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# Distance education evaluation scale: Teacher dimension

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**ABSTRACT**

The aim of this study is to develop a scale for teachers' evaluation of the distance education process and to examine teachers' evaluations of distance education according to the variables of gender and occupational seniority with the measurement tool. The sampling of the research consists of 616 secondary school teachers who work in a large city in the south of Turkey, selected by cluster sampling method. In the analysis of the data, respectively; exploratory and confirmatory factor analysis, Cronbach's alpha analysis, and Guttman split half value were used. According to exploratory factor analysis applied to establish the construct validity of the scale in question, it was found that the scale explained 66% of the total variance. As a result of confirmatory factor analysis of the obtained structure, it was concluded that the scale had an acceptable model. When the reliability values of the scale were calculated, the Cronbach's alpha value was determined as .94. As a result, when teachers' evaluations of distance education are considered, a valid and reliable measurement tool in five-point Likert type consisting of 20 items consisting of "learning environment", "personality", and "limitation" sub-factors has been developed.

**Keywords:** distance education, scale development, teacher, distance education evaluation

## INTRODUCTION

In the world we live in, there are many changes in the field of education in accordance with the developments in science and technology. Through education, it is expected that individuals who can adapt to these changes, research, communicate, think critically, and adapt to the environment shaped on the idea of continuous education (Alsalhi et al., 2019; Celik & Uzunboylu, 2020). In this context, great importance has been attached to technology supported training in education in recent years (Alaslani & Alandejani, 2020; Keser & Semerci, 2019; Magyar et al., 2020; Uzunboylu & Gundogdu, 2018). If we take a look at the historical development of the distance education method, it is seen that this education method continuously increases its effectiveness and efficiency with the technological tools brought by the age such as television, computer, and the Internet, with the integration of technology into education, starting with written sources such as mail and newspapers (Ozbay, 2015).

On the other hand, technology supported education is used by researchers with different names such as online learning, distance education, online teaching, e-learning and similar meanings. In this context, distance education is a teaching method in which the communication and interaction between educators and learners are specially prepared and the course content is obtained from a specific center through various environments in cases where the existing in-class teaching methods cannot be applied (Beldarrain, 2006). In other words, distance education; it is a planned and designed interdisciplinary formal learning activity that offers a wide variety of learning activities independent of time and space, carried out with digital or written communication resources.

In this context, Singh and Thurman (2019) define distance education as a form of learning in which students interact with instructors and other students and experience them through the Internet/online computers in a simultaneous classroom regardless of their physical location. Similarly, Simonson et al. (2019) also include distance education; defines it as a planned teaching process in which learning processes between lecturers and learners in different places are provided by various tools. Eisinger (2000) also defines distance learning as a predetermined learning experience that can combine the learners from different parts of the world and encourage students to communicate. Again, through distance education, students can access the subjects they want to learn whenever they want, wherever they want (Jeong et al., 2019; Davis et al., 2019a, 2019b; Ng & Baharom, 2018) according to their learning flexibility (Aderibigbe, 2021; Thoms & Eryilmaz, 2014) and learning styles (Xu et al., 2020).

From this point of view, educational scientists generally define distance education as synchronous (synchronous) or asynchronous (asynchronous) (Watts, 2016). In simultaneous teaching, learners and instructors meet at a specific time (mostly via the Internet) and carry on the lessons live (Fidalgo et al., 2020). As in the face-to-face teaching process, a more active environment

is created for instructors and learners, such as classroom interaction, asking questions, debating, and underlining ambiguous sections. Asynchronous education, on the other hand, means that instructors and learners do not have the facility to work simultaneously; It emerges as a type of education where learners can easily reach the necessary materials (presentation, video, audio recording, etc.) over the Internet whenever they want or need it (Watts, 2016).

When the studies on distance education are examined in the literature, it is clear that these studies generally focus on the higher education level, but there are limited studies at the primary and secondary education level (Arbaugh, 2010; Ching & Hursh, 2014; Mahdizadeh et al., 2008). In this context, for example, Ching and Hursh (2014) examined the three-year development process of teachers and their communication with peers in an online professional development course. As a result of the research, teachers are more satisfied with the online courses given. They have reached the conclusion that they have developed many projects. Arbaugh (2010) also examined the characteristics of the online graduate education provided by faculty members and student behaviors. As a result of the study, it was found out that both formal instructor activities and informal instructor activities affect students' perceptions positively in the online learning process. Similarly, Mahdizadeh et al. (2008) examined the factors explaining the use of e-learning environments by faculty members at a university in the Netherlands. As a result of this study, it was concluded that the factors affecting the e-learning environment mostly depend on the views of the instructors about web-based activities, their views on computer-assisted learning, and the perception that the online education environment adds value to learning. Again, Scherer et al. (2020) examined the readiness of teachers in higher education for learning and teaching in the distance education process in their study. As a result of the study, it was found that the opinions of the instructors at the university regarding online learning were in three categories: low, high, and inconsistent. Similarly, Hung et al. (2010) developed a five-dimensional scale to examine university students' readiness for the distance education process. As a result of the study, it was concluded that the students' computer/the Internet self-efficacy, learning motivation and readiness levels in online communication were high, but their readiness levels in student control and self-directed learning were low.

Hrtonova et al. (2015), on the other hand, as a result of their research examining the views of primary and secondary school teachers on distance education, concluded that teachers who voluntarily participated in distance education courses developed positive attitudes at the beginning and end of the lesson. Similarly, Hung (2016) obtained a valid and reliable 18-item scale as a result of the scale development study he carried out to examine the readiness of primary and secondary school teachers who provide face-to-face education in traditional classrooms for distance education. Wang et al. (2021), on the other hand, as a result of their study examining the difficulties experienced by primary school teachers in distance education, concluded that teachers with different occupational seniority did not have experience in distance education and they were worried about this issue because it was the first time such an education was given. Again, Liu et al. (2010) revealed that teachers who are experienced in technology-based learning and teaching have more knowledge about distance education practices and understand the subject better.

As can be clearly understood from the studies mentioned above, one of the most important building blocks of the distance education process is the teacher as the person who implements the application. In particular, teachers are expected to have the necessary knowledge, skills, and equipment to meet the needs of today's students (Basar et al., 2019; Orhan & Akkoyunlu, 1999). From this point of view, teachers' motivations, knowledge, and skills in e-learning environments appear as important factors on their students' cognitive and affective characteristics for online learning (Machado, 2007; Kurnaz et al., 2020). From this point of view, teachers who teach at all levels of education need to adapt the educational environment and practices suitable for today's conditions from traditional and passive classrooms to the distance education process, considering the technological developments (Hang, 2016). In this context, it is thought that it is of great importance to evaluate the views of teachers working at every education level on distance education. Based on this fact, this study aims to develop a scale to determine how secondary school teachers evaluate the distance education process, their perspectives on distance education, the difficulties they experience in this process, the limitations, and advantages of distance education. In addition, it was also examined whether there was a significant difference between the aforementioned scale and the views of secondary school teachers on distance education according to the variables of gender and professional seniority. Accordingly, answers to the following questions were sought:

1) Is the distance education evaluation scale prepared for secondary school teachers valid and reliable?
2) Do teachers' evaluations of distance education indicate a significant difference according to gender variables?
3) Is there a difference between teachers' evaluations of distance education according to the variable of occupational seniority?

## LITERATURE REVIEW

Distance education is a teaching method in which communication and interaction between educators and learners is provided from a certain center through specially prepared teaching units and various environments, in cases where current education-teaching methods cannot be applied (Cagiltay, 2002). In other words, distance education; it is a planned and designed interdisciplinary formal learning activity that offers a wide variety of learning activities independent of time and place, carried out with digital or written communication resources (Altiparmak et al., 2011). Distance education offers the opportunity to teach without the limitation of time and place for both the learner and the teacher. It offers individuals the opportunity to learn at their own pace and creates an advantage for people with different intelligences thanks to its multimedia tools (Valentine, 2002). Distance education provides the opportunity for lifelong learning and provides individuals with the opportunity to get education from anywhere with ease of transportation by saving time. Distance education provides great convenience for individuals who need special education (Karakus et al., 2020; Valentine, 2002). The positive effects of distance education are related to the correct

implementation of the application. Distance education offers different learning environments for students at different levels according to the needs of each student. The extent to which students feel they belong to these environments and how much interactions attract students to learning activities is an important issue. It enables students to benefit from course materials at the highest level with multimedia elements such as video, sound, and animation, as well as pictures and texts used in distance education environments (Yildirim et al., 2014). Although distance education has advantages, it also has some disadvantages. All courses, especially the practical ones, are not suitable for distance education, there is no face-to-face communication in learning environments, instant feedback during learning, lesson planning problems of people who do not have the habit of individual study, communication problems in large groups, insufficient and economical infrastructure works required for distance education. can be demonstrated within the limitations (Dincer, 2006).

On the other hand, when the relevant literature is examined, it is emphasized by many researchers that there are many common features that affect the distance education process (Bernard et al., 2004). These common features are concepts such as learning environment, self-regulated learning, and limitations (Escobar Fandino & Velandia, 2020; Vonderwell & Zachariah, 2005; Wardoyo et al., 2021). In this context, learning environment refers to an environment that has sufficient technological infrastructure and is suitable for the student's television, computer, and the Internet use (Stojanovic et al., 2020). Self-regulated learning involves the students' ability to regulate their cognitive processes, motivations, and behaviors after going through various self-regulation processes (Hofer et al., 1998). People with this skill are able to plan, organize, conduct, observe, evaluate every step of the learning processes in terms of metacognition, see themselves as motivationally sufficient, effective, and autonomous, choose behaviorally and create the most suitable environment for learning (Ozmentes, 2008). On the other hand, Cobb (2003) defines the concept of self-regulated learning as the ability of learners to participate in the learning process cognitively, motivationally, and behaviorally. According to Schunk and Ertmer (2000), self-regulation is the generation of thoughts and emotions that a person needs for learning and motivation, and planning and implementing his actions in line with these feelings and thoughts in a systematic way. On the other hand, the limitations can be expressed as that some of the distance education students experience problems due to the lack of technological infrastructure depending on the environment they live in and the environment they live in (Fedynich, 2014; Fidalgo et al., 2020; Wang et al., 2021; Wedenoja 2020).

## METHODS

This study is a quantitative study conducted to develop a scale to determine the views of secondary school teachers on distance education and to examine the evaluations of distance education according to the variables of teachers' gender and occupational seniority with the developed measurement tool.

### Population and Study Group

The population consists of secondary school teachers working in a province in the south of Turkey. The teachers constituting the study group were determined according to the cluster sampling method. In the cluster sampling method, people with similar characteristics are randomly selected from among the groups formed by the gathering (Mills & Gay, 2019). The regions of the schools, where the teachers work was taken as a cluster. Accordingly, teachers working in three regions in low, middle, and high socio-economic environments formed the sample of the research. In this context, two different study groups were formed from a total of 616 secondary school teachers who participated in the research. Data from 317 teachers in the first study group were collected in the spring of 2021 and exploratory factor analysis was applied to the data in question. Data from 299 teachers in the second study group were collected in the fall of 2021, and confirmatory factor analysis and descriptive statistics were applied to these data, respectively. Of the participants in the first study group, 203 (64%) were female and 114 (36%) were male. According to professional seniority, about half of the participants have 0-5 years, about a quarter of them have 6-10 years and 16-20 years of seniority. Of the branch teachers who make up the research group, 20% is Turkish, 22% is mathematics, 18% is science and technology, 13% is social studies, 10% is English, 9% is religious culture and ethics, and 8% is the other two work in other branches (music, visual arts, physical education). In the second study group, 171 (57%) of the participants were female and 128 (43%) were male. In terms of occupational seniority, approximately one-third of the teachers have 6-10 years, the remaining one-third have 16-20 years, and the others have 21 years or more seniority. Of the branch teachers who make up the research group, 23% is Turkish, 21% is mathematics, 19% is science and technology, 15% is social studies, 9% is English, 8% is religious culture and ethics, and 5% is the other two work in other branches (music, visual arts, and physical education).

### Data Collection Tools

#### *Distance education evaluation scale*

In this section, first of all, the development process of the distance education evaluation scale was carried out by following the scale development steps in the literature (Devellis, 2022). Accordingly, firstly, an item pool was created, then the scale was finalized by conducting content validity, pilot implementation, construct validity and reliability studies. As the first step of the process, an item pool was created by scanning the relevant literature to create an item pool. In the second stage, the draft form was presented to the opinion of two experts in the field of assessment and evaluation, two in the field of curriculum development in education, and one expert in the field of language education, and its final form was given. The draft form, which was prepared in line with expert opinions, was applied as a pilot to a total of sixteen teachers working in different schools and checked for language and intelligibility. The scale items were arranged according to a five-point likert. As a result of these arrangements, the scale was given its final shape. **Appendix A** shows the distance education evaluation scale: Teacher dimension.

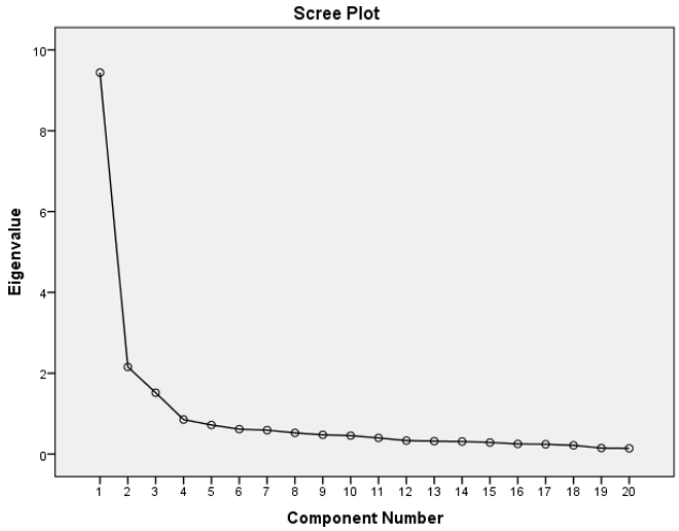


**Figure 1.** Screen plot graph

### Analysis of Data

The data were analyzed with the help of IBM SPSS 22.0 and Lisrel 8.7 package program. However, before the analysis process, the endpoint values were determined by the Mahalanobis distance test, and 14 forms were excluded from the evaluation. Accordingly, the data obtained from the first study group the construct validity of the scale was ensured by applying exploratory factor analysis (EFA). The reliability of the data was tested with Cronbach's alpha analysis and Guttman split half tests. In addition, descriptive analysis, independent groups t-test and item discrimination power were calculated. In the next stage, the confirmatory factor analysis (CFA) of the scale with construct validity was calculated over the second study group. The scale whose validity and reliability studies were completed; independent groups t-test in case of comparing two groups according to various variables (gender and occupational seniority) based on the data obtained from the second study group; one-way analysis of variance (ANOVA) was used in cases where at least three groups were encountered. In the process of comparing the groups, the Scheffe test was used. The condition of normal distribution, one of the assumptions required for the implementation of these analyses, was checked using the Kolmogorov-Smirnov test and it has been revealed that the data set has a normal distribution. In addition, the Levene test was applied for the homogeneity of variances, which is the prerequisite of the analysis of variance, and then ANOVA analysis was performed. In this process, p=.05 and p=.01 were accepted for the significance value in the analysis of all statistical analyses.

## RESULTS

In this section, firstly, the findings related to the analyses applied during the development of the "distance education evaluation scale" are included. In the other part, there is data on the changes in the distance education evaluation scale according to the gender and professional seniority of the participants.

### Findings Regarding the Structural Validity of the Distance Education Evaluation Scale

Before the EFA exploratory factor analysis applied to the distance education evaluation scale, the data in terms of factor analysis and the adequacy of the sample size was tested with the Kaiser-Meyer-Olkin (KMO) test and the Bartlett sphericity test (Buyukozturk, 2020). Accordingly, the KMO was .93 and the Bartlett sphericity test was calculated as $x^2$=2,526.995 (p<0.01). It was concluded that the obtained values were suitable for factor analysis. On the other hand, according to the results of principal components analysis applied to the scale (Tabachnick & Fidell, 2013), three factors with eigenvalues above one were obtained for 20 items. Accordingly, the structure of factors with an eigenvalue of one or more is considered stable (Tabachnick & Fidell, 2013). In this context, the scree plot is shown in **Figure 1**. When **Figure 1** is examined, the graph moves on the horizontal axis after the third factor. Therefore, it is accepted that the factors that make up the scale consist of three sub-factors.

In addition, as a result of the analysis, a three-factor structure was obtained in six iterations and is given in **Table 1**. As seen in **Table 1**, the percentage of total variance of the scale, which consists of a three-factor structure with an eigenvalue greater than one, is 65.56%. The factor loadings of the scale vary between .62 and .93. The first factor is the "learning environment" sub-factor, which consists of eleven items related to the environment of the distance education process.

The second factor is named as the "personal suitability" sub-factor, which consists of four items and evaluates whether distance education is suitable for the individual. The third factor is the "limitation" sub-factor, which consists of five items related to the limitations in distance education. It is seen that the arithmetic averages of the items that make up the distance education evaluation scale vary between 1.69 and 3.03. The arithmetic mean, standard deviation, and correlation values of the sub-factors of the distance education evaluation scale are given in **Table 2**. When **Table 2** is examined, it is seen that there is a significant and high correlation between total score of the distance education evaluation scale and all its sub-factors (r=.83, r=.85; r=.73, p<0.01).

**Table 1.** Factor analysis results of distance education evaluation scale

| Item number | Learning environment | Personal suitability | Limitation | Mean | S |
|---|---|---|---|---|---|
| Item 1 | .93 | | | 3.03 | 1.24 |
| Item 2 | .88 | | | 2.72 | 1.16 |
| Item 3 | .85 | | | 2.92 | 1.23 |
| Item 4 | .83 | | | 3.02 | 1.34 |
| Item 5 | .83 | | | 2.95 | 1.18 |
| Item 6 | .77 | | | 2.88 | 1.18 |
| Item 7 | .71 | | | 2.94 | 1.24 |
| Item 8 | .70 | | | 2.38 | 1.13 |
| Item 9 | .68 | | | 2.84 | 1.28 |
| Item 10 | .66 | | | 2.76 | 1.12 |
| Item 11 | .62 | | | 2.65 | 1.21 |
| Item 12 | | .90 | | 2.21 | 1.26 |
| Item 13 | | .88 | | 2.51 | 1.24 |
| Item 14 | | .87 | | 2.43 | 1.21 |
| Item 15 | | .84 | | 2.07 | 1.24 |
| Item 16 | | | .85 | 1.77 | .85 |
| Item 17 | | | .78 | 1.68 | .73 |
| Item 18 | | | .67 | 2.31 | 1.13 |
| Item 19 | | | .66 | 2.39 | 1.10 |
| Item 20 | | | .66 | 2.12 | .91 |
| **Eigenvalue** | 9.44 | 2.16 | 1.50 | | |
| **Variance percentage (%)** | 47.19 | 10.77 | 7.59 | Total variance percentage (%)=65.56 | |
| **Range** | .62-.93 | .84-.90 | .66-.85 | | |
| **Number of items** | 11 | 4 | 5 | | |

**Table 2.** Values related to the sub-factors of the distance education evaluation scale

| Distance education evaluation scale sub-factors | F1 | F2 | F3 | $\bar{X}$ | S |
|---|---|---|---|---|---|
| Learning environment (F1) | 1 | | | 2.83 | .97 |
| Personal suitability (F2) | .58** | 1 | | 2.31 | 1.09 |
| Limitation (F3) | .47** | .48** | 1 | 2.05 | .69 |
| Total | .83** | .85** | .73** | 2.40 | .76 |

Note. **p<0.01

**Table 3.** Calculated values and limit values og the distance education evaluation scale

| Fit indexes | Calculated value | Limit values | Perfect fit | Good fit | References |
|---|---|---|---|---|---|
| $\chi^2$/df | 1.53 | Perfect fit | 0≤$\chi^2$/df≤2 | .2≤$\chi^2$/df≤3 | Kline (2016) |
| RMSEA | .08 | Good fit | .00≤RMSEA≤.05 | .05≤RMSEA≤.08 | Brown (2015); Browne and Cudeck (1993) |
| SRMR | .09 | Good fit | .00≤SRMR≤.05 | .05≤SRMR≤.10 | Browne and Cudeck (1993) |
| GFI | .91 | Good fit | . 95≤SRMR≤1.00 | .90≤SRMR≤.95 | Jöreskog and Sörbom (1993) |
| AGFI | .93 | Perfect fit | . 90≤SRMR≤1.00 | .85≤SRMR≤.90 | Jöreskog and Sörbom (1993); Schermelleh-Engel et al. (2003) |
| NNFI | .99 | Perfect fit | .95≤CFI≤1.00 | .90≤CFI≤.95 | Hu and Bentler (1999); Sumer (2000) |
| CFI | .99 | Perfect fit | .90≤CFI≤1.00 | .90≤CFI≤.95 | Hu and Bentler (1999); Sumer (2000) |
| IFI | .99 | Perfect fit | .95≤CFI≤1.00 | .90≤CFI≤.95 | Hu and Bentler (1999); Sumer (2000) |

### *Findings related to confirmatory factor analysis of distance education evaluation scale*

CFA was applied to determine whether the three-factor structure obtained as a result of the EFA applied to the distance education evaluation scale was appropriate. The fit index values and limit values obtained during the analysis process are shown in **Table 3**. When **Table 3** is examined, the perfect fit of some values ($\chi^2$/sd=1.53; AGFI=.93; NNFI=.99; CFI=0.99; IFI=.99) in the context of fit indices; some values are (RMSEA=0.08; SRMR=0.90; GFI=0.91) It is clearly seen that it is among the acceptable fit values. Accordingly, the obtained values reveal that the structure is in harmony with the collected data.

### *Findings regarding the reliability of the distance education evaluation scale*

Cronbach's alpha and Guttman split half values were calculated to determine the reliability of the scale. The results of the analyzes are presented in **Table 4**. Accordingly, when **Table 4** is examined, Cronbach's alpha values are .94 in the learning environment sub-factor, respectively; it was .91 in the personal convenience sub-factor, .86 in the limitation sub-factor, and .94 for the total score. In addition, the Guttman split half test was also calculated to determine the consistency of the scale. Accordingly, the Guttman split half test was .92 for the learning environment sub-factor and .93 for the personal convenience sub-factor, respectively; .86 for the limitation sub-factor and .79 for the entire scale. was calculated as. The fact that all of these obtained values are greater than .70 indicate that the scale data are reliable (Fraenkel et al., 2018; Tabachnick & Fidell, 2013).

In addition, the corrected item total correlation values as a result of the analysis performed to determine the reliability of the distance education assessment scale and the Cronbach's alpha values when the item was removed are also given in **Table 5**. As can be seen in **Table 5**, the item total correlation coefficient varies between .407 and .830 according to the results of the applied

**Table 4.** Cronbach's alpha & Guttman split half values of total scores & sub-factor scores of distance education evaluation scale

| Sub-factors | Cronbach's alpha | Guttman split half |
|---|---|---|
| Learning environment | .94 | .92 |
| Personal suitability | .91 | .93 |
| Limitation | .85 | .86 |
| Total score | .94 | .79 |

**Table 5.** Corrected item-total correlations of distance education evaluation scale & Cronbach's alpha value when item is excluded

| Item number | Modified item total correlation value | Cronbach's alpha value after deleting items |
|---|---|---|
| Item 1 | .685 | .936 |
| Item 2 | .674 | .936 |
| Item 3 | .666 | .936 |
| Item 4 | .620 | .937 |
| Item 5 | .813 | .933 |
| Item 6 | .716 | .935 |
| Item 7 | .714 | .935 |
| Item 8 | .752 | .934 |
| Item 9 | .746 | .934 |
| Item 10 | .688 | .936 |
| Item 11 | .830 | .933 |
| Item 12 | .633 | .937 |
| Item 13 | .670 | .936 |
| Item 14 | .652 | .936 |
| Item 15 | .649 | .936 |
| Item 16 | .412 | .940 |
| Item 17 | .446 | .939 |
| Item 18 | .500 | .939 |
| Item 19 | .439 | .940 |
| Item 20 | .407 | .940 |

item analysis. These values are expected to be non-negative and to have a value of at least .30 and above (Buyukozturk, 2020). Accordingly, it can be said that the scale meets these criteria. In addition, it is seen that the Cronbach's alpha value obtained when the items are removed is between .936 and .940. That this value is .70 and above is sufficient for the reliability of the test scores (Fraenkel et al., 2018; Rabbit, 2010).

### *Distinctive characteristics of the items of the distance education evaluation scale*

It is expected from the developed measurement tool to distinguish whether the desired behavior is exhibited or not (Can, 2014). For this purpose, firstly, independent groups t-test was applied to the scale in order to determine the discrimination power of the items in the distance education evaluation scale (Balci, 2021). The upper and lower 27% groups were determined by listing the total scores of the data in the study group, and the t-test values of the independent groups were calculated within the scope of the scores belonging to the groups. Analysis results are shown in **Table 6**. As seen in **Table 6**, it has been concluded that there is a statistically significant difference between the mean scores of the upper group and the mean scores of the lower groups. Accordingly, it can be said that the items of the distance education evaluation scale are distinctive.

### The Findings Regarding Teachers' Evaluation of Distance Education According to Gender Variable

The results of the analysis carried out with the aim of examining the differences between the views of teachers on the evaluation of distance education according to gender are given in **Table 7**. When **Table 7** was examined, it was concluded that there was no significant difference between the opinions of teachers about evaluating distance education according to the gender variable ($t(297)=1.36$, $p>.05$; $t(297)=1.61$, $p>.05$; $t(297)=0.05$, $p>.05$ $t(297)=1.39$, $p>.05$).

### The Findings Regarding Teachers' Evaluation of Distance Education According to Occupational Seniority

Again, it was tested with ANOVA whether there was a difference between the views of teachers on the evaluation of distance education according to occupational seniority. These results were included in **Table 8**. As seen in **Table 8**, it was concluded that teachers had different views on the limitation sub-factor according to their occupational seniority [$F(3, 297)=1.36$, $p<.05$]. In this context, according to the results of Scheffe analysis applied to the scale; the difference between teachers with a seniority of 21 years and above is in favor of teachers with a seniority of 6-10 years. In addition, it is clearly seen from the table that the opinions of teachers with different occupational seniority are close to each other in terms of other sub-factors and total points.

## DISCUSSION ANF CONCLUSION

The aim of this study is to develop a scale to determine the views of teachers on distance education and to examine teachers' evaluations on distance education according to the variables of gender and occupational seniority with the developed measurement tool. In this context, first of all, an item pool of 63 items was created by scanning the literature during the

**Table 6.** Item analysis results of distance education evaluation scale

| Item number | n | Lower groups | | Upper group | | t |
|---|---|---|---|---|---|---|
| | | $\overline{X}$ | S | $\overline{X}$ | S | |
| Item 1 | 52 | 1.96 | 1.170 | 3.84 | .957 | 8.98** |
| Item 2 | 52 | 1.75 | 1.007 | 3.55 | 1.017 | 9.10** |
| Item 3 | 52 | 1.87 | 1.048 | 3.69 | 1.112 | 8.62** |
| Item 4 | 52 | 1.98 | 1.364 | 3.87 | .950 | 8.17** |
| Item 5 | 52 | 1.77 | .831 | 3.98 | .779 | 14.00** |
| Item 6 | 52 | 1.88 | 1.060 | 3.83 | .785 | 10.61** |
| Item 7 | 52 | 1.83 | .944 | 3.96 | .928 | 11.63** |
| Item 8 | 52 | 1.38 | .565 | 3.38 | .911 | 13.45** |
| Item 9 | 52 | 1.73 | .992 | 4.00 | .950 | 11.91** |
| Item 10 | 52 | 1.83 | .901 | 3.65 | .883 | 10.44** |
| Item 11 | 52 | 1.42 | .667 | 3.85 | .826 | 16.46** |
| Item 12 | 52 | 1.29 | .696 | 3.65 | 1.219 | 12.15** |
| Item 13 | 52 | 1.52 | .700 | 4.10 | .799 | 17.50** |
| Item 14 | 52 | 1.52 | .610 | 3.94 | .938 | 15.62** |
| Item 15 | 52 | 1.12 | .583 | 3.38 | 1.223 | 12.08** |
| Item 16 | 52 | 1.23 | .469 | 2.17 | 1.061 | 5.86** |
| Item 17 | 52 | 1.21 | .412 | 2.12 | .943 | 6.34** |
| Item 18 | 52 | 1.50 | .804 | 3.02 | 1.038 | 8.34** |
| Item 19 | 52 | 1.62 | .867 | 2.92 | 1.152 | 6.54** |
| Item 20 | 52 | 1.54 | .727 | 2.63 | .929 | 6.70** |

Note. **p<0.01

**Table 7.** Independent groups t-test results of the distance education evaluation scale according to gender variable

| Sub-factors of distance education evaluation scale | Gender | N | Mean | S | sd | t | p-value |
|---|---|---|---|---|---|---|---|
| Learning environment | Female | 171 | 2.96 | .89 | 297 | 1.36 | .17 |
| | Male | 128 | 2.81 | .97 | | | |
| Personal suitability | Female | 171 | 2.47 | 1.10 | 297 | 1.61 | .11 |
| | Male | 128 | 2.29 | 1.08 | | | |
| Limitation | Female | 171 | 2.10 | .70 | 297 | .05 | .96 |
| | Male | 128 | 2.12 | .64 | | | |
| Total score | Female | 171 | 2.48 | .73 | 297 | 1.39 | .16 |
| | Male | 128 | 2.36 | .74 | | | |

**Table 8.** ANOVA results of distance education evaluation scale according to occupational seniority

| Sub-factors of DEES | Occupational seniority | n | Mean | S | F | p | Significant difference Scheffe analysis |
|---|---|---|---|---|---|---|---|
| Learning environment | 6-10 years | 102 | 2.84 | .97 | | | |
| | 11-15 years | 54 | 2.94 | .86 | .188 | .904 | |
| | 16-20 years | 81 | 2.92 | .94 | | | |
| | 21 years or more | 62 | 2.91 | .92 | | | |
| Personal suitability | 6-10 years | 102 | 2.43 | 1.06 | .671 | .570 | |
| | 11-15 years | 54 | 2.20 | .92 | | | |
| | 16-20 years | 81 | 2.46 | 1.12 | | | |
| | 21 years or more | 62 | 2.40 | 1.23 | | | |
| Limitation | 6-10 years | 102 | 1.99 | .65 | 3.64 | .013* | 21 years or more>6-10 years |
| | 11-15 years | 54 | 2.05 | .72 | | | |
| | 16-20 years | 81 | 2.12 | .59 | | | |
| | 21 years or more | 62 | 2.35 | .84 | | | |
| Total score | 6-10 years | 102 | 2.35 | .72 | .812 | .488 | |
| | 11-15 years | 54 | 2.40 | .67 | | | |
| | 16-20 years | 81 | 2.50 | .71 | | | |
| | 21 years or more | 62 | 2.50 | .83 | | | |

Note. *p<.05 & DEES: Distance education evaluation scale

development of the scale, and the content validity of the items was ensured by submitting the item pool to expert opinions. This situation is similar to the idea that scale items should be submitted to the opinion of at least two subject experts in order to ensure content validity, based on the guidelines put forward by Salkind (2013).

Afterwards, as a result of the EFA applied to establish the construct validity of the scale, it was concluded that three factors explained 66% of the total variance. In this context, it is sufficient for the variance explained for two or more scales to be between 40% and 60% (Cokluk et al., 2021).

Accordingly, it indicates that the scale values measure teachers' evaluations on distance education at an acceptable level.

In addition, during the development of the scale, the factor loads of the items in the EFA ranged from .62 to .93. When the literature is examined, it can be said that the factor loadings of the items within the scope of this research are sufficiently good,

since this value is expected to be at least .32 (Tabachnick & Fidell, 2013). As a result of the CFA performed to test the suitability of the structure of the distance education evaluation scale, it was concluded that the values of the fit indices were appropriate. In this context, when the values in the literature are examined, it is revealed that the results obtained have a good fit within the scope of the fit model (Brown, 2015, Kline, 2016; Sumer, 2000). Accordingly, as a result of both exploratory and confirmatory factor analyzes of the distance education evaluation scale developed for teachers, it has been found that the said scale has a valid structure.

Again, the Cronbach's alpha total value of the scale was found to be .94 and the Guttman split half value to be .79, among the analyzes made for the reliability of the distance education evaluation scale. The fact that the obtained values are higher than .70 is an indication that the scale is quite reliable (Fraenkel et al., 2018). In line with the results obtained, it was concluded that the distance education evaluation scale developed for teachers is reliable.

On the other hand, in order to determine the item discrimination power within the scope of the reliability of the scale, it was concluded that there was a significant difference between the score of the upper group of 27% over the total score and the score of the subgroup ($p<.01$) and that the items in the scale were distinctive (Can, 2014). It was concluded that there were high-level and statistically significant relationships between the sub-factors of the distance education assessment scale (learning environment, personal relevance, and limitation) and the total score at the level of .85, .87, and .73, respectively. Since these values are greater than .70 (Fraenkel et al., 2018), it can be said that there is a high level of relationship between the sub-factors and the total score.

On the other hand, when the sub-factors in the distance education evaluation scale are examined, it is seen that these factors are grouped under three main headings. Accordingly, the first factor is the sub-factor of "learning environment". According to the findings obtained from the research, the use of technological tools for distance education and teacher-student competencies are of great importance in the learning environment sub-factor. This result is also similar to the relevant literature (Stojanovic et al., 2020; Kim et al., 2014; Shea & Bidjerano, 2010; Vonderwell & Zachariah, 2005). In this context, for example, Stojanovic et al. (2020) emphasized that learning environments are very important in the distance education process and that online distance education tools and mass media such as TV should be actively used in these environments. In addition, Shea and Bidjerano (2010) concluded in their study that students who have sufficient technology knowledge in learning environments are more successful than other students. Accordingly, the conclusion that the learning environment is important for teachers in the distance education process is similar to the literature.

Another of the sub-factor in the distance education evaluation scale is the sub-factor of "personal suitability". This result is also in line with the relevant literature are similar (Abuhammad, 2020; Fedynich, 2014; Fidalgo et al., 2020; Horspool & Lange, 2012; Hung, 2016; Kim, 2020; Otter et al., 2013; Sun et al., 2008; Valentine, 2002; Wang et al., 2021). In this context, for example, Fidalgo et al. (2020) have found that distance education provides an opportunity for lifelong learning and provides individuals with the opportunity to get education from anywhere with time saving and ease of transportation as a result of their studies (Fedynich, 2014; Kim, 2020). Again, according to many researchers, distance education can offer different learning environments for students at different levels according to the needs of each student. It allows students to be in a safe educational environment and provides the opportunity for students to benefit from the course materials at the highest level with multimedia elements such as video, sound, and animation as well as pictures and texts (Yildirim et al., 2014). In addition, as a result of Hung's (2016) study examining the readiness levels of teachers in distance education, it was revealed that teachers can learn very easily and transfer the knowledge they have learned in appropriate distance education environments. According to this, it can be said that the difference between the results of the research and some study results is due to the difference in the sample or the application in a different teaching process.

The last sub-factor in the distance education evaluation scale are the "limitation" sub-factor. This result is also similar to the related literature (Abuhammad, 2020; De Paepe et al., 2018; Demuyakor, 2020; Fidalgo et al., 2020). In this context, for example, De Paepe et al. (2018) concluded in their study that there are some limitations in distance education due to the lack of simultaneousness of some courses in distance education, the lack of face-to-face communication in the learning environment and the inability to provide instant feedback during learning. Again, Wedenoja (2020) also concluded in his study that some learners experience significant problems due to the lack of online access or the limitations they experience in online learning tools such as computers. Similarly, Wang et al. (2021), in their study with teachers, concluded that they experience some limitations in distance education due to the lack of infrastructure and technological equipment. In addition, as a result of Demuyakor's (2020) study, in which students who continue their undergraduate education in China, examine their satisfaction in the distance education process, it has been concluded that some students spend a lot of money to reach this education, as technology-supported education such as distance education costs. Again, Kaleli-Yilmaz and Guven (2015) concluded that, as a result of their studies with pre-service teachers, they encountered some limitations such as holding distance education courses for a very long time, not being able to ask questions to the teachers outside the classroom and experiencing technical problems in the courses.

On the other hand, secondary school teachers' evaluations of distance education according to the gender variable were also examined in the study. Accordingly, it was concluded that there was no significant difference between secondary school teachers' evaluations of distance education in terms of gender variable. Studies on this subject in the literature point to similar results (Cuadrado-García et al., 2010; Hung et al., 2010; Yalman & Kutluca, 2013). In this context, for example, Hung et al. (2010) concluded in their study that male and female university students' views on distance education are close to each other. Similarly, Masters and Oberprieler (2004) concluded in their study that the participation of female and male students in distance education is equal to each other. However, Gonzalez-Gomez et al. (2012) concluded that female students in Spain were more successful than male students in undergraduate courses conducted within the scope of distance education, while in some studies concluded that male

students are more willing and successful in distance education than female students (Li & Kirkup, 2007; Ong & Lai, 2006; Teo, 2014). It can be said that the differences between these findings are due to the sample difference.

As the last sub-goal of the research, the evaluation status of secondary school teachers in distance education according to the variable of occupational seniority was examined. Accordingly, it has been concluded that teachers with more occupational seniority face more limitations in distance education. Similar studies in the literature also point to similar results. In this context, for example, Teo (2014) revealed in his study on primary and secondary school teachers' acceptance of technology that teachers with more seniority have difficulties in using technology and spend a lot of effort. Similarly, in his study, Hung (2016) concluded that teachers with more occupational seniority have difficulty in communicating in the distance education process and feel more inadequate than inexperienced teachers. However, Liu et al. (2010) in their studies conducted within the scope of technology-based learning and teaching, concluded that experienced teachers have more knowledge and better understanding of educational practices. On the other hand, Wang et al. (2021) also examined the difficulties faced by primary school teachers in distance education. As a result of their studies, they concluded that not all teachers with different occupational seniority have experience in distance education and that they are concerned about this issue as they are providing such training for the first time. It can be said that the differences between these findings are due to the sample difference of the teachers' thoughts on distance education according to their occupational seniority.

Knowing the views of teachers on distance education evaluations should be considered when planning distance education. In this regard, it can be suggested that teachers' limitations (computer literacy, inadequacy of technology use, lack of technological equipment, etc.) should be known and measures should be taken to eliminate the negativities. As a result, a valid and reliable measurement tool in five-point Likert type consisting of 20 items consisting of "learning environment", "personality" and "limitation" sub-factors was developed for the distance education evaluation of teachers. This study is limited to teachers working in secondary schools only. In future studies, validity and reliability studies can be carried out on students or teachers at other levels. In addition, with the paradigm change to be realized with distance education, studies can be carried out to ensure the effectiveness of distance education by using flip-learning or blended education where students can be at the center instead of teacher-centered education.

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# APPENDIX A

**Table A1.** Distance education evaluation scale: Teacher dimension

| | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| **Factor 1: Learning environment** | | | | | |
| 1. The variety of materials used during the distance education process has increased. | | | | | |
| 2. Distance education increases motivation as it allows the measurement and evaluation results to be obtained immediately. | | | | | |
| 3. Thanks to the use of materials in the distance education process environment, the learning of individuals with different learning styles becomes permanent. | | | | | |
| 4. The learning environment is better supported by multimedia elements such as pictures, videos, sounds and animations compared to face-to-face education. | | | | | |
| 5. Distance education facilitates the solution of many educational problems through rich learning activities. | | | | | |
| 6. Students participating in distance education show a positive approach to learning. | | | | | |
| 7. In the distance education process, the number of exercises solved in the lessons has increased. | | | | | |
| 8. I think it makes students more active in terms of distance education teaching practices. | | | | | |
| 9. Distance education is advantageous as it allows each student to learn at their own pace. | | | | | |
| 10. Distance education improves self-assessment skills. | | | | | |
| 11. Distance education provides a good learning opportunity for students. | | | | | |
| **Factor 2: Suitability** | | | | | |
| 12. It is more difficult for me to go to school to give/receive education. | | | | | |
| 13. Distance education is suitable for my lifestyle. | | | | | |
| 14. Due to the intensity of my personal work, distance education is suitable for me. | | | | | |
| 15. I prefer distance education to face-to-face education. | | | | | |
| **Factor 3: Limitation** | | | | | |
| 16. Internet is not sufficient in distance education. | | | | | |
| 17. It may not be effective enough for students who do not have the habit of learning in distance education. | | | | | |
| 18. It is difficult to provide feedback to students in the distance education process. | | | | | |
| 19. Changing course times in the distance education process negatively affects the functioning. | | | | | |
| 20. In the distance education process, the teacher/student has difficulty in reaching the technical equipment. | | | | | |

Note. 5: Strongly agree; 4: Agree; 3: Undecided; 2: Disagree; & 1: Strongly disagree