



## Pre-School and Primary School Pre-Service Teachers' Attitudes towards Using Technology in Music Education

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### ARTICLE INFO

#### Article History:

Received: 9 Nov. 2019

Received in revised form: 12 Feb. 2020

Accepted: 30 Apr. 2020

DOI: 10.14689/ejer.2020.87.3

#### Keywords

attitude towards educational technology, using technology in music education, pre-school education, primary education

### ABSTRACT

**Purpose:** The present study aims to develop a valid and reliable scale that measures attitude towards using technology in music education and to investigate pre-school and primary school pre-service teachers' attitudes towards using technology in music education concerning their demographic variables and musical experiences.

**Research Methods:** A total of 640 students studying in pre-school and primary education departments at a public university in Turkey participated in this research (N=640). Data were collected using a questionnaire for collecting the demographic information and the musical background of the respondents in addition to Attitude towards Using Technology in Music Education Scale, which was developed by the researchers in this study.

**Findings:** Analyses resulted in an 8-item Attitude towards Using Technology in Music Education Scale with a Cronbach's  $\alpha$  of 0.931. Confirmatory factor analysis demonstrated a statistically significant model fit to the data with six indices indicating a good fit and three indicating a substantial fit. Attitude towards using technology in music education did not show any significant difference concerning gender and musical background. However, primary school pre-service teachers had a more positive attitude than those of pre-school pre-service teachers. Finally, age correlated with the attitude towards using technology in music education.

**Implications for Research and Practice:** Attitude towards Using Technology in Music Education Scale is a valid and reliable research instrument. Having more experience in using technology or perceiving that the future profession and instructional program at the universities necessitate the use of technology improves attitude towards using technology. Positive attitudes of pre-service teachers, who feel themselves inadequate about using their voice and instruments, and have inadequate musical experience, maybe due to their belief that they will be able to compensate for these deficiencies in music with the opportunities offered by technology.

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## Introduction

The relationship between technology and learning is becoming increasingly important in music education (Addessi & Pachet, 2005). The widespread use of information technology (IT) in schools has made these technologies an indisputable part of learning and teaching for most individuals (Savage, 2005). In recent years, many musicians, music educators, and music students have been using computer-based technology more frequently in their music lives (Comber, Hargreaves & Colley, 1993).

Technology provides many benefits to music education. The use of technology in music education increases the performance (Byrne & MacDonald, 2002), participation (Crow, 2006), interest (Comber et al., 1993; Savage, 2007), and motivations (Ho, 2004; Kim, 2013; Savage, 2007) of students, as well as their musical perceptions (Kim, 2013). Furthermore, it contributes to their musical creativity (Addessi & Pachet, 2005; Savage, 2005) and functions by improving their psychological states (Hanrahan, Hughes, Banerjee, Eldridge & Kiefer, 2019). Additionally, using technology in music education makes it possible for children to relate more closely to school music and facilitates students' creation of connections between the music they listen to and their real lives (Cain, 2004). Besides, it has been found to be beneficial by teachers about improving the quality of education (Ho, 2004) and facilitating assessment and accessibility (Byrne & MacDonald, 2002).

The widespread use of technology has also led to a change in the perception of traditional musical talent and the evolution of music concerning an area of expertise, into an area where everyone can perform and create. Comber et al. (1993) reported that before the use of technology in music education, effective musical learning focused on traditional music performance skills, knowledge, and understanding. With the use of technology, a new perspective has emerged concerning the dimensions of composing, performing, and listening in music education (Cain, 2004). The use of technology has enabled many people who do not perceive themselves as being musicians to be able to deal with, create, and communicate with music (Comber et al., 1993), and has provided students with a lack of traditional instrument skills to compose music (Cain, 2004; Savage, 2007).

The effects of technology on music education are not limited to these aspects. Ho (2004) states that the use of IT in music education does not only mean replacing blackboards with electronic displays and multimedia presentations, rather IT also provides an opportunity to restructure music education, resulting in fundamental reforms in the curriculum and pedagogy. In addition, the widespread use of technology in music education requires a change in the teacher's role (Cain, 2004). This is because an effective change in music education through the introduction of technology is only possible when the teachers have competence in this regard (Ho, 2004). Therefore, in addition to traditional roles and competencies, teachers need to assume new roles and acquire new competencies about the integration of technology into music education. However, studies have pointed out that teachers face some

obstacles and have difficulties in integrating technology into music education (Byrne & MacDonald, 2002; Haning, 2016).

Ertmer (1999) has mentioned that there are two types of barrier when it comes to teachers integrating technology into their programs- internal and external. External barriers, such as equipment, time, training and support, are deemed to be first-degree barriers (Gurer, Tekinarslan & Gonultas, 2019). Self-efficacy for and attitude towards educational technology, epistemological and pedagogic beliefs, and beliefs, such as the perceived value of technology in learning environments, are viewed as internal barriers, which are deemed to be second-degree barriers (Gurer et al., 2019). Due to investments in educational technology, first-degree barriers have become increasingly overcome (Frailon, Ainley, Schulz, Friedman & Gebhardth, 2014; Gurer et al., 2019), and research has focused on second-degree barriers (Abbitt, 2011; Celik & Yesilyurt, 2013; Niederhauser & Perkmen, 2010; Yusuf & Balogun, 2011). In this context, teachers' and pre-service teachers' attitudes towards educational technology have been an important issue in recent years (Teo & Noyes, 2011; Yesilyurt, Ulas & Akan, 2016).

Attitude is defined as the "graded affective characteristic that an individual directs toward a certain-purposeful behavior" (Fishbein & Ajzen, 1975, p. 216). Many studies have revealed that attitude is the most powerful factor in the intention to use technology in education (Chau & Hu, 2002; Hebert & Benbasat, 1994; Louho, Kallioja & Oittinen, 2006; Schaper & Pervan, 2007). Moreover, it has been seen that there is a close relationship between the attitude towards technology, the intention to use technology, and the extent of using technology (Louho et al., 2006). Moreover, in technology models, such as the Theory of Reasoned Action (Ajzen & Fishbein, 1980), the concept of attitude plays a critical role in the formation of an individual's intent that affects him concerning using technology. In this context, it can be considered that teachers' attitudes towards technology have a significant effect on their use of technology. Accordingly, previous research has revealed that teachers have positive attitudes towards technology and that technology experience and education are important variables that affect attitudes towards technology (Sexton, King, Aldridge & Goodstadt-Killoran, 1999; Tsitouridou & Vryzas, 2003).

### *Significance and Purpose*

In Turkey, music education in pre-school and primary school is provided by pre-school and primary school teachers, respectively. This period has critical importance concerning the intellectual, social, and personal development of the child, along with gaining musical skills for the child (Hallam, 2010). However, pre-school and primary school teachers often do not see themselves as having sufficient skills when it comes to teaching music (Russell-Bowie, 2010). Since they perceive music as a field that requires special skills (Seddon & Biasutti, 2008; Hennesy, 2000; Holden & Button, 2006), they are concerned about the teaching aspects (Hennesy, 2005). Their beliefs about their inadequacy in terms of music education and their musical experiences during their undergraduate years play an important role in the formation of these views (Burak, 2019).

As mentioned earlier, the widespread use of technology has led to significant changes in school curriculum and the practice of music education. Pre-school and primary school teachers, who have the responsibility for providing music education and ensuring the musical development of children, need to be aware of and competent about these changes in music education. This is because teachers possess important positions on the issue of the use of technology in education (Ho, 2004). The effective use of technology by teachers in music education in the pre-school and primary school years can increase a child's interest, creativity and motivation for music. Effectively using technology in music education could be beneficial in terms of developing confidence in music education for teachers and teaching candidates who do feel inadequate on the topic of music or who think that music is a field of special skill. Also, using technology in music education can lead to an increase in the motivation of pre-school and primary school teachers and pre-service teachers in addressing music teaching. However, considering that attitude is an important indicator of intent that determines behavior (Fishbein and Ajzen, 1975), it is necessary to have a positive attitude towards using technology in music education to use technology in music education. Pre-school and primary school pre-service teachers who have positive attitudes towards using technology in music education may use this technology effectively in the classroom, and using technology effectively may contribute to their future music teaching. This study aimed to develop a valid and reliable scale that measures attitude towards using technology in music education and to investigate pre-school and primary school pre-service teachers' attitudes towards using technology in music education concerning their demographic variables and musical experiences, such as instruments and vocals, that may be correlated to the use of technology in music education for pre-service teachers.

## Method

### *Research Design*

This research was designed as a quantitative study. Initially, a scale development study consisting of two phases was conducted. The first research aimed to explore the factor structure of the newly developed Attitude towards Using Technology in Music Education Scale while the second research aimed to confirm the extracted factor structure. Then, correlational analyses were conducted on participants' attitudes towards using technology in music education, their demographic information and musical background.

### *Participants*

This research was conducted on students studying in departments of the pre-school and primary education in the Faculty of Education at a public university in the southern part of Turkey. A total of 640 pre-service teachers –an accessible population– was enrolled in those departments during this study (N=640). The pre-service teachers who were available for this study were sampled; hence, a convenience sampling method was employed. Only consenting individuals participated in this research. Of the 640 pre-service teachers, 117 (18.28%) individuals participated in the pilot study

and 523 (81.72%) individuals participated in the confirmatory study. The demographic information concerning the participants is shown in Table 1.

**Table 1**

*Demographic Information*

		Pilot Study		Confirmatory Study	
		f	(%)	f	(%)
Gender	Female	92	82.1	386	73.8
	Male	21	17.9	137	26.2
Program	Pre-school	62	52.1	271	51.8
	Primary School	57	47.9	252	48.2
Grade	1 <sup>st</sup>			130	24.9
	2 <sup>nd</sup>			120	22.9
	3 <sup>rd</sup>	93	79.5	131	25.0
	4 <sup>th</sup>	24	20.5	142	27.2

*Research Instruments and Procedures*

Data were collected by a paper-and-pencil survey that was comprised of the Attitude towards Using Technology in Music Education Scale (AUTMES), which was developed by the researchers in this study, in addition to a questionnaire for collecting the demographic information and the musical background of the respondents. The questionnaire included questions about the participants' age, gender, and grade, as well as whether they had previously played musical instruments, whether they had previously taken voice training, and their beliefs about effectively using technology, their voice or instruments, in music education. A pilot instrument included the pilot scale and the demographic questions. Permission was obtained from institution officials. The first study (the pilot study) concluded with a 10-item revised scale extracted by exploratory factor analysis (EFA). In the second study (the confirmatory study), data were collected with the use of a new paper-and-pencil survey consisting of the revised scale, demographic questions, and questions about the respondent's musical background.

*Data Analysis*

Statistical analyses were performed using IBM SPSS Statistics (IBM SPSS Statistics version 25) and IBM SPSS Amos (IBM SPSS Amos version 24) computer programs. EFA was employed to explore the underlying factor structure of the AUTMES. To investigate whether items were clustering into factors (Tavsancil, 2002), a principal component analysis (PCA) with varimax rotation was performed on the data collected as part of the pilot study. Varimax rotation minimizes factor complexity with a maximized variance of factor loadings (Tabachnick & Fidell, 2013). For checking the reliability of the instrument, Cronbach's  $\alpha$  internal consistency estimate was computed for the pilot scale. Finally, confirmatory factor analysis (CFA) was performed on the data collected by the revised scale for determining whether or not the factor structures

could be confirmed. After factor analyses, a one-way analysis of variance (ANOVA) was applied to the scores of the groups to reveal the significant differences according to participants' year of study. Thereafter, t-tests were applied to the scores of the groups to reveal significant differences concerning gender, departments, playing the recorder or an instrument other than the recorder, opinions about using instruments and their voices effectively in music education. For non-normal groups, the Mann-Whitney U tests were applied to the scores to reveal significant differences about having music training outside of that provided in school and having vocal training. Finally, Pearson's product-moment correlation coefficient was used to investigate the relationship between participants' age and their attitudes towards using technology in music education.

## Results

### *Development of Attitude towards Using Technology in Music Education Scale*

Initially, 117 students attending pre-school or primary school education programs, who were taking a music education course, were asked to write a composition regarding their thoughts about using technology in music education. In addition to these compositions, related literature was reviewed and previously-prepared attitude scales were examined (Albirini, 2006; Palaigeorgiou, Siozos, Konstantakis & Tsoukalas, 2005; Tyson, 2005). The compositions were qualitatively analysed and the resulting thematic structure -together with the attitude scales examined- were used as the basis for creating a pool of 75 items. Two experts in educational measurement & evaluation, an expert in music education, an expert in Turkish instruction, and an expert in educational technology reviewed the item pool. Unclear statements were corrected and similar items were removed from the pool. Davis (1992) technique was utilized to establish the content validity of the scale (Yurdugul, 2005). The content validity index value of each item was calculated by dividing the number of experts who rated "Relevant" by the total number of experts. The content validity index of 15 of the items yielded more than 0,80. Hence, other items were discarded (Davis, 1992; Yurdugul, 2005). Consequently, a 15-item "pilot -scale" was constructed. The pilot scale took the form of a 5-point Likert-type scale. The rating scale ranged from 1 (strongly disagree) to 5 (strongly agree).

After administering the pilot instrument on 117 pre-service teachers, an EFA was performed on the collected data. There were no missing values for the items. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.882, indicating that the sample size was adequate (Tavsancil, 2002). Bartlett's test of sphericity was significant ( $\chi^2(105)=1146.280$ ,  $p=0.000$ ), indicating that the sphericity assumption was not violated and that the correlation matrix among the items was not an identity matrix (Field, 2018). It was found that the scale had three factors with an Eigenvalue greater than 1. The cumulative variance of the scale was 69.397% and the factor loadings of the items in Factor 1 ranged between 0.722 and 0.876. All item loadings were above 0.722, and there were no item cross-loadings. Therefore, no items were removed as a result of this EFA procedure. However, in the reliability analysis, it was observed that Item 15 decreased the Cronbach's  $\alpha$  of the scale. Therefore, Item 15 was removed, and a

second EFA procedure was conducted. The number of items loading both Factors 2 and 3 decreased to two. Hence, the researchers reached the conclusion that Factors 2 and 3 were not making a significant contribution to the scale. Therefore, the four items loading Factor 2 and 3 were discarded. Figure 1 displays the scree plot of the pilot scale.

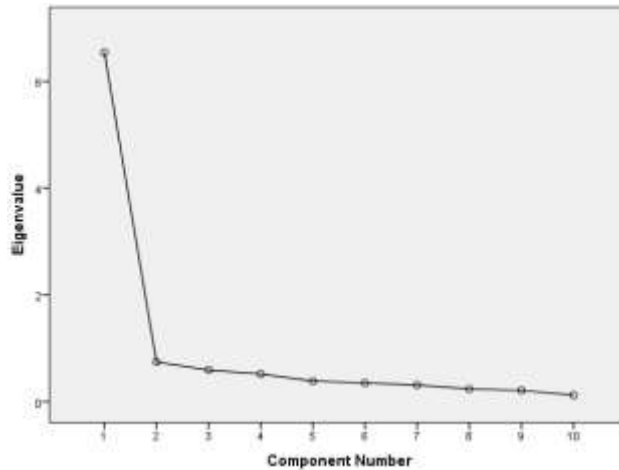


Figure 1. Scree Plot of the Pilot Scale

The scree plot and communalities (0.521-0.768) supported a single factor structure, as well. Once again, EFA and reliability analysis were applied. It was observed that the Cronbach's  $\alpha$  of the scale increased after the removal of each of the aforementioned five items. Consequently, Item 05, Item 08, Item 09, Item 12, and Item 15 were removed from the scale. As a result, a 10-item single factor "revised scale", explaining 65.415% of the variance, was obtained with a Cronbach's  $\alpha$  of 0.940. Table 2 illustrates the EFA results of the revised scale.

Table 2

EFA Results of the Revised Scale

	Item-Total Correlation	Factor Loadings	$\bar{x}$	SD
Item 01	0.750	0.803	4.11	0.911
Item 02	0.837	0.876	4.28	0.753
Item 03	0.828	0.867	4.18	0.819
Item 04	0.751	0.808	4.27	0.844
Item 06	0.750	0.799	3.91	0.844
Item 07	0.754	0.803	4.07	0.777
Item 10	0.786	0.832	4.04	0.762
Item 11	0.708	0.765	3.85	0.907
Item 13	0.659	0.722	4.03	0.740
Item 14	0.751	0.802	4.16	0.745

In the second dataset collected for the CFA, missing values and normal distribution of item scores were checked again for satisfying the assumptions of the CFA. The CFA results validated the factor structure of the revised scale:  $\chi^2(17)=42.273$ ,  $p=0.001$ ,  $\chi^2/df=2.47$ ,  $RMSEA=0.05$ ,  $GFI=0.980$ ,  $AGFI=0.957$ ,  $RMR=0.012$ ,  $SRMR=0.018$ ,  $NFI=0.985$ ,  $NNFI=0.985$ ,  $CFI=0.991$ . However, Item 01 and Item 02 were discarded to ensure that the index values comply with the fitness criteria. On the other hand, the error variance of Item 03 was correlated with the error variances of Item 04 and Item 10; and the error variance of Item 05 was correlated with the error variance of Item 04. These correlations were understood to be stemming from the item contents. All of those items were concerned with the need to use educational technology to make music instruction more effective and easier. The model was accepted with the error variances on the grounds that the scale made theoretical sense when it included those items and those items yielded remarkable values for all of the analyses performed on the model (Brown, 2015; Byrne, Shavelson, & Muthén, 1989; Wheaton, 1987). According to the evaluation criteria proposed by Schermelleh-Engel, Moosbrugger, and Müller (2003), an overview of the fit indices is illustrated in Table 3.

**Table 3***Fit Indices for the Hypothesized Model*

Index	Criterion	Result	Evaluation
p	>0.05	0.001	No fit
$\chi^2/df$	$\leq 3$ acceptable, $\leq 2.5$ substantial	2.47	Substantial fit
RMSEA	<0.1 mediocre, <0.08 adequate, <0.05 good	0.05	Good fit
GFI	>0.85 acceptable, >0.90 good, >0.95 substantial	0.980	Substantial fit
AGFI	>0.80 acceptable, >0.90 good, >0.95 substantial	0.957	Substantial fit
RMR	Close to 0 is good fit	0.012	Good fit
SRMR	<0.1 acceptable, <0.05 good	0.018	Good fit
NFI	>0.90 acceptable, >0.95 good	0.985	Good fit
NNFI	>0.95 acceptable, >0.97 good	0.985	Good fit
CFI	>0.95 acceptable, >0.97 good	0.991	Good fit

As summarized in Table 3, six indices indicated a good fit in addition to three substantial fit evaluations. Hence, the indices produced by CFA demonstrated a statistically-significant model fit to the data. As a result, an 8-item single factor scale explaining 67.479% of the variance was obtained with a Cronbach's  $\alpha$  of 0.931. Inter-item correlations ranged between 0.503 and 0.734 ( $\bar{x}=0.627$ ). Item-total correlations ranged between 0.698 and 0.808 ( $\bar{x}=0.761$ ). Scree plot and communalities (0.588-0.738) supported a single factor structure, as well. The means of the items ranged between 3.97 and 4.21 ( $\bar{x}=4.08$ ). The path diagram of AUTMES is displayed in Figure 2.

Finally, a significant correlation between a global item (asking the participant to indicate how important he or she thinks using technology is in music education) and the total score of the scale supported the nomological validity of the scale ( $r=0.450$ ,  $n=523$ ,  $p=0.000$ ) (Edison & Geissler, 2003). Nomological validity is a form of construct validity and is defined as "the degree to which predictions in a formal theoretical



network containing a construct of interest are confirmed" (Bagozzi, 1981, p. 327). In a similar vein, American Psychological Association defines nomological validity as "the degree to which a measure assesses the specific construct it is designed to assess, as formulated from the nomological network for the construct being measured" (2020). Therefore, this final 8-item version of the pilot scale was accepted as the "AUTMES". The scale includes items, such as "I believe that the use of technology makes music instruction more effective", "I can access the necessary resources for music instruction more easily using technology", and "I need technology while teaching music".

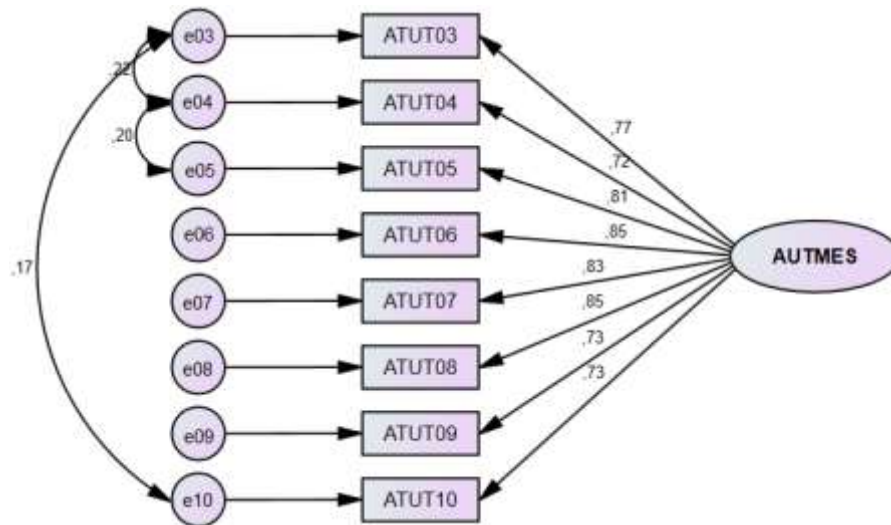


Figure 2. Path Diagram of AUTMES

#### Descriptive Findings Regarding Participants' Musical Experience

Initially, descriptive analyses were applied to the questions asked for collecting information about the musical experiences of pre-service teachers. Table 4 illustrates the descriptive findings regarding participants' musical experience.

It was understood that 56.6% of the pre-service teachers knew how to play the recorder and that 43.4% of them did not. While the rate of pre-service teachers who knew how to play an instrument other than recorder was 23.9%, the rate was 75.3% for the ones who did not. It was observed that 22.8% of pre-service teachers received music education outside of the education provided in the schools and that 76.9% of them did not. The findings showed that 5% of the pre-service teachers received vocal training, while 94.5% of pre-service teachers did not receive. Despite this, 53.7% of the pre-service teachers thought that they would effectively use a musical instrument in their instruction, and 38.1% thought they would effectively use their voices. Of all the pre-service teachers, 74.2% thought that they could effectively use technology in music education.

**Table 4***Descriptive Results Regarding Participants' Musical Experience*

Variable	Group	Frequency	Percentage
Extra-scholastic music education	No	402	76.90
	Yes	120	22.80
Having previous vocal training	No	494	94.5
	Yes	29	5.5
Knowing how to play recorder	No	227	43.4
	Yes	296	56.60
Knowing how to play other instrument	No	394	75.30
	Yes	125	23.9
Can use instrument effectively	No	239	45.7
	Yes	281	53.7
Can use his/her voice effectively	No	321	61.4
	Yes	199	38
Can use educational technology effectively	No	133	25.4
	Yes	388	74.2

*Correlational Findings regarding Demographics and AUTMES*

A one-way ANOVA was applied to the scores of the groups to reveal significant differences according to participants' years of study. Table 5 depicts the results of ANOVA on AUTMES. As seen from Table 5, the participants' attitudes towards using technology in music education showed meaningful differences depending on their grades ( $F(3,519)=5.189$ ,  $p=0.002$ ,  $\eta^2=0.05$ ).

**Table 5***Results of ANOVA on AUTMES and Year of Study*

Grade	N	$\bar{x}$	S	Source	S	MS	df	F	p	$\eta^2$
1 <sup>st</sup>	130	31.12	5.73	between Groups	446.57	148.858	3	5.18	*0.002	0.05
2 <sup>nd</sup>	120	32.53	5.23							
3 <sup>rd</sup>	131	33.21	5.65	within Groups	14889.40	28.689	519			
4 <sup>th</sup>	142	33.49	4.78							
Total	523	32.61	5.42	Total	15335.98		522			

Note: \* $p<0.001$

The effect size was close to the medium level. Tukey's test results of post hoc analyses revealed that the attitude scores of the pre-service teachers in the first grade ( $\bar{x}=31.12$ ) were significantly lower than those of pre-service teachers in the third ( $\bar{x}=33.21$ ) and fourth grades ( $\bar{x}=33.49$ ). To reveal significant differences in terms of sex

and department, independent t-tests were applied to the scores of the groups. Table 6 depicts the results of t-test analyses on participants' demographic variables and AUTMES levels.

**Table 6**

*Results of t-test Analysis on AUTMES and Demographic Variables*

Variable	Groups	N	$\bar{x}$	S	df	t	p	$\eta^2$
Sex	Female	386	32.41	5.325	521	-1.431	.153	
	Male	137	33.18	5.662				
Department	Pre-School	271	31.75	5.276	521	-3.849	*0.000	0.02
	Primary	252	33.55	5.428				

Note: \* $p < 0.001$

As can be seen in Table 6, the levels of the participants' attitude towards using technology in music education did not show any significant difference in terms of gender ( $t(521) = -1.431$ ,  $p = 0.153$ ). On the other hand, the participants' age and attitudes towards using technology in music education had small but positive and significant correlations ( $r = 0.125$ ,  $p = 0.006$ ). In addition, an independent t-test was applied to the scores of the groups to reveal any significant differences depending on the department in which the pre-service teachers were studying. Participants' attitude towards technology use in music education showed significant differences depending on their departments ( $t(521) = -3.849$ ,  $p = 0.000$ ,  $\eta^2 = 0.02$ ). Primary school pre-service teachers' attitudes regarding using technology in music education were significantly more positive than those of pre-school pre-service teachers. However, the effect size was small.

#### *Correlational Findings Regarding Musical Experience and AUTMES*

This study aimed to reveal whether the pre-service teachers' musical experiences and their opinions with regards to teaching music effectively had a relationship with their attitudes towards using technology in music education. Table 7 illustrates the results of independent t-test analyses on variables regarding participants' musical experience and their AUTMES level.

Pre-service teachers' attitudes towards using technology in music education did not show significant differences concerning the variables related to music, such as playing the recorder ( $t = -1.341$ ,  $p > 0.05$ ), playing an instrument other than recorder ( $t = 0.694$ ,  $p > 0.05$ ). In addition, the pre-service teachers' attitudes towards using technology in music education did not show significant differences concerning their opinions about using instruments ( $t = 1.244$ ,  $p > 0.05$ ) and their voices ( $t = 0.272$ ,  $p > 0.05$ ) effectively in music education. Furthermore, pre-service teachers' attitudes towards using technology in music education differed significantly concerning their opinions about using technology effectively in music education ( $t(519) = -3.389$ ,  $p = 0.000$ ,  $\eta^2 = 0.05$ ). With a close to medium effect size, pre-service teachers who think that they can use technology effectively in music education had a significantly higher attitude towards the use of technology in music teaching.

**Table 7***Results of Independent t-test Analysis on AUTMES and Musical Experience*

Variable	Groups	N	$\bar{x}$	S	df	t	p	$\eta^2$
Knowing how to play recorder	No	227	32.25	5.279	521	-1.341	.180	
	Yes	296	32.89	5.519				
Knowing how to play other instrument	No	394	32.69	5.229	517	.694	0.488	
	Yes	125	32.30	6.011				
Can use instrument effectively	No	239	32.95	5.497	518	1.244	0.214	
	Yes	281	32.35	5.352				
Can use his/her voice effectively	No	321	32.68	5.377	518	0.272	0.786	
	Yes	199	32.54	5.521				
Can use educational technology effectively	No	133	30.47	5.530	519	-5.403	*0.000	0.05
	Yes	388	33.33	5.191				

Note: \* $p < 0.001$ 

Finally, the Mann-Whitney U tests were applied on teachers' attitudes towards using technology in music education to differ based on extra-scholastic music education and having previous vocal training, since attitudes towards using technology in music education did not normally distribute across the groups of those two dichotomous variables. Table 8 depicts the results of the Mann-Whitney U tests.

**Table 8***Results of Mann-Whitney U test Analysis on AUTMES*

Variable	Group	N	Mean Rank	Sum of Ranks	U	p
Extra-scholastic music education	No	402	264.18	106201.50	22639.5	0.371
	Yes	119	250.25	29779.50		
	Total	521				
Having previous vocal training	No	494	262.53	129690.50	6900.5	0.738
	Yes	29	252.95	7335.50		
	Total	523				

As seen in Table 8, pre-service teachers' attitudes towards using technology in music education did not show significant differences about having music training outside of that provided in school ( $U=22.639$ ,  $p>0.05$ ) or having previous vocal training ( $U=6900.500$ ,  $p>0.05$ ).

### Discussion, Conclusion and Recommendations

The present study aims to develop a valid and reliable scale that measures attitude towards using technology in music education and to investigate the relationships between pre-school and primary school pre-service teachers' attitudes towards using technology in music education concerning their demographic variables and musical experiences. In this research, the musical experiences of pre-service teachers were

limited to playing instruments and having vocal training. Besides, this research aims to develop a valid and reliable measurement tool to measure the attitudes of pre-service teachers towards using technology in music education. For this purpose, the Attitude towards Using Technology in Music Education Scale was developed by the researchers. The EFA, CFA, and the reliability coefficient showed that the scale consisting of 8 items and a single factor is a valid and reliable measurement tool that can be used to measure attitude with regard to using technology in music education.

For developing the scale, firstly, 117 students attending pre-school or primary school education programs, who were taking a music education course, were asked to write a composition regarding their thoughts about using technology in music education. Related literature was reviewed and previously prepared attitude scales were examined, as well (Albirini, 2006; Palaigeorgiou, Siozos, Konstantakis & Tsoukalas, 2005; Tyson, 2005). Two experts in educational measurement and evaluation, an expert in music education, an expert in Turkish instruction, and an expert in educational technology reviewed the pool of 75 items created by qualitative analysis of the compositions Davis (1992) technique was utilized to establish the content validity of the scale. Consequently, a 15-item "pilot-scale" was constructed. The pilot-scale took the form of a 5-point Likert-type scale. The rating scale ranged from 1 (strongly disagree) to 5 (strongly agree). After administering the pilot instrument, the data were analyzed using EFA and Cronbach's  $\alpha$  internal consistency estimates were computed. After three sets of EFA and Cronbach's  $\alpha$  computations, a 10-item single factor "revised scale", explaining 65.415% of the variance, was obtained with a Cronbach's  $\alpha$  of 0.940. In the second dataset, a CFA was performed on the data collected by the revised scale for determining whether the factor structures could be confirmed. The CFA results validated the factor structure of the revised scale:  $\chi^2(17)=42.273$ ,  $p=0.001$ ,  $\chi^2/df=2.47$ , RMSEA=0.05, GFI=0.980, AGFI=0.957, RMR=0.012, SRMR=0.018, NFI=0.985, NNFI=0.985, CFI=0.991. However, two more items were discarded to ensure that the index values comply with the fitness criteria. As a result, an 8-item single factor scale explaining 67.479% of the variance was obtained with a Cronbach's  $\alpha$  of 0.931.

According to the findings obtained in this study, attitudes of pre-school and primary school pre-service teachers in this respect did not show significant differences depending on gender. This result was similar to research results that did not show gender differences concerning attitudes towards technology (Jennings & Onwuegbuzie, 2001; Kadijevich, 2000; Suri & Sharma, 2013). However, there are also studies which report that men's attitudes to the computer are more positive, they are more confident about computer use, and use computers more than women (Colley & Comber, 2003; Comber, Colley, Hargreaves & Dorn, 1997). Comber et al. (1993) have stated that men have more confidence than women with regard to music technology, which increases their interest in music. Similarly, Savage (2007) has reported that male students' interest in technology makes them more interested in music than females. The conclusions obtained from this study are consistent with the findings of research in which male individuals' interest in and attitude towards the use of technology in music are higher.

In this study, a small but significant relationship was found between pre-service teachers' ages and their attitudes towards using technology in music education. As the ages of the pre-service teachers increase, their attitudes towards using technology in music education become more positive. This result is consistent with the research findings, which indicates that using technology in music increases with age (Colley & Comber, 2003). Moreover, results from ANOVA analyses have revealed that the attitudes of pre-service teachers who are in the 3<sup>rd</sup> and 4<sup>th</sup> grades with regard to using technology in music education are more positive than that of those in the 1<sup>st</sup> grade. This result is inconsistent with research findings that do not show any difference in technology attitudes depending on the year of the study (Atabek & Burak, 2019; Ipek & Acuner, 2001). This difference between the attitudes of pre-service teachers in 3<sup>rd</sup> and 4<sup>th</sup> grades with regard to using technology in music education and those in 1<sup>st</sup> grade may be due to the effects of technology-based courses taken during the undergraduate period. It has been observed that as the pre-service teachers' experiences in technology increase, their attitudes towards using technology in music education also become more positive.

The attitude towards using technology in music education also showed a significant difference depending on the program. The attitudes of primary school pre-service teachers with regard to using technology in music education were found to be significantly more positive than those of pre-school pre-service teachers. This can be explained by the content differences of the courses in the programs. The primary school teacher program requiring more technology usage, and the courses in the pre-school teaching program being more practical, might be seen as the reason for this. This result also suggests that pre-service primary school teachers intend to use technology more in their future music education and perceive the primary school curriculum as being more likely to require the use of technology. The mean score of the pre-school and primary school pre-service teachers from the scale was 4.08. Atabek and Burak (2019) found that the mean of pre-service music teachers' attitudes towards using technology in education was 3.81. The result can be interpreted that the attitudes of pre-service pre-school and primary school teachers towards using technology in education are more positive than those of pre-service music teachers. The findings suggest that pre-service teachers' attitudes towards using technology improve if their future professions and instructional programs at their universities necessitate the use of technology.

Descriptive findings obtained from the analyses on pre-service teachers' musical experiences also showed that pre-school and primary school pre-service teachers have very inadequate musical experiences. The majority of the pre-service teachers did not know how to play an instrument other than the recorder; they did not have vocal training, and have not received music training apart from what is provided in school. This result supports research related to the insufficiency of musical experiences of pre-service pre-school and primary school teachers (Russel-Bowie, 2010; Seddon & Biasutti, 2008). Despite inadequate musical experiences, almost half of the pre-service teachers think that they can use their instruments effectively in music education. On the other hand, pre-service teachers who think that they can use their voices effectively

remain in the minority. This result is similar to the results of the study, which reported that pre-service teachers found themselves inadequate for using both their voice effectively (Baris & Ozata, 2009; Swain & Allen, 2014) and instruments (Topoglu, 2015). However, another important finding of this study is that most of the pre-service teachers think that they can use technology effectively in music education. Pre-service pre-school and primary school teachers think that music education is a special field and requires special talent (Hennesy, 2000; Seddon & Biasutti, 2008). One of the most important effects of the spread of technology in the field of music education is to change the perceptions of people with regard to music and to allow music to be perceived as an area that everyone can perform. In this respect, the positive attitudes of pre-service teachers who feel themselves inadequate about using their voice and instruments, and have inadequate musical experience, maybe due to their belief that they will be able to compensate for these deficiencies in music with the opportunities offered by technology. They may think that technology will contribute to an increase in the quality of music education they will provide in the future.

The inadequacy of musical experience on the part of pre-service pre-school and primary school teachers and their positive attitudes towards using technology in music education show that this is an area that should be emphasized in the education of these pre-service teachers. The opportunities offered by technology concerning music education should be considered as an opportunity for pre-service teachers whose main branch is not music to compensate for their perceived inadequacies in music. In this context, technology-directed courses should be increased in undergraduate programs for pre-service teachers to be able to effectively use technology in music education. Using the attitude towards using technology in music education scale developed in this research, pre-service teachers' attitudes and other features, such as interest in technology, motivation and musical experiences, such as musical creativity can be investigated.

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### Okul Öncesi ve Sınıf Öğretmeni Adaylarının Müzik Eğitiminde Teknoloji Kullanımına Yönelik Tutumları

#### Atıf:

Atabek, O., & Burak, S. (2020). Pre-School and primary school pre-service teachers' attitudes towards using technology in music education. *Eurasian Journal of Educational Research*, 87, 47-68. DOI: 10.14689/ejer.2020.87.3

#### Özet

*Problem Durumu:* Türkiye'de okul öncesi ve ilkököl yıllarında müzik eğitimi, okul öncesi ve sınıf öğretmenleri tarafından gerçekleştirilmektedir. Bu dönem müzik eğitimi, çocuğa müziksel becerileri kazandırması ile birlikte çocuğun entelektüel, sosyal ve kişisel gelişimi açılarından da kritik bir öneme sahiptir. Fakat okul öncesi ve sınıf öğretmenleri çoğu zaman kendilerini müzik eğitimi konusunda yeterli görmemekte, müziği özel yetenekler gerektiren bir alan olarak algılayarak, öğretim konusunda kaygı yaşamaktadırlar. Bu görüşlerinin oluşmasında, onların lisans döneminde aldıkları müzik eğitiminin ve geçmiş müziksel deneyimlerinin yetersizliği ile ilgili inançları önemli rol oynamaktadır.

Teknoloji kullanımının yaygınlaşması, müzik eğitimi program ve uygulamalarında önemli değişikliklere neden olmuştur. Müzik eğitimi verme ve çocukların müziksel gelişimini sağlama sorumluluğuna sahip okul öncesi ve sınıf öğretmenlerinin, müzik eğitiminde yaşanan bu değişimler konusunda farkındalık ve yeterlilik sahibi olmaları gerekmektedir. Müzik eğitiminde teknolojiyi etkili kullanmak, kendilerini müzik konusunda yeterli hissetmeyen ya da müziğin özel bir yetenek alanı olduğunu düşünen öğretmen ve öğretmen adayları için müzik öğretimlerinde kendilerine olan güvenlerinin gelişmesi açılarından yararlı olabilir. Ayrıca müzik eğitiminde teknoloji kullanımı, okul öncesi ve sınıf öğretmeni ve öğretmen adaylarının müzik öğretimine yönelik motivasyonlarının artmasına da neden olabilir. Bununla birlikte, tutumların davranışı belirleyen niyetin önemli bir göstergesi olduğu göz önünde bulundurulduğunda, müzik eğitiminde teknolojiyi kullanmak için olumlu tutumlara sahip olunması gerekmektedir. Müzik eğitiminde teknoloji kullanımına yönelik olumlu tutumlara sahip okul öncesi ve sınıf öğretmeni adaylarının bu teknolojiyi müzik eğitiminde etkili bir biçimde kullanma yoluna

gidecekleri, bu durumun ileride verecekleri müzik eğitimlerine olumlu katkılarının bulunacağı düşünülmektedir.

*Araştırmanın Amacı:* Bu çalışmada, müzik eğitiminde teknoloji kullanımına yönelik tutumu ölçen geçerli ve güvenilir bir ölçme aracının geliştirilmesi ile okul öncesi ve sınıf öğretmeni adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumlarının onların demografik değişkenleri, çalgı ve ses gibi müziksel deneyimleri ile olan ilişkilerinin ortaya çıkarılması amaçlanmıştır.

*Araştırmanın Yöntemi:* Araştırmaya Akdeniz Üniversitesi Eğitim Fakültesi Sınıf Öğretmenliği ve Okul Öncesi Öğretmenliği Anabilim Dallarında öğrenim gören 640 öğretmen adayı katılmıştır. Veriler araştırmacılar tarafından geliştirilen anket ile toplanmıştır. Bu anket, Müzik Eğitiminde Teknoloji Kullanımına Yönelik Tutum Ölçeği ile katılımcıların yaşları, cinsiyetleri ve sınıfları ile daha önce müzik aleti çalıp çalmadıkları, daha önce ses eğitimi alıp almadıkları ve teknolojiyi, seslerini veya müzik eğitiminde enstrümanları etkin bir şekilde kullanma konusundaki inançları hakkındaki soruları içermektedir. Araştırmada verilerin çözümlenmesi için IBM SPSS Statistics (25) ve IBM SPSS Amos (24) bilgisayar programları kullanılmıştır. Müzik Eğitiminde Teknoloji Kullanımına Yönelik Tutum Ölçeğinin geliştirilmesinde faktör yapısının belirlenebilmesi için Açıklayıcı faktör analizi uygulanmıştır. Ölçeğin güvenilirliğinin ölçülmesinde iç tutarlılık katsayısı hesaplanmıştır. Faktör yapılarının doğrulanıp doğrulanamayacağıın tespiti için revize edilen ölçek tarafından toplanan veriler üzerinde doğrulayıcı faktör analizi yapılmıştır. Ek olarak, verilerin analizinde ANOVA, t testi, Mann-Whitney U testi ve Pearson korelasyon katsayısı kullanılmıştır.

*Araştırmanın Bulguları:* Geliştirilen "Müzik Eğitiminde Teknoloji Kullanımına Yönelik Tutum Ölçeği", 8 maddeden ve tek faktörden oluşmaktadır ve Cronbach  $\alpha$  değeri 0.931 olarak hesaplanmıştır. Maddelerin ortalaması 3.97 ile 4.21 arasında değişmektedir (ortalama = 4.08). Okul öncesi ve sınıf öğretmeni adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları onların cinsiyetlerine göre anlamlı farklılık göstermemektedir ( $t=-1.431$ ,  $p>0.05$ ). Araştırmada, öğretmen adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları ile yaşları arasında ise anlamlı ilişki bulunmuştur ( $r=0.125$ ,  $p=0.006$ ). Öğretmen adaylarının yaşları yükseldikçe müzik eğitiminde teknoloji kullanımına yönelik tutumları artmaktadır. Ayrıca 3. ve 4. sınıfa devam eden öğretmen adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları 1. sınıftakilere göre daha yüksek olarak hesaplanmıştır ( $F(3,519)= 5.189$ ,  $p= 0.002$ ,  $\eta^2=0.05$ ). Müzik eğitiminde teknoloji kullanımına yönelik tutum, okunan programa göre de anlamlı farklılık göstermektedir ( $t(521) =-3.849$ ,  $p=0.001$ ,  $\eta^2=0.02$ ). Sınıf öğretmeni adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları okul öncesi öğretmen adaylarına göre anlamlı derecede yüksek olarak hesaplanmıştır. Öğretmen adaylarının sorulara verdikleri yanıtlar analiz edildiğinde onların %56.6'sının blokflüt çalmayı bildiği anlaşılmıştır. Blokflüt dışında çalgı çalmayı bilen öğretmen adayları %23.9 oranındadır. Okulda verilen eğitim dışında müzik eğitimi alan öğretmen adaylarının %22.8, ses eğitimi almış olan öğretmen adaylarının ise %5 oranında olduğu saptanmıştır. Buna karşın öğretmen adaylarının %53.7'si bir müzik enstrümanını öğretimlerinde etkili bir biçimde kullanacaklarını düşünmekte, %38'i, seslerini etkili bir biçimde kullanacaklarını

düşünmektedirler. Öğretmen adaylarının %74.2'si ise teknolojiyi müzik eğitiminde etkili bir biçimde kullanabileceklerini düşünmektedirler. Öğretmen adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları, blokflüt çalmayı bilme ( $t=-1.341$ ,  $p>0.05$ ), blokflüt dışında bir enstrüman çalmayı bilme ( $t=0.694$ ,  $p>0.05$ ), okulda verilen eğitim dışında müzik eğitimi almış olma ( $U=22.639$ ,  $p>0.05$ ) ve ses eğitimi almış olma ( $U=6900.500$ ,  $p>0.05$ ) gibi müzikle ilgili değişkenlere göre anlamlı farklılıklar göstermemektedir. Ayrıca öğretmen adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları onların enstrümanlarını ( $t=1.244$ ,  $p>0.05$ ), ve seslerini ( $t=0.272$ ,  $p>0.05$ ) müzik eğitiminde etkili bir biçimde kullanma ile ilgili görüşlerine göre de anlamlı farklılıklar göstermemektedir. Öte yandan, teknolojiyi müzik eğitiminde etkili bir biçimde kullanabileceğini düşünen öğretmen adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları anlamlı derecede yüksek olarak hesaplanmıştır ( $t(519) = -3.389$ ,  $p=0.000$ ,  $\eta^2=0.05$ ).

*Araştırmanın Sonuçları ve Önerileri:* Okul öncesi ve sınıf öğretmeni adaylarının kendilerini, çalgılarını ve seslerini müzik eğitiminde yeterli kullanamayacaklarına yönelik görüşleri ile müziksel deneyimlerinin yetersizliği değerlendirildiğinde; müzik eğitiminde teknoloji kullanımına yönelik olumlu tutumları ve teknolojiyi etkili kullanabileceklerine yönelik görüşleri, müzik eğitiminde teknoloji kullanımının oldukça önem verilmesi gereken bir konu olduğunu göstermektedir. Teknolojinin müzik eğitimi açısından sunduğu olanaklar, asıl branşı müzik olmayan öğretmen adayları için müzikteki yetersizliklerini telafi etmeleri için bir fırsat olarak değerlendirilmelidir. Bu bağlamda öğretmen adaylarının teknolojiyi müzik eğitiminde etkili bir biçimde kullanabilmeleri için lisans programlarında teknolojiye yönelik derslerin artırılması gerekmektedir. Öğretmen adaylarının lisans dönemi boyunca aldıkları müzik derslerinde teknolojiyi nasıl daha etkili kullanacakları yönünde uygulamalar yapılmalıdır. Araştırmada geliştirilen ölçek, öğretmen adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumları ile müzik eğitiminde teknoloji kullanımına yönelik ilgi ve motivasyonları ile ilişkilerinin incelenmesinde kullanılabilir. Ayrıca, ölçek, müzik eğitiminde teknoloji kullanımına yönelik tutum ile bu çalışma kapsamında ele alınmayan diğer müziksel özellikler arasındaki ilişkilerin ortaya çıkarılmasında da kullanılabilir. Deneysel çalışmalar ile öğretmen adaylarının müzik eğitiminde teknoloji kullanımına yönelik tutumlarına etki eden değişkenlerin ortaya çıkarılması yönünde çalışmalar yapılabilir.

*Anahtar Kelimeler:* Eğitim teknolojisine yönelik tutum, müzik eğitiminde teknoloji kullanımı, okul öncesi eğitimi, sınıf eğitimi.

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