection

The final test form were copied and sent to nursery schools and primary schools affiliated to Ministry of National Education as well as independent nursery schools. Teachers in these schools were informed about the scale beforehand, and, after teachers were motivated, 405 teachers who volunteered to fill in the form were requested to participate in the study for data collection, which lasted 14 days.

Data Analysis

Prior to data analysis, data errors, deviating values and extreme values were checked, and negative expressions in the scale were reversed for grading. The obtained data were used to analyze construct and content validity of the scale to prove its validity and reliability, and Cronbach Alpha reliability coefficient was calculated. 1 classroom teaching specialist and 2 pre-school education specialist were asked to review the scale for the determination of its content validity and suitability of scale items, 1 Turkish language specialist for the linguistic analysis of scale items and 1 scale development specialist for the analysis of its suitability for scale development standards. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed in order to determine the construct validity of the scale. Kaiser-Meyer Olkin (KMO) coefficient and Bartlett Sphericity test were used for data factor analysis prior to EFA, which was made using SPSS 22 package program. EFA indicated the number of factors in the scale, the position of items in each scale and items that must be omitted from the scale in accordance with certain standards. After the factor construct of the scale had been determined, LISREL 8.80 program was used for CFA of the data. In addition, Cronbach Alpha reliability coefficient and item test correlation were analyzed to measure reliability and validity of the scale, respectively. Finally, Cronbach Alpha reliability coefficient of each scale sub-dimension was calculated, and Pearson Product-Moment Correlation Analysis was performed to determine the relationship among factors.

Conclusion And Suggestions

In this study, a scale was developed in order to determine classroom and pre-school teachers' attitudes towards educational games. During the development process, following specialists' review on the scales, a test form consisting of 48 items were tested for validity and reliability. After a factor analysis was performed to measure construct validity, a two-factor construct which consists of 20 items and explains 59.51% of the variance was obtained. These factors were named as "positive attitude" and "negative attitude" towards educational games as described by various researchers in the literature. The first and second factor consists of 14 and 6 items, respectively. The goodness of fit index values obtained from CFA were analyzed to indicate a satisfactory goodness of fit between the data and model. Cronbach Alpha reliability coefficient was also calculated to measure the reliability of the scale, and Cronbach Alpha reliability coefficient for the whole scale, first and second sub-factors were calculated as .92, .95 and .82, respectively. These findings demonstrate that the scale has a reliable construct in terms of both sub-dimensions. Total item correlation was analyzed in order to determine whether scale items measure the intended variables. Total item correlations vary between .62 and .81 for the first factor (positive attitude) and between .55 and .59 for the second factor (negative attitude). Therefore, it can be said that scale items measure the same construct.

In the light of findings in the present study, it is safe to argue that this scale presents a valid and reliable construct. Therefore, this scale can be used as a data collection tool in order to explore classroom and pre-school teachers' attitudes towards educational games. The scale can

be employed to determine (1) classroom and pre-school teachers' attitudes towards educational games, (2) to identify variables that influence classroom and pre-school teachers' attitudes towards educational games, and (3) to reveal the correlation between classroom and pre-school teachers' attitudes in different fields and their attitudes towards educational games. Furthermore, scale development studies can be carried out to delve into attitudes of teachers in different disciplines towards educational games. Because the scale developed for the present study only focuses on classroom and pre-school teachers, the scale must be revised for reliability and validity through the data to be obtained from new samples.

Keywords: Basic Education, Pre-school Education, Classroom Teaching, Educational Game, Attitude Scale.

EĞİTSEL OYUNA YÖNELİK TUTUM ÖLÇEĞİNİN GELİŞTİRİLMESİ: GEÇERLİK VE GÜVENİRLİK ÇALIŞMASI

ÖZ

Bu çalışmanın amacı sınıf ve okul öncesi öğretmenlerinin eğitsel oyunlara yönelik tutumlarını ölçmeye dönük ölçme aracı geliştirmektir. 48 maddeden oluşan 5'li Likert tipindeki ölçeğin nihai formu Türkiye'nin farklı illerinde görev yapmakta olan 405 Okul Öncesi ve Sınıf Öğretmeni üzerinde uygulanmıştır. Geliştirilen ölçeğin yapı geçerliliğini kanıtlamak için elde edilen veriler üzerinden Açımlayıcı ve Doğrulayıcı Faktör Analizi uygulanmıştır. Açımlayıcı Faktör Analizi sonucunda ölçeğin iki alt faktörlü bir yapıya sahip olduğu belirlenmiştir. Birinci alt faktör 14 maddeden oluşurken tek başına tutum değişkenine ilişkin varyansın %46,09'unu açıklamaktadır. İkinci alt faktör 6 maddeden oluşmakta ve tek başına bu alt faktör ilgili tutum değişkenine ait varyansın %13,42'sini açıklamakta; bu iki alt faktör birlikte ilgili tutum değişkenine ilişkin varyansın %59,51'ini açıklamaktadır. Faktörler araştırmacılar tarafından olumlu tutum ve olumsuz tutum olarak adlandırılmıştır. Ayrıca, madde geçerliğine kanıt sağlamak amacıyla madde test korelasyonları hesaplanmış; madde test korelasyonlarının 0,55 ile 0,81 arasında değiştiği saptanmıştır. Açımlayıcı faktör analizi ile elde edilen yapıya kanıt sağlamak amacıyla doğrulayıcı faktör analizi yapılmıştır. Doğrulayıcı faktör analizi sonucu [$x2/df=3.54$ (p=.000); RMSEA=0,079; NFI=0,96; CFI=0,98; AGFI=0,84; GFI=0,87; SRMR=0.035; NNFI= 0.97] olarak hesaplanmıştır. Ayrıca ölçeğin güvenirliğine kanıt sağlamak amacıyla Crα güvenirlikleri incelenmiş; ölçeğin tamamı için elde edilen Cronbach Alfa güvenirlik katsayısı .92, birinci alt faktör için elde edilen Cronbach Alfa güvenirlik katsayısı .95, ikinci alt faktör için elde edilen Cronbach Alfa güvenirlik katsayısı .82 olarak hesaplanmıştır. Elde edilen bulgular, ölçeğin eğitsel oyuna yönelik tutumları ölçmek için geçerli ve güvenilir olduğunu göstermiştir.

Anahtar Kelimeler: Temel Eğitim, Okul Öncesi Eğitimi, Sınıf Eğitimi, Eğitsel Oyun, Tutum ölçeği.

Introduction

Education in early childhood bears utmost importance for children, and educational games constitute one of the most important factors in improving the quality of education in this period. The historical development of games dates back to earliest times of human history. In this period, it can be noted that numerous scientists' views on games underline the importance of games in early childhood and recommend teachers and parents to include games in their children's education (Koçyiğit, Tuğluk and Kök, 2007; Mooney, 2013).

Platon (427-347 BC) states that a child's freedom to play should not be limited because it reveals children's skills and abilities. Al-Ghazali, (1058-1111) stresses the decisive role of games in refreshing children's memory and relieving their body and spirit. Comenius (1592-1671) associates games with an individual's desire to make friends and capacity to take responsibility. Piaget (1962) considers games as one of the most efficient methods and social behaviors for children to gain social skills and provide them with a world view in early childhood. Vygotsky (1967) recommends games to improve a child's motor skills, thin and thick muscles, and language skills. Frobel argues that games increase a child's excitement to learn new things (Akandere, 2003; Koçyiğit et al., 2007; Pehlivan, 2012; Piaget, 1962; Sevinç, 2005).

Turkish dictionary of Turkish Language Association defines game as "an entertainment with certain rules which improves skills and mind and helps having a good time" (TDK, 2017). Various researchers generally define it as a learning process which "depends either certain rules or is played without rules, with or without a specific purpose; is particularly effective in regulating oneself and producing development cycles in every field and consists of active, interesting, funny, uncertain, free, adaptable, purposeless, motivating and participatory activities with personal experiences; which children enjoy and benefit from to make their own decisions; can be re-organized for specific purposes when a child displays inadequate, clumsy, exaggerated behaviors; enables children to explore their environment and gives them opportunity for social communication; shapes children's development in every field, and helps children adapt to real life situations (Brown, 2009; Burghardt, 2011; Dewey, 1938; Dönmez, 1999 ; Frost, Wortham and Reifel, 2012; Rogoff, 2003; Roskos and Christie , 2006; Sutton-Smith, 1997).

In educational research and applications, the term "educational game" is often used instead of the word "game" (Varışoğlu, Şeref, Gedik and Yılmaz, 2013). Similar to the definition of game, educational game can be defined as a game which "provides an individual with freedom to a certain extent, enables children to enjoy and be entertained in class environment, fulfills the purposes and outcomes of an educational program, help children repeat what they have learned, influences affective, behavioral, cognitive, physical and psycho-motor dimensions, attracts students' attention thanks to its funny and enjoyable aspects, and improves children's problem-solving skills (Aytaş and Uysal, 2017; Bayırtepe and Tüzün, 2007; Çangır, 2008; Demirel et al., 2003; Dönmez, 1999; Gedik and Tekin, 2015; Hazar, 2005; Önen et al., 2012). Therefore, the use of educational games in class environment will influence children's development positively.

In today's world, teachers' attitudes and views are important in terms of designing classroom activities in a modern constructivist and flexible educational program. Attitude was first defined by Baldwin (1901-1905) as "preparation for a series of actions or attention". On the other hand, although he argues that attitude contained multiple sub-dimensions, Thurstone (1931) brings the affective dimension to the forefront and defines attitude as "the degree of an individual's positive and negative emotions towards a psychological object". Although attitude has so far been defined in specific ways in the social sciences, it is generally acknowledged that it is related to an individual's tendency to negatively or positively react against external stimuli (Beyer, Bizub, Szabo, Heller, Kistner, Shawgo and Zetts, 2015). It was Smith (1947) who gave a tripartite definition of attitude with three components. Similarly, according to Middlebrook (1974), attitude consists of three components as

cognitive, affective and behavioral. Brecker (1984) states that cognitive component includes perceptual reactions and ideas and information structures, affective component includes emotions and emotive reactions, and behavioral component includes explicit performance and behavioral tendencies (cited in Erkuş, 2003).

Allport (2008) views attitude as a mental and neural state of preparation organized by experience and states that it directs an individual's reactions against all objects and situations with a dynamic effect on them. Positive or negative attitudes towards an object determine positive or negative behaviors towards that object (Handayani, 2011). Therefore, individuals' attitudes towards a situation should be taken into consideration. In this respect, a teacher's use of educational games in classroom environment will be affected by their attitudes towards educational games.

Few scales were developed by researchers for the determination of attitudes towards educational games in Turkey. The scale developed by Varışoğlu et al. (2013), Attitude Scale for Educational Games in Turkish Language Classes, contains 12 items. The scale has a three-dimensional construct and consists of three factors as Valuing Educational Games, Teacher's Motivation for the Educational Games and Internal Motivation for Educational Games. The sample on which the validity and reliability of the scale was tested consisted of 339 primary school second grade students. In addition, Hazar (2015) developed Gaming Scale for measuring attitudes of individuals aged between 18 and 22 towards games with physical activities. The scale was applied to 533 students aged between 18 and 22. Consisting of 25 items, the scale had a five-factor construct as passion for games, risk taking, social adaptation, gaming desire and enjoying games. No scale was found in the international literature for the determination of attitudes towards educational games.

It must be noted that the above-mentioned studies were applied to secondary school, high school and undergraduate students. Therefore, this study mainly focuses on the development of a new scale for the measurement of teachers' attitudes towards educational games in early childhood education.

Methodology

This is a scale development study. This section describes the study group, development process of the Attitude Scale for Educational Games, data collection and analysis.

Study Group

The study group consists of 405 pre-school and classroom teachers who graduated from the departments of pre-school teaching and classroom teaching and currently work in different cities in Turkey. Female and male teachers comprised 62.5% (n=253) and 37.5% (n=152) of the study group, respectively. In addition, while 53.5% (n=216) of the participants were classroom teachers, 46.5% of them (n=189) were pre-school teachers.

Scale Development Process

The related literature was reviewed before developing Attitude Scale for Educational Games (ASFEG) in order to determine possible items in the designed scale. In addition, various scales developed by various researchers for teachers in different disciplines were also used to create items for this attitude scale. Items were written by taking theoretical framework on attitude and its sub-components (cognitive, affective and behavioral) into consideration. Consisting of 55 items in total, the scale item pool contains 16 items for cognitive sub-component (I2, I4, I6, I10, I11, I14, I15, I23, I25, I28, I30, I34, I38, I43, I48 and I52), 18 items for affective sub-component (I1, I7, I9, I12, I13, I17, I18, I21, I29, I32, I35, I41, I45, I47, I49, I51, I54 and I55) and 21 items for behavioral sub-component (I3, I5, I8, I16, I19, I20, I22, I24, I26, I27, I31, I33, I36, I37, I39, I40, I42, I44, I46, I50 and I53). Additionally, taking the degree of positive and negative emotions (Thurstone, 1931) as a definition of attitude, we created 25 items for negative emotions and 30 items for positive emotions.

Afterwards, 5 specialist were asked for advice on these, and in parallel with their views, 7 ambiguous items which expressed more than one statement were omitted from the scale to create a final test form with 48 items. Finally, scale items were graded with five-point Likert scale (Strongly Disagree=1, Disagree=2, Do not Know=3, Agree=4, Strongly Agree=5).

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Data Analysis

Prior to data analysis, data errors, deviating values and extreme values were checked, and negative expressions in the scale were reversed for grading. The obtained data were used to analyze construct and content validity of the scale to prove its validity and reliability, and Cronbach Alpha reliability coefficient was calculated. 1 classroom teaching specialist and 2 pre-school education specialist were asked to review the scale for the determination of its content validity and suitability of scale items, 1 Turkish language specialist for the linguistic analysis of scale items and 1 scale development specialist for the analysis of its suitability for scale development standards. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed in order to determine the construct validity of the scale. Kaiser-Meyer Olkin (KMO) coefficient and Bartlett Sphericity test were used for data factor analysis prior to EFA, which was made using SPSS 22 package program. EFA indicated the number of factors in the scale, the position of items in each scale and items that must be omitted from the scale in accordance with certain standards. After the factor construct of the scale had been determined, LISREL 8.80 program was used for CFA of the data. In addition, Cronbach Alpha reliability coefficient and item test correlation were analyzed to measure reliability and validity of the scale, respectively. Finally, Cronbach Alpha reliability coefficient of each scale sub-dimension was calculated, and Pearson Product-Moment Correlation Analysis was performed to determine the relationship among factors.

Results

Validity Results

It is reported in the related literature that sample size in a scale development process must generally be 5 to 10-fold as high as the number of items in a scale for a healthy factor analysis (Bryman and Cramer, 2001; Kass and Tinsley, 1979; Kline, 1994; Pett, Lackey and Sullivan, 2003; Tavşancıl, 2005). This study focuses on the data of 405 participants, and thus it can be stated that it reached an adequate sample size.

First, EFA was applied to the scale in order to prove its construct validity. Kaiser-Meyer Olkin (KMO) coefficient and Bartlett Sphericity test were used to understand whether data are suitable for factor analysis, which gave a KMO value of 0.94. Kaiser (1974) states that KMO value must be higher than 0.5 for a factor analysis. On the other hand, some researchers maintain that KMO value must be over 0.6 (Field, 2005; Pallant, 2001; Pallant and Manuel, 2001). The level of significance in Chi-square test results obtained from Bartlett Sphericity test indicate a normal data distribution. The analysis indicates that Bartlett test was significant (X^2=5146.161, sd: 190, p<.01). These findings suggest that the data used in this study is suitable for factor analysis.

As a result of the factor analysis, 28 items (2, 4, 7, 8, 12, 13, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28, 31, 34, 36, 38, 39, 40, 42, 43, 46 and 48) that were not suitable for the scale were omitted. The remaining 20 items were used to create a construct with two sub-factors, the item eigenvalues of

which were over 1. The first factor consists of 14 items (1, 3, 5, 6, 9, 10, 11, 14, 15, 22, 29, 30, 32 and 37), and the eigenvalue of the first factor which informs about the significance degree and weight of each factor in the construct was found 9.21. This sub-factor explains 46.09% of the variance for the related attitude variable, and it was named as "positive attitude". The second sub-factor consists of 6 items (33, 35, 41, 44, 45 and 47) and its eigenvalue was found as 2.68. This sub-factor explains 13.42% of the variance for the related attitude variable, and it was named as "negative attitude". It is often suggested that the sum of total variance explained by the factors be higher 50% (Thompson, 2004). These two sub-factors explain 59.51% of the variance related to the attitude variable. Factor weight value and common factor variance are given in Table 1.

Table 1: *Factor Weight Values and Common Factor Variance*

Factor		Items	Factor 1	Factor 2	Common Factor Variance
Positive Attitude	I5	Students actively take part in classes with educational games.	.840		.714
	I11	I believe that educational games improve imagination.	.840		.722
	I9	Educational games increase class motivation.	.834		.708
	I1	I like using educational games in my classes.	.817		.676
	I3	Educational games make a subject and lesson more enjoyable for students.	.810		.659
	I14	I believe that educational games improve communication skills.	.798		.645
	I10	I think that educational games attract students' attention.	.789		.645
	I30	I think that educational games support what students learn during the lesson.	.779		.671
	I15	Educational games support social development.	.782		.615
	I37	Educational games increase students' motivation for a certain subject.	.748		.625
	I32	I enjoy teaching new educational games.	.720		.606
	I22	I lose the track of time when I teach a subject with educational games.	.678		.476
	I6	I want to use educational games for all subjects.	.670		.492
	I29	I take educational games seriously as a teaching technique.	.652		.451
Negative Attitude	I45	I hesitate to use educational games in my classes.		.772	.607
	I41	I get bored when I read books about educational games.		.729	.537
	I44	I do not think that educational games are suitable for my teaching style.		.706	.529
	I47	It is boring to watch TV programs on educational games.		.706	.503
	I35	I would ban using educational games if I could.		.705	.537
	I33	Educational games make it difficult to use my time effectively.		.678	.486
		Eigenvalue:	9.21	268	-
		Explained Variance:	46.09	13.42	-
		Total Explained Variance:		59.51	

*Weight values lower than 0.30 are not given in the table.

As shown in Table 1, the factor weights of the first factor related to the scale items vary between 0.65 and 0.84, while the factor weights of the second factor vary between 0.67 and 0.77. It is recommended in the literature that the factor weight of an item must be at least .40 (Büyüköztürk, 2008; DeVellis, 2003; Field, 2005; Harrington, 2009). These findings demonstrate that the scale has a satisfactory construct validity.

Correlation coefficients between the sub-dimensions of the scale are given in Table 2. The analysis results indicate that dimensions have a moderate positive significant relationship.

Table 2: *Correlation Coefficients between Sub-Dimensions*

Dimensions	Positive Attitude	Negative Attitude
Positive Attitude	1.00	.460*
Negative Attitude	.460*	1.00

*p<0.01

When Table 2 is analyzed, it can be observed that the correlation between sub-dimensions of the scale is .46 and has a significance level of .01. The fact that the correlation is moderately significant demonstrates that these two sub-factors are components of the attitude related to educational games (Kan and Akbaş, 2005).

CFA was applied in order to confirm two-factor construct obtained from EFA. The factor distribution and values obtained from CFA are given in Figure 1.
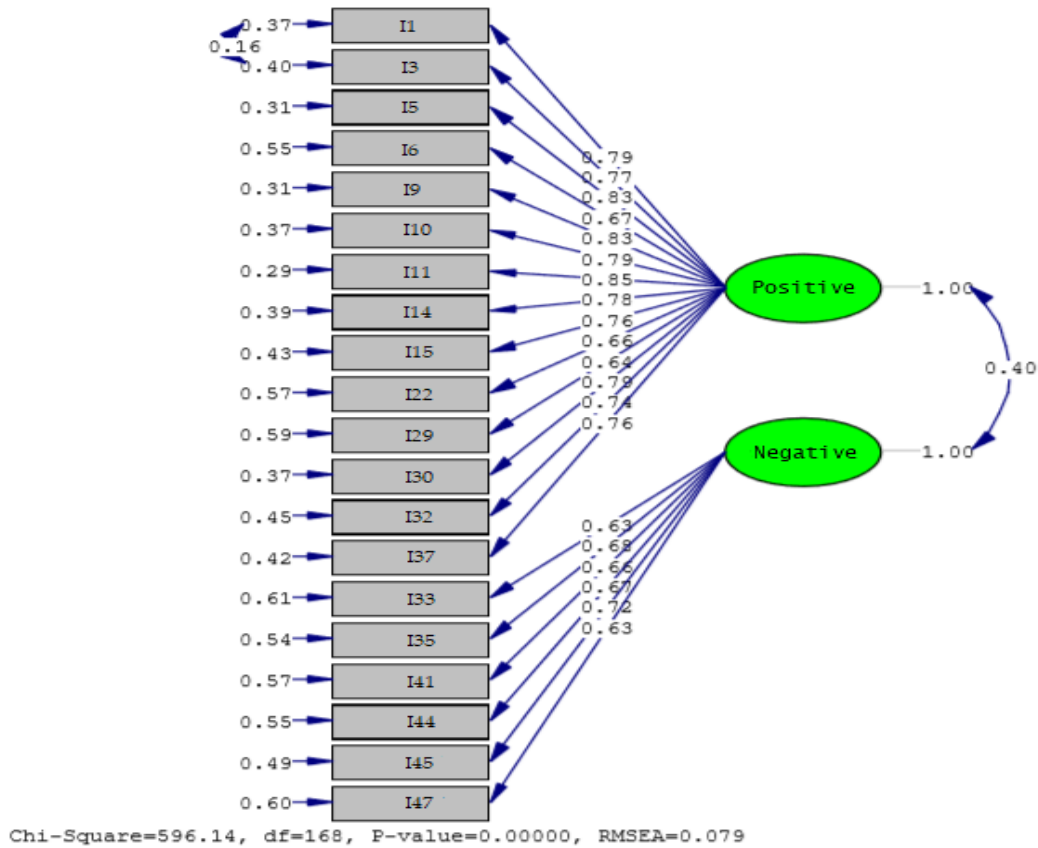

Figure 1. Confirmatory Factor Analysis

In this study, X^2/df Chi-square/Degree of freedom, Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI) and Comparative Fit Index (CFI) were analyzed as models of goodness of fit. In this respect, following CFA on the scale construct consisting of 20 items and two factors, the results without any modification on the model can be summarized as follows: [$χ2$/df=3.54 (p=.000); RMSEA=0,079; NFI=0,96; CFI=0,98; AGFI=0,84; GFI=0,87; SRMR=0.035; NNFI= 0.97].

When goodness of fit index values of the model are analyzed, it can be noted that $χ2$/df is 3.54. Kline (2010) reports that a $χ2$/df value lower than 2 signifies an excellent model and that that model is still acceptable if this value is under 5. RMSEA value was found as .079, which indicates a good goodness of fit (Brown, 2006; Jöreskog and Sörbom, 1993). CFI and NFI values were calculated as 0.98 and 0.96, respectively. These two index values above .95 indicate an excellent goodness of fit for the model (Kline, 2010; Sümer, 2000; Thompson, 2004). AGFI and GFI values were found as 0.84 and 0.87, respectively. According to Jöreskog and Sörbom (1993), a GFI value higher than .85 and an AGFI value higher than .80 represents an acceptable goodness of fit. In this respect, AGFI and GFI values of the model display a good goodness of fit for the model. SRMR was measured as 0.035. A SRMR value lower than 0.08 means a higher goodness of fit, while a value lower than 0.10 means a mediocre goodness of fit (Brown, 2006; Byrne, 1994; Hu and Bentler, 1999). Finally, NNFI value was calculated as 0.97. An NNFI value higher than .95 represents an excellent goodness of fit, while a value higher than .90 displays a high goodness of fit (Sümer, 2000).

Following CFA, t values were analyzed in order to determine whether standardized analysis values of each item are significant. The obtained t values vary between 12.88 and 20.93, and are significant for all items. When the level of significance is below .05, any t value in the scale must be equal to or higher than 1.96 (Kline, 2010; Raykov & Marcoulides, 2008; Tabachnick & Fidell, 2007). In the light of these findings, it can be argued that the two-factor scale consisting of 20 items displays a high goodness of fit and is thus applicable.

Results on Reliability and Item Analysis

Cronbach Alpha reliability coefficient was calculated for the whole scale and each sub-dimension. In addition, total item correlation of each item (n=20) in the scale was measured in order to determine their capacity to measure the intended variable. Findings on Cronbach Alpha reliability coefficients and total item correlation are given in Table 3.

Table 3: *Total Item Correlation and Cronbach Alpha Reliability Coefficients of the Scale Items*

Factors / Items	$\overline{X}$	S	Total Item Correlation	Cronbach Alpha Reliability Coefficients When Items Omitted
Factor 1: Positive Attitude (α = .95)				
I1	4.57	0.73	.778	.945
I3	4.56	0.74	.763	.946
I5	4.50	0.78	.806	.945
I10	4.46	0.81	.762	.946
I9	4.45	0.83	.799	.945
I11	4.44	0.83	.814	.944
I15	4.43	0.83	.737	.946
I30	4.43	0.76	.783	.945
I14	4.42	0.81	.759	.946
I37	4.32	0.77	.752	.946
I32	4.31	0.82	.725	.947
I29	4.23	0.86	.626	.949
I22	4.19	0.84	.647	.949
I6	4.06	1.01	.654	.949
Factor 2: Negative Attitude (α = .82)				
I35	4.65	0.72	.599	.792
I45	4.38	0.82	.640	.781
I44	4.30	0.90	.591	.790
I47	4.17	0.96	.563	.797
I33	4.14	0.96	.553	.800
I41	4.03	0.93	.594	.790
Scale (α = .92)				

Cronbach Alpha reliability coefficient for the whole scale was calculated as .92. In addition, Cronbach Alpha reliability coefficients for the first and second sub-factors were calculated as .95 and .82, respectively. A reliability coefficient higher than .70 represents a satisfactory value (Nunnally, 1978; Şencan, 2005). Thus, it is evident that the scale has a satisfactory reliability.

When total item correlation analysis results given in Table 3 are analyzed, it can be observed that these results vary between .62 and .81 for the first factor (positive attitude), whereas it varies between .55 and .59 for the second factor (negative attitude). A total item correlation higher than .30 is an indicator of validity for the scale items (DeVellis, 2003; Kline, 1986; Nunnally and Bernstein, 1994). Therefore, scale items in this study measure the same construct.

Conclusion and Suggestions

In this study, a scale was developed in order to determine classroom and pre-school teachers' attitudes towards educational games. During the development process, following specialists' review on the scales, a test form consisting of 48 items were tested for validity and reliability. After a factor analysis was performed to measure construct validity, a two-factor construct which consists of 20 items and explains 59.51% of the variance was obtained. These factors were named as "positive attitude" and "negative attitude" towards educational games as described by various researchers in the literature. The first and second factor consists of 14 and 6 items, respectively. The goodness of fit index values obtained from CFA were analyzed to indicate a satisfactory goodness of fit between the data and model. Cronbach Alpha reliability coefficient was also calculated to measure the reliability of the scale, and Cronbach Alpha reliability coefficient for the whole scale, first and second sub-factors were calculated as .92, .95 and .82, respectively. These findings demonstrate that the scale has a

reliable construct in terms of both sub-dimensions. Total item correlation was analyzed in order to determine whether scale items measure the intended variables. Total item correlations vary between .62 and .81 for the first factor (positive attitude) and between .55 and .59 for the second factor (negative attitude). Therefore, it can be said that scale items measure the same construct.

In the light of findings in the present study, it is safe to argue that this scale presents a valid and reliable construct. Therefore, this scale can be used as a data collection tool in order to explore classroom and pre-school teachers' attitudes towards educational games. The scale can be employed to determine (1) classroom and pre-school teachers' attitudes towards educational games, (2) to identify variables that influence classroom and pre-school teachers' attitudes towards educational games, and (3) to reveal the correlation between classroom and pre-school teachers' attitudes in different fields and their attitudes towards educational games. Furthermore, scale development studies can be carried out to delve into attitudes of teachers in different disciplines towards educational games. Because the scale developed for the present study only focuses on classroom and pre-school teachers, the scale must be revised for reliability and validity through the data to be obtained from new samples.

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TEMEL EĞİTİM ÖĞRETMENLERİNİN EĞİTSEL OYUNLARA YÖNELİK TUTUM ÖLÇEĞİ

Madde No	Maddeler	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1	Sınıfımda eğitsel oyunları kullanmak hoşuma gider.					
2	Konu anlatırken eğitsel oyunları kullanmak dersin daha eğlenceli geçmesini sağlar.					
3	Eğitsel oyunlar ile işlenen konularda öğrenciler derse aktif katılır.					
4	Bütün konularda eğitsel oyunları kullanabilmeyi isterim.					
5	Sınıfımda Eğitsel oyunları kullanmak öğrenci motivasyonunu artırır.					
6	Eğitsel oyunların öğrencilerin dikkatini çektiğini düşünüyorum.					
7	Eğitsel oyunların hayal gücünü geliştirdiğine inanırım.					
8	Eğitsel oyunların iletişim becerilerini geliştirdiğine inanıyorum.					
9	Eğitsel oyunlar sosyal gelişimi destekler.					
10	Eğitsel oyunlar ile konu anlatırken zamanın nasıl geçtiğini anlamam.					
11	Eğitsel oyunları öğretim tekniği olarak kullanmayı önemserim.					
12	Eğitsel oyunun öğrenilenlerin pekiştirilmesinde faydalı olduğunu düşünüyorum.					
13	Yeni eğitsel oyunlar öğrenmekten zevk alırım.					
14	Konuyu anlatırken Eğitsel oyunları kullanmak motivasyonumu artırır.					
15	Eğitsel oyun kullanmak vakti etkin kullanmayı zorlaştırır.					
16	Elimde olsa eğitsel oyunların kullanılmasını yasaklarım.					
17	Eğitsel oyunlarla ilgili kitapları okurken sıkılırım.					
18	Eğitsel oyunların konu anlatma tarzıma uygun olmadığını düşünüyorum.					
19	Eğitsel oyunları sınıfımda kullanmaktan endişe duyuyorum.					
20	Televizyonda eğitsel oyunlar ile ilgili yayınları izlemek sıkıcıdır.					