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DEVELOPING PRESCHOOL TEACHERS' BELIEF SCALE REGARDING EDUCATIONAL TECHNOLOGIES: A VALIDITY AND RELIABILITY STUDY

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ABSTRACT

In this study, it is aimed to develop a measurement tool that helps to determine preschool teachers'beliefs on educational technologies. An item pool of 100 items was created by examining field studies. 376 volunteer preschool teachers participated in the study. Exploratory factor analysis was performed on the list of questions which was reduced to 79 items as a result of the Lawshe analysis conducted within the scope of content validity. In the factor analysis, 79 variables were subjected to factor analysis, and 5 factors with an eigenvalue of 1 and above emerged as a result of varimax orthogonal rotation. These 5 factors explain 57.17% of the total variance. The Kaiser-Meyer-Olkin criterion shows that the sample is sufficient for factor analysis (KMO= 0.935). As a result of Bartlett's test of sphericity ($x2(595) = 6773.24$, $p<0.001$) it was confirmed that there were suitable correlations between the variables for factor analysis. The factor loading values of the scale, which consists of 5 sub-dimensions, vary between .58 and .78. After the factor structure of the scale was examined by exploratory factor analysis, a five-factor structure emerged. As a result of confirmatory factor analysis, it was found that this structure had a good level of modelfit (x2/sd=5.09, RMSEA= 0.10, SRMR= 0.06, GFI= 0.70, AGFI= 0.66, NFI=0.93, CFI=0.95, RFI=0.93). The internal consistency coefficient for the entire scale is .80. The internal consistency coefficients of the sub-dimensions were found as .90 for the Belief in the Contribution of Educational Technologies to Personal and Instructional Skills sub-dimension, .87 for the Belief in the Methodical Contribution of Educational Technologies sub-dimension, .85 for the Belief in the Positive Effects of Educational Technologies sub-dimension, .80 for the Negative Beliefs on the Use of Educational Technologies sub-dimension and .78 for the Belief in the Negative Effects of Educational Technologies sub-dimension. The analyzes showed that 35 item Preschool Teachers' Belief Scale on Educational Technologies is a valid and reliable scale.

Keywords: Kindergarten teacher, Technology integration to education, Preschool education

INTRODUCTION

With the developing technology in the 21st century, our world is changing rapidly and children grow up in a world that their lives shaped by digital technologies (Flewitt & Cowan, 2019). This also changes the method of accessing information and the speed of accessing information, thus affecting the teaching process. We are witnessing this change especially during the pandemic we have been experiencing since 2019. Due to the new type of coronavirus (Covid-19), declared as a pandemic by the World Health Organization, face-to-face education was suspended in schools in 192 countries in different continents of the world, and more than 1.5 billion students remained away from face-to-face education (Unesco, 2020). In the world we live in, human beings see the great need for technology during this time. Before the pandemic, In the world we live in, all human beings see how great the need for technology is. The use of technology, which was controversial in the field of education a year ago, has taken its place among the indispensables. Today, the areas of technology usage are increasing rapidly. Regardless of the development level, societies are going through a transformation process. The most important factor in this process is the developments in science and technology (Aygün & Ofluoğlu, 2019). Lexical meaning of technology is expressed as 'application of the knowledge and science regarding the construction methods, tools, equipment and tools used in an industrial area, and their usage patterns' (Turkish Language Association, 2019). In another definition, technology is defined as the applications of scientific principles and innovations towards solving problems. In other words, technology is an application of science (Aksoy, 2005).

Education and technology are among the most important elements of human life in rapidly transforming societies. Both elements have been the two basic tools that people use to ensure their active participation in their natural and social environment (Alkan, 2005). Educationis the process of gaining, raising and developing knowledge and skills in a certain field of science or area whereastechnology helps people to use the knowledge and skills gained through education more efficiently (Alkan, 2005).

Today, the concepts of education and technology are discussed together. A separate concept that expresses the development of education and the increase of quality in education now takes place in literature. Looking at the studies of Kaya (2017), it is seen that the contribution of use of technology is important for raising qualified students and for an efficient education. In schools, it is remained limited and difficult for students to understand theoretically explained topics. It is stated in the studies that it is important to use educational technologies effectively and efficiently. It is thought by many researchers that the effective and efficient use of educational technologies by teachers in the teaching and learning process will be very effective in the productivity of students (Öztemel, 2018; Elvan, Mutlubaş, 2020; Ulaş, Ozan, 2010, İşman, 2002). The first postgraduate study on educational technologies was done in 1988 (Ağmaz&Ergüleç, 2020). There have been tremendous technological advances since 1988.Although the definitions of educational technology seem to be stated in different ways by researchers, the common point of the definitions is that educational technology increases the quality of learning-teaching processes in education and makes these processes more efficient and effective for teachers and especially students. And it is a discipline that tries to give an answer to one important question of "How Should We Teach?" in education (Uşun, 2006). When and in which ways children, who are born into and grow up with technology, can use technological tools and how they will grow up away from their harmful effects are questions

that have gained importance in recent years (Kutluca and Oğuz, 2020). According the study conducted by Bay (2022), 43 preschool teachers stated both positive and negative aspects of digital technology in education. They stated positive aspects of digital technology in education it makes doing their job easier supports learning in education, facilitates the transfer of achievements, and enable communication with family. There are various applications in the early childhood education in Turkey (Özdil, et.al., 2021)

According to the literature, teachers should develop teaching methods, strategies, and techniques to integrate digital technology into educational programs (Sulak, 2019). There are many models for the integration of educational technologies. Stekee (2005) examined these approaches under four headings; Developing Information and Communication Technologies (ICT) Skills, ICT Pedagogy approach, Subject-Specific Approach and Implementation-oriented approach (Mumcu, 2011). In addition, the Technology Planning Model developed by Roblyer (2006) proposes a systematic way of integrating technology into education. This model includes 5 stages. They are; determining the relative benefit, deciding on the goals and evaluations, designing the integration strategy, preparing the instructional environment, evaluating the integration strategies and returning to the previous strategy if necessary. The Technological Pedagogical Content Knowledge (TPACK) Model was developed by Koehler and Mishra (2009). It is argued that this model is a customized, versatile structure of necessary information in the process of learning and teaching technology. This model was created by adding technology to the content information model developed by Shulman (Mumcu, 2011). Most of the studies conducted today are based on the work of the Technological Pedagogical Content Knowledge (TPACK) model developed by Mishra and Koehler. TPACK consists of 7 components which are pedagogical knowledge, content knowledge, technological pedagogical knowledge, technological content knowledge and technological pedagogical content knowledge (Öztürk, 2017). When the literature is examined, it is seen that the integration of educational technologies and related approaches continue to develop together byaffecting each other.

According to Öztürk (2017), the first condition of teaching effectively by using technology is to have an effective use of TPACK. TPACK puts pedagogy and technology into practice in the integration process. One of the techno-pedagogical integration models is Technological Pedagogical Content Knowledge (TPACK or TPCK). TPACK is a teacher information framework developed by incorporating technology information into the teacher information framework (Yurakul, et al. 2012). According to Kohler and Mishra (2005), the intersection of all components is specified as TPACK. The TPACK component can be defined as the combined knowledge that a teacher should have regarding the combined use of pedagogical and technological knowledge. Technological Pedagogical Content Knowledge (TPACK) is basically defined as a framework of teacher knowledge for technology integration.

Research shows that technology is in our lives at a very early age. Preschool ages from birth to the end of the age of six are one of the most important and critical stages in the life process. The education to be given in this period significantly affects the future life of the child (Simsar, Kadim, 2017). Today, a newborn baby comes into a world where technology develops rapidly and he adapts rapidly to using the technological tools that surround him, even this adaptation becomes almost a necessity (Ramazan, Öcal, & Yağcı, 2019). It could be said that some changes in the content of preschool education are needed and the usage of technology should be added while preparing children for a society that surrounded with technology

(Aldhafeeri et al., 2016; Özdil et al., 2021).It is very important to provide rich and stimulating environmental opportunities suitable for the developmental levels and individual characteristics of children aged 0-72 months. The multi-faceted content presented in the preschool period supports the development of children with all its dimensions (Kol, 2011; Kuzgun & Özdinç, 2017). Today, the need for continuous learning is increasing due to the abundance, growth rate and diversity of information. While the tools and approaches used in the teaching process support the change in these needs, the roles of teachers and students differ accordingly (KocamanKaroğlu, Bal Çetinkaya, Çimşir, 2020).The basic knowledge, skills and habits to be acquired through the experiences to be provided to the child at an early age will positively affect the social and emotional life as well as the later learning life experience of the child. Preschool teachers play a key role in providing a rich environment and stimuli for children and having important effects on the child's development. It is very important for pre-school teachers to use educational technologies in their educational environments and to increase the quality of their education so that the child can continue by recognizing, knowing and integrating the developing technologies in a correct and positive way (Arı, 2003; Çakmaz, 2010).

Nowadays, a baby is born into a world where technology develops rapidly, and he adapts quickly to using the technological tools around him. This adaptation even becomes almost a necessity. Therefore, the individual needs role models for the beneficial and careful use of technology for specific purposes while protecting himself from its harm (Ramazan, Öcal, & Yağcı, 2019). It is important for preschool teachers to be qualified enough to meet today's needs, all for students, society and our country (İnci, Kandır, 2017; Kol, 2011; Gökbulut & ÖzdurakSıngın, 2020, Bulut, 2018; Oyman, Turan, & Gök, 2010; Karadeniz, 2014; Karamustafaoğlu, Ayvalı, & Ocak, 2018; Koç, 2014; Demir, 2015). A study conducted in 2019 analyzed the content of postgraduate theses in the field of technology in pre-school education in Turkey between the years 1988-2019. In the study it is stated that 18 master's and 4 doctoral theses in the field technology have been conducted about childhood. Furthermore, there are 13 master's and 3 doctoral theses about the technology in the field of pre-school (Ağmaz, Ergüleç, 2020).Kol developed the 'Attitude Scale towards the Use of Technological Equipment in Preschool Education' in 2012. It has been revealed that this developed scale can scientifically measure the attitudes of preschool teachers in a single factor. Çakıroğlu, Gökoğlu, and Çebi conducted a scale development study for teachers' technology integration in 2015. In this study, there are questions in 5 subsections which are; technology integration into teachers' lessons, technology literacy, teaching with technology, professional development, ethics and policies, organization and management. However, this scale does not specifically target preschool teachers. In 2018, Akar and Yoleri adapted the 'ICT Use in Early Childhood Scale' developed by Kackaert, Vanderlinde and Vanbraak in 2015, into Turkish. In this study, the positive effect of the deliberative use of ICT for children is mentioned.Demirezen published a master thesis related with Technological Pedagogical Content Knowledge of Preschool Teachers in 2021 (Demirezen, 2021). In this study, validity and reliability studies were conducted on the Turkish sample of the scale developed by Liang et al. (2013) to determine the technological pedagogical content knowledge of preschool teachers. The original scale consists of 36 items under 6 dimensions. As a result of the analyzes made in the thesis, a 25-item structure gathered under 2 dimensions was created.

Technological developments, which greatly affect daily life, cause radical changes in many areas and bring global changes. Web 2.0, broadband Internet, mobile technologies, cloud computing, digital media, big data, artificial intelligence, augmented reality, 3D printers etc. showthe impact of technology on society (TUBITAK Bilgem, 2019). Considering all the studies carried out from past to present and the changes of children in the 21st century, it is thought that teachers should keep up with this change. It is foreseen that students at any age should learn to use technology to produce, not to consume. This can only happen if teachers guide students in a correct way. First, it is necessary to measure teachers' belief in technology integration in education, and then to develop educational models for teachers. In the literature, it is seen that the beliefs of preschool teachers towards technology are under-studied. Based on thislack, in this study it is aimed to develop a measurement tool that evaluates preschool teachers' beliefs on educational technologies.

METHOD

Research model

This study, which aims to develop a valid and reliable scale that evaluates the beliefs of preschool teachers towards educational technologies, is a study of measurement tool development.

Study group of the research

The study group of the research consists of employees working in different regions of Turkey in the 2019-2020 academic year (Marmara Region 93 people; Central Anatolia Region 96 people; Aegean Region 75 people; Eastern Anatolia Region 15 people; Southeastern Anatolia Region 12 people; Mediterranean Region 48 people; Black Sea Region 37 people). 376 pre-school teachers were reached by random sampling method. In order to test whether the sample is representative of the population, the population was taken according to the 2018-2019 Ministry of National Education statistics. Accordingly, 51,143 pre-school teachers work in the Ministry of National Education. Yazıcıoğlu and Erdoğan (2004) stated that when the number of universe units is over 10000, the sample number should be 384, with an acceptable sampling error formula of +/-0.05 for α=0.01 for a universe of 100 million. The sample number of 376 people reached was deemed sufficient in terms of population representation.

According to the demographic data of the sample of the study, 4.5% of the teachers are between 20-25 years old, 14.6% are between 26-30 years old, 33.2% are between 31-35 years old, 31.6% are between 36-40 years old and 16% are in the age range of 41 years and above. 8% of the teachers participating in the study are associate degree graduates, 88.8% of them are undergraduate and 9% of them are graduate. 83% of the teachers are married and 17% of them are single. 3% of the teachers live in the Southeastern Anatolia Region, 4% in the Eastern Anatolia Region, 9% in the Black Sea Region, 12.8% in the Mediterranean Region, 19.9% in the Aegean Region, 24.7% in the Marmara Region and 25.5% reside in the Central Anatolia Region. 6.4% of the teachers work in private schools, 41% of them work in independent kindergartens within the Ministry of National Education, and 52.7% of them work in kindergartens within the Ministry of National Education primary school.

Data collection tools

Personal information form

In the personal information form, questions about the regions of the participants, their ages, graduation degrees, marital status and the types of institutions they work in were included.

Preschool Teachers' Belief Scale Regarding Educational Technologies

The scale items were formed by evaluating the relevant literature (Çakıroğlu, Gökoğlu & Çebi, 2015; Kabakcı-Yurdakul, Odabası, Kilicer, Coklar, Birinci & Kurt, 2012; Koehler & Mishra, 2009; Liang, Chai, Koh, Yang & Tsai, 2013; Niederhauser & Perkmen, 2008;) and the scales prepared in this area (Balçın & Ergün, 2016; Kaya, Kaya & Emre, 2013; Kol, 2012; Mazman-Akar & Yoleri, 2018; Sahin, 2011). At the beginning of forming the scale, the researchers determined an item pool consisting of 100 items.

As a result of the analyzes applied to the 100-item item pool, the scale took its final form as a 5-point Likert-type form consisting of 35 items and 5 sub-dimensions with validity and reliability to serve the educational field. The internal consistency of the 35-item scale is .80. The internal consistency levels of the 5 sub-dimensions, respectively, are .90 for the Belief in the Contribution of Educational Technologies to Personal and Instructional Skills, .87 for the Belief in the Methodical Contribution of Educational Technologies, .85 for the Belief in the Positive Effects of Educational Technologies, .80 for the Negative Beliefs for the Use of Educational Technologies. and .78 for Belief in the Negative Effects of Educational Technologies dimension. A total of 26 items of the application form were reverse scored in order to reduce the bias in the answers and to see possible systematic errors in the scale.

Data collection

Data were collected by using Google Forms which is an online data collection tool. The online forms were sent from preschool teachers' communication online platforms. And also chains of personal networks have been used to reach preschool teachers. This method is compatible with the snowball data collection method in statistics literature. In the literature the snowball method is described as a non-random sample technique. In these methods, not everyone has an equal chance of being selected, and it is not clear who will be included in the final sample (Naderifar, Goli, & Ghaljaie; 2017). This research focuses on a development of a blief scale regarding educational technologies for preschool teachers. The data obtained from the participants were only used in order to conduct validity and reliability studies. The use of snowball sample method also allowed us to include geographically diverse participants. For the confidentiality of the participants their names were not asked. Numbers were used instead of the participants' names. The forms also include a voluntary participation consent form. All participants answered all of the questions. According Field (2009) data collected from about 300 participants should be enough for obtaining stable results. For this reason researchers have stopped collecting data when they obtained 376 answered forms.

Validity analysis

In order to determine the content validity of the scale, expert opinions were analyzed with the Lawshe technique. In the literature review, findings and information on content validity are included in many studies. Experimental or theoretical processes are mostly used in scale development studies. Studies conducted in terms of statistics are those in which processes such as "scope validity index" and "scope validity ratio" are used (Yurdagül, 2005). For the expert opinions obtained from the preliminary studies to be valid and consistent in terms of understanding the scale items created and the suitability of the collected data for the targeted

sample, it should be examined in terms of content validity ratios and content validity values developed by Lawshe (1975). In Lawshe technique, expert opinion of at least 5 and maximum 40 people is needed (Yurdagül, 2005).

Based on this information, opinions on the scale items presented to 10 experts were collected and the content validity ratios were calculated.

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were applied to determine the construct validity of the scale. In order to determine the factor structures of the scale in EFA, unrotated principal component analysis and then rotated (varimax) principal component analysis was used. After the exploratory factor analysis, reliability analyzes were made, and then CFA was performed to test the accuracy of the model created.

Reliability analysis

In order to determine the reliability of the sub-dimensions determined by EFA, firstly, the Cronbach alpha internal consistency coefficient was checked by calculating the correlation values (item-total correlations) with the Alpha model. Then, independent groups t-test was used to examine the significance of the difference between the item scores of the upper 27% and lower 27% groups, which were determined according to the scale total score. Items were analyzed by looking at item-total correlations and item discrimination. The relationship of each sub-dimension with the other sub-dimensions was examined with Pearson Product Moments Correlation. Finally, the test developed with an interval of 2 weeks was re-applied to 30 teachers, and the continuity of the coefficients were examined with the test-retest process.

RESULTS

In this section, the findings regarding the validity (content and appearance) and reliability of the scales developed as a result of the research are presented.

Findings on content validity

The item pool of 100 questions created within the scope of the study was sent to 10 experts working on the use of technology in education and their opinions were received. Since the item pool was submitted to the opinion of 10 experts, the CVR was taken as .62 (Yurdagül, 2004). Therefore, 21 of 100 questions were removed after expert opinions and study was conducted with 79 questions. The CVR values of the items remaining in the form vary between .80 and 1.00. Content Validity Ratios for each item were excluded from the scale as they did not provide the minimum value (.62) for CVRs at the significance level of α=0.05 for 21 items. The scale was restructured in line with the suggestions from the experts and took its final form.

Factor structure and reliability analyzes of the scale

The analyzes of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) based on the answers given by the teachers who participated in the pilot study during the scale development phase are summarized below, respectively. The consistency of this 79-item scale, which aims to measure preschool teachers' perceptions of technology integration

into education, was tested with exploratory factor analysis (EFA and CFA), one of the first exploratory and confirmatory factor analysis methods.

In the study, the Kaiser-Meyer-Olkin (KMO) criterion was used to test the suitability of the sample for factor analysis, and the result showed that the items were suitable for KMO (KMO= 0.924). As a result of Bartlett's sphericity test (x2 (595) =6773.24, p<0.001) it was determined that there were correlations between the variables suitable for factor analysis. After these procedures, "Preschool Teachers' Belief Scale for Educational Technologies" was subjected to exploratory factor analysis-EFA. As a result of varimax orthogonal rotation from principal component analyses, 5 factors with eigenvalues of 1 and above emerged. These 5 factors explain 57.17% of the total variance.

The table below shows the item factor loads and explanatory variance values related to exploratory factor analysis.

Table 3

Analysis table of the Factor Loads of the Items in the Rotateḍ Principal Components Analysis Method of the Preschool Teachers' Beliefs on Educational Technologies Scale

Items	**Factors**				
	1	**2**	**3**	**4**	**5**
I1: Technology contributes to the development of children's thinking skills.	,781				
I2	,746				
I3	,745				
I4	,744				
I5	,684				
I6	,667				
I7	,624				
I8	,612				
I9	,610				
I10: Technology is an effective tool in achieving my educational goals.	,581				
I11		,711			
I12		,652			
I13		,652			
I14		,647			
I15		,639			
I16		,619			
I17		,589			
I18			,760		
I19			,733		
I20: I try to follow all developments related to technology in education.			,693		
I21			,673		
I22			,665		
I23			,644		
I24				,740	
I25				,694	

I26	,664	
I27	,638	
I28	,635	
I29	,613	
I30:The use of technology affects children's health negatively.		,785
I31		,652
I32		,630
I33		,620
I34		,616
I35		,611

Variance explained:	
FACTOR 1: Belief in the Contribution of Educational Technologies to Personal and Instructional Skills Items: 1,2,3,4,5,6,7,8,9,10	%16.2
FACTOR 2: Belief in the Methodical Contribution of Educational Technologies: 11,12,13,14,15,16,17	%12
FACTOR 3: Belief in the Positive Effects of Educational Technologies: 18,19,20,21,22,23	%10.95
FACTOR 4: Negative Beliefs on the Use of Educational Technologies: 24,25,26,27,28,29	%9.13
FACTOR 5: Belief in the Negative Effects of Educational Technologies: 30,31,32,33,34,35	%8.87
Total:	57.17

Findings regarding the reliability of the scale

In this part of the study, the internal consistency coefficients of the Preschool Teachers' Belief Scale for Educational Technologies, the item-total correlations, the relations between the factors and the time invariance of the scale are included. Since it was found that there would be no change in consistency in case of removing a random item from the scale, it was decided not to remove the items that gave their final form to the scale. The internal consistency coefficients of the factors are found as; the first dimension is .91, the second dimension is .87, the third dimension is .84, the fourth dimension is .80, and the fifth dimension is .78.

An item analysis was conducted to determine the discriminative power of 35 items in the Preschool Teachers' Beliefs on Educational Technologies Scale. The total scores obtained from the scale were ordered from biggest to smallest, and the mean score and t values of the groups in the lower and upper 27% were calculated. In this way, item discrimination powers were calculated. Table 6 shows the t-test results for the sub-dimensions of the scale and the mean of the lower-upper group.

An independent sample t-test was conducted regarding the differences between the sub-dimensions of the preschool teachers' belief scale towards educational technologies and the averages of the lower 27% and upper 27% groups. As a result, the mean scores were between 3.15 and 3.89 ($p<.005$) in the total scale, 2.97 and 4.50 in factor 1 ($p<.005$), 3.56 and 4.76 in factor 2 ($p<.005$), and 3.22 and 4.79 in factor 3. ($p<.005$), it was found between 1.76 and 3.53

(p<.005) in factor 4 and 2.03 and 3.61 (p<.005) in factor 5. In other words, all sub-dimension total scores distinguish individuals in the lower and upper groups.

Table 5

Related Group t-Test Results to Determine Whether There Is a Difference Between Preschool Teachers' Beliefs Scale Towards Educational Technologies Test-Retest Scores

Score	Group	$\bar{x}$	N	Std. Deviation	r	sd	t	p
Scale Total	pretest	3,48	30	,20739	,544	29	-.110	,913
	posttest	3,49	30	,27272				
Factor 1	pretest	3,91	30	,51444	,751	29	.541	,592
	posttest	3,87	30	,53607				
Factor 2	pretest	4,17	30	,45746	.684	29	-.342	,735
	posttest	4,20	30	,62516				
Factor 3	pretest	4,12	30	,48529	.835	29	-.376	,710
	posttest	4,14	30	,58842				,
Factor 4	pretest	2,37	30	,58014	.858	29	-.357	,724
	posttest	2,39	30	,66448				
Factor 5	pretest	2,44	30	,49390	.828	29	-.177	,861
	posttest	2,45	30	,61422				

When the test-retest reliability coefficients showing the reliability of the scale in terms of stability are evaluated in terms of total factors and each sub-factor, they were found .544, .751, .684, .835, .858, .828 (p< .05) respectively. The fact that the correlation coefficients calculated for test-retest reliability are positive, significant and high for each dimension can be interpreted as the scale giving stable measurements over time. At the same time, when the invariance of the total scale and each sub-factor is examined with the t-test, the lack of difference between the pre-test and the post-test can be evaluated as an indicator of the scale's invariance over time.

Confirmatory factor analysis

The model fit of the five-factor structure obtained by the exploratory factor analysis of the Preschool Teachers' Belief in Educational Technologies scale was examined with the first level confirmatory factor analysis, and the findings are given in Figure 1.

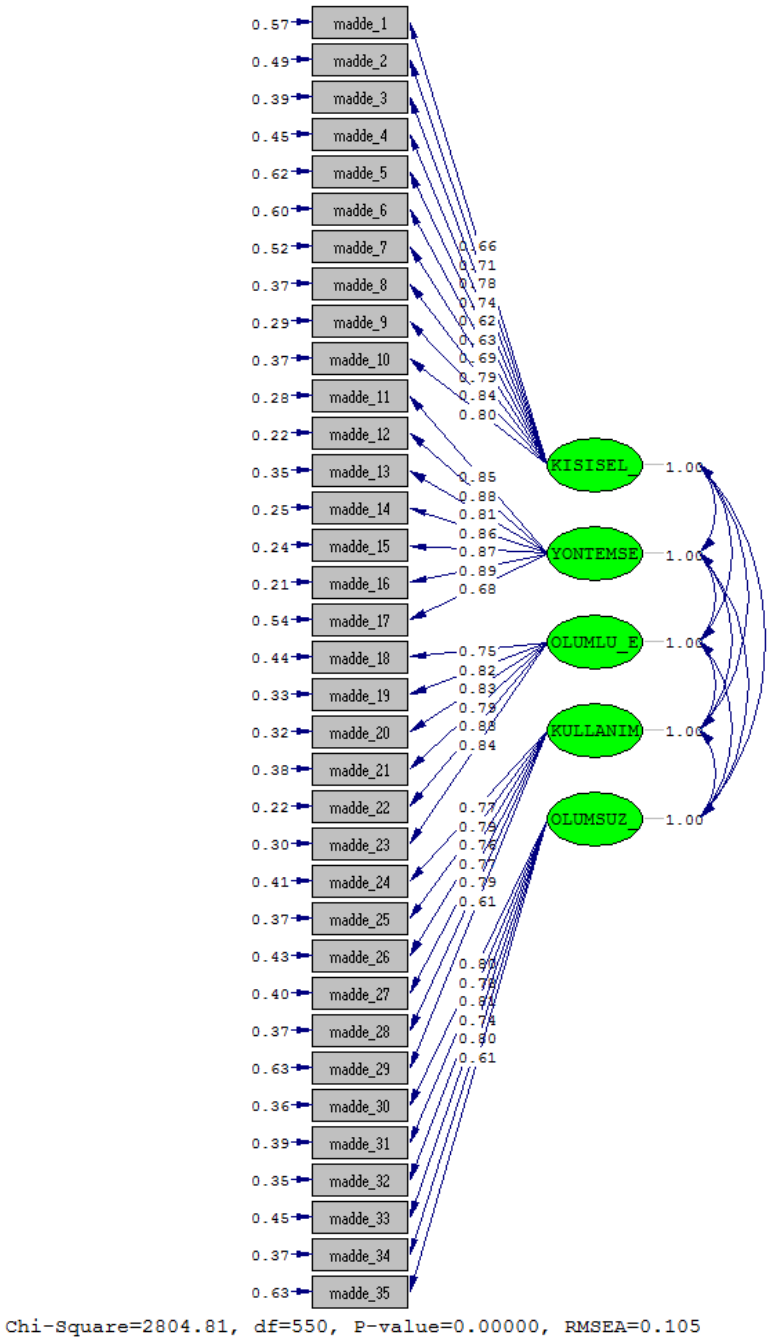

Figure 1: Preschool Teachers' Beliefs on Educational Technologies Scale First Level Factor Analysis Results

When Figure 1 is examined, it is seen that the fit indices of the Preschool Teachers' Beliefs on Educational Technologies Scale, which consists of 35 items and 5 sub-factors, are significant (X2= 2804,81, sd=550, p=.00, x2/sd=5.09).

Good fit and acceptable fit limit values of the most commonly used fit indices were compared with the literature (see: Schermelleh-Engel & Moosbrugger, 2003). According to the results of the analysis; similarity rate was determined as chi-square statistic X2(550)= 2804.81, P<0.01. Root mean square error of approximation (RMSEA) = 0.10; standardized root mean square residual (SRMR)=0.06; goodness of fit index (GFI)=0.70; adjusted goodness-of-fit

index (AGFI)=0.66; normed fit index (NFI)=0.93; comparative fit index (CFI)=0.95; relative fit index (RFI)= 0.93. The results show that although the scale does not have perfect fit values, it is within acceptable limits.

After standard solutions, t values between factors and items were examined. Seçer (2013) stated that the absence of red arrows in the t values indicates that all items are significant at the .05 level. The findings of the study are also in this direction. All these findings confirm the factor structure of the Preschool Teachers' Belief Scale on Educational Technologies.

DISCUSSION AND SUGGESTIONS

Koehler, Mishra, & Yahya (2007) state that in order to raise technology literate individuals, teachers must first be technology literate and use their technological knowledge in classroom practices in a meaningful and appropriate way. In other words, it seems important for teachers to integrate technology into education in order to raise individuals who have the competence to use technology (Balçın&Ergün, 2016). Literature studies show that although teachers are an important decision maker for children in the use of technology (Barron et al., 2011; Puerling, 2012), it can be difficult for teachers to follow the rapid changes in technology (Koehler & Mishra, 2009). The environmental conditions of theteacherswho graduated from university 20-30 years ago and still work in the field and the conditions of their students were born into are quite different in terms of many factors, especially technology. Despite this difficulty, studies show that students are more interested in teaching practices in which technology is integrated (Schrum et al., 2007; Sweederand Bednar, 2001) and emphasize the need for teachers to improve themselves in the field of technology integration into education (Ramazan, Öcal, & Yağcı, 2019). In this context, it can be thought that technology is important in supporting pedagogy and knowledge in the field. With the addition of technology by Mishra & Koehler (2006) to the concept of Pedagogical Content Knowledge (PCK) created by Shulman (1986; 1987), the concept of Technological Pedagogical Content Knowledge (TPACK) was formed. While creating the items of this scale, a comprehensive literature review was conducted, and TPACK and various sources and scales in the literature were used while creating the theoretical framework and questions (Balçın & Ergün, 2016; Çakıroğlu, Gökoğlu & Çebi, 2015; Kabakcı-Yurdakul, Odabası, Kılıçer, Coklar, Birinci & Kurt, 2012; Kaya, Kaya & Emre, 2013; Koehler & Mishra, 2009; Kol, 2012; Liang, Chai, Koh, Yang & Tsai, 2013; Mazman-Akar & Yoleri, 2018; Niederhauser & Perkmen, 2008; Sahin, 2011)

There are various studies on this subject in the literature on different levels of education. However, because it has been studied specifically with preschool teachers, in terms of its content and the number of participants involved, this scale will contribute a lot to the field.

The 79-item form was delivered to 376 pre-school teachers. Analyzes were made with the data collected from the teachers. EFA was conducted for the validity study of the scale. EFA is among the analysis methods frequently used in scale development studies. With EFA, it is tried to find factors based on the relations between the variables (Tabachnik & Fideli, 2001 cited in Büyüköztürk, 2002). The KMO value is .93. If the KMO value is below .50, it means that the factors cannot be clustered (Field, 2000 cited in Kaya, 2013). The fact that the KMO coefficient approaches 1 indicates that the data are appropriate at an acceptable level for analysis (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2009). After obtaining the KMO value of the substances, the anti-image value was calculated.

In the literature, it is stated that factor analysis can only be performed if the anti-image values are greater than .50 (Polat, 2012). In this scale development study, the value of .58 was accepted as the limiting value. Other values below the value determined in the anti-image value table were excluded from the scale. As a result of the analysis, 44 items were removed, and the scale consisted of 35 items and 5 sub-dimensions.

The internal consistency coefficient for the entire scale is .80. The internal consistency coefficients of the sub-dimensions of the scale were .90 for the dimension of Belief in the Contribution of Educational Technologies to Personal and Instructional Skills, .87 for the dimension of Belief in the Methodical Contribution of Educational Technologies, .85 for the dimension of Belief in the Positive Effects on Educational Technologies, and .85 for the dimension of Negative Belief on the Use of Educational Technologies. and .78 for Belief in the Negative Effects of Educational Technologies dimension. In the literature, it is stated that the limit value can be at least .70 when calculating the reliability of a scale (Liu, 2003). Since the internal consistency levels of the whole scale and its sub-dimensions were .80 and above (Büyüköztürk, 2012) except for one sub-dimension in this study, it can be said that it has a very high reliability. It can be said that the fact that there was no significant difference as a result of the analysis performed with two-week intervals to evaluate the invariance of the scale against time indicates that the developed scale is invariant over time (Baş, 2006).In the literature, there is 'Attitude scale towards the use of technological tools and equipment in preschool education' (Kol, 2012), which specifically addresses the attitudes of preschool teachers towards technology. The scale also used by Gulen in master's thesis in 2021. In the study of Gulen (2021), it was aimed to reveal the attitudes of preschool teachers towards using technological tools and equipment with various variables.In this context, it can be anticipated that the scale will contribute greatly to the field.

While developing the scale participants were only preschool teachers so it can be recommended to develop such scales in other teaching areas as well. In addition, the research was methodically limited to the development of a scale, so the use of this scale can be used to determine the differences in teachers' attitudes towards technology use according to their different characteristics. Comparisons can be made by measuring the beliefs of preschool teachers in different regions or different countries. By making use of the scale, teachers' deficiencies can be identified and information seminars and workshops can be organized on the use of technology in these areas. Preschool teachers who have not yet met with educational technologies can be determined and subjected to a training program. With the group evaluated positively by the scale, an educational technology program content creation study suitable for pre-school education can be carried out.

CONCLUSION

"Preschool Teachers' Belief Scale Regarding Educational Technologies" is a 5-point Likert-type measurement tool consisting of 35 items and aims to evaluate the beliefs of preschool teachers about educational technologies and usage of educational technologies, with proven validity and reliability. The scale consists of "Belief in the Contribution of Educational Technologies to Personal and Instructional Skills", "Belief in the Methodical Contribution of

Educational Technologies", "Belief in the Positive Effects on Educational Technologies", "Negative Belief in the Use of Educational Technologies" and "Belief in the Negative Effects of Educational Technologies". consists of five sub-dimensions.Looking at the field survey, there is no tool that specifically measures preschool teachers' beliefs about educational technologies. It is thought that a deficiency in the literature will be eliminated with the 'Belief Scale of Preschool Teachers on Educational Technologies'.

While developing the scale, the study was limited with only pre-school teachers. However, due to our new world and conditions, it can be recommended to develop such scales in other teaching areas as well. In addition, the research was methodically limited to the development of a scale, so the use of this scale can be used to determine the differences in the attitudes of teachers towards the use of technology according to their different characteristics. By using the scale, information seminars and workshops can be organized on the use of technology in these areas by identifying the deficiencies of teachers.

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