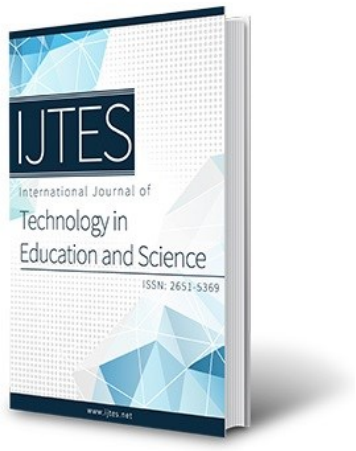

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Abstract

The aim of this research is to determine the perceptions of music teachers about their technological competencies. For this purpose, it was aimed to determine what the pre-service teachers' views on their technological proficiency levels were and whether these views differed based on the variables of gender, age, school type, and grade level. Data were gathered through "Technological Competency Scale for Teachers" developed by (Bayraktar, 2015). The study was carried out with 231 music teachers working in secondary and high schools in the Central Anatolia region in the 2020-2021 academic year. Independent groups t-test and one-way analysis of variance techniques were used in the analysis of the data. It was found that the perceptions of music teachers regarding their technological competencies differed significantly by the variables of gender, age and school type. However, no significant difference was found between the technological competencies of music teachers working in secondary and high schools.

Introduction

With the COVID-19 pandemic, schools suddenly shifted from traditional learning environments to technology-supported education models (Akerson & Carter, 2021; Boothe, 2021; Ghazi-Saidi et al., 2020; Maani, 2020; Sarıkaya, 2021; Unger & Meiran, 2020). The new technological situation and challenges that emerged with the effect of the epidemic, teachers and students has experienced difficulties in teaching -learning. Many extra tasks of teachers and students that require time and patience have revealed a large number of demands for their professional practices and competencies. Thus, the competencies and skills of teachers have become an important factor in overcoming new problems (Arslantaş, 2021).

Instructional technologies, which are defined as one of the leading elements of educational environments and learning and teaching, are gaining more importance day by day and are integrated to education with new models. Educators emphasize that good communication and learning will take place and a lively and interesting learning environment will be created if instructional technology models are used appropriately and effectively. Studies reveal that instructional technology-supported education is more effective and learning is more permanent (Kaleli, 2021; Koyuncuoğlu, 2021; Yıldız et al., 2004). However, achieving the expected benefit from education and training technologies depends on the use of the appropriate model at an appropriate time and

manner. For this reason, teachers have substantial responsibility for making effective use of teaching technologies in schools (Paje, Rogayan & Dantic, 2021). The responsibility of planning, maintaining and evaluating teaching and using instructional technology applications that will enable reaching the goals rests on the shoulders of teachers (Doğru, 2020; Kara, 2020; Kara, 2021; Reddy et al., 2020). Today, the expectation for teachers to be effective in the classroom has increased more than ever before. No Child Left Behind (NCLB) has made it clear that high-quality professional development is key for teachers to have the knowledge and skills to help students so that all students meet high standards (Lauer, Dean, Martin-Glen, & Asensio, 2005, 21).

As the implementer of the educational program and educational technology, the teacher must have gained certain competencies in order to fulfill the duties expected from him or her. The most important issue regarding instructional technologies is the teacher's preparation, use of technological materials suitable for the course and the subject matter and ability to motivate students in this regard. If students do not find technology useful, they will not be open to instructional technologies (Kibici & Sarıkaya, 2021; Kilinçer, 2021).

Self-efficacy beliefs lie on the basis of technological competence. Self-efficacy beliefs increase commitment, effort and persistence, and contribute to the excellent performance of individuals (Morris & Usher, 2011; Sahin, 2009; Schunk & Pajares, 2005; Tunkler et al., 2016). Individuals with high levels of self-efficacy attribute their failures to lower attempts rather than low abilities, while those with low self-efficacy attribute their failure to low abilities. Therefore, individuals with low self-efficacy are more likely to avoid their duties, delay their work, give up in a short time or show shyness (Arslantaş, 2021; Bandura, 1997; Hemmings et al., 2012; Lent et al., 2008; Zang et al., 2019). Teachers' self-efficacy requires knowledge, skills and attitudes to fulfill the duties and responsibilities required by the profession (Akturk & Sahin, 2010; Kaleli, 2021; McClure et al., 2011; Salanova, Martínez; Lorens, 2012; Ünlü, Aydos & Sünbül, 2008; Woolfolk Hoyve Spero, 2005). In fact, teachers' perceptions of self-efficacy are one of the main elements of success of new instructional technologies in the teaching environment. The perception determines the quality of teaching and the effectiveness of teaching technologies, methods and techniques (Alan, 2014; Rimm-Kaufman & Sawyer, 2004; Sünbül, 1996; Sünbül & Arslan, 2006).

The key to successful teaching is educators' ability to effectively integrate technology and subject matter with pedagogy. Educators need to use the teaching methods and technologies effectively in order to transform the content knowledge into the forms that students can understand and learn (Mishra & Kohler, 2006 Chen et al., 2019). A higher level of technological knowledge does not mean that teachers' technological competence is at a high level. It is important for teachers to have the knowledge and skills to use technology so that they can implement those skills and knowledge in their lessons with appropriate pedagogical approaches (Koh & Chai, 2011; Sahin, Akturk & Schmidt, 2009). In addition, in integrating technology into teaching environments, care should be taken to ensure that the selected technology is suitable for the purpose of the subject matter, and all these require a certain level of technological competence (Koyuncuoğlu, 2021; Niess, 2005).

The effective use of instructional technologies by teachers is directly related to their competence in instructional technologies and their perceptions of instructional technologies. Teachers who have competence in instructional

technologies will use these technologies more actively and efficiently in their lessons. Developing technological competencies for future teachers will enable their students to acquire digital skills as well. This will positively affect the quality of music education, as in all other fields (Bejaković & Mrnjavac, 2020; European Commission, 2016; García-Vandewalle et al., 2021; Heuling, Wild & Vest, 2021; Koliouska & Reimers, 2020). Technology has become an essential part of our daily personal and professional lives and has significantly improved communication and business performance, among many other aspects (Mendoza et al., 2015). The use of technology in music education can provide students with creative and collaborative opportunities through meaningful music making activities (Crawford, 2017; Kaleli, 2020; Leong, 2012). Emerging technologies have created learning opportunities that challenge traditional pedagogical approaches in music learning through mobile services and web conferencing software (Cho et al., 2019; Sabet, 2020).

Previous literature suggests that the use of digital technologies in blended or online learning, such as wikis, simulations, social networking sites, and social media tools, can effectively support face-to-face teaching in a variety of disciplines and grades (Chu et al., 2019; Ng, 2021; Ng & Chu, 2021b). However, there is little research to understand the effectiveness of online pedagogy for music learning (Edward et al., 2018; Pike, 2017). In fact, there are many advantages of teaching music online and in computer-assisted environments. For example, technology-based or online music learning enhances students' flexible learning (Biasutti, 2015; Kibici, 2018), allows creative opportunities to make music in studio production (King & Himonides, 2016), encourages students to exchange dialogues for collaboration and promotes the acquisition of music knowledge effectively (Adileh, 2012). However, switching to a technology-based alternative mode presents a number of teaching challenges. First, the significant latency in web conferencing environments due to technological infrastructure, internet bandwidth, among others, will limit the smoothness of face-to-face online learning (Johnson, 2017). Second, it can disrupt interactions between music teachers and students when creating and performing music in social activities such as music practices and orchestras (Philippe et al., 2020). Third, motivating students in online music learning environments can be difficult and educators need to put extra effort into redesigning their pedagogical approaches (Bowman, 2014). In all these problems, the technological competence of music teachers is an important factor.

Technological and digital competence gaps in teacher education stem from gaps experienced by teacher trainers (Instefjord & Munthe, 2017). If prospective teachers do not see their educators as role models in the use of new technologies in education, they are unlikely to be inspired to apply technology in the classroom (García-Vandewalle et al., 2021). There is a mismatch between the skills that teachers need to develop their students' digital competence and their own real skills (García-Vandewalle et al., 2021). Teachers cannot develop their students' digital competence if they do not master these skills themselves (Ramírez-Montoya et al., 2017). They cannot effectively teach a subject matter without mastering ICT skills and overcoming isolated pockets of knowledge in technology, content, or education.

After reviewing the advantages and challenges of learning music online, it is important to know how educators are adopting technology-based and online teaching strategies to teach music based on evidence-based practices (Ng, Ng & Chu, 2021). Ho (2007), in a study conducted among 1741 students in 15 Shanghai secondary

schools, found that multimedia technologies such as interactive presentations, videos, and recordings can help students learn music by listening to music, reading notes, hearing musical instruments, and reading biographical, cultural, and historical background. Kruse and Veblen (2012) reviewed 40 YouTube folk/traditional music instructional videos and found that most of them taught music instrumental technique (73%), music theory (58%), and melody teaching (58%). Online instructors modeled the ways to play the musical instrument and provided pedagogical advice to students to solve potential problems (Kruse & Veblen, 2012). In addition, these recorded videos demonstrated the use of physiological stimuli (e.g., hand shape and placement) and simple musical instruments or equipment (e.g., music picks, tuning pegs, wooden sticks) to support students' understanding of music. These findings shed light on how teachers are adopting recorded video and social media (YouTube) to design online music education. In addition, Johnson (2017) revealed that collaborative learning tasks and community interaction and social constructivist activities as well as digital illustrations such as procedural demonstrations are necessary to enable students to imitate teachers to play and learn music in groups. Serdaroğlu (2020) demonstrated the positive effects of online music education, using YouTube to create safe and reliable resources specifically designed for children by sharing the London Symphony Orchestra's expertise and educational content during the COVID-19 pandemic.

There are significant inadequacies in developing music teachers' technological competencies in Turkey, and a very limited number of professional development activities are organized throughout the provinces and school district. The majority of professional development activities are carried out by the Ministry of National Education with traditional methods and without adequate consideration of teachers' needs, and these methods are found ineffective in studies carried out (Desimone, Smith, & Ueno, 2006; Lauer, Dean, Martin-Glen, & Asensio, 2005). In addition, in the research conducted by Seferoğlu (2001), in-service training offered to teachers is not sufficient and the teachers have difficulties in accessing professional publications. Considering the fact that in-service training activities do not contribute enough to the personal and professional development of teachers in Aydoğan's (2002) study, it is possible to conclude that there are significant problems in teachers' technological competencies in Turkey's. For this purpose, it was aimed to investigate the technological competencies of music teachers based on the variables of gender, age, school type, and grade level.

Method

In this study, survey (descriptive) model was used. According to Karasar (1999), survey models are research approaches that aim to describe a past or present situation as it is. The event, individual or object that is the subject of the research is defined in its own conditions and as it is. In this research, since the technological competencies of music teachers will be determined based on their opinions, the survey model was used.

Participants

The target population of the research consisted of music teachers working in secondary and high schools in the Central Anatolian Region of Turkey. 231 music teachers working in the provinces of Konya, Ankara, Karaman, Aksaray, Niğde, Nevşehir and Kırşehir were included in the study on a voluntary basis. Online surveys were

distributed to teachers between February and June 2021. The distribution of teachers by gender, age and the type of school they work in is given in Table 1.

Table 1. Distribution of Music Teachers Based on Demographic and School Variables

Gender	N	%
Female	139	60.2%
Male	92	39.8%
School Type		
Public School	127	55.0%
Private School	104	45.0%
Age		
21-30	66	28.6%
31-40	59	25.5%
41-50	47	20.3%
51 and above	59	25.5%
Grade Level		
High School	55	23.8%
Secondary School	176	76.2%

Measuring Tool

The Technological Competency Scale for Teachers developed by Bayraktar (2015) was adapted by the researcher. In the scale form developed within the scope of the study, there are two dimensions: 'technological literacy' and 'integrating technology into the lesson'. It is a 5-point Likert type, and all of the items in the scale are positive expressions, and exploratory and confirmatory factor analyses supported 2 sub-scales. The Cronbach Alpha value was 0.82 for the whole scale and between 0.88 and 0.90 for each factor. High scores obtained from the scale indicate that music teachers have high technological competency in total and subscales.

Data Analysis

Within the scope of the research, the distribution of the data was analyzed before the technological competency scores of the music teachers were analyzed. The skewness and kurtosis values were taken as the basis for determining the distribution. According to Yurt and Sünbül (2012), the fact that these values are in the range of ±1 indicates that the data fit normal distribution. The values obtained in this study indicated that the technological competency scores of music teachers were distributed very close to normal distribution. Considering this, an Independent Sample t-Test was used to analyze the data of the technological competency scores of the music teachers based on gender, school type and grade level, and 'One Way ANOVA' technique was used in the comparison of the technological competency scores based on the age variable.

Table 2 shows that the mean scores of technological literacy, technology integration into the course, and general technology competencies of music teachers were 3.71 (±0.89), 3.31 (±1.17) and 3.55 (±0.93), respectively. According to the mean values obtained, it was found that the technological literacy of the music teachers was high, and the technology integration into the lesson and general technological competencies were moderate.

Table 2. Descriptive Data on the Technological Competencies of Music Teachers

	N	Minimum	Maximum	Mean	Sd
Technological Literacy	231	1	5	3.71	.89
Technology Integration into Lessons	231	1	5	3.31	1.17
General Technological Competency	231	2	5	3.55	.93

Table 3 shows that the mean scores of technology integration to the lesson of music teachers did not differ significantly by gender ($p>0.05$). However, significant differences were found in technological literacy and general technological competencies based on the variable of gender. Male music teachers had significantly higher levels of technological literacy and general technological competencies than their female colleagues.

Table 3. t-Test Analysis of Music Teachers' Technological Competencies by Gender

	Gender	N	Mean	Sd	t	p
Technological Literacy	Female	139	3.55	.953	-3.495	.001
	Male	92	3.96	.715		
Technology Integration into Lessons	Female	139	3.20	1.153	-1.766	.079
	Male	92	3.48	1.176		
General Technological Competency	Female	139	3.41	.950	-2.892	.004
	Male	92	3.77	.851		

Table 4 shows that the technological literacy, technology integration into the lesson and general technological competencies of music teachers did not show a significant difference based on the grade level ($p>0.05$). The technological competencies of the secondary and high school music teachers participating in the research were at a similar level.

Table 4. t-Test Analysis of Music Teachers' Technological Competencies by School Level

	Grade Level	N	Mean	Sd	t	p
Technological Literacy	High School	55	3.91	.934	1.854	.065
	Secondary School	176	3.65	.865		
Technology Integration into Lessons	High School	55	3.49	1.088	1.322	.187
	Secondary School	176	3.25	1.189		
General Technological Competency	High School	55	3.74	.873	1.733	.085
	Secondary School	176	3.49	.937		

Table 5 shows that music teachers' technological literacy, technology integration into the lesson and general technological competencies differed significantly ($p<0.05$). There were differences in the technological competencies of public and private school music teachers participating in the research. According to the mean scores of the groups, it was found that the music teachers working in private schools had significantly higher technological competencies compared to their colleagues in public schools.

Table 5. t-Test Analysis of Music Teachers' Technological Competencies Based on the School Type They Work

	School Type	N	Mean	Sd	t	p
Technological Literacy	Public School	127	3.48	.961	-4.607	.000
	Private School	104	4.00	.690		
Technology Integration into Lessons	Public School	127	3.09	1.138	-3.213	.002
	Private School	104	3.58	1.152		
General Technological Competency	Public School	127	3.32	.944	-4.279	.000
	Private School	104	3.83	.826		

Table 6 shows that the mean scores of technological literacy, technology integration into the lesson and general technological competency of music teachers differed significantly based on age ($p<0.05$). According to the Tukey test analysis, the technological literacy, technology integration into the lesson and general technological competency mean scores of the music teachers in the 20-29 age group were significantly higher than those of the teachers aged 51 and above.

Table 6. F-Test Analysis of Music Teachers' Technological Competencies by Age

	Age	N	Mean	Sd	F	p
Technological Literacy	21-30	66	3.97	.968	3.792	.011
	31-40	59	3.76	.863		
	41-50	47	3.57	.828		
	51 and above	59	3.49	.794		
	Total	231	3.71	.887		
Technology Integration	21-30	66	3.71	1.048	6.524	.000
into Lessons	31-40	59	3.48	1.229		
	41-50	47	2.97	1.230		
	51 and above	59	2.96	1.018		
	Total	231	3.31	1.167		
General Technological	21-30	66	3.87	.910	5.766	.001
Competency	31-40	59	3.65	.925		
	41-50	47	3.33	.921		
	51 and above	59	3.28	.840		
	Total	231	3.55	.926		

Discussion

This study, which investigated the technological competencies of music teachers based on gender, age, school type and grade level, found that the technological literacy competencies of the participants were high, whereas the competency regarding integrating the relevant technology into the field and practice was moderate. Another finding of the research was related to the question whether technological literacy levels of music teachers differed significantly in terms of gender variable. It was found that there were significant differences between the technological literacy of the male and female music teachers. In terms of technological literacy, male music teachers had significantly higher scores than their female colleagues. However, there was no significant gender difference in terms of integrating technology into practice. When compared with the literature, this study revealed similar findings in terms of gender variable in technological literacy and competency (Alan & Sünbül, 2010; Doğru, 2020; Koh & Chai, 2011; Kaleli, 2020; Kılıçarslan, 2021; Koyuncuoğlu, 2021). These findings show that music teachers generally perceive themselves as competent in technology and its use.

According to Zimmerman (2006), multidimensional learning-teaching processes and past experiences of individuals in cognitive and psychomotor areas affect their self-efficacy in the development of high-level competencies specific to a field. In fact, in a study conducted by Demirer, Çintaş, and Sünbül (2010) at secondary and high school levels, it was found that male students spend more time in front of computers and the internet and show a higher level of interest in such applications. Therefore, the fact that male participants, who spend more time on technology, engage in activities and have more experience, had higher perceptions of efficacy in this field than those with little or no experience, corroborates the literature.

Another finding of the study is that the technological competencies of music teachers showed significant differences based on their ages. It was found that music teachers in the 20-29 age group exhibited significantly higher technological competencies than their colleagues aged 50 and above. These findings are similar to the research findings of Rojo-Ramos Mueller et al. (2021), Doğru (2020), Kara (2021), and Mueller et al. (2008). As Mueller et al. (2008) state, future teachers, who are currently in the beginning stages, lack digital formation, but are technology literate and active users. However, in the context of secondary education in the study, it was found that teachers had moderate level of technological competency in their educational practices.

Conclusion

In the study, it was found that music teachers had a moderate level of technological competency. Male participants had higher levels of technological competency. The technological competencies of music teachers working in public schools and over the age of 50 were significantly low. Based on the results of the research, technological competency in the study is limited to the self-reports of music teachers. In future studies, it is recommended to investigate the use of digital technologies by music teachers using mixed research methods. Technological competency has a very important place in music teaching profession. Thus, emphasis could be given to academic in-service trainings that improve the technological competencies of music teachers.

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