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Did teachers' digital literacy levels affect distance education during the covid-19 pandemic in Türkiye?

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ABSTRACT

Aim: This study, it is aimed to examine the attitudes of teachers in Türkiye towards distance education applications, which have become a critical need during the pandemic process, and the effect of their digital literacy levels on this situation.

Materials and Methods: The research is a cross-sectional - analytical type of observational study. The research universe consists of teachers working at pre-school, primary, secondary, and high school education levels in Türkiye. The data were collected online via 'Google forms', with an online questionnaire with a total of 43 questions about distance education, including the Digital Literacy Scale.

Results: It was carried out with 748 teachers, 451 women and 297 men. According to the results of multivariate regression and path analysis, the increase in teachers' digital literacy levels and age increases the distance education attitude level. In addition, the distance education attitude levels of teachers working in high schools were found to be lower.

Conclusion: The trainings to be given to improve the digital literacy levels of teachers will increase their adaptation to distance education.

Key Words: Distance education, digital literacy, teacher, COVID-19 pandemic.

1. INTRODUCTION

The definition of education appears in the dictionary as "helping new generations to acquire the necessary knowledge, skills, and understandings to take their place in social life and to develop their personalities" (1). In the most general sense, distance education is described in the literature as "a carefully designed instructional plan, where the student and the teacher are in separate environments; but, when necessary, it is defined as 'educational activities provided by face-to-face interviews' (2). In addition, technology in the literature; is seen as an essential way to motivate teachers to try, implement and improve new approaches to learning and teaching (3).

The COVID-19 pandemic has led to an increase in the use of technology by teachers. Schools were closed in 188 countries due to the pandemic, and educational activities were interrupted. According to the UNESCO report, it is estimated that more than 1.5 billion students (91% of the world's school population) are affected by this crisis (4). Many countries seeking answers to this problem have tried to continue their educational activities with distance education. Türkiye is one of these countries. After the first case in the country was seen on March 11, 2020, education was suspended in primary and secondary schools and high schools as of March 16, 2020. As of March 23, 2020, students have started to continue their lessons

with distance education (5). Although it is not the first distance education experience in Türkiye, it has been applied for the first time in such a broad framework.

While the first distance education steps in Türkiye were taken in 1927, "learning by letter" applications date to 1956 and the first web-based applications to the 90s (6–8). An essential factor facilitating adaptation and access to the distance education system in Türkiye during the pandemic period is the infrastructure previously created with projects to use technology in education (9). Education and training activities in the country were continued briefly, both on television and online (5). However, adaptation to the transition process has affected teachers and students. This kind of education system, which especially requires digital tools, brings the concept of digital literacy to the schedule. In this crisis environment, the adaptation of teachers, who are the implementers of the system, to distance education, their attitudes towards distance education, and their digital literacy levels are important factors affecting the process.

From this point of view, with this study, teachers serving at compulsory education levels in Türkiye; The study aimed to examine the attitudes towards distance education and the effect of digital literacy levels on this situation during the pandemic process.

2. MATERIALS AND METHODS

2.1. Participants

Teachers working in compulsory education levels in Türkiye in January 2021 are the universe of the cross-sectional study. Compulsory education in Türkiye within the scope of the law no. 6287 dated 30/03/2012; It consists of four years of primary school, four years of secondary school, and four years of high school education (10). Inclusion criteria for the study; the profession of the individual was to be a teacher and serve in one of the compulsory education levels in Türkiye. According to the Ministry of National Education data for the 2019-2020 academic year, 1,117,686 teachers serve at compulsory education levels in Türkiye, including public-private and open education (11). The sample size of the study was calculated using the OpenEpi program. The population was accepted as 1,117,686, the prevalence was 50%, the confidence interval was 95%, the deviation was 5%, the pattern effect was 1, and the sample size was calculated as 384. The study was completed with 748 teachers, 451 women, and 297 men.

2.2. Data Collection

The data were collected online using 'Google forms' with 43 questions, including a digital literacy scale, prepared by the researchers. The first part of the questionnaire consists of questions to determine the sociodemographic characteristics (age, gender, marital status, region of residence, graduated faculty, educational institution, and level of the teacher). The second part consists of questions to determine teachers' distance education attitudes and digital literacy levels.

2.2.1. Distance Education Attitudes

To evaluate the attitudes of teachers towards distance education, 6 questions scored between 1-10 were asked, and the mean of the total score given to these questions was used. These questions are; The usefulness and necessity of distance education, adaptation to distance education and teaching, students' adaptation to distance education courses, students' adaptation to doing the assigned homework, and the teacher's success in controlling this homework was scored (Table 1).

Table 1. Items related to distance education attitude.

What do you think about distance education conducted during the COVID 19 pandemic?*	**Mean (SD)**
Benefit level of distance education	5.57 (1.89)
Necessity level of distance education	7.20 (2.23)
Adaptation of the teacher to distance education	7.97 (1.69)
Adaptation of students to distance education	5.80 (2.07)
Students' adaptation to homework in the distance education process	5.07 (2.21)
The compliance of the teacher to check homework in the distance education process	4.71 (2.32)
Total Distance Education Attitude Score	**6.05 (1.27)**

Note. SD: Standart Deviation, Min-max:1-10 for each item.
**As a result of the analysis of variance (general linear model-post hoc bonferroni), all items were statistically significantly (<0.001) different from each other, except for the difference between 5-6 items (p=0.101).*

2.2.2. Digital Literacy Scale

To measure the digital literacy level of teachers, the Digital Literacy Scale (DLS) consists of 17 items and 4 sub-dimensions (attitude, technical, cognitive, and social) developed by Ng (2012) and adapted into Turkish by Hamutoğlu et al. was used (12,13). The scale has no reverse-scored items. A 5-point Likert-type rating was used as strongly agree-5, strongly disagree-1. The mean score obtained from the scale was used in the analyses. The increase in the mean score of DLS; indicates high digital literacy. The adapted scale's Cronbach Alpha internal consistency coefficient is 0.93, and the test-retest reliability is 0.98 (13).

2.3. Data Analysis

The data were analyzed using IBM SPSS 22 and AMOS 24 package program. Descriptive statistics (number, percentage, mean, standard deviation), independent groups t-test, one-way ANOVA, Pearson correlation, linear regression analyses (Backward LR method), and path analyses were applied. Variables with $p<0.250$ in univariate analyzes were included in the regression model. Significant predictors ($p<0.05$) in the regression model were included in the path analysis. Ethics committee approval dated 26.01.2021 and numbered 37 was obtained from the Clinical Research Ethics Committee of the Süleyman Demirel University, Faculty of Medicine.

3. RESULT

This study was conducted on teachers working in compulsory education levels in Türkiye; 60.3% of the teachers included in the research were women, 77.9% were married, 76.9% were education faculty graduates, and 42.9% were living in the Mediterranean region, and their mean age was 39.04 (SD: 8.87) years. Most of the teachers (92.4%) work as civil servants and 4.4% of them serve at pre-school level, 21.8% at primary school, 40.6% at secondary school, and 33.2% at high school level.

The average teaching experience years of the teachers were 14.40 (SD: 9.04, min-max: 0 - 42), and their weekly lesson hours were 24.22 (SD: 8.18, min-max: 0 - 50). During the pandemic process, it was seen that 98.4% of the teachers taught their lessons through distance education, and 83.0% preferred distance education in all their lessons. The teachers spent a mean of 3.69 (SD: 2.04, min-max: 0 - 12) hours per day at the computer/tablet and 1.97 (SD: 1.77, min -max: 0 - 12) hours at the mobile phone for distance education. Except for distance education, these hours were 1.39 (SD: 1.52, min-max: 0 - 12) hours at the computer/tablet and 1.97 (SD: 1.46, min-max: 0 - 16) hours at the mobile phone. When teachers' experience of using distance education was questioned, only 3.9% knew about distance education and used it actively in their lessons before the pandemic. On the other hand, more than half (53.2%) were aware of distance education for the first time during the pandemic and used it in their lessons. The two programs most frequently used by teachers for distance education were EBA-TR (Education information network) (80.3%) and Zoom (94.3%) (Table 2).

In the analyses, there was no significant difference in distance education attitude regarding gender, educational institution, distance education experience, and frequency of using distance education in lessons ($p>0.05$). On the other hand, the attitude scores of those who were married were significantly higher than those who were single (p:0.026), those who lived in the Mediterranean region than the residents of other regions (p:0.040), and those who graduated from the faculty of education were significantly higher than those who graduated from different faculties (p:0.032).

Again, the stage of education worked was a significant predictor of the distance education attitude score. According to the posthoc analysis, the significant difference was between high school and other stages ($p<0.001$) (Table 2).

Table 2. The teachers' sociodemographic characteristics and the effect of these variables on the attitude towards adaptation to distance education.

		n (%)	DEA Mean (SD)	p
Variables				
Gender	Male	297 (39.7)	5.96 (1.19)	0.101
	Female	451 (60.3)	6.11 (1.31)	
Marital Status	Married	583 (77.9)	6.11 (1.25)	**0.026**
	Single	165 (22.1)	5.86 (1.31)	
Region	The Mediterranean region	321 (42.9)	6.16 (1.34)	**0.040**
	Other regions	427 (57.1)	5.97 (1.21)	
Graduated faculty	Faculty of Education	575 (76.9)	6.11 (1.23)	**0.032**
	Other faculty (science and literature faculty etc.)	173 (23.1)	5.87 (1.37)	
Educational institution	Public	691 (92.4)	6.07 (1.23)	0.241
	Private	57 (7.6)	5.82 (1.60)	
Educational stage	Pre-school	33 (4.4)	6.34 (1.22)	
	Primary school	163 (21.8)	6.42 (1.32)	**<0.001**
	Middle School	304 (40.6)	6.12 (1.15)	
	High school*	248 (33.2)	5.70 (1.29)	
Frequency of using distance education in lessons	In all lessons	621 (83.0)	6.07 (1.23)	
	Generally	74 (9.9)	5.90 (1.42)	0.341
	Sometimes	41 (5.5)	6.24 (1.44)	
	None	12 (1.6)	5.63 (1.48)	
Distance education experience before the COVID-19 pandemic	No knowledge	398 (53.2)	6.00 (1.32)	
	Knew but had no experience	321 (42.9)	6.14 (1.21)	
	Knew and experienced	29 (3.9)	5.94 (1.09)	0.301
Total		748 (100)	6.05 (1.27)	

According to the Pearson correlation analysis, there was a positive low-moderate significant relationship between the attitude score and age, years of work in the profession, and digital literacy level. There was a negative and weakly significant relationship between the time spent with a mobile phone other than distance education and the positive attitude towards distance education. In addition, no significant association was found between distance education attitude and weekly lesson hours, time spent with a PC/ tablet for distance education or except distance education, and time spent with a mobile phone for distance education (Table 3).

Table 3. Univariate regression and correlation results of interval variables affecting distance education attitude score.

	Mean±SD (min-max)	DEA	
		Beta (%95 GA),	r (p)
Digital literacy level (point)	3.54 ± 0.95 (1 - 5)	-0.155 (-0.341 – 0.030)	0.119 (**0.001**)
Age (years)	39.04 ± 8.88 (22 - 63)	0.015 (0.005 – 0.026)	0.107 (**0.003**)
Teaching experience (years)	14.40 ± 9.04 (0 - 42)	0.013 (0.003 – 0.023)	0.096 (**0.008**)
Weekly lesson hours	24.22 ± 8.18 (0 - 50)	-0.002 (-0.013 – 0.009)	-0.014 (0.694)
Time spent with a PC/ tablet for distance education (hours/days)	3.69 ± 2.04 (0 - 12)	0.038 (-0.007 – 0.083)	0.061 (0.095)
Time spent with a mobile phone for distance education (hours/days)	1.97 ± 1.77 (0 - 12)	-0.020 (-0.071 – 0.031)	-0.028 (0.444)
Time spent with /tablet outside of distance education (hours/days)	1.39 ± 1.52 (0 - 12)	-0.033 (-0.093 – 0.027)	-0.040 (0.276)
Time spent with a mobile phone outside of distance education (hours/days)	1.97 ± 1.46 (0 - 16)	-0.088 (-0.150 – -0.026)	-0.102 (**0.005**)

Note. DEA = Distance Education Attitude

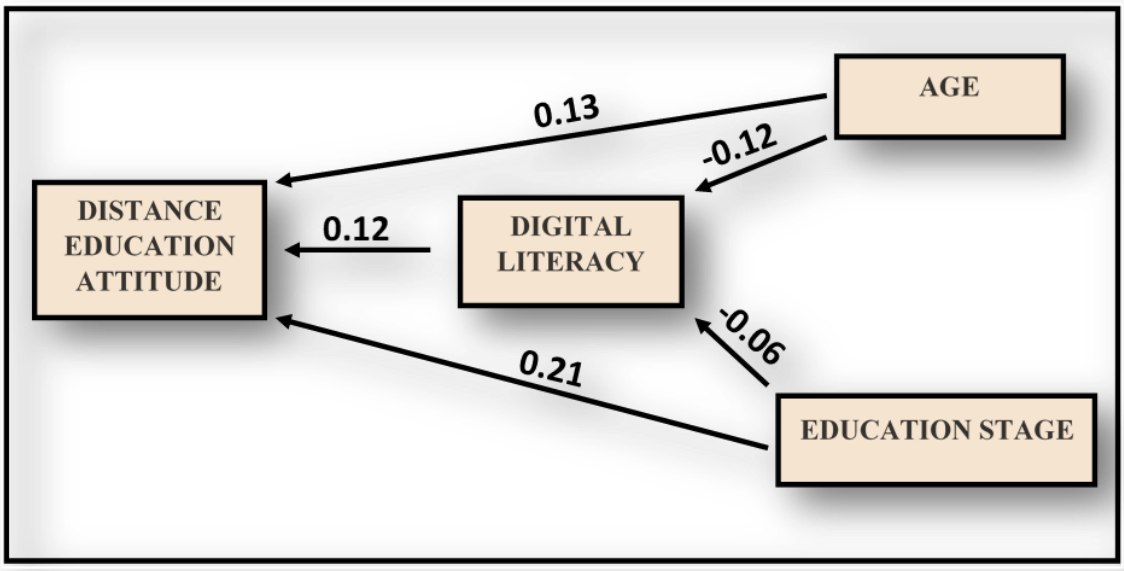
The multivariate linear regression analysis model included variables with p<0.250 in univariate analyses. The variables included in the model are digital literacy level, gender, age, marital status, region, graduated faculty, educational institution, level of education, time spent with a PC/ tablet for distance education, and time spent with a mobile phone, excluding distance education. Significant predictors of distance education attitude score were determined among these variables as teachers' digital literacy level, age, and educational stage. It was seen that 1 point increase in digital literacy level and one year increase in age significantly increased the distance education attitude score by 0.163 and 0.022 points, respectively. Considering the effect of the education level on the distance education attitude score; it was found that those working at secondary school (beta: 0.529), primary school (beta: 0.697), and pre-school (beta: 0.718) were significantly higher than those working at high school (Table 4).

Table 4. Multivariate linear regression results of variables affecting distance education attitude score.

		Distance education attitude score	
		Beta (95% GA)	**p**
Digital literacy level		0.163 (0.979 – 1.022)	**0.001**
Age		0.022 (0.891 – 1.122)	**<0.001**
Educational stage	High school	Ref.	
	Middle School	0.529 (0.698 – 1.432)	**<0.001**
	Primary school	0.697 (0.767 – 1.304)	**<0.001**
	Pre-school	0.718 (0.916 – 1.091)	**0.002**

Note. DEA = Distance Education Attitude, Adjusted R Square: 0.078, Durbin Watson: 2.011, Model ANOVA p<0.001

In multivariate linear regression analysis, the direct and indirect effects of digital literacy level, age, and education level variables, which are significant predictors of distance education attitude in teachers, were evaluated by path analysis (Figure 1).



*Note. DEA = Distance Education Attitude. DL = Digital Literacy. Age and education stage were controlled. *p<0.001 Model Fit Coefficients: CMIN:2.680, df:1, CMIN/DF: 2.680, GFI:0.998, AGFI: 0.982, IFI: 0.977, NFU: 0.963, CFI: 0.975, TLI: 0.849, RMSEA: 0.047*

Figure 1. Path diagram

As shown in Table 5, the model fit values of the applied path analysis were appropriate. In addition, the level of digital literacy increased the distance education attitude score, age increased the digital literacy and distance education attitude score (direct and indirect effect), and the education level only affected the distance education attitude score (direct effect).

Table 5. Testing the pathways of the multivariate model.

	Standardized Regression Weights	Standardized Total effect	Standardized Direct effect	Standardized Indirect effect
	Estimate (S.E)	Estimate	Estimate	Estimate
DEA-DL	0122 (0.047)*	0.122	0.122	-
DEA-Age	0.134 (0.005)*	0.120	0.135	-0.002
DEA-Education Stage	-0.208 (0.052)*	-0.214	-0.208	-0.010
DL-Age	-0.120 (0.004)*	-0.120	-0.120	-
DL-Educatioan Stage	-0.057 (0.040)	-0.057	-0.057	-

4. DISCUSSION

In this study, in the questions asked about the teachers' distance education attitudes, they did not find distance education as useful as they thought it necessary. They found teachers more successful than students in adapting to distance education. Teachers found themselves more successful than students in adapting to distance education. It was determined that the increase in digital literacy level and age also positively affected the positive attitude towards distance education. Another predictor of the positive attitude towards distance education was the level of education served. It was observed that high school teachers approached distance education more negatively than their colleagues working at other education levels. However, in the early stages of the pandemic, technical difficulties such as both teachers and students experiencing this system for the first time in an unusual way, inadequacies/ deficiencies in students' participation in the lesson, lack of knowledge in the use of digital tools, and problems in internet network connection did not allow effective education delivery as well as face-to-face education (14,15). This situation may have caused it to be considered less beneficial. In a study conducted at the same time as this study, teachers said that "distance education is beneficial; but not as much as face-to-face education at school' supports this finding (15).

In the study, it was seen that teachers found themselves more successful than students in adapting to distance education. In another study conducted in Türkiye, in which the view of teachers and students towards distance education during the pandemic period was evaluated, it was determined that teachers viewed distance education more positively than students (15). The reason why teachers consider themselves more effectively may be that they approach distance education more positively than students.

It was seen that the subject in which the teachers evaluated themselves the most unsuccessful in distance education was checking the assigned homework. Two different qualitative studies from Türkiye were conducted on teachers during the pandemic period; in the first one, "teachers control the homework through applications such as WhatsApp; however, teachers stated that sometimes they could not get an answer from many of the students (14) and in another study, teachers said that

they had "problems in reaching students" (16). It is expected that homework control cannot be done effectively in distance education conditions where face-to-face communication cannot be established. This situation may have led teachers to evaluate themselves as unsuccessful.

In the study, it was determined that the increase in the age of the teachers had a positive and significant effect on the attitude towards distance education. However, studies in the literature also find a negative relationship between age and distance education attitude (17,18). For this reason, although a significant relationship was observed in this study, it needs to be confirmed by more studies on the subject. This result may be because the older teacher has increased his professional experience and competence in the course content and student communication over the years.

The study observed that the increase in digital literacy positively affected the attitude towards distance education. The reason for this can be thought of as distance education delivery requires knowledge of using digital tools and media such as phones, tablets, and PCs. Teachers with a high digital literacy may have had less difficulty using this system, which may have contributed positively to the course presentation and distance education attitude. When we look at the literature, it is known that digital literacy is a facilitator of e-learning (19).

It has been observed that high school teachers approach the subject of distance education more negatively than their colleagues working at other education stages. In a study on distance education from Türkiye during the pandemic period, it was reported that the group that viewed distance education most positively was secondary school teachers (18), while in another study in which the perception of distance education was measured, there was no difference between stages (20). No study was found about the negative attitude of high school teachers. However, the fact that high school students, who are in a period of high internal tension and conflicts with authority figures such as adolescence, are a particular group compared to students in other age groups, and the difficulties in the continuity and efficiency of this group in classes may have negatively affected the view of high school teachers (21).

Strengths of the study

Most studies on distance education and digital literacy in the literature were conducted on students. In a systematic review on the subject, it is seen that the studies on distance education are mostly done on students, and the least studied group is the instructors (22). Our study is remarkable because it was carried out on teachers from this perspective. In the study, the teachers' views on distance education were reached when all schools were closed, and all education and training activities were carried out through distance education. In this respect, we think that it will contribute to the literature.

Limitations

The fact that the study was conducted online can be a disadvantage. However, if we want to communicate with the participants, we have the e-mail address information to reach them. In addition, it would be better to evaluate the attitude towards distance education with a valid and reliable scale. However, the scales questioning the improved attitude were either aimed at students (23) or prepared before the pandemic and were not competent to question the attitude towards current practice in this period (24).

5. CONCLUSION

As a result, it is a fact that the COVID-19 pandemic is a common problem for the whole world. Unfortunately, it is impossible to predict when it will end. It is essential to overcome such crises with the least damage. This can only be achieved by being prepared. In terms of distance education, the pandemic has increased our experience. In this process, it is crucial to examine the situations in the distance education process in the light of technological and pedagogical content knowledge

and to support teachers with in-service training after the epidemic. In the literature, it is recommended to help teachers regularly evaluate online education quality (25). It will be valuable in taking remedial measures to take into account the feedbacks of teachers (homework follow-up, assessment and evaluation problems, etc.) and bring the results to the attention of politicians and educational scientists. Another important point is supporting distance education systems in terms of infrastructure, management, financing, course content, design, implementation, and human resources. In addition, there is a need for other similar studies in which distance education is evaluated from the teacher's perspective.

On the other hand, digital literacy is described as a fundamental essential life skill for today's information society (26,27). In this context, increasing the digital literacy level of teachers and students, who are the people of the information age, should be the duty of the countries. To prepare for the current pandemic and other possible crises, we should see our experiences as an opportunity to improve ourselves in this area.

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