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Examining the Relationship Between Teachers' Levels of Digital Literacy and Their Attitudes Towards Distance Education

Uğur Gezer, Assist. Prof. Dr., Corresponding Author
Yozgat Bozok University, Türkiye
E-mail: ugur.gezer@bozok.edu.tr
Orcid ID: 0000-0001-6752-7526

Nazike Karagözoğlu, Assoc. Prof. Dr.
Yozgat Bozok University, Türkiye
E-mail: nazike.karagozoglu@bozok.edu.tr
Orcid ID: 0000-0002-7410-3286

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Abstract

The primary aim of this study was to investigate the relationship between teachers' levels of digital literacy and their attitudes towards distance education. Teachers' perceptions of distance education and their digital literacy levels were also compared in terms of gender, major, age, professional experience and the time they spend online daily. The sample of this survey study consisted of 919 teachers with 10 different majors working in state schools in the 2020-2021 academic year. The data were gathered through the digital literacy scale and the distance education attitude scale. In data analysis, regression and Pearson correlation, independent samples t-test, one-way ANOVA and Post Hoc tests were employed. The results showed that the teachers had a good level of digital literacy and their attitudes towards distance education were at moderate level. Significant differences were observed in their attitudes towards distance education and digital literacy levels in terms of gender, age, major and the time they spend online daily. In addition, a positive and moderately significant relationship was found between the teachers' levels of digital literacy and their attitudes towards distance education, and it was concluded that their digital literacy levels were a statistically significant predictor of their attitudes towards distance education attitude.

Keywords: Teachers, digital literacy, distance education, attitude

Introduction

Developments in science and technology have made communication easy and speeded up accessing information with a variety of ways and methods. The changes and developments have also affected the competencies and skills that individuals should have. Although many innovations such as appointment systems in the field of health, online shopping in the fields of economy and trade, banking systems and distance education tools in the field of education make our daily lives easier, they brought with them the need to acquire and develop certain skills so that we can benefit from these innovations.

Digital literacy has its place among the basic skills needed in the 21st century. The American Library Association (ALA) defines digital literacy as the cognitive and technical skills required to find, evaluate, create and communicate information using information and communication technologies. The concept was first defined by Paul Gilster (1997, p. 220) in 1997 as "the ability to use and evaluate digital resources, tools and services suitably and to extend this to lifelong learning processes". Digital literacy involves the ability to access information, media and technology, understand and critically evaluate different aspects of content, and create and communicate effectively. It can be briefly expressed as the ability to find, evaluate, use, share and create content using information technologies and the Internet.

Digital competence has been included among the eight key competencies included in the curricula updated in 2017. In the curricula, this competency is explained as follows, "It involves using information and communication technologies for work, daily life and communication in a safe and critical way. It is supported by basic skills such as using computers for accessing, evaluating, storing, producing, presenting, and exchanging information, as well as participating in common networks and communicating over the Internet" (Ministry of National Education [MoNE], 2017, p. 5). For students to be able to use information and communication technologies, teachers must first have these skills so as to use them effectively in their classes and enable their students to gain these skills.

Teachers' getting to know innovative educational technologies and creating learning opportunities for students by integrating them with pedagogical content knowledge has become a competency required by the digital age (Aksin, 2020: 43). Today, teachers are expected to keep up with

the developing technology and integrate it into their classes in order to address a group of students who know much more about technology than they do and who have been raised with technology. Prensky refers to people who are acquainted with digital technologies and try to keep up with them as “digital immigrants”, and those who grow up familiar with these technologies are “digital natives” (Prensky, 2001). Digital natives who grow up surrounded by digital media are different from digital immigrants who learn to use technology later in life. These young individuals constitute the first generation in history to know more than their parents and teachers about digital information and communication technologies that are the most powerful tools for change in society (Trilling & Fadel, 2009). Although our tech-savvy 21st century students are often more fluent in the use of technology than their parents or teachers, they will always need guidance on how best to apply these powerful tools in complex learning and creative tasks (Trilling & Fadel, 2009). Teachers need to have digital competencies to be a good guide and use technology effectively in both face-to-face teaching and distance education. Even though the combination of decent content knowledge and good pedagogical competence is strategic for instruction, the ability to use technology as an important and powerful pillar of this integration has become one of the professional skills for today's teachers (Uzun & Akay, 2021, p. 242). Cuban, Kirkpatrick and Peck (2001) state that teachers' low-level use of technology is not sufficient to meet 21st-century students' needs, and that even the teachers who claim to have student-centred and constructivist practices do not have a strong or innovative way of using technology.

Digital literacy is regarded within the competency area called technological pedagogical content knowledge (TPACK) by Koehler and Mishra (2009). In addition, digital literacy covers “information literacy, media literacy, and information and communication technologies literacy” of the 21st century skills. The importance of having digital literacy skills for every member of the society, from teachers to students, or from children to the elderly, has been clearly seen during the COVID-19 pandemic that started in the first months of 2020 and spread all over the world. The pandemic turned all areas of life upside down, and various measures were taken to prevent its spread in Turkey as in rest of the world. Curfews, the obligation to use masks, the flexibility of working from home in government and private organizations were introduced, and face-to-face education was thus suspended. Many countries followed the concept "School's Out, But Class's On" adopted by the Chinese Ministry of Education, and have decided to suspend classes in the classroom, but move teaching and learning activities to a virtual environment (Carlesso, 2020, p. 1). Thus, distance education was implemented through online synchronous classes via computers/the Internet. In Turkey, one week after the schools were closed on March 11, 2020, the Ministry of National Education announced that there would be broadcasts on the Ministry's Education Information Network (EBA) and several TV channels of the Turkish State Radio and Television Corporation (TRT) for elementary and middle school students starting from March 23, 2020. Students were able to follow their own classes asynchronously through EBA. The same classes were broadcast on TRT channels at certain times of the day for students who did not have access to EBA and did not have computer/Internet access at home (Eken, Tosun & Tuzcu Eken, 2020, p. 119).

This instructional arrangement adopted during the pandemic is called "emergency distance education". According to Bozkurt et al. (2020), the most apparent difference between emergency distance education and distance education is that the latter is an option, but the former is a necessity. Distance education is a planned activity, and its implementation is based on theoretical and practical knowledge specific to the field and its nature. However, emergency distance education is about continuing educational activities with all available offline/online resources at the time of a crisis.

Distance education is an instructional setting that can be organized via the internet and computers without the need for the teacher and the student to be physically in the same environment. In the distance education process that was suddenly put into practice due to COVID-19, it was aimed to protect the health of children and young individuals on the one hand, and to continue education on the other. The use of information and communication technologies was prominent in this practice, trying to continue education through online and offline classes over the EBA platform (i.e. Educational Informatics Network in Turkey) and Zoom program.

The widely accepted advantage of distance education is flexibility in time, location and the pace of learning. Furthermore, students can attend the same lesson as many times as they want and review the same content as much as they need by means of materials uploaded online and video lessons stored in virtual libraries (Machado et al., 2019). The distance education process became a driving force by revealing the necessity of improving users' ability to use information and communication technologies. In order to ensure the effectiveness of the process, and academic achievement, both teachers, students and even parents had to try and improve their digital competencies through the help they could get from the environment, videos and online courses. The digital competencies of teachers, students and parents were an important factor affecting the effectiveness of the process. For Bozkurt et al. (2020), digital literacy skills emerged as the most critical need in emergency distance education for students, parents and teachers. Sezgin (2021, p. 284) also reported the lack of technological literacy and pedagogical knowledge of instructors who did not have distance education experience among the problems and limitations experienced in the process. Trust and Whalen (2020, p. 193) referred to teachers' competencies regarding the emergency distance education process as "making an airplane while flying". They found that teachers who frequently used technology in their classroom practices reported an easier transition to distance education for themselves and their students, while most teachers learned online and distance education strategies and tools during online classes.

The level of digital literacy skills teachers and students have in distance education can be seen as a factor that can positively or negatively affect their perception of this process. In the pandemic process starting with the 2020-2021 school year, many studies have been conducted in the context of distance education, particularly emergency distance education (Bozkurt et al., 2020; Carlesso, 2020; Eken, Tosun & Tuzcu Eken, 2020; Ferri, Grifoni & Guzzo, 2020; Sezgin, 2021; Trust & Whalen, 2020). There are also various studies on digital literacy, the focus of this study (Aksoy, Karabay & Aksoy, 2021; Arslan, 2019; Ata, Yıldırım, İpek & Ataş, 2021; Falloon, 2021; Sadaf & Johnson, 2017; Tatlı, 2018). However, no studies in the literature have focused on the relationship between teachers' levels of digital literacy and their attitudes towards distance education. The results of this study are expected to contribute to the research attempts on teacher competencies, digital literacy, and distance education.

The present study aimed at investigating the relationship between teachers' levels of digital literacy and their attitudes towards distance education by addressing the following research questions:

1. What are teachers' levels of digital literacy and their attitudes towards distance education?

2. Is there a relationship between teachers' digital literacy and their attitudes towards distance education?

3. Do teachers' levels of digital literacy have a statistically significant predictive effect on their attitudes towards distance education?

4. Do teachers' levels of digital literacy differ based on gender, major, age, education level, professional experience and the time they spend online daily?

5. Do teachers' attitudes towards distance education differ based on gender, major, age, education level, professional experience and the time they spend online daily?

Method

Research Model

Correlational survey model was adopted in this study aiming to examine the relationship between teachers' digital literacy and their attitudes towards distance education. Correlational survey studies are conducted to examine the relationships between two or more variables in order to describe a present case (Tabachnick & Fidell, 2013). Survey models are research approaches that aim to describe a past or present case as it exists. The case, individual or object that is the focus of research is aimed to be defined in its own conditions and as it is. There is no effort to change or influence them in any way (Karasar, 2012, p. 77).

Sample

Participants were chosen by convenience sampling. The participants in the sample were 919 teachers with 10 different majors working in state schools in the Central Anatolia Region in the 2020-2021 academic year. Demographic data for the participants are presented in Table 1.

Table 1. *Frequency and percentage distributions regarding the demographic characteristics of the participants*

Variable	Categories	*f*	%
Gender	Female	701	76,3
	Male	218	23,7
Major	Elementary School	387	42,1
	Social Studies	61	6,6
	Foreign Language	79	8,6
	Religious Culture and Ethics	41	4,5
	Mathematics	59	6,4
	Turkish Language	63	6,9
	Special Education	39	4,2
	Guidance	47	5,1
	Science and Technology	60	6,5
	Preschool	83	9,0
Age	20-30	120	13,1
	31-40	313	34,1
	41-50	328	35,7
	51 and above	158	17,2
Educational Level	Associate Degree	16	1,7
	Undergraduate	795	86,5
	Master's	93	10,1
	PhD	15	1,6
Professional Experience	1-5 years	94	10,2
	6-10 years	144	15,7
	11-15 years	160	17,4
	16-20 years	153	16,6
	21 years and above	368	40,0
Time Spent Online	less than 1 hour	35	3,8
	1-2 hours	200	21,8
	2-5 hours	421	45,8
	5 hours or above	263	28,6
Total		919	100,0

As is seen in Table 1, among the participants, 701 (76.3%) teachers were female and 218 (23.7%) male. With respect to major, 387 (42.1%) teachers were elementary school teachers, 61 (6.6%) social studies teachers, 79 (8.6%) foreign language teachers, 41 (4.5%) religious culture and ethics teachers, 59 (6.4%) mathematics teachers, 63 (6.9%) Turkish language teachers, 39 (4.2%) special education teachers, 47 (5.1%) guidance teachers, 60 (6.5%) science and technology teachers and 83 (9.0%) preschool teachers. Of all the teachers, 16 (1.7%) had an associate degree (two-year university program), 795 (86.5%) an undergraduate degree, 93 (10.1%) a Master's degree and 15 (1.6%) a PhD degree. Ninety-four teachers (10.2%) had a professional experience of 1-5 years, 144 (15.7%) 6-10 years, 160 (17.4%) 11-15 years, 153 (16.6%) 16-20 years and 368 (40%) 21 years and above. As for the time spent online daily, 35 (3.8%) teachers spent less than an hour, 200 teachers (21.8%) 1-2 hours, 421 teachers (45.8%) 2-5 hours and 263 teachers (28.6%) 5 hours or longer.

Data Collection Tools

The data were gathered through the "digital literacy scale" developed by Bayrakçı (2020) and the "distance education attitude scale" developed by Ağır (2007). The digital literacy scale consists of six sub-dimensions and 29 items on a five-point Likert type grading scale. The Kaiser-Meyer-Olkin (KMO) value was calculated as 0.922, and the Bartlett's test coefficient was significant ($p<.005$). The Cronbach-Alpha internal consistency coefficient was found to be 0.911. The CFA results of the scale showed that the fit indices of the six-factor model were at an acceptable level ($\chi 2/sd = 4.3$; GFI = .91; AGFI = .90; CFI = .91; RMSEA = .05; RMR = .05; NFI = .89; IFI = .91).

Distance education attitude scale consists of 21 items on a five-point Likert-type grading scale, and two sub-dimensions. The KMO fitness value was calculated as 0.814, and the Bartlett test coefficient was found to be significant. The Cronbach-Alpha reliability coefficient was 0.835, and the correlation coefficient calculated using the Spearman Brown formula for split-half test reliability was found to be 0.799.

Data Analysis

The data collection instruments were shared online with the participants after obtaining the necessary permission from the Ethics Commision of Yozgat Bozok University (date: 12.08.2021, decision no.: 24/22). In order to see whether the collected data normally distributed, kurtosis, skewness and Kolmogorov-Smirnov normality test values were checked.

Table 2. *Descriptive statistics, normality and Levene's test values of the scores obtained from the scales*

Variables	n	$\bar{x}$	sd	Kurtosis	Skewness	Kolmogorov-Smirnov
Digital Literacy Scale	919	103,04	17,91	.166	-.219	.051
Distance Education Attitude Scale	919	55,27	13,97	.039	.127	.060

The skewness and kurtosis values of the scores obtained from each scale range from -1 to +1, and Kolmogorov-Smirnov test scores were found to be significant ($p>.05$). In this respect, the data can be said to be normally distributed in terms of scores obtained through the digital literacy scale and distance education attitude scale.

After ensuring a normal distribution, regression and Pearson correlation analyses were performed to determine the relationships between teachers' levels of digital literacy and their attitudes towards distance education. Whether the teachers' scores in the digital literacy scale and the distance

education attitude scale differed based on gender was examined by using Independent Samples T-test, while one-way ANOVA was used to reveal whether the scores differed based on major, age, education level, professional experience and the time spent online daily. In the case of significant differences as a result of ANOVA, Post Hoc analyses were carried out to determine which groups led to a significant difference. In the study, α=0.05 was accepted as the level of significance.

Ethical Permits of Research

In this study, all the rules specified to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been taken.

Ethics Committee Permission Information:

Name of the committee that made the ethical evaluation = Yozgat Bozok University, Ethics Committee

Date of ethical review decision= 25.08.2021

Ethics assessment document issue number= 24/22

Findings

What are teachers' levels of digital literacy and their attitudes towards distance education?

The descriptive statistics on the teachers' scores in the digital literacy scale and the distance education attitude scale are presented in Table 3.

Table 3. *Descriptive statistics on the teachers' scores in the digital literacy scale and the distance education attitude scale*

Variables	n	Range	Min	Max	Median	$\bar{x}$	sd
Digital Literacy Scale	919	104	41	145	130	103,04	17,91
Distance Education Attitude Scale	919	80	21	101	55	55,27	13,97

The teachers' (n=919) mean score was 103.04 in the digital literacy scale where the lowest score could be 29 and the highest 145. It can thus be argued that the teachers' digital literacy levels were good in general. The teachers' (n=919) mean score 55.27 in the distance education attitude scale where the lowest score could be 21, and the highest 105. In this regard, the teachers' attitudes towards distance education were at a moderate level.

Is there a relationship between teachers' digital literacy and their attitudes towards distance education?

The results of the correlation analysis conducted to see whether there was a relationship between the teachers' digital literacy levels and their attitudes towards distance education are presented in Table 4.

Table 4. *Results of the Pearson correlation analysis on the relationship between the teachers' digital literacy levels and their attitudes towards distance education*

Variables	n	$\bar{x}$	sd	r
Digital Literacy Scale	919	103,04	17,91	.339*
Distance Education Attitude Scale	919	55,27	13,97	

*$p < .01$

The results revealed a positive, moderate-level and significant relationship (r= .339, p < .01) between the teachers' digital literacy levels and their attitudes towards distance education.

Do teachers' mean scores in the digital literacy scale have a statistically significant predictive effect on their mean scores in the distance education attitude scale?

The results of the regression analysis performed to determine whether the teachers' digital literacy levels had a statistically significant predictive effect on their attitudes towards distance education are presented in Table 5.

Table 5. *Results of the regression analysis on the predictive effect of the teachers' digital literacy levels on their attitudes towards distance education*

R	R^2	ΔR^2		B	Std. Error	β	t	p
.339	.115	.114	Constant	28,05	2,53	.339	11,06	.001
			Attitude towards distance education	.264	.024		10,89	

The results showed that the teachers' digital literacy levels were a statistically significant predictor of their attitudes towards distance education. Of the total variance in the attitudes towards distance education, 11% could be explained with the teachers' digital literacy levels.

Do teachers' levels of digital literacy differ based on gender, major, age, educational level, professional experience, and the time they spend online daily?

The results of the Independent Samples t-test employed to determine whether the teachers' digital literacy levels significantly differed by gender.

Table 6. *Results of the Independent Sample t-test for the teachers' digital literacy levels based on gender*

Gender	n	$\bar{x}$	sd	df	t	p
Female	701	101,36	17,49	917	-5,161	.001*
Male	218	108,43	18,20			

*p<.01

The teachers' digital literacy levels were found to differ significantly by gender [t(917)=-5.161, p < .01]. The significant difference was due to the male teachers' digital literacy mean scores ($\bar{X}$=108.43; sd=18.20) being higher than those of the female teachers ($\bar{X}$=101.36; sd=17.49).

Table 7 shows the results of ANOVA performed to determine whether the teachers' digital literacy levels differed significantly based on major.

Table 7. *Results of ANOVA for the teachers' digital literacy levels based on major*

Major	n	$\bar{x}$	sd	df	F	p
Elementary School	387	100,58	18,42	9 909	1,866	.06
Social Studies	61	106,52	18,73			
Foreign Language	79	103,46	19,86			
Religious Culture and Ethics	41	101,97	14,58			
Mathematics	59	106,71	13,83			
Turkish Language	63	103,66	17,03			
Special Education	39	106,33	18,14			
Guidance	47	107,02	20,39			
Science and Technology	60	104,63	16,84			
Preschool	83	104,00	15,77			

The teachers' digital literacy levels were found not to differ statistically significantly based on major [F(9-909)=1,866, p > .05]. Although there was no statistically significant difference, guidance ($\bar{X}$=107.02; sd=20.39), mathematics ($\bar{X}$=106.71; sd=13.83), social studies ($\bar{X}$=106.52; sd=18, 73) and special education ($\bar{X}$=106.33; sd=18.14) teachers were observed to have higher levels of digital literacy compared to their colleagues with other majors. On the other hand, elementary school ($\bar{X}$=100.58; sd=18.42) and religious culture and ethics ($\bar{X}$=101.97; sd=14.58) teachers had lower levels of digital literacy.

The results of ANOVA conducted to see whether the teachers' digital literacy levels differed significantly based on age.

Table 8. *Results of ANOVA for the teachers' digital literacy levels based on age*

Age	n	$\bar{x}$	sd	df	F	p	Post Hoc
20 – 30	120	108,05	15,26				
31 - 40	313	106,60	17,35	3			1>3,4
41 - 50	328	100,39	18,35	915	15,019	.001*	2>3,4
51 and above	158	97,68	17,64				

*p<.01; Categories: 20-30=1, 31-40=2, 41-50=3, 51 and above=4

The teachers' levels of digital literacy showed a statistically significant difference based on age [F(3-915)=15,019, p < .01]. According to the Post Hoc test performed, the significant difference was due to the fact that the digital literacy levels of the teachers aged 20-30 ($\bar{X}$=108.05; sd=15.26) and 31-40 ($\bar{X}$=106.60; sd=17.35) were higher than those aged 41-50 ($\bar{X}$=100.39; sd=18.35) and 51 and over ($\bar{X}$=97.68; sd=17.64).

The results of ANOVA performed to determine whether the teachers' digital literacy levels significantly differed based on professional experience are presented in Table 9.

Table 9. *Results of one-way ANOVA for the teachers' digital literacy levels based on experience*

Professional Experience	n	$\bar{x}$	sd	df	F	p	Post Hoc
1 – 5 years	95	108,68	15,54				
6 – 10 years	144	107,39	18,39				1>4,5
11 – 15 years	160	104,39	16,78	4			2>4,5
16 – 20 years	153	103,38	17,59	914	9,412	.001*	3>5
21 years and above	367	99,13	18,10				4>5

*p<.01; Categories: 1-5 years=1, 6-10 years=2, 11-15 years=3, 16-20 years=4, 21 years and above=5

The teachers' levels of digital literacy showed a statistically significant difference based on professional experience [F(4-914)=9,412, p < .01]. The Bonferroni test revealed that the significant difference was due to the teachers with a professional experience of 1-5 years ($\bar{X}$=108.68; sd=15.54), 6-10 years ($\bar{X}$=107.39; sd=18.39), 11-15 years ($\bar{X}$= 104.39; sd=16.78) and 16-20 years ($\bar{X}$=103.38; sd=17.59) having higher digital literacy levels than those with an experience of 21 years and longer ($\bar{X}$=99.13; sd=18.10), and the teachers with an experience of 1-5 years ($\bar{X}$=108.68; sd=15.54) and 6-10 years ($\bar{X}$=107.39; sd=18.39) having higher digital literacy levels than those with an experience of 16-20 years ($\bar{X}$=103.38; sd=17.59). Based on the data, it can be stated that as the professional experience of the teachers increased, their average score in the digital literacy scale decreased.

Table 10 presents the results of ANOVA conducted to see whether the teachers' digital literacy levels differed significantly based on educational level.

Table 10. *Results of one-way ANOVA for the teachers' digital literacy levels based on educational level*

Education Level	n	$\bar{x}$	sd	df	F	p	Post Hoc
Associate Degree	16	98,25	14,62				
Undergraduate	795	101,81	17,45	3			3>1,2
Master's	93	110,92	18,66	915	15,332	.001*	4>1,2,3
PhD	15	124,26	15,40				

**p*<.01; Categories: Associate degree=1, Undergraduate=2, Master's=3, PhD=4

The teachers' levels of digital literacy were found to significantly differ based on educational level [F(3-915)=15,332, p < .01]. The significant difference was due to the teachers with a Master's degree ($\bar{X}$=110.92; sd=18.66) having higher digital literacy levels than those with an associate degree ($\bar{X}$=98.25; sd=14.62) and an undergraduate ($\bar{X}$=101.81; sd=17.45), and the teachers with a PhD degree ($\bar{X}$=124.26; sd=15.40) having higher digital literacy levels than those with an associate degree ($\bar{X}$=98.25; sd=14.62), an undergraduate ($\bar{X}$=101.81; sd=17.45) and a Master's degree ($\bar{X}$=110.92; sd=18.66). In other words, as the teachers' educational level increased, their average score in the digital literacy scale also increased.

The results regarding the teachers' digital literacy levels based on the time spent online daily are presented in Table 11.

Table 11. *Results of one-way ANOVA for the teachers' digital literacy levels based on the time spent online daily*

Time Spent Online	n	$\bar{x}$	sd	df	F	p	Post Hoc
Less than 1 hour	45	94,95	17,56				
1-2 hours	191	101,31	17,81	3			2>1
2-5 hours	413	103,29	17,75	915	5,084	.002*	3>1
5 hours or above	270	105,22	17,88				4>1,2

**p*<.01; Categories: Less than 1 hour=1, 1-2 hours=2, 2-5 hours=3, 5 hours or above=4

The teachers' levels of digital literacy showed a statistically significant difference based on the time spent online daily [F(3-915)=5,084, p < .01]. The post-hoc test revealed that the teachers who were online 1-2 hours ($\bar{X}$=101.31; sd=17.81) and 2-5 hours a day ($\bar{X}$=103.29; sd=17.75) had higher digital literacy levels than those who spent less than 1 hour ($\bar{X}$=94.95; sd=17.56), and the teachers who were online for 5 hours or longer ($\bar{X}$=105.22; sd=17.88) had higher digital literacy levels than those who were online 1 hour ($\bar{X}$=94.95; sd=17.56) and 1-2 hours a day ($\bar{X}$=101.31; sd=17.81).

Do teachers' attitudes towards distance education differ based on gender, major, age, educational level, professional experience and the time they spend online daily?

Independent Samples t-test was performed to determine whether the teachers' attitudes towards distance education significantly differed by gender. The results of the analysis are presented in Table 12.

Table 12. *Results of the Independent Samples t-test for the teachers' attitudes towards distance education based on gender*

Gender	n	$\bar{x}$	sd	df	t	p
Female	701	54,01	12,94			
Male	218	59,35	16,26	917	-4,996	.001*

**p* <.01

The data shows that the teachers' attitudes towards distance education differed statistically significantly based on gender [t(917)=-4.996, p < .05]. This significant difference was in favor of the male

teachers who had higher attitude scores ($\bar{X}$=54.01; sd=12.94) than the female teachers ($\bar{X}$=59.35; sd=16.26).

The results of ANOVA performed to determine whether the teachers' attitudes towards distance education differed significantly based on major are presented in Table 13.

Table 13. *Results of ANOVA for the teachers' attitudes towards distance education based on major*

Major	n	$\bar{x}$	ss	sd	F	p	Post Hoc
Elementary School	387	53,40	13,19				
Social Studies	61	62,42	15,15				
Foreign Language	79	57,56	16,05				
Religious Culture and Ethics	41	53,63	13,18				
Mathematics	59	57,98	12,83	9			2>1,3,4,6,7,9,10
Turkish Language	63	54,36	14,69	909	4,060	.001*	3>1,7
Special Education	39	51,92	13,99				5>1,7
Guidance	47	59,57	11,05				8>1,4,7,10
Science and Technology	60	56,46	14,85				
Preschool	83	54,46	13,69				

**p*<.01; Categories: Elementary school=1, social studies=2, foreign language=3, religious culture and ethics=4, mathematics=5, Turkish language=6, special education=7, guidance=8, science and technology=9, preschool=10

The teachers' levels of attitudes towards distance education were found to differ statistically significantly based on major [F(9-909)=4,060, p < .01]. The post-hoc test revealed that this significant difference was in favor of the social studies ($\bar{X}$=62.42; sd=15.15), foreign language ($\bar{X}$=57.56; sd=16.05), mathematics ($\bar{X}$=57.98; pp. =12.83) and guidance teachers ($\bar{X}$=59.57; sd=11.05) who had higher scores in the distance education attitude scale than those with other majors.

The results of ANOVA performed to determine whether the teachers' attitudes towards distance education showed a significant difference based on educational level are presented in Table 14.

Table 14. *Results of one-way ANOVA for the teachers' attitudes towards distance education based on age*

Age	n	$\bar{x}$	sd	df	F	p	Post Hoc
20 – 30	120	57,05	12,53				
31 - 40	313	56,72	14,58	3			1>4
41 - 50	328	54,22	14,07	915	3,533	.01*	2>3,4
51 and above	158	53,24	13,23				

**p*<.05; Categories: 20-30=1, 31-40=2, 41-50=3, 51 and above=4

The teachers' levels of attitudes towards distance education showed a statistically significant difference based on age [F(3-915)=3,533, p < .05]. This difference was in favor of the teachers aged 20-30 ($\bar{X}$=57.05; sd=12.53) who had higher levels of attitudes than those aged 51 and above ($\bar{X}$=53.24; sd=13.23), and the teachers aged 31-40 ($\bar{X}$=56.72; sd=14.58) who had higher levels of attitudes than those aged 41-50 ($\bar{X}$=54.22; sd=14.07) and 51 and above ($\bar{X}$=53.24; sd=13.23).

The results of ANOVA conducted to find out whether the teachers' attitudes towards distance education significantly differed based on professional experience are presented in Table 15.

Table 15. *Results of one-way ANOVA for the teachers' attitudes towards distance education based on professional experience*

Professional Experience	n	$\bar{x}$	sd	df	F	p
1 – 5 years	95	56,28	13,43			
6 – 10 years	144	57,90	13,38			
11 – 15 years	160	55,74	14,86	4 914	2,337	.054
16 – 20 years	153	54,94	14,10			
21 years and above	367	53,92	13,79			

The teachers' levels of attitudes towards distance education showed no significant difference based on professional experience [F(4-914)=2,337, p > .05]. Even though there was no statistically significant difference, as the teachers' professional experience increased, their mean score in the distance education attitude scale decreased steadily.

Table 16 shows the results of ANOVA on the teachers' attitudes towards distance education based on educational level.

Table 16. *Results of one-way ANOVA for the teachers' attitudes towards distance education based on educational level*

Educational Level	n	$\bar{x}$	sd	df	F	p	Post Hoc
Associate degree	16	53,06	10,84				
Undergraduate	795	54,32	13,60	3			3>1,2
Master's	93	60,72	13,84	915	16,563	.001*	4>1,2,3
PhD	15	74,73	16,25				

*p<.01; Categories: Associate degree=1, undergraduate=2, Master's=3, PhD=4

The teachers' levels of attitudes towards distance education were found to significantly differ based on educational level [F(3-915)=16,563, p < .01]. This significant difference was in favour of the teachers with a Master's degree ($\bar{X}$=60.72; sd=13.84) who had higher levels of attitudes than those with an associate degree ($\bar{X}$=53.06; sd=10.84) and an undergraduate degree ($\bar{X}$=54.32; sd=13.60), and the teachers with a PhD degree ($\bar{X}$=74.73; sd=16.25) who had higher levels of attitudes than those with an associate degree ($\bar{X}$=53.06; sd=10.84), an undergraduate degree ($\bar{X}$=54.32; sd=13.60) and a Master's degree ($\bar{X}$=60.72; sd=13.84). That is to say, as the teachers' educational level increased, their mean score in the distance education attitude scale also increased.

The results regarding the teachers' attitudes towards distance education based on the time spent online daily are presented in Table 17.

Table 17. *Results of one-way ANOVA for the teachers' attitudes towards distance education based on the time spent online daily*

Time Spent Online	n	$\bar{x}$	sd	df	F	p	Post Hoc
Less than 1 hour	45	46,77	14,84	3	9,422	.001*	2>1
1-2 hours	191	53,15	13,44				3>1,2
2-5 hours	413	55,85	13,22	915			4>1,2
5 hours or above	270	57,32	14,67				

*p<.01; Categories: less than 1 hour=1, 1-2 hours=2, 2-5 hours=3, 5 hours or above=4

The teachers' levels of attitudes towards distance education statistically significantly differed based on the time spent online daily [F(3-915)=9,422, p < .01]. According to the post-doc test, the difference was in favor of the teachers who were online 1-2 hours ($\bar{X}$=53.15; sd=13.44), 2-5 hours ($\bar{X}$=55.85; sd=13.22) and 5 hours or longer a day ($\bar{X}$=57.32; sd=14.67) compared to those who spent less than 1 hour ($\bar{X}$=46.77; sd=14.84), and the teachers who were online for 2-5 hours ($\bar{X}$=55.85; sd=13.22)

and 5 hours or longer a day ($\bar{X}$=57.32; sd=14.67) compared to those who were online less than 1 hour ($\bar{X}$=46.77; sd=14.84) and 1-2 hours a day ($\bar{X}$=53.15; sd=13.44). It can thus be stated that the teachers' mean scores in the distance education attitude scale increased as the time they spent online a day also increased.

Discussion and Conclusion

Developments observed in science and technology have led to a change in the competencies and skills that individuals should possess. The need for new skills and competencies has emerged with the widespread use of digital technologies in all areas of life (McGarr & McDonagh, 2019). Digital competence is one of these new skills and competencies. In the Turkish Qualifications Framework (2015, p. 24), digital competence is defined as "being able to use information society technologies for work, daily life and communication in a safe and critical manner". Reasons such as the effectiveness of using digital materials in education, easy access to public services over digital environments, the rapid spread of using information and communication technologies among children and young individuals, and the transition to distance education in elementary education during the pandemic process have highlighted that it is important for teachers, pre-service teachers, and students, even parents, to develop digital competence. In the European Union's Digital Education Action Plan covering the years 2021-2027, it is stated that digital competence should be a basic skill for all teachers and other educational staff and should be integrated into all areas of teacher professional development, including pre-service teacher training (Demirci, 2021, p. 10).

The results retrieved in the present study that aimed to reveal the relationship between teachers' levels of digital literacy and their attitudes towards distance education, and to compare their attitudes towards distance education and digital literacy levels in terms of gender, age, major and professional experience are as follows:

In the study, the teachers' levels of digital literacy were firstly determined, and these levels were compared in terms of gender, age, major and professional experience. It was found that the teachers' levels of digital literacy were somewhat good and showed significant difference in favor of the male teachers. Yontar (2019) and Rizal, Setiawan & Rusdiana (2018) found that the digital literacy levels of teacher candidates were at a moderate level, and Arslan (2019) reported that teachers' digital literacy scores were at a high level in average. Krumsvik (2008) argues that digital competence is more needed in the teaching profession than in other professions or for the average citizens. This is because teachers need to expand the opportunities of using information and communication technologies in their classes, as well as to enable their students to develop an ability to use technology safely and effectively (Krumsvik, 2008, p. 283). Similar to the findings of the present study, Çam and Kıyıcı (2017), Özerbaş and Kuralbayeva (2018), and Yontar (2019) found that male teacher candidates had higher levels of digital literacy compared to their female peers. This was attributed to the fact that men could be more interested in technological tools and developments than women.

Although the teachers' levels of digital literacy did not show a significant difference based on major, guidance teachers, mathematics teachers, social studies teachers and special education teachers were found to have higher levels than those with other majors did. Elementary school teachers and religious education and ethics teachers were found to have lower levels of digital literacy compared to teachers of other majors. In Arslan (2019), the digital literacy levels of teachers were revealed to differ

based on major, and the levels of informatics, mathematics and science teachers were found to be higher. Aksoy, Karabay and Aksoy (2021) reported that elementary school teachers perceived themselves as highly digitally literate.

The teachers' levels of digital literacy significantly differed based on age. The significant difference was in favor of the teachers aged 20-30 and 31-40 who had higher levels of digital literacy than those aged 41-50 and 51 and over. Sengir (2019) reported that the female teachers, teachers over 40 years old, and those with more than 20 years of experience had lower levels of using information technologies. Several studies (e.g., Aksoy, Karabay & Aksoy, 2021; Aslan, 2019) reported a negative correlation between the level of digital literacy and the age of teachers, indicating that the level of digital literacy decreases as the age of teachers increases. This can be explained by the fact that digital-immigrant teachers have more difficulties in adapting to technology compared to today's youth.

The teachers' levels of digital literacy were found to significantly differ based on professional experience. The Bonferroni test showed that the significant difference was due to the teachers with a professional experience of 1-5 years, 6-10 years, 11-15 years, and 16-20 years having higher digital literacy levels than those with an experience of 21 years and longer, and the teachers with an experience of 1-5 years and 6-10 years having higher digital literacy levels than those with an experience of 16-20 years. This finding overlaps with the results reported in Karabay and Aksoy (2021), and Aslan (2019), which can be interpreted as that the teachers' levels of digital literacy decreased as their professional experience increased. This can be attributed to the teacher education system that has been modified over the years.

The results of the present study revealed that the teachers' levels of digital literacy significantly differed based on educational level. The teachers holding an MA degree had higher levels of digital literacy than those with a two-year college degree or an undergraduate degree, while the teachers with a PhD degree had higher levels than those with a two-year college degree, an undergraduate degree or an MA degree. This shows that the teachers' level of digital literacy increased with their educational level. Similarly, Aksoy, Karabay and Aksoy (2021) found that teachers with a graduate degree had higher levels of digital literacy than those with other education levels did.

The amount of time spent online daily was found to be a variable that affected the level of digital literacy. The teachers' levels of digital literacy were found to differ statistically significantly based on the time spent online daily. The digital literacy levels of the teachers who were online for 5 hours or longer a day were higher than those who spent less time online. As the duration of using information and communication technologies increases, the skills and experience gained with digital tools will also increase with the digital literacy levels of teachers. This result coincides with the results of the research conducted by Yaman (2019) and Özerbaş and Kuralbayeva (2018), both of which concluded that the duration and frequency of Internet use was an effective variable on the digital literacy levels of teacher candidates.

Positive attitudes towards any task, activity or class are an important factor that increases the level of achievement. Just as teachers' or students' attitudes towards a class in face-to-face education affects the effectiveness of instruction, the same is true for the distance education process. The successful implementation of this process, for which we were not well prepared due to the pandemic, could mainly be associated with teachers' attitudes towards distance education.

In the present study, the teachers' attitudes towards distance education were determined, and were examined in terms of gender, age, major and professional experience. Their attitudes were found to be at the moderate level and differed based on gender in favor of the male teachers. The male teachers' scores in the distance education attitude scale were found to be higher than those of the female teachers. Several studies (e.g. Baek, Zhang & Yun, 2017; Moçoşoğlu & Kaya, 2020) found that teachers' levels of attitudes towards distance education were low. Ülkü (2018) reported that the attitudes of teachers working in primary schools were moderate towards distance education, but they had mostly negative attitudes. Kocayiğit and Uşun (2020) found that teachers' attitudes towards distance education were at a high level, but nearly half of the teachers participating in the study had little knowledge about distance education.

The teachers' levels of attitudes towards distance education were found to differ significantly based on major. The social studies, foreign language, mathematics, and guidance teachers had higher levels of attitudes towards distance education than those with other majors. In Baek, Zhang and Yun (2017), language teachers had a higher attitude than other content teachers.

The teachers' levels of attitudes towards distance education showed a statistically significant difference based on age. The teachers aged 20-30 had higher levels of attitudes than those aged 51 and above, and the teachers aged 31-40 had higher scores than those aged 41-50, and those aged 51 and above. Although there was no statistically significant difference in the teachers' levels of attitudes based on professional experience, as the teachers' professional experience increased, their mean score in the distance education attitude scale showed steady decrease. This finding overlaps with the findings reported in Moçoşoğlu and Kaya (2020) and Özen and Baran (2020). Yahşi and Kırkıç (2020) also found that attitudes towards distance education decreased as professional experience increased.

The teachers' levels of attitudes towards distance education were found to significantly differ based on educational level. In the distance education attitude scale, the teachers holding an MA degree had higher scores than those with a two-year college degree or an undergraduate degree, while the teachers with a PhD degree had higher scores than those with a two-year college degree, an undergraduate degree or an MA degree. In other words, as the teachers' level of educational degree increased, their mean scores in the distance education attitude scale also increased. In a similar vein, Karaca et al. (2021) concluded that teachers with an MA degree had a more positive perception of distance education than those with an undergraduate degree. Likewise, Yahşi and Kırkıç (2020) also found that teachers' attitudes towards distance education differed based on education level, and that their attitudes towards distance education became more positive as their education level increased.

The teachers' attitudes towards distance education differed significantly based on the duration of online time spent daily, and as this duration increased, their mean scores in the distance education attitude scale also showed an increase. This is consistent with another study, Durmuş and Baş (2017), reporting that the awareness level of teachers about distance education increased as the duration of using technological devices such as computers, tablets and smart phones increased.

With the global epidemic, online and distance education options have been widely used to ensure the continuity of education and instruction. In this regard, teachers' digital competencies have become one of the variables that bring about differences in quality and scope of online and distance education practices. In this process, teachers' lack of digital readiness caused many limitations (Demirci,

2021). Distance education implemented during the pandemic was a process where digital competencies were, in a way, tested. Teachers with digital competence were able to employ different methods, techniques and materials in online courses, as in face-to-face teaching. However, those who did not have this competence had a lot of difficulties in this process.

The results of the correlation analysis conducted to identify whether there was a relationship between teachers' levels of digital literacy and their attitudes towards distance education revealed a positive, moderate and significant relationship between the teachers' digital literacy levels and their attitudes. The results reported in Yahşi and Kırkıç (2020) also indicate that as the technology usage of teachers improves, their attitudes towards distance education get better. Metin, Gürbey and Çevik (2021) reported that teachers generally had a negative view of distance education, were not able to use the technological tools and software employed in distance education, and thus experienced difficulties in the process. The results of the regression analysis performed to determine whether the teachers' digital literacy levels had a statistically significant predictive effect on their attitudes towards distance education demonstrated that their digital literacy levels were a significant predictor of their attitudes. Bakioğlu and Çevik (2020) concluded that the biggest problems faced by science teachers in distance education were related to basic digital competencies including hardware/software programs like the Internet connection, computer programs and how to use computers. In international surveys, most teachers indicate that they need support to improve their ICT skills (Demirci, 2021). Sezgin (2021) asserts that the problems experienced by educators, such as content development, and finding, learning, and using the right technologies, or ethical concerns due to the use of personal data, especially in the emergency distance education process, can be the basis for resistance and reluctance to distance education in the long term.

Recommendations

Based on the results of this study, there seems to be a need to develop positive attitudes in individuals in order to increase effectiveness in distance education and for this to be achieved, teachers' digital competencies need to be improved. In based on the results of the present study, the following suggestions can be offered:

For teachers to integrate digital technologies into their classes, their levels of digital competence should be determined at the beginning of each semester and their needs should be clearly defined. The number of in-service trainings on distance education and digital competencies can be increased so as to ensure teacher professional development and promote positive attitude towards distance education. It can also be suggested to create forums where information and experiences are shared about using technology in face-to-face and distance education and organize national and international teacher congresses to share good practices. Digital literacy and distance education can be added to teacher education programs as compulsory courses. Implementing hybrid education in schools affiliated to the Ministry of National Education, as in higher education, and continuing to teach various courses through distance learning can increase teachers' experience in digital competencies and distance education. Studies in the literature mostly focus on teacher candidates' attitudes towards distance education. Teacher candidates are students in the distance education process, not educators. Further studies should be conducted to examine the experiences and perceptions of in-service teachers in distance education.

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Genişletilmiş Türkçe Özet

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Öğretmenlerin Dijital Okuryazarlık Düzeyleri ile Uzaktan Eğitime Yönelik Tutumları Arasındaki İlişkinin İncelenmesi

Giriş

Bilim ve teknolojide yaşanan gelişmeler iletişimi kolaylaştırmış, bilgiye ulaşma yol ve yöntemlerini çeşitlendirerek hızlandırmıştır. Yaşanan değişim ve gelişmeler bireylerin sahip olması gereken yetkinlik ve becerileri de değiştirmiştir. Öğretmenlerin yenilikçi eğitim teknolojilerini iyi tanıyıp, pedagojik alan bilgileri ile bütünleştirerek öğrenciler için öğrenme fırsatları oluşturabilmesi dijital çağın gerektirdiği bir yeterlilik halini almıştır (Aksin 2020). Günümüzde öğretmenlerin, teknoloji hakkında kendilerinden çok daha fazla bilgi sahibi olan, teknoloji ile büyüyen bir öğrenci grubuna hitap edebilmesi için gelişen teknolojiye ayak uydurmaları ve teknolojiyi dersleriyle bütünleştirebilmeleri gerekmektedir. Bunun için ise öğretmenlerin dijital okuryazarlıklarının belirlenmesi önem taşımaktadır.

Uzaktan eğitim, öğretmen ve öğrencinin fiziksel olarak aynı ortamda bulunmasına gerek kalmadan internet ve bilgisayar aracılığıyla gerçekleştirilebilen bir eğitim uygulamasıdır. Covid-19 nedeniyle hızlı bir şekilde uygulamaya konulan uzaktan eğitim sürecinde bir yandan çocukların ve gençlerin sağlığını korumak diğer yandan eğitimin devam ettirilmesi amaçlanmıştır. Bu uygulamada bilgi iletişim teknolojilerinin kullanımı ön plana çıkmış, EBA platformu ve Zoom programı üzerinden çevrimiçi ve çevrimdışı dersler aracılığı ile eğitimin sürdürülmesine çalışılmıştır. Uzaktan eğitim süreci kullanıcıların bilgi ve iletişim teknolojilerini kullanma yeterliliklerini geliştirme zorunluluğunu ortaya çıkararak bir itici güç unsuru olmuştur.

Uzaktan eğitim sürecinde öğretmen ve öğrencilerin sahip oldukları dijital okuryazarlık becerilerinin düzeyi onların uzaktan eğitime yönelik algısını olumlu ya da olumsuz yönde etkileyen bir unsur olarak görülebilir. Literatür incelendiğinde öğretmenlerin dijital okuryazarlık düzeyleri ile

uzaktan eğitime ilişkin tutumları arasındaki ilişkinin incelendiği bir çalışmaya rastlanmamıştır. Öğretmenlerin dijital okuryazarlık düzeyleri ile uzaktan eğitime yönelik tutumları arasındaki ilişkiyi ortaya koymayı amaçlayan bu araştırmaya ilişkin alt problemler şunlardır:

1. Öğretmenlerin dijital okuryazarlık ve uzaktan eğitime yönelik tutumları hangi düzeydedir?

2. Öğretmenlerin dijital okuryazarlık düzeyleri ile uzaktan eğitime yönelik tutumları arasında ilişki var mıdır?

3. Öğretmenlerin dijital okuryazarlık düzeylerinin uzaktan eğitime ilişkin tutum düzeyleri üzerinde istatistiksel olarak anlamlı bir yordama etkisi var mıdır?

4. Öğretmenlerin dijital okuryazarlık düzeyleri cinsiyete, branşa, yaşa, eğitim düzeyine, mesleki kıdeme ve günlük çevrimiçi kaldıkları süreye göre farklılık göstermekte midir?

5. Öğretmenlerin uzaktan eğitime ilişkin tutum düzeyleri cinsiyete, branşa, yaşa, eğitim düzeyine, mesleki kıdeme ve günlük çevrimiçi kaldıkları süreye göre farklılık göstermekte midir?

Yöntem

Öğretmenlerin dijital okuryazarlık düzeyleri ile uzaktan eğitime yönelik tutumları arasındaki ilişkinin incelendiği bu araştırma bir ilişkisel (korelasyonel) tarama araştırmasıdır. Araştırma örneklemine dâhil edilen katılımcılar, kolay ulaşılabilir örnekleme yöntemiyle belirlenmiştir. Örneklemde yer alan katılımcılar, 2020-2021 eğitim-öğretim yılında İç Anadolu Bölgesindeki devlet okullarında, 10 farklı branşta görev yapan 919 öğretmenden oluşmaktadır. Veri toplama araçları olarak dijital okuryazarlık ölçeği ve uzaktan eğitim tutum ölçeği kullanılmıştır. Elde edilen verilerin normal dağılıp dağılmadığının incelenmesi için basıklık, çarpıklık ve Kolmogorov-Smirnov normallik testi değerlerine bakılmıştır. Verilerin normal dağıldığını belirledikten sonra öğretmen adaylarının dijital okuryazarlık düzeyleri ile uzaktan eğitime yönelik tutumları arasındaki ilişkileri belirlemek için regresyon ve Pearson korelasyon analizleri gerçekleştirilmiştir. Öğretmen adaylarının dijital okuryazarlık ölçeği ve uzaktan eğitim tutum ölçeğinden elde ettikleri puanların cinsiyete göre anlamlı bir farklılık oluşturup oluşturmadığı bağımsız örneklem t-testi; sınıf düzeyi ve gelir düzeyine göre anlamlı bir farklılık oluşturup oluşturmadığı ise tek yönlü ANOVA testi ile incelenmiştir.

Bulgular

Öğretmenlerin Dijital Okuryazarlık ve Uzaktan Eğitime Yönelik Tutumları Hangi Düzeydedir?

Öğretmenlerin dijital okuryazarlık ölçeği ve uzaktan eğitime yönelik tutum ölçeğinden aldığı puanlara ilişkin betimsel istatistikler incelendiğinde, öğretmenlerin (n=919) dijital okuryazarlık ölçeği puan ortalamalarının 103,04 olduğu görülmektedir. Öğretmenlerin ölçekten alabileceği en düşük puan 29, en yüksek puan ise 145'tir. 103,04 olan dijital okuryazarlık ölçeği puan ortalaması dikkate alındığında, öğretmenlerin dijital okuryazarlık düzeylerinin genel itibarıyla iyi düzeyde olduğu söylenebilir. Öğretmenlerin (n=919) uzaktan eğitim tutum ölçeği puan ortalamaları ise 55,27'dir. Uzaktan eğitim tutum ölçeğinden öğretmenlerin alabileceği en düşük puan 21, en yüksek puan ise 105'tir. Bu bağlamda düşünüldüğünde, öğretmenlerin uzaktan eğitime ilişkin tutumlarının orta düzeyde olduğu söylenebilir.

Öğretmenlerin Dijital Okuryazarlık Düzeyleri ile Uzaktan Eğitime Yönelik Tutumları Arasında İlişki Var Mıdır?

Öğretmenlerin dijital okuryazarlık düzeyleri ile uzaktan eğitime yönelik tutumları arasında ilişki olup olmadığını belirlemek amacıyla yapılan korelasyon analizi sonuçları incelendiğinde, öğretmenlerin dijital okuryazarlık düzeyleri ile uzaktan eğitime yönelik tutum puanları arasında pozitif yönlü ve orta düzeyde (r= .339, p <.01) anlamlı bir ilişki olduğu görülmektedir.

Öğretmenlerin Dijital Okuryazarlık Tutum Ölçeği Puan Ortalamalarının Uzaktan Eğitim Tutum Ölçeği Puan Ortalamaları Üzerinde İstatistiksel Olarak Anlamlı Bir Yordama Etkisi Var Mıdır?

Öğretmenlerin dijital okuryazarlık düzeylerinin uzaktan eğitime yönelik tutum düzeyleri üzerinde istatistiksel olarak anlamlı bir yordama etkisine sahip olup olmadığını belirlemek amacıyla gerçekleştirilen regresyon analizi sonuçları incelendiğinde, öğretmenlerin dijital okuryazarlık düzeylerinin, uzaktan eğitim tutum puanlarının istatistiksel olarak anlamlı bir yordayıcısı olduğu (R =.339, R^2 =.115, F = 118,787; P < .01) görülmektedir. Uzaktan eğitime ilişkin toplam varyansın %11'inin öğretmenlerin dijital okuryazarlık düzeyleri ile açıklandığı ifade edilebilir.

Öğretmenlerin Dijital Okuryazarlık Düzeyleri Cinsiyete, Branşa, Yaşa, Kıdeme, Eğitim Düzeyine ve Günlük Çevrim İçi Kalma Sürelerine Göre Farklılık Göstermekte Midir?

Öğretmenlerin dijital okuryazarlık düzeylerinin cinsiyete göre anlamlı farklılık gösterip göstermediğini belirlemek amacıyla gerçekleştirilen bağımsız örneklem t-testi sonuçlarına bakıldığında, öğretmenlerin dijital okuryazarlık düzeylerinin cinsiyete göre anlamlı bir farklılık gösterdiği görülmektedir [$t_{(917)}$=-5,161, p < .01]. Anlamlı farklılık erkek öğretmenlerin dijital okuryazarlık düzeyi puan ortalamalarının ($\bar{X}$=108,43; ss=18,20) kadın öğretmenlerin dijital okuryazarlık düzeyi puan ortalamalarından ($\bar{X}$=101,36; ss=17,49) daha yüksek olmasından kaynaklanmaktadır.

Öğretmenlerin dijital okuryazarlık düzeylerinin, görev yaptıkları branşa göre anlamlı farklılık gösterip göstermediğini belirlemek amacıyla yapılan tek yönlü varyans analizi (ANOVA) sonuçları incelendiğinde, öğretmenlerin dijital okuryazarlık düzeylerinin görev yaptıkları branşa göre istatistiksel olarak anlamlı bir şekilde farklılaşmadığı görülmektedir [$F_{(9\text{-}909)}$=1,866, p > .05]. İstatistiksel olarak anlamlı bir farklılık görülmemesine rağmen Rehberlik ($\bar{X}$=107,02; ss=20,39), Matematik ($\bar{X}$=106,71; ss=13,83), Sosyal Bilgiler ($\bar{X}$=106,52; ss=18,73) ve Özel Eğitim ($\bar{X}$=106,33; ss=18,14) branşlarında görev yapan öğretmenlerin dijital okuryazarlık düzeylerinin diğer branşlarda görev yapan öğretmenlere göre daha yüksek olduğu görülmektedir. Sınıf Öğretmenliği ($\bar{X}$=100,58; ss=18,42) ve Din Kültürü ve Ahlak Bilgisi Öğretmenliği ($\bar{X}$=101,97; ss=14,58) branşlarında görev yapan öğretmenlerin dijital okuryazarlık düzeylerinin ise diğer branşlarda görev yapan öğretmenlerden daha düşük düzeyde olduğu söylenebilir.

Öğretmenlerin dijital okuryazarlık düzeylerinin yaşa göre anlamlı farklılık gösterip göstermediğini belirlemek için gerçekleştirilen tek yönlü varyans analizi (ANOVA) sonuçları incelendiğinde, öğretmenlerin dijital okuryazarlık düzeylerinin yaşa göre istatistiksel olarak anlamlı farklılık gösterdiği görülmektedir [$F_{(3\text{-}915)}$=15,019, p < .01]. Anlamlı farkın hangi değişken kategorilerinden kaynaklandığını belirlemek amacıyla yapılan Post Hoc testi sonucunda, görülen anlamlı fark, 20-30 ($\bar{X}$=108,05; ss=15,26) ile 31-40 ($\bar{X}$=106,60; ss=17,35) yaş aralığında olan

öğretmenlerin dijital okuryazarlık düzeylerinin, 41-50 ($\bar{X}$=100,39; ss=18,35) ile 51 ve üzeri ($\bar{X}$=97,68; ss=17,64) yaş aralığında olan öğretmenlerden daha yüksek olmasından kaynaklanmaktadır.

Öğretmenlerin dijital okuryazarlık düzeylerinin kıdeme göre anlamlı farklılık gösterip göstermediğini belirlemek için yapılan tek yönlü varyans analizi (ANOVA) sonuçlarına göre, öğretmenlerin dijital okuryazarlık düzeyleri kıdeme göre istatistiksel olarak anlamlı farklılık gösterdiği görülmektedir [$F_{(4\text{-}914)}$=9,412, p < .01]. Gerçekleştirilen Bonferroni testi sonucunda, anlamlı farklılığın 1-5 yıl ($\bar{X}$=108,68; ss=15,54), 6-10 yıl ($\bar{X}$=107,39; ss=18,39), 11-15 yıl ($\bar{X}$=104,39; ss=16,78) ve 16-20 yıl ($\bar{X}$=103,38; ss=17,59) arası kıdeme sahip öğretmenlerin 21 yıl ve üzeri ($\bar{X}$=99,13; ss=18,10) kıdeme sahip öğretmenlerden; 1-5 yıl ($\bar{X}$=108,68; ss=15,54) ve 6-10 yıl ($\bar{X}$=107,39; ss=18,39) arası kıdeme sahip öğretmenlerin ise 16-20 yıl ($\bar{X}$=103,38; ss=17,59) arası kıdeme sahip öğretmenlerden daha yüksek dijital okuryazarlık düzeyine sahip olmasından kaynaklandığı görülmektedir. Veriler doğrultusunda öğretmenlerin mesleki kıdemleri arttıkça dijital okuryazarlık düzeyi puan ortalamalarının düşüş gösterdiği söylenebilir.

Öğretmenlerin eğitim düzeylerine göre dijital okuryazarlık düzeylerinin istatistiksel olarak anlamlı farklılık gösterip göstermediğini belirlemek için yapılan tek yönlü varyans analizi (ANOVA) sonuçları, öğretmenlerin dijital okuryazarlık düzeylerinin eğitim düzeylerine göre istatistiksel olarak anlamlı farklılaştığını göstermektedir [$F_{(3\text{-}915)}$=15,332, p < .01]. Görülen bu anlamlı farklılık yüksek lisans ($\bar{X}$=110,92; ss=18,66) mezunu öğretmenlerin ön lisans ($\bar{X}$=98,25; ss=14,62) ve lisans ($\bar{X}$=101,81; ss=17,45) mezunu olanlardan; doktora ($\bar{X}$=124,26; ss=15,40) mezunu olan öğretmenlerin ise ön lisans ($\bar{X}$=98,25; ss=14,62), lisans ($\bar{X}$=101,81; ss=17,45) ve yüksek lisans ($\bar{X}$=110,92; ss=18,66) mezunu olanlardan daha yüksek dijital okuryazarlık düzeyine sahip olmalarından kaynaklanmaktadır. Bir başka ifadeyle öğretmenlerin eğitim düzeyi arttıkça dijital okuryazarlık düzeyi puan ortalamalarının da artış gösterdiği söylenebilir.

Öğretmenlerin dijital okuryazarlık düzeylerinin günlük çevrim içi kalma sürelerine göre istatistiksel olarak anlamlı farklılık gösterip göstermediğine ilişkin sonuçlar incelendiğinde, öğretmenlerin dijital okuryazarlık düzeylerinin günlük çevrim içi kalma sürelerine göre istatistiksel olarak anlamlı farklılık gösterdiği görülmektedir [$F_{(3\text{-}915)}$=5,084, p < .01]. Anlamlı farkın hangi kategorilerinden kaynaklandığını belirlemek amacıyla yapılan Post Hoc testi sonucunda farklılığın, 1-2 saat ($\bar{X}$=101,31; ss=17,81) ve 2-5 saat ($\bar{X}$=103,29; ss=17,75) çevrim içi kalan öğretmenlerin 1 saatten az ($\bar{X}$=94,95; ss=17,56) çevrim içi kalan öğretmenlerden; 5 saat ve üzeri ($\bar{X}$=105,22; ss=17,88) çevrim içi kalan öğretmenlerin ise 1 saatten az ($\bar{X}$=94,95; ss=17,56) ve 1-2 saat ($\bar{X}$=101,31; ss=17,81) çevrim içi kalan öğretmenlerden dijital okuryazarlık düzeylerinin daha yüksek olmasından kaynaklanmaktadır.

Öğretmenlerin Uzaktan Eğitim Tutum Düzeyleri Cinsiyete, Branşa, Yaşa, Kıdeme, Eğitim Düzeyine ve Günlük Çevrim İçi Kalma Sürelerine Göre Farklılık Göstermekte Midir?

Öğretmenlerin uzaktan eğitime yönelik tutumlarının cinsiyete göre anlamlı farklılık gösterip göstermediğini belirlemek amacıyla gerçekleştirilen bağımsız örneklem t-testi sonuçları, öğretmenlerin uzaktan eğitime yönelik tutumlarının cinsiyete göre istatistiksel olarak anlamlı farklılaştığını göstermektedir [$t_{(917)}$=-4,996, p < .05]. Bu anlamlı fark, erkek öğretmenlerin uzaktan eğitime yönelik tutum puanlarının ($\bar{X}$=54,01; ss=12,94) kadın öğretmenlerin uzaktan eğitime yönelik tutum puanlarından ($\bar{X}$=59,35; ss=16,26) daha yüksek olmasından kaynaklanmaktadır.

Öğretmenlerin uzaktan eğitime ilişkin tutum düzeylerinin, görev yaptıkları branşa göre anlamlı farklılık gösterip göstermediğini belirlemek amacıyla yapılan tek yönlü varyans analizi (ANOVA) sonuçları incelendiğinde, öğretmenlerin uzaktan eğitim tutum düzeylerinin görev yaptıkları branşa göre istatistiksel olarak anlamlı bir şekilde farklılaştığı görülmektedir [$F_{(9\text{-}909)}$=4,060, p < .01]. Yapılan Post Hoc testi sonucunda bu anlamlı fark, Sosyal Bilgiler ($\bar{X}$=62,42; ss=15,15), Yabancı Dil ($\bar{X}$=57,56; ss=16,05), Matematik ($\bar{X}$=57,98; ss=12,83) ve Rehberlik ($\bar{X}$=59,57; ss=11,05) branşlarında görev yapan öğretmenlerin uzaktan eğitime ilişkin tutum düzeyi puan ortalamalarının diğer branşlarda görev yapan öğretmenlerden yüksek olmasından kaynaklanmaktadır.

Öğretmenlerin uzaktan eğitim tutum düzeylerinin yaşa göre anlamlı farklılık gösterip göstermediğini belirlemek amacıyla yapılan tek yönlü varyans analizi (ANOVA) sonuçları incelendiğinde, öğretmenlerin uzaktan eğitim tutum düzeylerinin yaşa göre istatistiksel olarak anlamlı farklılık gösterdiği görülmektedir [$F_{(3\text{-}915)}$=3,533, p < .05]. Elde edilen bu anlamlı fark, 20-30 yaş ($\bar{X}$=57,05; ss=12,53) aralığında olan öğretmenlerin 51 ve üzeri ($\bar{X}$=53,24; ss=13,23) yaş aralığında olan öğretmenlerden; 31-40 ($\bar{X}$=56,72; ss=14,58) yaş aralığında olan öğretmenlerin ise 41-50 yaş ($\bar{X}$=54,22; ss=14,07) aralığı ile 51 ve üzeri ($\bar{X}$=53,24; ss=13,23) yaş aralığında olan öğretmenlerden dijital okuryazarlık düzeylerinin daha yüksek olmasından kaynaklanmaktadır.

Öğretmenlerin uzaktan eğitim tutum düzeylerinin kıdeme göre anlamlı farklılık göstermediğine ilişkin tek yönlü varyans analizi (ANOVA) sonuçları incelendiğinde, öğretmenlerin uzaktan eğitime ilişkin tutum düzeylerinin kıdemlerine göre istatistiksel olarak anlamlı bir farklılık göstermediği görülmektedir [$F_{(4\text{-}914)}$=2,337, p > .05]. İstatistiksel olarak anlamlı bir farklılık görülmemesine rağmen, öğretmenlerin kıdemleri arttıkça uzaktan eğitim tutum düzeyi puan ortalamalarının da düzenli olarak düşüş gösterdiği söylenebilir.

Öğretmenlerin eğitim düzeylerine göre uzaktan eğitime ilişkin tutumlarının istatistiksel olarak anlamlı farklılık gösterip göstermediğini belirlemek için yapılan tek yönlü varyans analizi (ANOVA) verileri, öğretmenlerin uzaktan eğitim tutum düzeylerinin eğitim düzeylerine göre istatistiksel olarak anlamlı farklılaştığını göstermektedir [$F_{(3\text{-}915)}$=16,563, p < .01]. Görülen bu anlamlı farklılık yüksek lisans ($\bar{X}$=60,72; ss=13,84) mezunu öğretmenlerin ön lisans ($\bar{X}$=53,06; ss=10,84) ve lisans ($\bar{X}$=54,32; ss=13,60) mezunu olanlardan; doktora ($\bar{X}$=74,73; ss=16,25) mezunu olan öğretmenlerin ise ön lisans ($\bar{X}$=53,06; ss=10,84), lisans ($\bar{X}$=54,32; ss=13,60) ve yüksek lisans ($\bar{X}$=60,72; ss=13,84) mezunu olanlardan daha yüksek uzaktan eğitim tutum düzeyine sahip olmalarından kaynaklanmaktadır. Bir başka ifadeyle öğretmenlerin eğitim düzeyi arttıkça uzaktan eğitime ilişkin tutum düzeyi puan ortalamalarının da artış gösterdiği söylenebilir.

Öğretmenlerin uzaktan eğitim tutum düzeylerinin günlük çevrim içi kalma sürelerine göre istatistiksel olarak anlamlı farklılık gösterip göstermediğine ilişkin veriler incelendiğinde, öğretmenlerin uzaktan eğitim tutum düzeylerinin günlük çevrim içi kalma sürelerine göre istatistiksel olarak anlamlı farklılık gösterdiği görülmektedir [$F_{(3\text{-}915)}$=9,422, p < .01]. Anlamlı farkın hangi kategorilerinden kaynaklandığını belirlemek amacıyla yapılan Post Hoc testi sonucunda farklılığın, 1-2 saat ($\bar{X}$=53,15; ss=13,44), 2-5 saat ($\bar{X}$=55,85; ss=13,22) ile 5 saat ve üzeri ($\bar{X}$=57,32; ss=14,67) çevrim içi kalan öğretmenlerin 1 saatten az ($\bar{X}$=46,77; ss=14,84) çevrim içi kalan öğretmenlerden; 2-5 saat ($\bar{X}$=55,85; ss=13,22) ile 5 saat ve üzeri ($\bar{X}$=57,32; ss=14,67) çevrim içi kalan öğretmenlerin 1 saatten az ($\bar{X}$=46,77; ss=14,84) ve 1-2 saat ($\bar{X}$=53,15; ss=13,44) çevrim içi kalan öğretmenlerden uzaktan eğitim tutum düzeylerinin daha yüksek olmasından kaynaklandığı görülmektedir. Tablodaki veriler sonucunda

öğretmenlerin günlük çevrim içi kalma süreleri arttıkça uzaktan eğitim tutum düzeyi puan ortalamalarının da düzenli bir artış gösterdiği söylenebilir.

Tartışma ve Sonuç

Araştırmada ilk olarak öğretmenlerin dijital okuryazarlık düzeyleri belirlenmiş ve bu düzey cinsiyet, yaş, branş, mesleki kıdem değişkenleri açısından karşılaştırılmıştır. Araştırmada, öğretmenlerin dijital okuryazarlık düzeylerinin genel itibarıyla iyi düzeyde olduğu, bu düzeyin cinsiyete göre erkek öğretmenler lehine anlamlı bir farklılık gösterdiği belirlenmiştir. Yontar (2019) ve Rizal, Setiawan ve Rusdiana (2018) tarafından yapılan araştırmalarda da öğretmen adaylarının dijital okuryazarlık düzeyinin orta düzeyde olduğu, Arslan (2019) tarafından yapılan araştırmada öğretmenlerin dijital okuryazarlık ortalama puanlarının yüksek düzeyde olduğu belirlenmiştir. Yine araştırma bulguları ile örtüşen Çam ve Kıyıcı (2017), Özerbaş ve Kuralbayeva (2018) ve Yontar (2019) tarafından yapılan çalışmalarda erkek öğretmen adaylarının dijital okuryazarlık düzeylerinin kadın öğretmen adaylarınınkinden daha yüksek olduğu belirlenmiştir. Bu durumun, erkeklerin teknolojik araç ve gelişmelere kadınlara göre daha fazla merak ve ilgi duymalarından kaynaklanabileceği ifade edilmiştir.

Öğretmenlerin dijital okuryazarlık düzeylerinin, görev yaptıkları branşa göre istatistiksel olarak anlamlı bir şekilde farklılaşmadığı ancak Rehberlik, Matematik, Sosyal Bilgiler ve Özel Eğitim branşlarında görev yapan öğretmenlerin dijital okuryazarlık düzeylerinin diğer branşlarda görev yapan öğretmenlere göre daha yüksek olduğu görülmüştür. Arslan'ın (2019) yaptığı araştırmada öğretmenlerin dijital okuryazarlık düzeylerinin branşa göre farklılaştığı belirlenmiş, bilişim, matematik ve fen bilgisi öğretmenlerinin düzeylerinin diğer branşlara göre daha yüksek olduğu bulunmuştur. Aksoy, Karabay ve Aksoy (2021) tarafından yapılan çalışmada sınıf öğretmenlerinin kendilerini yüksek düzeyde dijital okuryazar gördükleri sonucuna ulaşılmıştır. Sonuçların farklılığı, örneklem farklılığı ile açıklanabilir. Öğretmenlerin dijital okuryazarlık düzeylerinin düşük yaş gruplarında daha yüksek olduğu görülmüştür. Aksoy, Karabay ve Aksoy (2021) ve Aslan (2019) tarafından yapılan çalışmalarda da öğretmenlerin yaşı arttıkça dijital okuryazarlık düzeyinin azaldığı görülmüştür. Bu durum, dijital göçmen olarak adlandırılabilen öğretmenlerin günümüz gençlerine oranla teknolojiye uyum sağlamakta zorlanmaları ile açıklanabilir. Öğretmenlerin dijital okuryazarlık düzeyleri, lisansüstü eğitim derecesine sahip öğretmenlerin lehine anlamlı farklılık göstermiştir. Aksoy, Karabay ve Aksoy (2021) tarafından yapılan çalışmada da lisansüstü eğitime sahip öğretmenlerin dijital okuryazarlık düzeylerinin diğer öğrenim düzeyindeki öğretmenlere kıyasla daha yüksek bulunmuştur. Günlük çevrimiçi kalma süresi yüksek olan öğretmenlerin dijital okuryazarlık düzeylerinin daha yüksek olduğu belirlenmiştir. Bu sonuç Yaman (2019) ve Özerbaş ve Kuralbayeva (2018) tarafından gerçekleştirilen araştırma sonuçları ile örtüşmektedir. Her iki çalışmada da internet kullanma süresi ve sıklığının öğretmen adaylarının dijital okuryazarlık düzeyleri üzerinde etkili bir değişken olduğu sonucuna ulaşılmıştır.

Araştırmanın diğer bir bağımlı değişkeni öğretmenlerin uzaktan eğitim tutum düzeyleridir. Öğretmenlerin uzaktan eğitim tutumlarının orta düzeyde olduğu ve bu tutumun cinsiyete göre istatistiksel olarak erkeklerin lehine anlamlı farklılaştığı görülmüştür. Baek, Zhang ve Yun (2017) ile Moçoşoğlu ve Kaya'nın (2020) çalışmalarında öğretmenlerin uzaktan eğitime yönelik tutum düzeylerinin düşük olduğu belirlenmiştir. Ülkü'nün (2018) çalışmasında ise ilkokullarda görev yapan öğretmenlerin uzaktan eğitime yönelik tutumlarının orta seviyede olduğu ancak daha çok olumsuz yönde bir tutuma sahip oldukları ifade edilmiştir.

Sosyal Bilgiler, Yabancı Dil, Matematik ve Rehberlik branşlarında görev yapan öğretmenlerin uzaktan eğitim tutum düzeyleri diğer branşlara göre daha yüksektir. Baek, Zhang ve Yun (2017) tarafından yapılan çalışmada ise dil öğretmenlerinin diğer branşlara göre daha yüksek bir tutuma sahip oldukları görülmüştür. 20-30 yaş aralığında olan öğretmenlerin 51 ve üzeri yaş aralığında olan öğretmenlerden; 31-40 yaş aralığında olan öğretmenlerin ise 41-50 yaş aralığı ile 51 ve üzeri yaş aralığında olan öğretmenlerden uzaktan eğitime ilişkin tutum düzeyi puanlarının daha yüksek olduğu görülmüştür. Bu bulgu, Moçoşoğlu ve Kaya'nın (2020) ve Özen ve Baran'ın (2020) araştırma sonuçları ile örtüşmektedir. Yahşi ve Kırkıç da (2020) mesleki kıdem yükseldikçe uzaktan eğitim tutumunun azaldığı yönünde sonuçlar elde etmişlerdir. Yüksek lisans mezunu öğretmenlerin ön lisans ve lisans mezunu olanlardan; doktora mezunu olan öğretmenlerin ise ön lisans, lisans ve yüksek lisans mezunu olanlardan daha yüksek uzaktan eğitim tutum düzeyine sahip oldukları görülmüştür. Bu bulgu öğretmenlerin eğitim düzeyi arttıkça uzaktan eğitime ilişkin tutum düzeyi puan ortalamalarının da artış gösterdiği şeklinde yorumlanabilir. Karaca ve arkadaşlarının (2021) yaptıkları çalışmada yüksek lisans mezunu öğretmenlerin lisans mezunu öğretmenlerden daha olumlu bir uzaktan eğitim algılarının olduğu sonucuna ulaşılmıştır. Yahşi ve Kırkıç da (2020) yaptıkları araştırmada öğretmenlerin uzaktan eğitime yönelik tutumlarının öğrenim düzeyi değişkenine göre farklılaştığı, öğretmenlerin eğitim düzeyi yükseldikçe uzaktan eğitim konusundaki tutumlarının daha olumlu olduğu sonucuna ulaşmışlardır. Öğretmenlerin uzaktan eğitim tutum düzeylerinin günlük çevrimiçi kalma sürelerine göre istatistiksel olarak anlamlı farklılık gösterdiği, günlük çevrimiçi kalma süreleri arttıkça uzaktan eğitim tutum düzeyi puan ortalamalarının da düzenli bir artış gösterdiği sonucuna ulaşılmıştır. Durmuş ve Baş'ın (2017) araştırmasındaki bilgisayar, tablet ve akıllı telefon gibi bilişim cihazlarını kullanma süresi arttıkça öğretmenlerin uzaktan eğitime ilişkin farkındalık düzeyinin arttığı sonucu, araştırmanın bulguları ile örtüşmektedir.

Araştırmada öğretmenlerin dijital okuryazarlık düzeyleri ile uzaktan eğitime yönelik tutum puanları arasında pozitif yönlü ve orta düzeyde anlamlı bir ilişki olduğu görülmüştür. Yahşi ve Kırkıç'ın (2020) araştırma sonuçları da öğretmenlerin teknoloji kullanım düzeyi iyileştikçe uzaktan eğitim tutumunun yükseldiği yönündedir. Araştırma sonucunda öğretmenlerin dijital okuryazarlık düzeylerinin, uzaktan eğitim tutum puanlarının istatistiksel olarak anlamlı bir yordayıcısı olduğu belirlenmiştir. Bakioğlu ve Çevik (2020) tarafından yapılan çalışmada fen bilimleri öğretmenlerinin uzaktan eğitimde yaşadıkları en büyük problemlerinin bilgisayarla ilgili olarak yazılım/donanım problemleri; internet bağlantısı, bilgisayar programları, bilgisayar aksanları ve bilgisayarı nasıl kullanacaklarını bilmeme gibi genel dijital yetkinlik düzeyleri olduğu sonucuna ulaşılmıştır.

Öneriler

Araştırma sonuçlarından hareketle uzaktan eğitimde başarının arttırılması için olumlu tutumun geliştirilmesine ve bunun gerçekleştirilebilmesi için de öğretmenlerin dijital yeterliliklerinin geliştirilmesine ihtiyaç duyulduğu söylenebilir. Bu kapsamda yapılabilecek öneriler şunlardır:

Öğretmenlerin dijital teknolojiyi dersleriyle bütünleştirebilmeleri için her yılın başında dijital yeterlilik düzeyleri belirlenmeli ve ihtiyaçları net olarak tanımlanmalıdır. Öğretmenlerin dijital yeterliliklerinin geliştirilmesi, uzaktan eğitime yönelik olumlu tutumun arttırılması için uzaktan eğitim ve dijital yetkinlik konusunda hizmetiçi eğitimlerin sayısı arttırılabilir. Yüz yüze eğitimde ve uzaktan eğitimde teknolojiyi kullanma konusunda bilgi ve deneyimlerin paylaşıldığı forumlar oluşturulması, örnek uygulamaların paylaşılabilmesi için düzenli olarak ulusal ve uluslararası öğretmen kongrelerinin

yapılması önerilebilir. Öğretmen eğitimi programlarına dijital okuryazarlık dersi ve uzaktan eğitim dersi zorunlu ders olarak eklenebilir. Milli Eğitim Bakanlığına bağlı okullarda da yükseköğretimde olduğu gibi hibrit eğitime geçilerek bazı derslerin uzaktan eğitimle yapılmaya devam edilmesi dijital yeterlilik ve uzaktan eğitim konusunda deneyimi arttırabilir. Yapılan çalışmalar genellikle öğretmen adaylarının uzaktan eğitime ilişkin tutumlarının incelendiği çalışmalardır. Öğretmen adayı uzaktan eğitim sürecinde eğitimci değil öğrenci konumundadır. Hizmet sürecindeki öğretmenlerin uzaktan eğiteme yönelik deneyimlerinin ve algılarının incelendiği çalışmalara daha fazla yer verilmelidir.