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Developing and implementing a student satisfaction scale for the emergency remote teaching in higher education

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Highlights

- A student satisfaction scale was developed using a large sample including all fields and degree levels in the university.
- The items in the scale are divided into four main factors: the role of the instructor, attitude, ICT infrastructure, and usability and access.
- Student satisfaction scores differ significantly by gender, but do not differ significantly according to field and degree level.

Article Info: Research Article

Keywords: *Distance education, emergency remote teaching, satisfaction scale, university students*

Abstract

With the COVID-19 pandemic that started in Turkey in 2020, a compulsory and rapid transition to distance education has been made at all levels of education, and online systems have become indispensable environments of the education system. In this process, students' satisfaction with the distance education process has emerged as a variable that educational institutions evaluate primarily. This study aims to develop a valid and reliable measurement tool to determine the satisfaction levels of students in higher education institutions in the process of emergency remote teaching (ERT). The scale items were created by the researchers through a literature review, and the scope and face validities were ensured by means of expert opinion. The scale was applied online to 6540 students at a state university in the spring term of the 2020–2021 academic year, via the learning management system. Because of the factor analysis, a scale consisting of 29 items and 4 factors was obtained. The factors are "The role of the Instructor" with 11 items, "Attitude" with 7 items, "ICT Infrastructure" with 7 items and "Usability and Access" with 4 items. It is seen that scale items explain 71.35% of the total variance. The structure of the scale was evaluated with confirmatory factor analysis and it was seen that the model had an acceptable fit. The values obtained in the reliability analyses show that the scale has high reliability. The Cronbach alpha coefficient for the scale was calculated as 0.975. Additionally, the satisfaction scores from the scale were examined in terms of the gender, field and degree level. While a significant relationship was found between satisfaction and gender, there was no significant relationship between satisfaction and field as well as between satisfaction and degree level.

1. Introduction

COVID-19, which started in China at the end of 2019 and was declared a pandemic by the World Health Organization (2020) later, has caused changes in many areas of human life. Indisputably, one of these areas, and the most important, is education. More than 1.4 billion students' education processes have been

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interrupted, but governments have found a solution to this gap in distance education, where online technologies are frequently used (UNESCO, 2020). Before the pandemic, distance education was mostly dependent on the preference of the learner, but with the pandemic, it became compulsory at all levels of education and became the new normal. Due to the sudden transition to distance education and the inability to meet all needs precisely, this form of teaching has been named as Emergency Remote Teaching (ERT). While a carefully prepared distance education requires careful instructional design, a planned and robust education ecosystem, the emergency remote teaching process differs from distance education because it offers fast and reliable education in times of crisis (Hodges et al., 2020).

With ERT, the learning environment has suddenly changed and brought along various challenges for students, teachers, institutions and even countries. While in many studies, face-to-face education or distance education was discussed up to yesterday, the pandemic process has led to a rethinking of educational problems (Azorín, 2020). In today's world where information can be accessed anytime and anywhere, rather than being stuck with the question of which is more effective, regardless of the type of education, it is more important to answer the following questions; How can we improve the processes? How can we make students' learning more effective? What kind of competencies should we give our teachers to educate 21st-century individuals? Bozkurt (2020) similarly emphasizes the distinction between distance education and emergency remote teaching, and draws attention to the changing needs of learners, learning contexts, digital transformation, digital skills and competencies, and concepts such as ethics, usability and access. Therefore, countries need to consider distance education as a part of the education process and create the necessary infrastructure, rather than as a type of education to be applied in an emergency.

2. Literature

In 2021, although face-to-face education was partially started with the increase in COVID-19 vaccination rates, especially higher education institutions started to work on integrating distance education into face-to-face education processes (HyFlex - hybrid+flexible, BlendFlex -Blended+Flexible) (Miller et al., 2021). Similarly, with the Guide for the Development of Healthy and Clean Environments in Higher Education Institutions in the Context of the Pandemic published by the Council of Higher Education in Turkey, it has been decided to give a part of the courses or curriculum (up to 40%) through distance education, regardless of the current pandemic processes (YÖK, 2020). Based on this, higher education institutions have decided to move some courses (joint courses and courses without practice) to the online environment in this process where face-to-face education has been started. Thus, it would not be wrong to say that online education is a part of the education system, especially at the higher education level.

Based on what has happened in the teaching processes since the beginning of 2020, Azorín (2020) used the simulation that we are in a dark tunnel and stated that we have two options for the future. He emphasized that the first of these two options is to return to the traditional understanding of education before the pandemic and the other is to make a solid educational transformation. If our goal is a transformation, what happened during the pandemic is an experience. For this reason, research conducted during the COVID-19 pandemic will guide the effective design and planning of future teaching environments.

Emergency Remote Teaching and Student Satisfaction

Student satisfaction is an important quality indicator for planned distance education processes (Elshami et al., 2020). However, as the ERT process happens quickly and unexpectedly, the focus was initially on non-interruption of teaching rather than student experiences. In this process, institutions have benefited from the technological infrastructure and online distance learning opportunities to move their teaching opportunities outside the campus walls. With the prolongation of the process, effective inclusion of students in learning and improving their learning experiences have been the other focus of researchers and

practitioners (Bond, 2021). As a matter of fact, with the change in learning environments, student satisfaction constantly changes in the process of adapting to the situation (Tran & Nguyen, 2022). For this reason, the quality of learning and student satisfaction have begun to be discussed (Baber, 2020).

Student satisfaction has been the subject of many studies in both face-to-face and distance education before the pandemic (Gibson, 2010; Landrum et al., 2021; Winstone et al., 2021). The reason of this is that student satisfaction contributes positively to student performance, academic success, the quality of teaching and retention (Dhaqane & Afrah, 2016; Langan & Harris, 2019). Due to its structure, student satisfaction has a multidimensional structure and many factors affect it. When the studies conducted in face-to-face education are examined, it is seen that some researchers express these in two groups as institutional and personal factors. Personal factors include age, gender, learning style, and the student's grade point average (Appleton-Knapp & Krentler, 2006; Sharma et al., 2020; Venkatesh et al., 2020). Institutional factors are course content, teaching tools, quality of teaching, consultancy support, services provided, future preparation, curriculum flexibility, university status, and prestige (Gibson, 2010; Kanwar & Sanjeeva, 2022; Weerasinghe & Fernando, 2017).

Similar to face-to-face education, student satisfaction with distance education is an important factor in evaluating the effectiveness of teaching (Alqurashi, 2018; Rothman et al., 2011) and it is expressed as the student's success in learning and enjoying the experience in the context of online education (Alqurashi, 2018). For this reason, students' satisfaction with distance education during and after the COVID-19 pandemic has been the subject of many studies. Alqurashi (2018) investigated how several variables can predict student satisfaction and perceived learning. The regression results of the study, in which 167 university students participated, show that the general model with all four predictor variables (learning self-efficacy, learner-content interaction, learner-instructor interaction, and learner-learner interaction) significantly predicted satisfaction and perceived learning. The study found that learner-content interaction was the strongest and most important predictor of student satisfaction, and that learning self-efficacy was the strongest and most important predictor of perceived learning. In their study, Kim & Kim (2021) developed a structural model to examine the relationship between the main factors affecting student satisfaction and success in online learning. Data collected from 250 students were analyzed using structural equation modeling. According to the results of the analysis, it was revealed that the course structure has a more important effect on student satisfaction and success than other basic factors such as student-student interaction, the presence of instructors, and student participation. Yunusa and Umar (2021) classified the predictors of satisfaction and perceived learning into four broad factors based on 38 determinant variables identified with the scope review of 53 articles between 2000 and 2019. These were categorized as e-learning environmental factors (course structure, navigation and ease of access, etc.), personality and situational factors (learner characteristic, age, gender, etc.), communication dynamics (interaction types, information quality, etc.), organizational factors (service quality, technological support, etc.).

The evaluation of student satisfaction is part of the accountability and development processes of higher education systems at the international level (Williams & Kane, 2009). Student feedback is a significant resource for evaluating the quality of teaching and provides the basis for improving the quality of teaching (Richardson, 2005). Therefore, student satisfaction is an important part of the process for both face-to-face and distance learning environments. During COVID-19, which has radically affected education life, student satisfaction with emergency remote teaching has been addressed and evaluated by researchers and experts. In these case, it is necessary to develop measurement tools that will enable the measurement of student satisfaction. For this reason, this study aims to develop a valid and reliable measurement tool to determine the satisfaction levels of students toward distance education in the ERT process. Other points that distinguish the research from similar ones are the sample size including participants from different degree levels of higher education (associate, undergraduate, graduate) and from different fields of education

(Science, Health and Social Sciences). This provides an assessment from a broader perspective and with pluralistic participation.

3. Methodology

3.1. Participants

The participants of the research consist of 6540 university students studying at a state university in the Spring semester of the 2020–2021 Academic Year. As shown in Table 1, they are 3653 female (55.86%) and 2887 (44.14%) male students. Of these students, 547 (8.36%) are associate degree students, 5428 (83%) are undergraduate students, 565 (8.64%) are graduate students. Regarding the fields, 3453 (52.8%) participants are studying at Science, 1453 (22.22%) Health, and 1634 (24.98%) Social fields.

Table 1.

Demographic information about the participants

Gender				
	Female		**Male**	**Total**
F	3653		2887	6540
%	55.86		44.14	100
Degree Level				
	Associate Degree	**Undergraduate**	**Graduate**	**Total**
F	547	5428	565	6540
%	8.36	83	8.64	100
Field				
	Science	**Health**	**Social**	**Total**
F	3453	1453	1634	6540
%	52.8	22.22	24.98	100

3.2. Data Collecting Tools and Implementation Process

To measure the satisfaction levels of university students toward the emergency remote teaching process, firstly, a literature review was conducted to create an item pool. Researches and studies in the literature were examined on the basis of the keywords "satisfaction with the distance education process" and "factors affecting student satisfaction". A 36-item item pool on factors such as "system", "technical infrastructure", "support services", "access", "usability", "flexibility", "instructor", "attitude", "communication", "interaction" were created. The items were sent to 4 field experts and 2 language experts to evaluate the content and face validity, and it was decided to remove 4 items in line with expert opinions and feedback. Simultaneously, the measurement tool was submitted to the opinion of the Education Commission affiliated to the Education and International Relations Office of the university, and approval was obtained for the implementation. Additionally, the items were reviewed by the commission members and edited in line with the feedback. The implementation process of the study is shown in Figure 1 in detail.

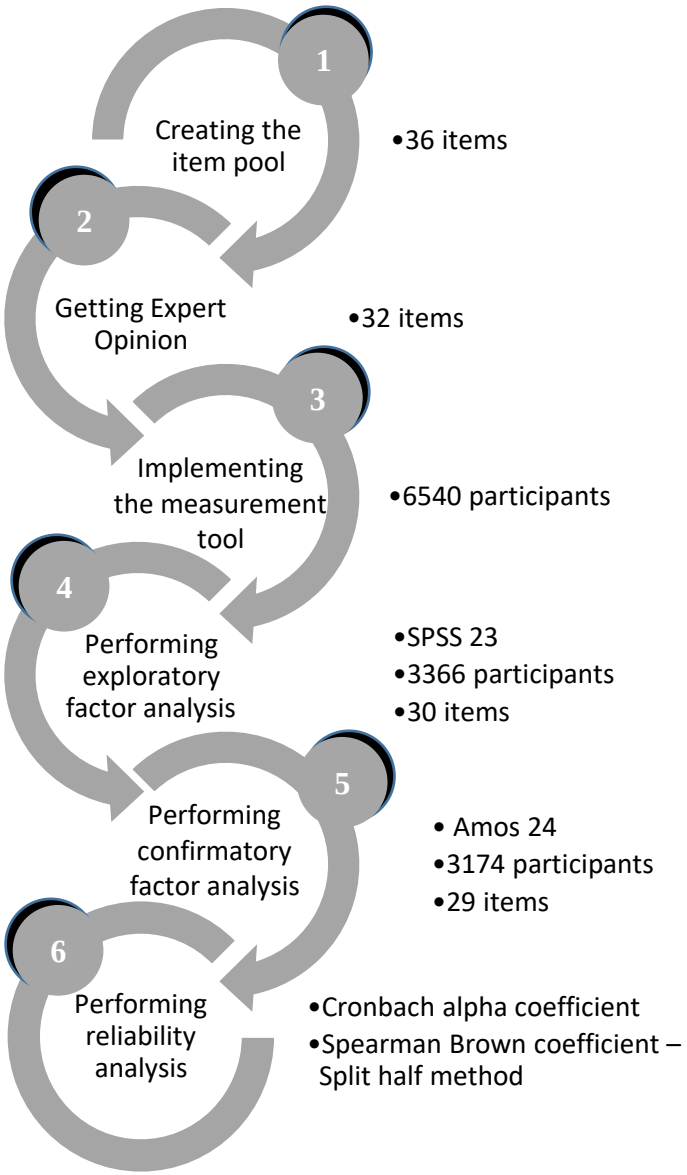

Fig. 1. The implementation process of the study

The final version of the tool, which consists of 32 items, is a 5-point Likert-type scale and is graded as strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1). It was applied to the students online on the learning management system, then the validity and reliability analyzes were made with the data collected from 6540 participants.

3.3. Data Analysis

Exploratory and confirmatory factor analysis was performed for the construct validity of the measurement tool. For reliability, the Cronbach's alpha coefficient and the Spearman-Brown coefficient in Split half reliability method were calculated. In general, factor analysis is used to see whether the question groups match the question groups defined as different parts of the measurement tool (Lodico et al., 2006). This analysis deals with the common factors and determines the number, nature, and model of the factors (Tucker

& MacCallum, 1997). Exploratory (EFA) and confirmatory (CFA) factor analyses are mathematically related because they are based on a common factor model. While EFA is primarily used as an exploratory step during the development of a measurement tool, CFA can be used as a second step to examine whether the construct identified in EFA works in a new sample (Harrington, 2009). Some of the data collected in the study were used for EFA and some for CFA.

3.4. Findings

Exploratory Factor Analysis (EFA)

The 32 items created in the study were first evaluated with exploratory factor analysis. While this analysis helps determine how many latent variables (factors) a group of items covers, it determines how the items work according to these factors and allows the identification and elimination of items that do not fit any factor or fit several of the factors (DeVellis, 2014). Approximately half of the data (N=3366) collected from 6540 students was used for the analysis performed using the SPSS 23 program.

The analysis was performed using promax, one of the oblique rotation methods. In studies, vertical rotation methods, which accept that the factors are independent of each other and produce unrelated factors, are preferred. Since the factors measured in the social sciences (such as behavior) are rarely divided into factors that operate independently of each other, it is generally expected that there will be a correlation between the factors. Oblique rotation, which allows the factors to be related, was preferred, considering that the factors affecting student satisfaction were theoretically related to each other, and a relationship greater than 0.4 between the factors emerged according to the results of factor analysis (Costello & Osborne, 2005; Devellis, 2014). The reason why promax, one of the oblique rotation methods, is preferred is that it is a simpler and faster method for oblique rotation, as well as giving faster results in countless data sets (Meyers et al., 2016).

Because of the rotations, the distribution of the items to the factors, communality values, and factor loadings were examined. In EFA, factor loads of items should be greater than .32 and communalities values should be greater than .40 (Carpenter, 2018). It was seen that M5 did not meet these two requirements and while the factor load value of M7 was slightly above .32, the common variance value was below .40. For this reason, it was decided to remove M5 and then M7 from the scale by checking whether the operations performed positively affect the variance explained by the scale. The factor loadings of 30 items in the final version of the measurement tool are presented in Table 2:

Table 2.

Distribution of the items of the scale according to the factors and factor loading values

	Factors			
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**
M33	.917			
M34	.891			
M35	.879			
M28	.858			
M36	.852			
M29	.842			
M27	.837			
M32	.833			
M30	.827			
M26	.815			
M31	.774			
M3		.921		
M11		.919		
M9		.863		

M10	.833		
M4	.807		
M8	.755		
M1	.644		
M24		.946	
M23		.935	
M25		.712	
M21		.633	
M20		.629	
M22		.546	
M15		.525	
M14			.883
M2			.879
M19			.664
M12			.485
M6			.441

According to the data obtained from the analysis, the scale was divided into 4 factors (sub-dimensions). The first factor consists of 11 items, the second factor 7 items, the third factor 7 items, and the fourth factor 5 items. Studies on naming factors were conducted in line with the literature review and the opinions of three field experts. As a result, the first factor was named "the role of the instructor", the second factor was named "Attitude", the third factor "ICT Infrastructure" (Information and Communication Technologies Infrastructure), and the fourth factor "Usability and Access".

Confirmatory Factor Analysis (CFA)

Unlike EFA, CFA focuses on theory, not data. It requires pre-specifying all aspects of the model to be tested and is used to verify the factor structure defined in EFA (Harrington, 2009). In the study, after determining the factor structure of the scale with EFA, CFA was performed using data from 3174 students (the rest of 6540 data, out of the data used for EFA). When the results of the analysis were examined, it was noticed that the factor loading of an item (M6) belonging to the "Usability and Access" was below 5 (Farooq, 2016), therefore the item was removed from the scale. Afterward, the modification indices were examined and three modifications were applied between the items with high correlation. The model used in the analysis performed in the AMOS 24 program and whose fit was evaluated is presented in Figure 2:

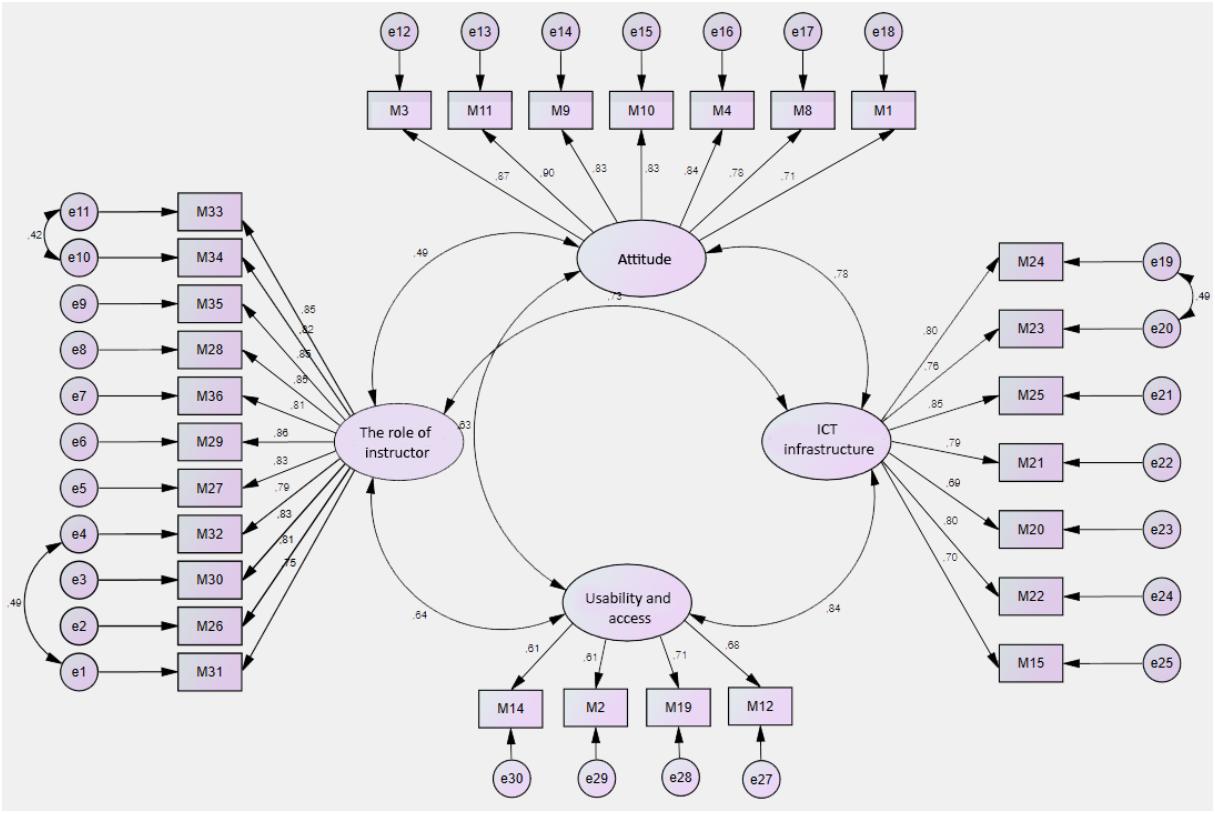

Fig. 2. Structural model of student satisfaction scale for emergency remote teaching process and standardized estimates of the model

Chi-square and Chi-square/df value are among the first indicators evaluated in the CFA results. Although it is stated that the Chi-square/df value, which indicates the deviation between the data and the model, should be below 2 or 5 (Baumgartner & Homburg, 1996), it is indicated that it is sensitive to sample size, causing the model to be rejected in analysis with large samples (Glaesmer et al., 2012). For this reason, this value, which gives a result greater than 5, was ignored in the study and focused on model fit indices, which are independent of sample size. As Figure 1 shows, CFI was calculated as .933, TLI was calculated as .926, and IFI was calculated as .933. Also, RMSEA value was calculated as .067. CFI, TLI and IFI fit indices above .90 and RMSEA values between .05 and .08 indicate acceptable fit (Baumgartner & Homburg, 1996). Here, it can be said that the scale is a valid measurement tool. Standardized regression weights for all items of the scale, calculated in CFA, are shown in Table 3 and it is seen that all of the values are more than .60.

Table 3.

Standardized regression weights of the items of the scale

	Factors			
	The role of the Instructor	**Attitude**	**ICT infrastructure**	**Usability and access**
M33	.847			
M34	.825			
M35	.849			
M28	.855			
M36	.806			
M29	.859			

M27	.833			
M32	.789			
M30	.834			
M26	.808			
M31	.755			
M3		.873		
M11		.901		
M9		.835		
M10		.827		
M4		.845		
M8		.782		
M1		.705		
M24			.799	
M23			.758	
M25			.850	
M21			.795	
M20			.694	
M22			.805	
M15			.702	
M14				.614
M2				.612
M19				.707
M12				.685

The total explained variance of the final version of the scale was 71.35%, the variance of the first factor "the role of the instructor" was 49.8%, the variance of the second factor "Attitude" was 12.4%, the variance of the third factor "ICT Infrastructure" was 5.59%, and the fourth factor was 5.59%. The variance of the factor "Usability and Access" was calculated as 3.56%. While the total explained variance of the scale is more than 50%, it is considered acceptable (Beavers et al., 2013), a variance over 70% can be interpreted as high.

Reliability Analysis

Cronbach alpha and Spearman Brown coefficient in the split half reliability method was used for the reliability analysis of the scale. The internal consistency of the measurement tool is evaluated with the Cronbach alpha coefficient, which is a useful reliability measure for multi-item scales (Cohen et al, 2007). The Cronbach alpha and Spearman Brown coefficients were calculated separately with the data used for both EFA and CFA, as well as the data from the whole sample. The results of analyses is shown in Table 4 and Table 5:

Tablo 4.

Cronbach alpha coefficients for scale and each of the factors

Factors	**Cronbach's alpha coefficient (sample used for EFA)**	**Cronbach's alpha coefficient (sample used for CFA)**	**Cronbach alpha coefficient (all sample)**
Scale (all factors)	.963	.962	.975

The role of the Instructor	.965	.959	.971
Attitude	.923	.937	.952
ICT infrastructure	.913	.913	.939
Usability and access	.840	.740	.858

According to Cohen et al. (2007), when Cronbach's alpha and Spearman Brown coefficients are calculated above .90, the measurement tools are accepted to be very highly reliable, when they are between .90 and .80, the tools are accepted to be highly reliable, when they are between .79 and .70, the tools are accepted to be reliable. Accordingly, when the Cronbach's alpha coefficients in Table 4 are examined, it is seen that the coefficients of the scale, first, second and third factors show a very highly reliable measurement, and the coefficient of the fourth factor shows a highly reliable/reliable measurement. Here, it can be interpreted that the reliability of the scale is high for the whole scale and for each of the factors.

Table 5.

Spearman Brown coefficients for each sample

Spearman Brown Coefficient (sample used for EFA)	Spearman Brown Coefficient (sample used for CFA)	Spearman Brown Coefficient (all sample)
.824	.817	.935

Spearman Brown coefficient was calculated in the split half reliability method and found as .824 for the sample used for EFA, .817 for the sample used for CFA, and .935 for the whole sample. It is stated that these values indicate high reliability (Cohen et al., 2007). As a result, considering the results of the reliability analysis, it can be said that the measurement tool has high reliability.

Findings Related to the Participants' Satisfaction

To interpret the student satisfaction scores from the scale, the levels of the students satisfaction was determined. The satisfaction scores point out three levels; high, medium and low. The score ranges of the satisfaction levels are shown in Table 6.

Table 6.

The levels of student satisfaction in scale and each of the factors

Factors of Scale	The Levels of Student Satisfaction		
	Low	**Medium**	**High**
The role of the instructor	11-25	26-40	41-55
Attitude	7-16	17-26	27-35
ICT infrastructure	7-16	17-26	27-35
Usability and access	4-9	10-15	16-20
Total (all factors)	29-67	68-106	107-145

The mean and standard deviation values of the participants' satisfaction scores for emergency remote teaching are presented in Table 7:

Table 7.

Mean and standard deviation values of satisfaction scores according to the scale and each of the factor of the scale

Factors of Scale	N	Average Scores	Standard Deviation
The role of the instructor	6540	40.6	11.89
Attitude	6540	21.21	8.99

ICT infrastructure	6540	23.2	7.98
Usability and access	6540	15.51	3.96
Total (all factors)	6540	100.53	29.05

When the average satisfaction scores of the participants are evaluated in general and by each of the factors, it is seen that the level of average satisfaction score in “the role of the instructor” is high, the levels of the scores in the "Attitude" and "ICT infrastructure" are medium, the levels of the scores in "usability and access" and the scale are medium, but close to high.

Findings Related to the Participants' Satisfaction in Terms of Gender, Field, and Degree Level

In the study, it is also among the aims of the research to reveal whether the satisfaction scores of the students differ according to gender, field, and degree level. In order to determine the analysis method to be used for this evaluation, it was evaluated whether the satisfaction scores showed a normal distribution according to the variables. Two of the methods used to examine the normal distribution are kurtosis and skewness of the data (Morgan & Griego, 1998). The values of kurtosis and skewness between -1.5 and +1.5 in a data set indicate a normal distribution (Tabachnick & Fidell, 2013). Table 8 presents the skewness and kurtosis values of the total satisfaction scores according to the variables of gender, field, and degree level:

Table 8.

Skewness – kurtosis values of students' satisfaction scores according to gender, field, and degree level

	Gender		**Field**			**Degree Level**		
	Female	Male	Science	Health	Social	Associate Degree	Undergraduate	Graduate
Skewness	-.245	-.530	-.436	-.409	-.376	-.523	-.403	-.477
Kurtosis	-.541	-.346	-.383	-.289	-.307	-.124	-.369	-.165

The skewness and kurtosis values of the satisfaction scores for all variables are between -1.5 and +1.5. According to these results, since the data showed a normal distribution, it was analyzed with parametric tests to determine whether the satisfaction scores showed a significant difference according to the variables.

Whether the students' satisfaction scores showed a significant difference according to the gender variable was examined with the independent samples t-test. Analysis results are presented in Table 9:

Table 9.

Independent samples T-test results regarding students' satisfaction scores by gender

	N	**Mean**	**sd**	**df**	**T**	**p**
Female	3653	101.92	27.278	6538	4.384	.00*
Male	2887	98.76	31.058			

*p<.05

The mean satisfaction scores of female students ($\bar{x}$= 101.92) are higher than the average of male students' satisfaction scores ($\bar{x}$= 98.76). When the results of the analysis are examined, it is seen that this difference in favor of female students is significant (t(6538)=4.384; p<.01). Accordingly, there is a significant relationship between gender and student satisfaction.

ANOVA test was conducted to determine whether the students' satisfaction scores showed a significant difference in their fields (science, health, social). Analysis results are presented in Table 10:

Table 10.

ANOVA results of students' satisfaction scores by field

Source	Sum of squares	df	Mean Square	F	P
Between Groups	1819.626	2	909.813	1.078	.340
Within Groups	5515597.110	6537	843.751		
Total	5517416.736	6539			

*p>.05

It has emerged that the satisfaction scores of the students do not show a significant difference according to the field, $F(2, 6537)=1.078$, $p>.05$. According to this result, there is no significant relationship between the students' fields and their satisfaction levels toward distance teaching.

To determine whether the satisfaction scores of the students show a significant difference according to the degree level (associate, undergraduate, graduate degrees), ANOVA test was conducted and the results of the analysis are shared in Table 11:

Table 11.

ANOVA results of students' satisfaction scores by degree level

Source	Sum of squares	df	Mean Square	F	P
Between Groups	5314.399	2	2657.199	3.151	.043
Within Groups	5512102.337	6537	843.216		
Total	5517416.736	6539			

*p>.05

It is seen that there is a significant difference between the satisfaction scores of the students according to different degree level, $F(2, 6537)=3.151$, $p<.05$, but there was no significant difference between any group in the result of the Scheffe Test, which was conducted to determine between which groups the differences were. Consequently, satisfaction does not have a significant relationship with the degree level.

3.5. Discussions

In line with the restriction decisions taken during pandemic, the teaching environment has completely changed and this situation has various effects for the actors in the process. Students are one of the most important stakeholders affected by this alteration. Actually, distance education is not suitable for every student and is generally preferred by learners who take responsibility for their own learning. However, in the ERT process distance education has become compulsory for all students; regardless of their preferences. The lack of a planned process, the absence of ready-made content and materials, the incomplete fulfillment of technological requirements, the instructors' being lack of experience in distance education, the problem of interaction and above all, the change in the learning environment have affected the students' adaptation to distance education. Therefore, it has become important to determine student satisfaction with the ERT process.

When examining the literature, it was found that there are scales for students' satisfaction with distance education both in Turkey and abroad (Bayrak & Altun, 2020; Cakir, 2017; Harsasi & Sutawijaya, 2018; Kafes & Yıldırım, 2021; Paraho et al., 2016). Since some of the existing scales (Cakir, 2017; Harsasi & Sutawijaya, 2018) were developed before the ERT processes, it can be said that these tools do not reflect

all aspects of the emergency remote teaching process. In addition, the current measurement tools contain items that belong to different sub-factors that influence satisfaction. For example, the student satisfaction scale developed by Kafes & Yıldırım (2021) consists of "interaction" and "accessibility", while the scale developed by Hwang & Kim (2022) includes "content, "interface," and "communication". In addition, it can be seen that some scales measuring students' satisfaction with distance education were developed for students in specific disciplines. For example, Toraman, Karadağ & Polat (2022) developed a satisfaction scale for medical students. Considering all these studies, the goal of the study was to develop a measurement tool that incorporates various factors that influence the concept of satisfaction, targets all disciplines and all university students, and also uses a large sample. In this study, a scale of student satisfaction for the emergency remote teaching process in universities was developed, and validity and reliability analyses of this scale were conducted.

"The role of the instructor", one of the factors of the scale, explains about half of the total variance of the scale. It can be said that this factor has crucial importance for students' satisfaction. When examining the literature related to online learning environments, it is found that the instructor's interaction, competence and efforts for the student have significant and positive effects on student satisfaction (Absah et al., 2021; Gray & DiLoreto, 2016; Kim & Kim, 2021). Attitude, which is another factor of the scale, is considered as emotion and reasoning based on cognitive, affective, or behavioral experience related to a particular topic or phenomenon (Schwarz, 2007). In the literature, the concept of attitude includes self-efficacy (Liaw & Huang, 2013; Tzafilkou, Perifanou & Economides, 2021), motivation (Fairchild et al., 2005; Yıldız et al., 2021), and perception (Tsai & Lin, 2004; Mitchell & Geva- May, 2009). Since the items included in the second factor in the study are related to these concepts, the factor was named "attitude".

"ICT infrastructure," the third factor of the scale, directly affects student satisfaction. Martín-Rodríguez et al. (2015) state that student satisfaction is influenced by the technological tools used, that students want to have effective tools, and that ease of access and visual appeal of technological media and materials are important. Another factor, “Usability and Access”, is a dimension that occurs in studies on student satisfaction (Avcı & Yıldız, 2021; Kafes & Yıldırım, 2021). Sun et al. (2008) stated that perceived ease of use and usefulness in online learning are critical factors that affect students' perceived satisfaction. Similarly, Jiang et al. (2021) expressed that student satisfaction is directly and indirectly affected by the perceived ease of use and usefulness of online platforms.

The study also examined whether student satisfaction showed a significant difference by gender, field, and degree level. According to the findings, the satisfaction scores differed significantly by gender, but not by the field and degree level. In studies that investigated the differentiation of student satisfaction by gender in emergency remote teaching, it was found that satisfaction showed no significant difference by gender, contrary to the results of the research. In the study by Yılmaz (2020), it was stated that university students’ satisfaction levels with the Google Classroom System used during the pandemic showed no significant difference by gender, as Bawa'aneh (2021) found that the satisfaction levels of students in public schools in the United Arab Emirates did not significantly differ by gender. Similarly, Resch, Alnahdi & Schwab (2022) expressed in their study with undergraduate students that during the pandemic, students’ satisfaction with the learning process from home did not differ significantly by gender. In the study by Fırat et al. (2018), it was reported that the intrinsic motivation scores of university students, which is a predictor of student satisfaction in e-learning environments, did not change significantly by gender and program type (graduate-undergraduate). In the same study, students' intrinsic motivation levels were evaluated according to their fields and results showed that the students studying in Law, Tourism and Education programs had higher levels of intrinsic motivation, while the field of Health is the area with the lowest intrinsic motivation. In the study by Ozturk, Ozturk & Ozen (2018), it is stated that the teacher candidates’ distance education satisfaction levels show a significant difference by the degree level and fields. In the study that compared the satisfaction levels of the students who received pedagogical formation education and those registered in the education faculty, it was observed that the satisfaction levels of the prospective teachers

of the History-Geography and Philosophy departments were higher than those of the other departments. As a result, it is seen that the findings of the current study are different from the previous research results. In this direction, repeating the analysis by applying the scale items to different groups, adding items related to different factors affecting satisfaction, and conducting validity and reliability studies will greatly contribute to the improvement of the scale.

4. Conclusion and Suggestions

Because of the evaluation of the data obtained with the participation of 6540 students in the study, a scale that evaluates students' satisfaction in the emergency remote teaching process has been developed. The scale consists of 29 items and 4 factors. The first factor is "The Role of the Instructor" and includes 11 items. The second factor “Attitude”, the third factor “ICT Infrastructure” and the fourth factor “Usability and Access” consist of 7, 7, and 4 items, respectively. The scale, which is designed in a 5-point Likert structure, generally has high reliability and an acceptable level of model fit. It is seen that the total variance of the scale, which is calculated as 71.35%, is also at an acceptable level. The lowest score to be taken from the scale is 29, and the highest score is 145. Also the satisfaction levels of the groups that score between 107 and 145 on the scale can be evaluated as high, the groups between 106 and 68 can be considered as medium, and the groups between 29 and 67 can be evaluated as low. When the scores of the participants in the study were examined, it was seen that the satisfaction levels of the students were generally medium, but close to high.

It can be concluded that the scale developed during the pandemic can be used in all types of distance education processes carried out in universities. From this perspective, using the scale to evaluate student satisfaction within the scope of non-emergency distance education applications and repeating the validity and reliability studies will increase the generalizability of the scale and ensure that it has a wider usage area. However, the study was conducted with data collected only in one term from associate, undergraduate and graduate students studying at a state university. It can be suggested to conduct larger-scale studies with the participation of students from various public and foundation universities. Additionally, the reliability of the scale can be tested with data to be collected in more than one term.

The scale consists of four factors and it is seen that some factors are combined under one factor (for example, “self-efficacy”, “perception” and “motivation” are combined under “attitude” and “instructor-student interaction” occurred within “the role of the instructor”. Based on the results, satisfaction scales representing more factors quantitatively can be developed by adding different items to the scale in future studies. Additionally, it will also contribute to the literature to support both the current research and the recommended future studies with qualitative research. Factors affecting low or high student satisfaction can be determined by qualitative methods, and new items and factors can be determined based on the qualitative data.

References

Absah, Y., Karina, B., & Harahap, R.H. (2021). Strategies to Improve Student Satisfaction Through the Quality of Online Learning Facilities and Infrastructure, Characteristics of Academic Staff, Lecturers Competence, and Good University Governance in Medan. *Systematic Reviews in Pharmacy, 12*(3), 671-675.

Alqurashi, E. (2018). Predicting student satisfaction and perceived learning within online learning environments. *Distance Education, 40*(1), 133–148. https://doi.org/10.1080/01587919.2018.1553562

Appleton-Knapp, S., & Krentler, K. (2006). Measuring student expectations and their effects on satisfaction: the importance of managing student expectations. *Journal of Marketing Education,* pp. 254-264.

Avcı, İ., & Yıldız, E. (2021). COVID-19 Pandemi Sürecinde Uzaktan Eğitimi Kullanan Öğrencilerin Memnuniyet ve Davranışlarının Teknoloji Kabul Modeli Çerçevesinde İncelenmesi. *Gümüşhane Üniversitesi Sosyal Bilimler Dergisi, 12* (3), 814-830. Retrieved from https://dergipark.org.tr/en/pub/gumus/issue/65088/886553

Azorín, C. (2020). Beyond COVID-19 supernova. Is another education coming? *Journal of Professional Capital and Community*, Vol. 5 No. 3/4, pp. 381-390. https://doi.org/10.1108/JPCC-05-2020-0019

Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of COVID-19. *Journal of Education and e-learning Research*, *7*(3), 285-292.

Baumgartner, H., & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International journal of Research in Marketing*, *13*(2), 139-161.

Bawa'aneh, M. S. (2021). Distance Learning during COVID-19 Pandemic in UAE Public Schools: Student Satisfaction, Attitudes and Challenges. *Contemporary Educational Technology*, 13(3).

Bayrak, F., & Altun, A. (2020). Development of online course satisfaction scale. *Turkish Online Journal of Distance Education*, *21*(4), 110-123.

Beavers, A. S., Lounsbury, J. W., Richards, J. K., Huck, S. W., Skolits, G. J., & Esquivel, S. L. (2013). Practical considerations for using exploratory factor analysis in educational research. Practical Assessment, Research, and Evaluation, 18(1), 6.

Bond, M. (2021). Schools and emergency remote education during the COVID-19 pandemic: A living rapid systematic review. *Asian Journal of Distance Education*, *15*(2), 191-247.

Bozkurt, A. (2020). Koronavirüs (COVID-19) pandemi süreci ve pandemi sonrası dünyada eğitime yönelik değerlendirmeler: Yeni normal ve yeni eğitim paradigması. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi, 6*(3), 112-142. Retrieved from https://dergipark.org.tr/en/pub/auad/issue/56247/773769

Cakir, O. (2017). The factors that affect online learners' satisfaction. *Anthropologist, 17*(3): 895-902.

Carpenter, S. (2018). Ten steps in scale development and reporting: A guide for researchers. *Communication methods and measures*, 12(1), 25-44.

Cohen, L. Manion. L., & Morrison, K. (2007). *Research methods in education* (Sixth edition). Routledge.

Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical assessment, research, and evaluation*, *10*(1), 7.

DeVellis, R. F. (2014). Ölçek Geliştirme Kuram ve Uygulamalar (Scale Development Theory and Applications) (Üçüncü Basım) (T. Totan, Çev.). Ankara: Nobel Yayıncılık. (Orijinal çalışma basım tarihi 2012).

Dhaqane, M. K., & Afrah, N. A. (2016). Satisfaction of Students and Academic Performance in Benadir University. *Journal of Education and Practice*, *7*(24), 59-63.

Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges. *Medical Education Online*, *26*(1), 1920090.

Fairchild, A. J., Horst, S. J., Finney, S. J., & Barron, K. E. (2005). Evaluating existing and new validity evidence for the Academic Motivation Scale. *Contemporary Educational Psychology*, *30*(3), 331-358.

Farooq, R. (2016). Role of structural equation modeling in scale development. *Journal of Advances in Management Research*. 13(1), 75-91.

Fırat, M., Kılınç, H., & Yüzer, T. V. (2018). Level of intrinsic motivation of distance education students in e-learning environments. *Journal of Computer Assisted Learning*, *34*(1), 63-70.

Gibson, A. (2010). Measuring business student satisfaction: A review and summary of the major predictors. *Journal of Higher Education Policy and Management*, *32*(3), 251–259. doi: 10.1080/13600801003743349

Glaesmer, H., Rief, W., Martin, A., Mewes, R., Brähler, E., Zenger, M., & Hinz, A. (2012). Psychometric properties and population-based norms of the Life Orientation Test Revised (LOT-R). *British journal of health psychology*, *17*(2), 432-445.

Gray, J. A., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation*, *11*(1), n1.

Harrington, D. (2009). *Confirmatory factor analysis*. Oxford University press.

Harsasi, M., & Sutawijaya, A. (2018). Determinants of Student Satisfaction in Online Tutorial: A Study of A Distance Education Institution. *Turkish Online Journal of Distance Education*, *19* (1), 89-99. DOI: 10.17718/tojde.382732

Hettiarachchi, S., Damayanthi, B. W. R., Heenkenda, S., Dissanayake, D. M. S. L. B., Ranagalage, M., & Ananda, L. (2021). Student satisfaction with online learning during the COVID-19 pandemic: a study at state universities in Sri Lanka. *Sustainability*, *13*(21), 11749.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *EDUCAUSE Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teachingand-online-learning

Hwang, S., & Kim, H. K. (2022). Development and validation of the e-learning satisfaction scale (eLSS). *Teaching and Learning in Nursing*. https://doi.org/10.1016/j.teln.2022.02.004

Jiang, H., Islam, A. Y. M., Gu, X., & Spector, J. M. (2021). Online learning satisfaction in higher education during the COVID-19 pandemic: A regional comparison between Eastern and Western Chinese universities. *Education and information technologies*, 26(6), 6747-6769.

Kafes, A. Y., & Yıldırım, A. (2021). Üniversite Öğrencilerinin Uzaktan Eğitim Memnuniyeti Ölçeği'nin Geliştirilmesi: Geçerlik ve Güvenirlik Çalışması. *Electronic Turkish Studies*, *16*(6).

Kanwar, A., & Sanjeeva, M. (2022). Student satisfaction survey: A key for quality improvement in the higher education institution. *Journal of Innovation and Entrepreneurship*, *11*(1), 1-10.

Kim, S., & Kim, D. J. (2021). Structural relationship of key factors for student satisfaction and achievement in asynchronous online learning. *Sustainability*, *13*(12), 6734. https://doi.org/10.3390/su13126734

Landrum, B., Bannister, J., Garza, G., & Rhame, S. (2021). A class of one: Students' satisfaction with online learning. *Journal of Education for Business*, *96*(2), 82-88.

Langan, A. M., & Harris, W. E. (2019). National student survey metrics: where is the room for improvement?. *Higher Education*, *78*(6), 1075-1089.

Liaw, S. S., & Huang, H. M. (2013). Perceived satisfaction, perceived usefulness and interactive learning environments as predictors to self-regulation in e-learning environments. *Computers & Education*, *60*(1), 14-24.

Lodico, M. G., Spaulding, D. T., & Voegtle, K. H. (2006). *Methods in Educational Resarch From theory to Practice*. John Wiley & Sons.

Martín-Rodríguez, Ó., Fernández-Molina, J. C., Montero-Alonso, M. Á., & González-Gómez, F. (2015). The main components of satisfaction with e-learning. *Technology, Pedagogy and Education*, *24*(2), 267-277.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2016). *Applied multivariate research: Design and interpretation.* Sage publications.

Miller, A. N., Sellnow, D. D., & Strawser, M. G. (2021). Pandemic pedagogy challenges and opportunities: Instruction communication in remote, HyFlex, and BlendFlex courses. *Communication Education*, *70*(2), 202-204.

Mitchell, B., & Geva-May, I. (2009). Attitudes affecting online learning implementation in higher education. *International Journal of E-Learning & Distance Education/Revue internationale du e-learning et la formation à distance*, *23*(1), 71-88.

Morgan, G. A., & Griego, O. V. (1998). *Easy use and interpretation of SPSS for Windows: Answering research questions with statistics* (Vol. 1). Psychology Press.

Ozturk, D. S., Ozturk, F., & Ozen , R. (2018). The relationship between prospective teachers' readiness and satisfactions about internet-based distance education. *Turkish Online Journal of Distance Education*, *19*(1), 147-162.

Resch, K., Alnahdi, G., & Schwab, S. (2022). Exploring the effects of the COVID-19 emergency remote education on students' social and academic integration in higher education in Austria. *Higher Education Research & Development*, 1-15.

Richardson, J. T. (2005). Instruments for obtaining student feedback: A review of the literature. *Assessment & evaluation in higher education*, *30*(4), 387-415.

Rothman, T., Romeo, L., Brennan, M., & Mitchell, D. (2011). Criteria for assessing student satisfaction with online courses. *International Journal for e-Learning Security*, *1*(1-2), 27-32.

Schwarz, N. (2007). Attitude construction: Evaluation in context. *Social Cognition*, *25*(5), 638–656.

Sharma, K., Deo, G., Timalsina, S., Joshi, A., Shrestha, N., & Neupane, H. C. (2020). Online learning in the face of COVID-19 pandemic: Assessment of students' satisfaction at Chitwan medical college of Nepal. *Kathmandu University Medical Journal*, *18*(2), 40-47.

Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y., & Yeh, D. (2008). What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & education*, *50*(4), 1183-1202.

Tabachnick, B. G., & Fidell, L.S. (2013). *Using Multivariate Statistics* (sixth ed.). Pearson

Toraman, Ç., Karadağ, E., & Polat, M. (2022). Validity and reliability evidence for the scale of distance education satisfaction of medical students based on item response theory (IRT). *BMC medical education*, *22*(1), 1-13.

Tran, Q. H., & Nguyen, T. M. (2022). Determinants in Student Satisfaction with Online Learning: A Survey Study of Second-Year Students at Private Universities in HCMC. *International Journal of TESOL & Education*, *2*(1), 63-80.

Tsai, C. C., & Lin, C. C. (2004). Taiwanese adolescents' perceptions and attitudes regarding the Internet: Exploring gender differences. *Adolescence*, *39*(156), 725-734.

Tucker, L. R., & MacCallum, R. C. (1997). Exploratory factor analysis. Unpublished manuscript, Ohio State University, Columbus.

Tzafilkou, K., Perifanou, M., & Economides, A. A. (2021). Development and validation of a students' remote learning attitude scale (RLAS) in higher education. *Education and Information Technologies*, *26*(6), 7279-7305.

UNESCO (United Nations Educational Scientific and Cultural Organization). (2020). *COVID-19 impact on education*. https://en.unesco.org/covid19/educationresponse

Venkatesh, S., Rao, Y. K., Nagaraja, H., Woolley, T., Alele, F. O., & Malau-Aduli, B. S. (2020). Factors influencing medical students' experiences and satisfaction with blended integrated E-learning. *Medical Principles and Practice*, *29*(4), 396-402.

Weerasinghe, I. S., & Fernando, R. L. (2017). Students' satisfaction in higher education. *American journal of educational research*, *5*(5), 533-539.

World Health Organization. (2020). WHO Director-General's opening remarks at the media briefing on COVID-19. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020 (March 11, 2020), Accessed 27 July 2022.

Williams, J., and Kane, D. (2009). Assessment and Feedback: Institutional Experiences of Student Feedback, 1996 to 2007. *Higher Education Quarterly* 63 (3), 264–86. https://doi.org/10.1111/j.1468-2273.2009.00430.x.

Winstone, N. E., Ajjawi, R., Dirkx, K., & Boud, D. (2021). Measuring what matters: the positioning of students in feedback processes within national student satisfaction surveys. *Studies in Higher Education*, 1-13. https://doi.org/10.1080/03075079.2021.1916909

Yıldız, E. P., Çengel, M., & Alkan, A. (2021). Pandemi Sürecinde Uzaktan Eğitim Ortamlarının Kullanımına İlişkin Tutum Ölçeği. *OPUS Uluslararası Toplum Araştırmaları Dergisi,* 17(33), 132-153. https://doi.org/10.26466/opus.811510

Yılmaz, E. O. (2020). Pandemi sürecinde google classroom uzaktan eğitim sisteminin entegrasyonu ve öğrenci memnuniyet düzeylerinin incelenmesi. *Gelecek Vizyonlar Dergisi*, *4*(3), 42-55.

Yunusa, A. A., & Umar, I. N. (2021). A scoping review of critical predictive factors (CPFs) of satisfaction and perceived learning outcomes in E-learning environments. *Education and Information Technologies*, *26*(1), 1223-1270. https://doi.org/10.1007/s10639-020-10286-1

YÖK (Yükseköğretim Kurulu). (2020). *Küresel Salgın Bağlamında Yükseköğretim Kurumlarında Sağlıklı ve Temiz Ortamların Geliştirilmesi Kılavuzu*. Accessed 27 July 2022. https://www.yok.gov.tr/Documents/Yayinlar/Yayinlarimiz/2020/yuksekogretim-kurumlarinda-saglikli-ve-temiz-ortamlarin-gelistirilmesi-kilavuzu/index.html

Student Satisfaction Scale for the Emergency Remote Teaching in Higher Education
Yükseköğretimde Acil Uzaktan Öğretim için Öğrenci Memnuniyeti Ölçeği

Boyut	Maddeler	1	2	3	4	5
Öğretim Elemanı Rolü	1. Öğretim elemanı ders hedeflerini açık bir şekilde ifade eder.					
	2. Öğretim elemanı ders için farklı öğrenme/ ölçme etkinlikleri (ödev, forum vb.) planlar.					
	3. Öğretim elemanı eş zamanlı (canlı ders vb.) ve ayrı zamanlı (ödev, forum vb.) öğrenme etkinlikleri hakkında ayrıntılı bilgi verir.					
	4. Öğretim elemanı çevrim içi teknolojileri etkili bir şekilde kullanır.					
	5. Öğretim elemanı çevrim içi derse katılan öğrencilerin etkin ve katılımcı olmalarını sağlar.					
	6. Öğretim elemanı çevrim içi ders dışında da ulaşılabilirdir.					
	7. Öğretim elemanı e-posta, sohbet grupları, haber grupları ve diğer iletişim imkanları ile hızlı geri bildirim verir.					
	8. Öğretim elemanı çevrim içi derslerde yapabileceğinin en iyisini yapmaya çalışır.					
	9. Öğretim elemanı çevrim içi derslerde karşılaştığı problemlerin üstesinden gelmek için çaba gösterir.					
	10. Öğretim elemanı farklı kaynaklarla dersi destekler.					
	11. Öğretim elemanı ders süresini etkin kullanır.					
Tutum	12. Çevrim içi öğrenme ortamında kendimi rahat ifade edebilirim.					
	13. Çevrim içi öğretim derslere olan ilgimi artırır.					
	14. Çevrim içi öğretim yoluyla anlatılan konuları rahatlıkla öğrenebilirim.					
	15. Çevrim içi ders ortamında kendimi rahat hissederim.					
	16. Konfor alanımda çevrim içi derslere katılmaktan memnunum.					
	17. Çevrim içi uzaktan öğretim yoluyla gelecekte farklı eğitimler de almak isterim.					
	18. Çevrim içi uzaktan öğretimin etkili olabileceğine olan inancım arttı.					
BİT Altyapısı	19. Çevrim içi ölçme ve değerlendirme güvenilirdir.					
	20. Öğrenme yönetim sistemi kişisel verilerin korunması açısından güvenilirdir.					
	21. Çevrim içi derslerde öğrencilerle etkileşimimi sağlayan araçlardan (sohbet, anket vb.) memnunum.					
	22. Çevrim içi öğretim, öğrenciler için kaynak çeşitliliği sağlamaktadır.					

	23. Üniversitem çevrim içi öğretim için gerekli teknolojik imkanları sağlamaktadır.					
	24. Üniversitemden uzaktan öğretim sürecine yönelik yeterli düzeyde teknik destek alabilirim.					
	25. Üniversitemin çevrim içi uzaktan öğretim uygulamalarından memnunum.					
Kullanılabilirlik ve Erişim	26. Sanal sınıf aktivitelerinin tekrarlarını istediğim zaman izleyebilirim.					
	27. Ders içeriklerine istediğim zaman ulaşabilirim.					
	28. Öğrenme yönetim sisteminin kullanımı kolaydır.					
	29. Öğrenme Yönetim sistemine sorunsuz bağlanabilirim.					