International Journal of Assessment Tools in Education
2022, Vol. 9, No. 2, 451–469
https://doi.org/10.21449/ijate.959440
Published at https://ijate.net/ https://dergipark.org.tr/en/pub/ijate *Research Article*

Teachers' perceived skills, challenges and attitudes towards distance education: A validity and reliability study

Derya Cobanoglu Aktan [1,*], **Begum Oztemur** [2]

[1]Hacettepe University, Faculty of Education, Department of Educational Sciences, Ankara, Turkiye
[2]Turkish Ministry of National Education, Düzce, Turkiye

ARTICLE HISTORY

Received: June 29, 2021
Revised: Mar. 15, 2022
Accepted: Apr. 20, 2022

Keywords:
Distance education,
Attitudes towards distance education,
Challenges in distance education,
Perceived distance education skills,
Covid-19 pandemic.

Abstract: This study aimed to develop a reliable and valid measurement tool to examine teachers' attitudes towards distance education and perceived distance education skills. The data of the study were collected from 2290 K-12 teachers. In the data analysis, reliability was calculated with stratified Cronbach's alpha coefficient, and for construct validity, EFA and CFA were performed. Bartlett and KMO tests were used for the suitability of the data for factor analysis. It was observed that the calculated correlations among the item and the total score for the 25-item trial form were above 0.20. As a result of the EFA, 7 items that loaded more than one factor, or with a factor loading less than 0.45 were excluded from the scale. Promax rotation revealed three factors with an eigenvalue greater than 1.00. The total explained variance of the final form of the scale (18 items) was found as 53.594%. The fit indices calculated in the confirmatory factor analysis (RMSEA = 0.053; CFI = 0.932; TLI = 0.918, SRMR = 0.055) confirmed the three-factor model. The results obtained showed that the model fits the data. The stratified alpha reliability for the whole scale was calculated as .848. The results of the study show that the scale can measure teachers' perceived skills, challenges they face, and their attitudes towards distance education reliably and validly.

1. INTRODUCTION

In December 2019, the pandemic that stemmed from Covid-19 virus affected the entire world in a short time and then turned into an intercontinental pandemic in March 2020 (World Health Organization [WHO], 2020a; 2020b). Within the measures taken to tackle the pandemic following the closing down of the educational institutions on March 23, 2020, the Turkish Ministry of National Education started the content preparation for distance education via both the Internet and TV. This sudden change affected both teachers and students. In this context, teachers' attitudes towards distance education and perceived distance education skills are examined in this study. Before focusing on the "teachers", distance education, what distance education is, and the studies about distance education in the field are reviewed in the following section.

*CONTACT: Derya COBANOGLU AKTAN coderya@gmail.com [1]Hacettepe University, Faculty of Education, Department of Educational Sciences, Ankara, Turkiye

e-ISSN: 2148-7456 /

Moore (1972, p.76) defines distance education as "the family of instructional methods in which the teaching behaviors are executed apart from the learning behaviors . . . so that communication between the learner and the teacher must be facilitated by print, electronic, mechanical or other device". Distance education is the method of structuring courses and managing dialogue between teacher and learner to bridge with communications technology (Moore & Kearsley, 2011). In a general sense in distance education, learners stay at home or office and follow the courses, do the assignments, and interact with each other and the teacher via the Internet. In other words, the learners take the responsibility for their own learning, so that learner autonomy is of great importance (Ekmekçi, 2015). In distance education, in separate places, teachers and students use communication technologies to have one-way or two-way communication by using special software and special equipment (İşman, 2011).

It is contended that the first practice of distance education started in 1728 (Arat & Bakan, 2011), since then it has been carried out with various communication methods and materials. Early practices of distance education employed written materials, mail, and then it was followed by television (Uşun, 2006). In recent years, it has spread into computer environments with the advantages of internet technologies and mobile devices (Telli Yamamoto & Altun 2020).

Before the Covid-19 pandemic, the average age of the distance education participants was outside the compulsory education age group (Akinbadewa & Sofowora, 2020; Alharthi, 2020; Seage & Türegün, 2020). Most individuals chose distance education (Sheets, 1992; Wood, 1996) to get a degree at a higher education level and to meet the demands of knowledge-based economies (Levine, 2001). In this context, a student can enroll in a program given in an accredited institution and graduate from this institution without being physically present (Fornaciari et al., 1999; Kretovics, 1998).

After Covid pandemic, for a certain time, in Turkey distance education became a necessity rather than a choice. During that time, distance education provided a good opportunity for individuals who could not be physically present in the classrooms (Sousa & Florencıo Da Sılva, 2020). This necessity included all students. For a certain period of time, a voluntary basis of distance education became an obligation after the pandemic. Although there was a certain amount of distance education experience at the secondary, high school and university levels in Turkey, for the first time, it included all students at all levels (TEDMEM, 2021). Because of these changes, which are also the subject of this study, teachers had to teach in distance learning platforms (TEDMEM, 2022).

In this change, many teachers around the world were mostly unprepared to support continuity of learning and teaching with distance education. During those times, teachers took more responsibilities required by distance education. Many teachers made great efforts to improve their skills to use technology, digital content preparation, and distance learning while improving their knowledge of their field of interest (Orhan & Beyhan 2020). However, after face-to face formal education was interrupted, many teachers who had not received sufficient training in distance education and who had never had such an experience were caught off guard. In a study examining the distance education experiences of teachers during the Covid-19 pandemic, it was found that the vast majority of teachers (80% of 5.661 teachers) did not have distance education experience (Bahçeşehir University [BAU], 2020). The most common problems voiced by teachers were students' access to technology, knowledge of technology, internet connection, lack of teacher-student interaction, inadequate teaching time, assessment of learning, providing feedback to students, and learning motivation (Hebebci et al., 2020; Korkmaz & Toraman, 2020). To eliminate teachers' lack of knowledge in distance education and to increase their experience, some institutions and organizations such as the Ministry of Education, Teacher Network, and Istanbul Teacher Academies organized webinars on different platforms (e.g.

Zoom, YouTube, Twitter, Facebook) (ERG, 2020; Istanbul Teachers Academy, 2020; The Turkish Ministry of National Education [TMNE], 2020).

One difficulty of distance education is that teachers and students are in separate places and communicate using technology. To communicate effectively, to create a dialogue among learners and teacher, the content and teaching need to be organized with a certain structure. According to Moore (1972) the aim is to build a bridge across an understanding of a teacher and that of a learner. In distance education, teachers organize their courses to manage dialog via technology (Moore & Diehl, 2019). Thus, to teach in distance education, teachers are required to have different skill set, namely organizing course materials with certain structure, technology skills, and creating dialogue using course materials and technology. The fact that computer literacy has become a functional necessity in the learning environment and integrating technology into education has become even more prominent during those times. Technology skills are not enough by themselves to teach in distance education; however, they form, some of the essential parts to create a bridge for students' learning. It is reported that many educators lacked the most basic computerized communication technologies (CCT) skills, even if they had sufficient infrastructure and connectivity (UNESCO, 2020a; UNESCO, 2020b). Instructors generally use information communication technologies; for web searching, communicating, benefiting from electronic services, and making presentations, but they do not frequently use it for participating in forums, video and voice chat, creating multimedia, and presenting courses on the Internet (Düzakın & Yalçınkaya, 2008); therefore, it was stated that they need to improve their professional competencies with respect to quality distance education. (UNESCO, 2020b). It is also very important to assess teachers' readiness for online teaching, as it plays an important role in the effective delivery of online education (Miglani & Awadhiya, 2017).

There seems to be a global need to develop an understanding of educators' and schools' readiness for distance education and to modernize teacher education to meet the needs of knowledge-based global society. In times of crisis, it has also become important to increase teachers' applications in the use of CCT for pedagogy, digital literacy, and data assessment to enable more individualized learning (UNESCO, 2020b). It is important for teachers to keep up with the changes. In addition, determining to what extent they have sufficient knowledge to carry out the practices of distance education is also important to direct the training to be provided for teachers.

There are many studies on online teaching and distance education. The following part focuses on teachers' attitudes and perceptions of distance education. Higher education is the focus of most studies. The studies in the United States are reviewed by Shattuck (2019). In teaching online chapter of handbook of distance education, Shattuck (2019) summarizes characteristics of faculty members by answering "where, what, who, when, why, how" questions. Intrinsic and extrinsic motivators, age, gender, technology experience, and faculty rank on motivation, demotivators, faculty attitudes, values, and perceptions are listed among those faculty characteristics (Moore & Diehl, 2019). The relationship between technology acceptance and intentions to teach online was examined by Stewart, Bachman, and Johnson (2010). Dahlstrom and Brooks (2014) explored faculty members' perceptions of information and educational technology. AlShahrani (2014) investigated perceived self-efficacy in using technology and teaching online. A survey by Babson Research Group (Lammers et al., 2017) found that faculty are critical to the success of digital learning, and when they are supported. Ulmer et al. (2007) explored a link between attitudes and participation in online learning and acknowledged that faculty with experience in online distance education tended to have positive attitudes. Lin (2002) found that faculty was more likely to take part if they had a positive attitude toward distance education or had a positive distance education experience. Moreover, Zhen et al. (2008) explored faculties' teaching values and attitudes towards teaching online. According to

Zhen et al. (2008) if faculty members do not see intrinsic value and perceive their pedagogical values as being accommodated and encouraged, they might focus on demotivators and do not wish to teach online. In literature, the barriers that decrease faculty participation in distance online education have also been identified. Dillon and Walsh (1992), Berge et al. (2002), and Shea (2007) reported these barriers which negatively influence faculty participation in distance education; namely, lack of quality in online education, lack of time, lack of compensation, lack of incentives and/or rewards, lack of policies and institutional support, and lack of perceived student interaction.

When the studies conducted to examine the opinions of the teachers and faculty members on distance education in Turkey are reviewed, it is seen that Turkey did not benefit enough from the educational potential provided by the e-technology to meet the educational needs (Özkul, 2004). Further, even though various distance education applications are implemented, it is thought that the distance education applications are not efficient enough, and many of the web-based distance education programs do not go beyond downloading the lecture notes from websites (Gülnar, 2003). Orhan and Beyhan (2020), in their study, examined teachers' opinions on Zoom and stated that teachers see distance education as a supportive education as a continuation of formal education, while some teachers stated negative opinions. It is reported in the studies that some lecturers have negative attitudes towards distance education (Kaya et al., 2017; Yıldırım, 2020). Reasons for the demotivators (sources of negative attitudes) are reported as inadequate student participation, difficulties in preparation and presentation of course materials, and habits of face-to-face education interaction (Kaya, 2002). Faculty members needed training for web-supported education (Erişti et al., 2008; Soydal et al., 2012) and lacked necessary materials and equipment (Korkmaz & Tunç, 2010). It was also reported that teachers do not receive feedback from students during the lessons (Orhan & Beyhan, 2020) and in this specific context, lack of immediate feedback (course structure), complexity of the interface, lack of control in student-student interaction (dialogue), and lack of feedback (dialogue) in teacher-student interaction are considered as demotivators (Hamıutoğlu et al., 2018).

1.1. The Purpose of the Study

When the relevant literature for measuring attitudes and perceptions of distance education was reviewed, it was seen that there are scale development studies that focused on higher education institutions (Akaslan & Law, 2011; Dündar et al., 2017; Süer et al., 2005). The scale developed by Akaslan and Law (20119 composed of three factors: "readiness to e-learning", "acceptance of e-learning" and "e-learning education". Similarly, "Distance Education Attitude Scale" by Süer et al. (2005) included "trust in distance education" and "interest in distance education" factors. On the other hand, Dündar et al., (2017) developed a three-factor scale with a “cognitive”, “affective”, and “behavioral” factors. The only scale developed for K-12 level primary school teachers has two factors under the headings of the advantages of distance education and the limitations of distance education (Ağır, 2008). All these scales were created before the Covid-19 pandemic, when distance education was a choice rather than a necessity, and teachers were unprepared for distance education. Therefore, there was a need for a measurement tool to measure teachers' attitudes towards distance education, and their perceived distance education skills at all K-12 levels, during the closing down of the face-to-face formal education.

According to the studies, teachers’ attitudes, and their technical and pedagogical characteristics affect the success of online learning (Dillon & Guawardena, 1995; Leidner & Jarvenpaa, 1993; Volery & Lord, 2000). Therefore, differences in teachers’ attitudes, access to technical infrastructure, and tools will result in the difference in students’ learning. In this context, it is

important to have studies on measurement tools to measure teachers' attitudes towards distance education and their perceived distance education skills.

Considering the importance and the gap in the literature, the purpose of this study is to develop a reliable and a valid scale to evaluate attitudes towards distance education and perceived distance education skills of teachers working at primary and secondary education towards distance education.

2. METHOD

This section provides information about the study groups, the process of developing the scale, and the data analysis.

2.1. Study Group

The data used within the study were obtained from 2290 K-12 teachers (1145 of which were used in the Exploratory Factor Analysis and 1145 participants' data were used in the Confirmatory Factor Analysis). The data were collected from teachers working at all levels from 290 different primary school to high school in Turkey's Western Black Sea Region.

2.2. The Development of Item Pool

In order to write the items to be included in the scale, firstly the related literature was reviewed, scales developed for similar purposes were examined, and teachers' opinions about distance education were collected. When the studies on distance education were examined, it was seen that there were scales developed for primary school teachers (Ağır, 2008) and faculty members of higher education (Akaslan & Law, 2011; Dündar et al., 2017; Süer et al., 2005). Similarly, various qualitative studies on teachers' views on distance education were reviewed (Alshangeeti et al., 2009; Chao et al., 2006; Erişti et al., 2008; Göktaş & Kayri, 2005; Kaya, 2002; Lloyd et al., 2012; Miglani & Awadhiya, 2017). In addition to studies, reports were also reviewed (Bahçeşehir University [BAU], 2020; ERG, 2020; The Turkish Ministry of National Education [TMNE], 2020). Moreover, views of teachers were collected via open-ended questions, regarding opinions and difficulties about distance educations to generate items. When all these studies and views were examined, teachers' attitudes towards distance education and perceived skills of distance education dimensions were identified.

The pilot form of the scale was reviewed by two experts in the field of measurement and evaluation, two secondary school level teachers (mathematics, literacy), three elementary school teachers, and one psychological counseling and guidance teacher. Measurement and evaluation experts reviewed the items for content and item characteristics. Teachers assessed items for content representation. Reviewers assessed items as appropriate or inappropriate and also suggested revisions for the items if they thought it was necessary. Only minor wording revisions were suggested by the reviewers. The trial form was comprised of 25 items. Each item was scored as "*Strongly Disagree*", "*Disagree*", "*Undecided*", "*Agree*" and "*Strongly Agree*" according to the 5-point likert type grading scale.

2.3. Data Analysis

The data were collected using Google form. The Provincial Directorate of National Education shared the link of the form with teachers via SMS. No missing data was found in the data. Outliers were determined via Mahalanobis distances. The data from 168 participants were deleted according to their Mahalanobis distances. A Mahalanobis distance (χ^2 (25) = 38.104) was used to detect multivariate outliers. When the variance increase value [VIF] was analyzed for the remaining 977 participants' data, it was seen that it ranged between 1.202 and 2.997. Therefore, it can be interpreted that there is no multicollinearity problem for the data obtained from our sample because the VIF values were less than 10.

In this study, exploratory factor analysis [EFA] and confirmatory factor analysis [CFA] were performed for the construct validity of the teachers' attitudes towards the distance education scale. EFA aims to reach a few definable meaningful structures that these variables can explain together from many variables (items) and it is a method used to reveal whether there is a certain order among the responses of the respondents to the items in the measurement tool which has been developed (Büyüköztürk, 2004; Tavşancıl, 2006). In this study, EFA analysis was run in SPSS statistical software.

CFA was used to evaluate to what extent the factors formed from various variables theoretically matched the actual data. The extent to which a predetermined or constructed structure was verified by the collected data in CFA was examined. Some fit indices were used to determine the adequacy of the model tested in CFA (Büyüköztürk et al., 2004).

Confirmatory factor analysis [CFA] study was conducted (in MPlus) on data obtained from a different sample of 1145 teachers in order to provide evidence for the validity of the structure determined as a result of EFA and to reveal to what extent the observed structure was compatible with the data. Multiple fit indices were used for CFA and Chi-square fit test [Chi - Square Goodness], Comparative Fit Index [CFI], Root Mean Square Error of Approximation [RMSEA], Tucker-Lewis Index [TLI] and Standardized Root-Mean-Squared Residual [SRMR] fit indices were examined (Hu & Bentler, 1999; Çelik & Yılmaz, 2013; Kline, 2005).

Table 1. *Multivariate skewness and kurtosis test results.*

	Sample Value	x̄	ss	*p*
Skewness Value	36.134	7.992	0.3	0
Kurtosis Value	425.746	398.365	1.666	0

The normality of the data was examined in MPlus via multivariate skewness and kurtosis tests. The results are presented in Table 1. It can be interpreted that the data do not meet the assumption of normality, since the tests performed for skewness and kurtosis are statistically significant. Therefore, Maximum Likelihood Robust [MLR] was preferred as the estimation method in CFA. MLR method provides stronger estimation in non-normal data (Wang & Wang, 2019). In this study, stratified alpha value for reliability was calculated. When the literature is examined, it is recommended that the Stratified Cronbach's Alpha coefficient be used for the reliability of composite scores obtained from measurement tools containing sub-dimensions (Cronbach et al., 1965). Stratified Cronbach's alpha coefficient was calculated using the "sirt" package in the R program (Robitzsch, 2021).

3. FINDINGS

3.1. Findings on the Construct Validity Evidence of the Scale

3.1.1. *Exploratory factor analysis*

The item and the item-total scale correlations showed that there was no item below 0.20. The Bartlett test and Kaiser-Meyer-Olkin [KMO] values of the data obtained for the suitability of the data related to the scale trial form comprising of 25 items after item analysis were examined.

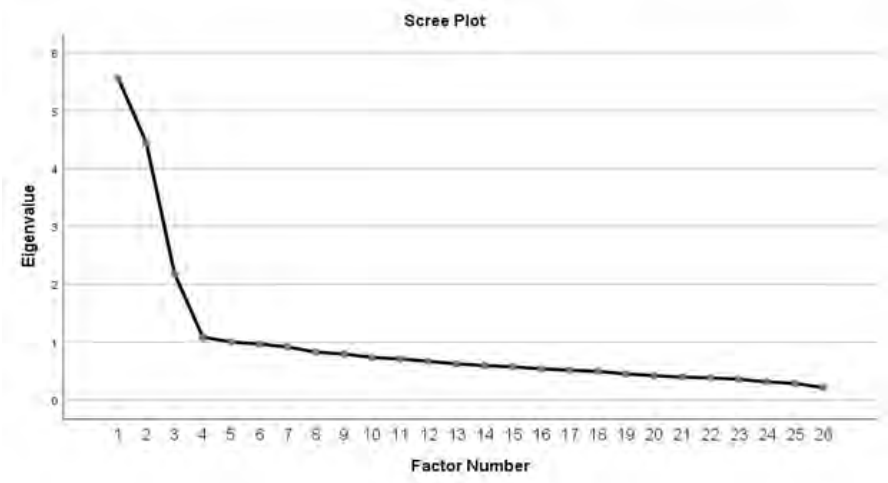
The calculated KMO value was found to be 0.878, and it was seen that for the Barlett test, the calculated chi-square statistics was also significant (χ^2 = 9170.480, *df* = 300, *p* <0.01). KMO values were determined to be quite high. It can be said that the sample size is suitable for factor analysis because the KMO value is high and the Bartlett test is significant. Exploratory factor analysis was conducted to determine the construct validity based on these data. In the exploratory factor analysis, the number of factors was determined according to the scree plot. According to the plot in Figure 1, the number of factors was found to be 3.

Table 2. *EFA eigenvalues and parallel analysis eigenvalues.*

Factor	Eigenvalues	PA eigenvalues
1	**5.552**	**1.3011**
2	**4.390**	**1.2563**
3	**2.025**	**1.2245**
4	1.073	1.1951

The parallel analysis supported this finding. According to the values given in Table 2, there are three factors, where the calculated eigenvalues are greater than the random eigenvalues generated in parallel analysis.

Figure 1. *Scree plot.*



After determining the number of factors, Promax rotation was used in factor analysis and Principal Axis Factoring was used as a method. The structure resulting from rotation helps to obtain items that can be classified meaningfully in only one category. Therefore, when using oblique rotation method, Promax rotation method is a good option to be fast and economical (Çokluk et al., 2016). Table 3 shows the factors and items after the rotation. After the rotation, the items that were not loaded under any factor were removed one by one, and then the items with a factor loading value below 0.45 were eliminated, starting with the item with the lowest value. Comrey and Lee (1992) suggest a scale of quality of factor loadings that is often referenced: .71 is excellent, .63 is very good, .55 is good, .45 is fair, and .32 is poor (Multiplicity et al., 2014). When the factor loading values are examined, item 1 and item 13 were discarded since the factor loading values were below 0.45. After this deletion, in EFA results, items that loaded more than one factor were also excluded from the scale. Following this rule, item 16, item 18 and item 24 were excluded from the scale since they loaded more than one factor. After removing these items from the scale and repeating the factor analysis, the factor loading of the item 19 was below 0.45 (please note that Table 3 presents item loadings with item 16, 18 and 24). Item 2 was also removed, because it was conceptually different from the items in that factor ("I think face to face education is a necessity for the best education" conceptually does not align with "challenges faced in distance education" factor). Thus, it was also excluded from the scale. Final factor loadings are given in Table 5.

Explained and total variances are presented in Table 4. The total variance percentage explained by the three factors is 53.594%. The variance explained by each factor is 24.361%, 20.016% and 9.218% and the eigenvalues calculated for each factor are 4.385; 3.603 and 1.659, respectively.

Table 3. *Factor loading values after rotation.*

	Factors		
	1	2	3
m1			.428
m4			.583
m5			.591
m8			.663
m9			.442
m11			.625
m12			.569
m13	.397		
m14	.637		
m15	.714		
m16	.335		.477
m18	.366	-.349	
m19			.489
m20	.685		
m21	.758		
m22	.807		
m24	-.516	-.494	.361
m2	-.301	.502	
m3		.591	
m6		.569	
m7		.653	
m10		.520	
m17		.462	
m23		.702	
m25		.724	

Table 4. *Eigenvalue and variance percentages for each factor.*

Factor	Values		
	Eigenvalues	Explained Variance (%)	Total Variance (%)
1	4.385	24.361	24.361
2	3.603	20.016	44.376
3	1.659	9.218	53.594

The final factor loading values obtained with promax rotation are presented in Table 5. According to the values specified in Table 5, the first factor on the scale comprises 7 items (m3, m6, m7, m10, m17, m23, m25); the second factor comprises 5 items (m14, m15, m20, m21, m22); and the third factor comprises 6 items (m4, m5, m8, m9, m11, m12). The names were given to each factor by considering the literature and their contents. The first factor was named as "challenges faced in distance education", the second factor as "perceived distance education skills", and the third factor as "positive attitudes toward distance education". The scale items and the factor loading values are presented in the Appendix Section. A confirmatory factor analysis was performed to provide evidence for the validity of the structure determined as a result of EFA (18 items and three factors). Data obtained from a different study group of 1145

people were used for CFA. In this data set, no missing data was observed, and the answers of 148 participants who showed outliers were deleted as a result of Mahalanobis distance. CFA was performed with the remaining data of 997 teachers.

Table 5. *Final factor loading values of the 18-item scale.*

Items	Factors		
	F1 (challenges faced)	F2 (perceived skills)	F3 (positive attitudes)
m4			.527
m5			.560
m8			.725
m9			.528
m11			.634
m12			.570
m14		.551	
m15		.700	
m20		.768	
m21		.856	
m22		.825	
m3	.558		
m6	.613		
m7	.700		
m10	.531		
m17	.460		
m23	.693		
m25	.702		

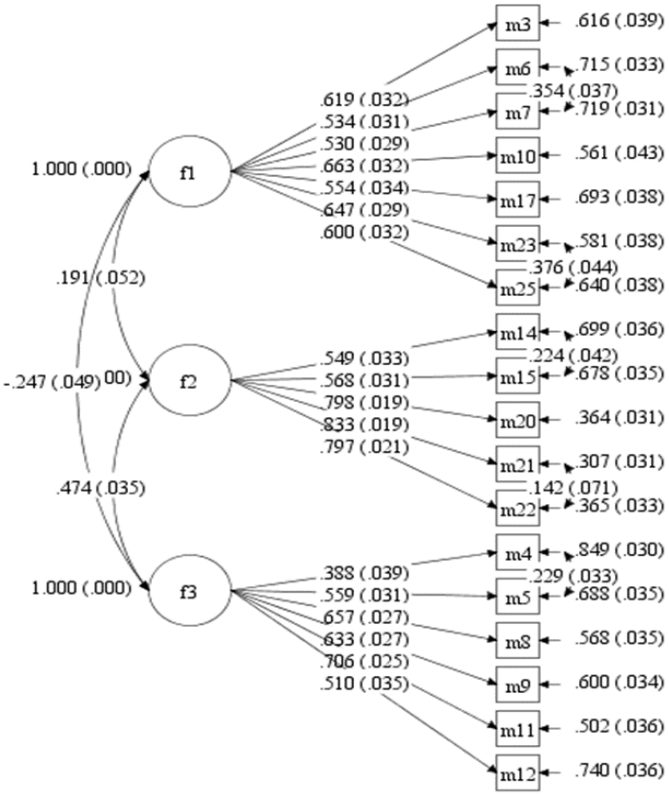
To test the data fit of the three-factor model, χ^2/df, RMSEA, CFI, TLI, SRMR values were calculated. The calculated fit indices were not in the range of acceptable values for good model fit, as seen in Table 6. Therefore, after an examination of the modification indices, modifications were carried out in order to decrease the chi-square value. According to their modification indices, the error terms of the items were correlated in the measurement model. The measurement model of the scale is presented in Figure 2.

The fit indices for the first and modified measurement model are presented in Table 6. The modified model fit indices are RMSEA = .053; CFI = .931; TLI = .918; SRMR = .055. These values show that model fit is ensured. The calculated value of χ^2= 486.856 (df = 127) was significant (p <.01) and χ^2/ df = 3.833. According to the literature, if the χ^2 is df < 3, it is the proof of perfect fit; if it is below 5, it is the proof of medium level of fit; if RMSEA and SRMR value is .80 or less it is acceptable fit; if the CFI and TLI value is higher than 0.90, it is accepted as an indicator of acceptable fit (Hu & Bentler, 1999; Kline, 2005; Şimşek, 2007; Yılmaz & Çelik, 2009).

Table 6. *The model fit indices and values calculated for the models.*

Model Fit Indices	(χ^2/df)	RMSEA	CFI	SRMR	TLI
First Model	6.018	.071	.874	.062	.854
Modified Model	3.833	.053	.931	.055	.918

Figure 2. *Model obtained by CFA.*



As seen in Figure 2, the item factor loading values are in a range of 0.307 and 0.849. As a result, it is seen that the factor loading values are acceptable. According to these results, it can be said that the model fits the data well.

Descriptive statistics for each factor were also explored. For the challenges faced in distance education factor, the maximum and minimum values were between 35 and 7, and the mean was found as 27.13, which indicates that participants thought they faced challenges during distance education. The distribution of the factor scores was negatively skewed, meaning that the number of the participants who faced high-level challenges was more than the number of participants who faced low-level challenges. Regarding the perceived skills factor, maximum and minimum values were between 25 and 5, and the mean was 17.87. This shows that participants perceived themselves as skilled in distance education. Finally, in terms of positive attitudes factor, maximum and minimum values were 30 and 6, and the mean was 13.46. The distribution of the scores was positively skewed, meaning that the number of participants with high positive attitudes levels was less than that of the low levels.

3.2. Reliability of the Scale

Cronbach Alpha internal consistency coefficients were calculated to determine the reliability of the final scale obtained for each factor and for total scale.

Table 7. *Cronbach Alpha values for the scale.*

Factor Number	Factor Name	Number of items	Cronbach Alpha
F1	Challenges faced in distance education	7	.804
F2	Perceived distance education skills	5	.865
F3	Positive attitudes toward distance education	6	.776
	Total (Stratified Alpha)	18	.848

Cronbach alpha values for the scale are presented in the Table 7. As seen in the Table 7 Stratified Cronbach's Alpha reliability of the whole scale was calculated as α = .848. In addition, the alpha reliability values obtained for each factor are respectively α = .804 for the 1st factor; α= .865 for the 2nd factor; and α = .776 for the 3rd factor. The obtained alpha coefficients are considered quite reliable for values between .60 and .79 in the literature and are highly reliable for values of .80 and above (Kalaycı, 2010). The overall reliability of the scale was calculated as .848 with stratified alpha.

4. DISCUSSION and CONCLUSION

In this study, a scale was developed to measure teachers' attitudes towards distance education, their perceived skills of distance education, and the challenges faced in distance education. The data were collected from 2290 primary and secondary education level teachers. The initial form of the scale comprised 25 items. To collect construct validity evidence, EFA and CFA were performed. In the EFA, 7 items were excluded from the scale. Three items, "I think I manage the classroom better in online lessons", "I use the existing materials in my online lessons", and "I think that in distance education, students regularly do their homework" were excluded from the scale because of their low factor loadings. In addition, "I am satisfied with distance education, because there are no distractions such as students talking among themselves or going out of the classroom", "I think it is necessary to examine the learning levels of students in distance education through exams", and "I think homework in distance education is sufficient in determining the learning levels of students" were eliminated from the scale because these items were loaded on more than one factor. Lastly "I think face to face education is necessity for the best education" was not included in the scale because of the content discrepancy with the factor.

The factors were named as "challenges faced in distance education", "perceived distance education skills" and "positive attitudes toward distance education". The first factor included items such as "In distance education, I feel like I'm talking by myself." The other items similarly are about challenges that teachers faced in distance education. The second factor, perceived distance education skills, included items about teachers' own skill perceptions such as "In online lessons, I can adequately employ multimedia such as graphics, sound and animation."

The third factor, positive attitudes toward distance education, is composed of items such as "I think distance education is suitable for student groups of all ages."

The measurement model obtained by EFA was verified by CFA with the data obtained from 1145 teachers. The fit indices of the model (three factors and 18 items) in the CFA were in the range of acceptable limits. In the model, positive correlation (.474) between "perceived distance education skills" and "positive attitudes towards distance education" factors was observed. In contrast, as expected, a negative correlation was found (-.247) between "challenges faced in distance education" and "positive attitudes towards distance education" factors. Lastly, there is a weak correlation (.191) between "challenges faced in distance education" and "perceived distance education skills" factors. The stratified reliability coefficients of the factors were calculated as .804, .865 and .776, respectively. In addition, for the whole scale stratified Cronbach's Alpha reliability coefficient value was found as .848. These evidences showed that the developed scale is valid and reliable in determining teachers' attitudes towards distance education, perceived distance education skills, and challenges faced in distance education.

In the scale developed by Ağır et al. (2008) some items in the disadvantages of distance education factor are similar to the challenges faced in distance education, however, the scale do not include any items regarding teachers' perceived distance education skills. In addition, the factor of positive attitudes towards distance education is similar to the factor of advantages of distance education. Süer et al.'s scale included two factors: trust in distance education and

interest in distance education. However, the researchers did not report any further information about the items and the concepts related to the items. Thus, it is not possible to make any comparison with the scale other than that it was administered to the different education level (higher education versus K-12). Dündar et al. (2017) reported that their scale included cognitive, affective, and behavioral factors related to the attitudes toward distance education. Similar to Süer et al. (2005), Dündar et al. also did not publish the items of their scale, but they just gave example items for the related factors.

According to the results of our study, the participants of the study reported that although they perceived themselves as skilled in distance education, they also faced challenges during the distance education and reported comparatively low level positive attitudes toward distance education. Research calls challenges faced in distance education as also demotivators of distance education. Considering this, to improve teachers' motivations and positive attitudes, teachers require support to overcome these challenges. This finding aligns with conclusions by Lin (2002) that faculty were more likely to participate if they had a positive attitude toward distance education or had a positive distance education experience. This is also supported by Shattuck's (2013) findings as Shattuck stated that, although faculty members are intrinsically motivated, they also value and need support services, including training opportunities in technology skills, design, and instructional support, and awareness of sound student support services. Although previous studies were conducted with faculty members, this study showed that K-12 teachers shared similar experiences in terms of challenges they faced during distance education.

Even if face-to-face education has started in Turkey, it is important to examine teachers' skills, attitudes and difficulties in order to be ready for the future or to benefit from distance education when necessary. In this context, the scale developed in this study provides a valid and reliable measurement tool to determine the attitudes and skill perceptions of teachers working in primary and secondary education. It is thought that developing a standardized measurement tool to measure teachers' perceptions of their attitudes and skills towards distance education will be beneficial in increasing teachers' positive attitudes and reducing the difficulties they face. It should be noted that the findings of this study are limited to the study participants and pandemic conditions. This study is limited to the group of teachers working in the Western Black Sea Region in Turkey. For further validation, the scale can be administered to groups of teachers working in different regions of Turkey, or at different education levels.

Declaration of Conflicting Interests and Ethics

The authors declare no conflict of interest. This research study complies with research publishing ethics. The scientific and legal responsibility for manuscripts published in IJATE belongs to the authors. **Ethics Committee Number**: Hacettepe University, 35853172-600

Authorship Contribution Statement

All authors contributed to the manuscript equally.

Orcid

Derya Çobanoglu Aktan https://orcid.org/00000-002-8292-3815
Begum Oztemur https://orcid.org/0000-0001-5761-2567

REFERENCES

Adıyaman, Z. (2014). Uzaktan eğitim yoluyla yabancı dil öğretimi [Foreign language teaching through distance education]. *Sakarya University Journal of Education Faculty*, 4, 420-425. https://dergipark.org.tr/tr/pub/sakaefd/issue/11231/134140

Ağır, F. (2008). Uzaktan eğitime karşı tutum ölçeği geliştirmeye yönelik geçerlilik ve güvenirlik çalışması [Development of the attitude scale towards distance learning: Reliability and validity], *Education Sciences*, *3*(2), 128-13.

Akaslan, D., & Law, E.L.C. (2011). Measuring teachers' readiness for e-learning in higher education institutions associated with the subject of electricity in Turkey. *2011 IEEE Global Engineering Education Conference (EDUCON)*, 481-490. https://doi.org/10.1109/educon.2011.5773180

Akinbadewa, B.O., & Sofowora, O.A. (2020). The effectiveness of multimedia instructional learning packages in enhancing secondary school students' attitudes toward Biology. *International Journal on Studies in Education (IJonSE)*, *2*(2), 119-133. https://doi.org/10.46328/ijonse.19

Alharthi, M. (2020). Students' attitudes toward the use of technology in online courses. *International Journal of Technology in Education (IJTE)*, *3*(1), 14-23. https://doi.org/10.46328/ijte.v3i1.18

Allen, B., Crosky, A., Yench, E., Lutze-Mann, L., Blennerhassett, P., Lebard, R., Thordarson, P., & Wilk, K. (2010). A model for transformation: A trans-disciplinary approach to disseminating good practice in blended learning in science faculty, *Curriculum, technology & transformation for unknown future*. *Proceedings of ascilite Sydney*, 36-48.

Alshangeeti, A., Alsaghier, H., & Nguyen, A. (2009). Faculty perceptions of attributes affecting the diffusion of online learning in Saudi Arabia: A quantitative study, *4th International Conference on e-Learning*, Toronto, Canada.

Anderson, J. (2020). The coronavirus pandemic is reshaping education, *Quartz*. https://qz.com/1826369/how-coronavirus-is-changing-education/

Arat, T., & Bakan, Ö. (2011). Uzaktan eğitim ve uygulamaları [Distance education and its applications], *Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi*, *14*(1), 363-374.

Arora, A.K., & Srinivasan, R. (2020). Impact of pandemic COVID-19 on the teaching–learning process: A Study of Higher Education Teachers. *Prabandhan: Indian Journal of Management*, *13*(4), 43-56. https://doi.org/10.17010/pijom/2020/v13i4/151825

BAU (2020, August 16). *BAU distance education report.* https://bau.edu.tr/haber/15707-%20bau-uzaktan-egitim-raporu

Bozkurt, A., Akgun-Ozbek, E., Yilmazel, S., Erdogdu, E., Ucar, H., Guler, E., Sezgin, S., Karadeniz, A., Sen-Ersoy, N., Goksel-Canbek, N., Dincer, G.D., Ari, S., & Aydin, C.H. (2015). Trends in distance education research: A content analysis of journals 2009-2013. *The International Review of Research in Open and Distributed Learning*, *16*(1). https://doi.org/10.19173/irrodl.v16i1.1953

Büyüköztürk, Ş. (2004). *Veri analizi el kitabı [Data analysis handbook]*. Pegem A Yayıncılık.

Cabı, E. (2018). Uzaktan eğitim ile bilgisayar okuryazarlığı öğretimi: Eğitmen deneyimleri [Computer literacy teaching with distance education: Instructor experiences]. *Başkent University Journal of Education*, *5*(1), 61-68. http://buje.baskent.edu.tr/index.php/buje/article/view/93

Can, E. (2019). Açık ve uzaktan yükseköğretim mezunları üzerine bir değerlendirme [An evaluation on open and distance higher education graduates]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi*, *5*(3), 81-105. https://dergipark.org.tr/en/download/article-file/853649

Can, E. (2020). Coronavirüs (Covid-19) pandemisi ve pedagojik yansımaları: Türkiye'de açık ve uzaktan eğitim uygulamaları [Coronavirus (Covid-19) pandemic and its pedagogical reflections: Open and distance education practices in Turkey]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi*, *6*(2), 11-53. https://dergipark.org.tr/en/download/article-file/1179832

Chao, T., Saj, T., & Tessier, F. (2006). Establishing a quality review for online courses. *Educause Quarterly, 29*(3), 32-39.

Chen, G.D., Ou, K.L., Liu, C.C., & Liu, B.J. (2001). Intervention and strategy analysis for web group- learning. *Journal of Computer Assisted Learning, 17*(1), 58-71. https://doi.org/10.1111/j.1365-2729.2001.00159.x

Comrey, A.L., & Lee, H.B. (1992). *A first course in factor analysis. (2nd ed.)*. Hillsdale, NJ: Lawrence Erlbaum.

Cronbach, L.J., Schönemann, P., & McKie, D. (1965). Alpha coefficients for Stratified-Parallel Tests. *Educational and Psychological Measurement, 25*(2), 291-312. https://doi.org/10.1177%2F001316446502500201

Czerniewicz, L. (2020, 15 March). What we learnt from "going online" during university shutdowns in South Africa. *Phil on EdTech*. https://philonedtech.com/what-we-learnt-from-going-online-during-university-shutdowns-in-south-africa/

Çelen, F.K., Aygül Ç., & Seferoğlu S.S. (2013). Analysis of teachers' approaches to distance education. *Procedia-Social and Behavioral Sciences, 83*, 388-392.

Çelik, H., & Yılmaz, V. (2013). *LISREL 9.1 ile yapısal eşitlik modellemesi [Structural equation modeling with LISREL 9.1]*. Anı Yayıncılık.

Çokluk, Ö., Şekercioğlu, G. & Büyüköztürk, Ş. (2014). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları [Multivariate statistics for social sciences: SPSS and LISREL applications]*. Pegem Akademi Yayınları.

Dillon, C.L., & Guawardena, C.N. (1995). A framework for the evaluation of telecommunications-based distance education. *In Proceedings of Selected Papers from the the 17th Congress of the International Council for Distance Education, Milton Keynes, UK: Open University.*

Dooley, K.E., & Murphrey, T.P. (2000). How the perspectives of administrators, faculty, and support units impact the rate of distance education adoption. *Online Journal of Distance Learning Administration, 3*(4). https://www.learntechlib.org/p/92503/

Dougiamas, M. (2000). Improving the effectiveness of tools for the internet-based education. *9th. Annual Teaching Learning Forum*, Curtin University of Technology, USA.

Durak, G., Çankaya, S., Yunkul, E., Urfa, M., Topraklikloğlu, K., Arda, Y., & İnam, N. (2017). Trends in distance education: A content analysis of master's thesis. *TOJET: The Turkish Online Journal of Educational Technology, 16*(1).

Dündar, S., Candemir, Ö., Demiray, E., Genç Kumtepe, E., Öztürk, S., Sağlık Terlemez, M., & Ulutak, İ. (2017). Anadolu Üniversitesi çalışanlarının açık ve uzaktan öğretime ilişkin tutumları [Attitudes of Anadolu University employees towards open and distance education]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi, 3*(4), 187-227.

Düzakın E., & Yalçınkaya S. (2008). Web tabanlı uzaktan eğitim sistemi ve Çukurova Üniversitesi öğretim elemanlarının yatkınlıkları [Web-based distance education system and the predispositions of Çukurova University faculty members]. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 17*(1), 225-244.

Eğitim Reformu Girişimi (ERG), (2020, July 7). *The effects of Coronavirus on education VII: The only thing that doesn't change is the importance of teachers*. https://www.egitimreformugirisimi.org/e-bulten/

Erişti, S.D., Şişman, E., & Yıldırım, Y. (2008). İlköğretim branş öğretmenlerinin web destekli öğretim ile ilgili görüşlerinin incelenmesi [Examination of primary school branch teachers' views on web-assisted teaching]. *İlköğretim Online, 7*(2), 384-400. https://app.trdizin.gov.tr/publication/paper/detail/TnpjM016RXg

Ferdig R.E., & Kennedy K. (2014). *Handbook of Research on K-12 Online and Blended Learning*. Carnegie Mellon University: ETC Press

Fornaciari, C.J., Forte, M., & Mathews, C.S. (1999). Distance education as strategy: How can your school compete?. *Journal of Management Education, 23*, 703-718.

Galusha, J.M., (1998). Barriers to Learning in Distance Education. *Institute of Education Sciences*. https://files.eric.ed.gov/fulltext/ED416377.pdf

Geng, S., Law, K.M.Y., & Niu, B. (2019). Investigating self-directed learning and technology readiness in blending learning environment. *International Journal Education Technology in Higher Education, 16*(17). https://doi.org/10.1186/s41239-019-0147-0

Gökmen, Ö., Uysal, M., Yaşar, H., Kırksekiz, A., Güvendi, G., & Horzum, M. (2017). Türkiye'de 2005-2014 Yılları Arasında Yayınlanan Uzaktan Eğitim Tezlerindeki Yöntemsel Eğilimler: Bir İçerik Analizi [Methodical Trends in Distance Education Theses Published Between 2005-2014 in Turkey: A Content Analysis]. *Eğitim ve Bilim, 42*(189). http://dx.doi.org/10.15390/EB.2017.6163

Gökdaş, İ., & Kayri, M. (2005). E-öğrenme ve Türkiye açısından sorunlar, çözüm önerileri [E-Learning-The problems and solution recommends terms of Turkey situation]. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi, 2*(2), 1-20.

Gülnar, B. (2003). *Bilgisayar ve İnternet Destekli Uzaktan Eğitim Programlarının Tasarım, Geliştirme ve Değerlendirme Aşamaları (SUZEP Örneği) [Design, Development and Evaluation Phases of Computer and Internet Supported Distance Education Programs]*, (Master thesis, Selçuk University, Konya). https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Hamutoğlu, N.B., Sezen Gültekin, G., & Savaşçı, M. (2019). Öğretmen adaylarının uzaktan eğitime yönelik görüşleri: Açıköğretim uygulamaları [Pre-service teachers' views on distance education: Open education practices]. *Yükseköğretim Dergisi, 9*(1), 19–28. https://doi.org/10.2399/yod.18.023

Harris, D.A., & Krousgrill, C. (2008). Distance education: New technologies and new directions. *Proceedings of the IEEE, 96*(6), 917-930. https://doi.org/10.1109/JPROC.2008.921612.

Hebebci, M.T., Bertiz, Y., & Alan, S. (2020). Investigation of views of students and teachers on distance education practices during the Coronavirus (COVID-19) Pandemic. *International Journal of Technology in Education and Science (IJTES), 4*(4), 267-282. https://files.eric.ed.gov/fulltext/EJ1271267.pdf

Holmberg, B. (1989). *Theory and practice of distance education*. New York: Routledge.

Horzum, M.B., Özkaya, M., Demirci, M., & Alpaslan, M. (2013). Türkçe uzaktan eğitim araştırmalarının incelenmesi [Examination of Turkish distance education research]. *İnönü Üniversitesi Eğitim Fakültesi Dergisi, 14*(2), 79-100.

Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55. https://doi.org/10.1080/10705519909540118.

Istanbul Teachers Academies (2020, July). *Special education academy*. https://istanbulakademi.meb.gov.tr/akademiler.php?cID=14

İşman, A. (2011). *Uzaktan eğitim [Distance Education].* Pegem Akademi.

Johnson, A.E. (2008). A nursing faculty's transition to teaching online. *Nursing Education Perspectives, 29*(1), 17-22.

Kalaycı, Ş. (2010). *SPSS uygulamalı çok değişkenli istatistik uygulamaları [Multivariate statistics applications with SPSS]*. Asil Yayın Dağıtım Ltd. Şti.

Kaya, Z. (2002). *Uzaktan eğitim [Distance Education].* Pegem A Yayıncılık.

Kaya, Z., & Önder, H. (2002). İnternet yoluyla öğretimde ergonomi [Ergonomics in ınternet teaching]. *The Turkish Online Journal of Educational Technology, 1*(1), 48-54. http://www.tojet.net/articles/v1i1/118.pdf

Kaya, M., Çitil Akyol, C., Özbek, R., & Pepeler, E. (2017). Lisansüstü eğitim programlarında 'uzaktan eğitim uygulamasına' yönelik 'Eğitim Bilimleri Bölümü' akademisyenlerinin görüşleri [Opinions of 'Educational Sciences Department' academicians on 'distance education application' in graduate education programs], *Elektronik Sosyal Bilimler Dergisi*, *16*(64), 1616-1627. https://dergipark.org.tr/tr/pub/esosder/issue/31376/328632

Kline, R.B. (2005). *Methodology in the social sciences. Principles and practice of structural equation modeling.* Guilford Press.

Korkmaz, Ö., & Tunç, S. (2010). Mesleki-teknik eğitim öğretmenlerinin bilgisayar ve internet temelli öğretim materyallerinden yararlanmaya ilişkin görüşleri [Vocational-technical education teachers' opinions on using computer and internet-based teaching materials]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 11*(3). 263-276. https://dergipark.org.tr/en/download/article-file/1492916

Köklü, N., Büyüköztürk, Ş. & Çokluk, Ö. (2007). *Sosyal bilimler için istatistik [Statistics for the social sciences]*. Pegem A Yayıncılık.

Kretovics, M. A. (1998). *Outcomes assessment: The impact of delivery methodologies and personality preference on student learning outcomes*. [Unpublished doctoral dissertation], Colorado State University.

Leidner, D.E., & Jarvenpaa, S.L. (1993). The information age confronts education: case studies on electronic classroom. *Information Systems Research*, *4*(1), 24–54.

Levine, A. (2001). The remaking of the American university, *Innovative Higher Education*, *25*, 253- 267.

Lloyd, S.A., Byrne, M.M., & McCoy, T.S. (2012). Faculty-perceived barriers of online education. *Journal of online learning and teaching*, *8*(1), 1-12.

Maloney, E.J., & Joshua Kim, J. (2020, May). Fall Scenario 13: A HyFlex Model. *Inside Higher Ed*. https://www.insidehighered.com/blogs/learning-innovation/fall-scenario-13-hyflex-model

Marvasi, M., Sebastian, G., & Lorenzo, S.L.J. (2019). Fostering researcher identity in STEM distance education: impact of a student led online case study. *FEMS Microbiology Letters*, *366*(6). https://doi.org/10.1093/femsle/fnz068

Miglani, A., & Awadhiya, A.K. (2017). Mobile learning: readiness and perceptions of teachers of Open Universities of Commonwealth Asia, *Journal of Learning for Development-JL4D*, *4*(1), 58-71.

Moore, M. G. (1972). Learner autonomy: The second dimension of independent learning. *Convergence, 5(2)*, 76–88.

Moore, M.G., & Kearsley, G. (2011). *Distance education: A systems view of online learning*, Belmot: CA: Wadsworth.

Moore, M.G., & Dielh W. (2019). *Handbook of Distance Education*, Routledge.

Kuru, E. (2019). Sosyal bilgiler öğretmen adaylarının dijital okuryazarlık kavramına ilişkin görüşleri [Opinions of social studies teacher candidates on the concept of digital literacy]. *Electronic Turkish Studies*, *14*(3). https://turkishstudies.net/turkishstudies?mod=makale_tr_ozet&makale_id=22563

Orhan, G., & Beyhan, Ö. (2020). Teachers' perceptions and teaching experiences on distance education through synchronous video conferencing during Covid-19 pandemic. *Social Sciences and Education Research Review*, *7*(1), 18-44.

Özer, N., & Kır, Ş. (2018). Halk eğitim merkezinde görev yapan öğretmenlerin yetişkin eğitiminde uzaktan eğitimin uygulanabilirliğine ilişkin görüşleri [Opinions of teachers working in public education centers on the applicability of distance education in adult education]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi*, *4*(4), 69-86. https://dergipark.org.tr/en/pub/auad/issue/42908/519039

Özkul, A.E. (2004, Mayıs). Açık ve Uzaktan Eğitimin Neresindeyiz? [Where are we in Open and Distance Education?], *Mersin Üniversitesi ÖYP-YUUP Uzaktan Eğitim Çalıştayı, Mersin.*

Robitzsch, A. (2021). Sirt: An R package for Supplementary Item Response Theory Models. Version 3.10-118. https://cran.r-project.org/web/packages/sirt/sirt.pdf

Sampson, N. (2003). Meeting the Needs of Distance Learners. *Language Learning & Technology, 7*(3), 103-118.

Seage, S.J., & Türegün, M. (2020). The effects of blended learning on STEM achievement of elementary school students, *International Journal of Research in Education and Science (IJRES), 6*(1), 133-14. https://files.eric.ed.gov/fulltext/EJ1231349.pdf

Seaman, J. (2009). *Online learning as a strategic asset. Volume II: The paradox of faculty voices: Viewsand experiences with online learning*. Washington, DC: Association of Public and Land-grant Universities and Babson Survey Research Group. https://files.eric.ed.gov/fulltext/ED517311.pdf

Sheets, M. (1992). Characteristics of adult education students and factors which determine course completion: a review, *New Horizons in Adult Education, 6*(1), 3-18.

Sousa, O.C., & Florencio Da Silva, R. S. (2020). Contributions of Technology to Distance Learning. How the University will need to reinvent itself to face the challenges of the 21st Century. *Revista Espacıo, 41*(2), 21.

Soydal, İ., Alır, G., & Ünal, Y. (2012). Türk üniversiteleri e-öğrenmeye hazır mı? Hacettepe Üniversitesi Edebiyat Fakültesi Örneği [Are Turkish universities ready for e-learning? Example of Hacettepe University Faculty of Letters]. Ankara: Hacettepe Üniversitesi Bilgi ve Belge Yönetimi Bölümü.

Süer, İ., Kaya, Z., Bülbül, H. İ., Karaçanta, H., Koç, Z., & Çetin, Ş. (2005). Gazi Üniversitesi'nin uzaktan eğitim potansiyeli [Distance education potential of Gazi University], *The Turkish Online Journal of Educational Technology*, *4*(1), 107-113.

Şimşek, Ö.F. (2007). *Yapısal eşitlik modellemesine giriş, temel ilkeler ve LİSREL uygulamaları [Introduction to structural equation modeling, basic principles and LISREL applications]*. Ekinoks Yayınları.

Tabachnick, B.G., & Fidell, L.S. (2006). *Using multivariate statistics*. Pearson.

Tavşancıl, E. (2002). *Tutumların ölçülmesi ve SPSS ile veri analizi [Measuring attitudes and data analysis with SPSS]*. Nobel Yayınları.

TEDMEM, (2021). *2020 Education Evaluation Report*, TED. https://tedmem.org/yayin/2020-egitim-degerlendirme-raporu

TEDMEM, (2022). *2021 Education Evaluation Report*, TED. https://tedmem.org/yayin/2021-egitim-degerlendirme-raporu

Telli Yamamoto, S.G., & Altun, D. (2020). Coronavirüs ve çevrimiçi (online) eğitimin önlenemeyen yükselişi [Coronavirus and the unstoppable rise of online education]. *Üniversite Araştırmaları Dergisi, 3*(1), 25-34.

The Turkish Ministry of National Education [TMNE], (2020, July). *"Teachers' Lounge" starts in the TRT-EBA-TV*. http://www.meb.gov.tr/ogretmenler-odasi-kusagi-trt-eba-tvde-basliyor/haber/21224/tr

Tutsun, E. (2020). Açıköğretim hizmeti veren bir üniversitede uzaktan eğitim deneyimi olmayan personelin uzaktan eğitim hakkındaki görüşlerine ilişkin bir durum çalışması [A case study on the views of personnel who do not have distance education experience at a university providing distance education services]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi*, *6*(3), 1-26. https://dergipark.org.tr/tr/pub/auad/isue/56247/672732

United Nations Educational, Scientific and Cultural Organization [UNESCO], (2020a). *International Task Force on Teachers for Education 2030*. https://teachertaskforce.org/sites/default/files/2020-04/COVID19_PDF_2PAGES_EN.pdf

United Nations Educational, Scientific and Cultural Organization [UNESCO], (2020b). *UNESCO Covid-19 Education Response Education Sector issue notes*. https://unesdoc.unesco.org/ark:/48223/pf0000373338/PDF/373338eng.pdf.multi

Uşun, S. (2006). *Uzaktan eğitim [Distance education].* Nobel Yayıncılık.

Volery, T., & Lord, D. (2000). Critical success factors in online education, *International Journal of Educational Management, 14*(5), 216 – 223.

Wang J., & Wang X., (2012). *Structural equation modeling applications using Mplus*, Wiley Publication, Higher Education Press.

Wu C.H. (2008). An Examination of the Wording Effect in the Rosenberg Self-Esteem Scale Among Culturally Chinese People, *The Journal of Social Psychology, 148:5*, 535-552, https://doi.org/10.3200/SOCP.148.5.535-552

Yıldırım, Y. (2020). Fatih projesi kapsamında düzenlenen uzaktan hizmet içi eğitimlere yönelik öğretmen görüşlerinin incelenmesi [Examining the opinions of teachers about distance in-service trainings organized within the scope of Fatih project]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi, 6*(2), 76-90. https://dergipark.org.tr/en/pub/auad/issue/55662/761364

Yılmaz, V., & Çelik, H. (2009). *LISREL ile yapısal eşitlik modellemesi [Structural equation modeling with LISREL]*. Pegem Akademi.

Zhu, X., & Liu, J., (2020). Education in and after Covid-19: immediate responses and long-term visions, *Postdigital Science and Education, 2*, 695-699.

APPENDIX

Scale Items

Factor 1: Challenges faced in distance education
m3. I think, in distance education, my students are distracted.
m6. I can't understand whether students understand the lessons in distance education.
m7. In distance education, I feel like I'm talking by myself.
m10. The active participation rate of students in distance education is lower than that of face-to-face education.
m17. Since there are no exams in distance education, I think my students do not care as much as in face-to-face education.
m23. Not being able to make eye contact with students and not seeing their faces in distance education make it difficult for me to adjust my teaching speed.
m25. I find distance education platforms complicated.
Factor 2: Perceived distance education skills
m14. I think the EBA system is easy to use for the online lessons.
m15. I can use internet resources such as e-books and e-journals as a course material.
m20. I can visualize my online lessons with appropriate pictures in a clear and understandable way more easily.
m21. In online lessons, I can adequately employ multimedia such as graphics, sound and animation.
m22. I think online learning systems are easy to use.
Factor 3: Positive attitudes toward distance education
m4. I prefer distance education to face-to-face education.
m5. I think that distance education enables every student to learn at their own pace.
m8. I think distance education is suitable for student groups at all ages.
m9. I think the time allocated for each subject in distance education is sufficient.
m11. I can cover topics in distance education in depth.
m12. I think distance education is also suitable for disadvantaged students