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Investigation of the Perceptions Regarding Distance Education with the Information Systems Success Model in the COVID-19 Pandemic

COVID-19 Pandemisi Sürecinde Uzaktan Eğitim Sistemine Yönelik Algıların Bilgi Sistemleri Başarı Modeli ile İncelenmesi

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Özet

COVID-19 pandemisi sürecinde, eğitim etkinliklerinde kilit bir role sahip olan uzaktan eğitim teknolojilerinin değerlendirmesi ve kullanım seviyesinin incelenmesi, üniversiteler için giderek daha önemli hale gelmektedir. Bu çalışma, COVID-19 pandemisi boyunca Bilgi Sistemleri Başarı Modeli'ni kullanarak uzaktan eğitim sistemlerinin öğrenci üzerindeki etkisini incelemeyi amaçlamaktadır. Bu doğrultuda, algılanan eğitim kalitesi, teknik hizmet kalitesi, bilgi kalitesi ve COVID-19 korkusunu da içeren genişletilmiş bir Bilgi Sistemleri Başarı Modeli kullanılmıştır. Bu amaçla, Türkiye'de Necmettin Erbakan Üniversitesi'nde öğrenim gören 1011 lisans öğrencisine uzaktan eğitim sistemini kullanmayı etkileyen faktörler hakkında anket yapılmış ve elde edilen veriler Yapısal Eşitlik Modellemesi (YEM) kullanılarak analiz edilmiştir. Analizler, COVID-19 korkusunun uzaktan eğitim sistemiyle ilgili kalite algısını olumlu etkilediğini ortaya koymuştur. Teknik hizmet, eğitim ve bilgi kalitesinin uzaktan eğitimle ilişkili olarak memnuniyet ve kullanım niyeti üzerinde önemli bir etkisi olduğu bulunmuştur. Ayrıca, çalışma sonuçları, memnuniyet ve kullanım niyetinin gerçek kullanım davranışları üzerinde olumlu bir etkiye sahip olduğunu göstermiştir.

Anahtar Sözcükler: Bilgi Sistemleri Başarı Modeli, COVID-19 Pandemisi, Türkiye, Uzaktan Eğitim, Yükseköğretim

Abstract

During the COVID-19 pandemic, the evaluation and analysis of the usage level of distance education technologies, which play a key role in education activities, has become increasingly important for universities. This study aims to investigate the impact of distance education systems on students during the COVID-19 pandemic using the Information Systems Success Model. In this context, an expanded Information Systems Success Model, including perceived education quality, technical service quality, information quality, and fear of COVID-19, was used. For this purpose, a survey was conducted on 1011 undergraduate students studying at Necmettin Erbakan University in Türkiye about factors affecting the use of the distance education system, and the data obtained were analyzed using Structural Equation Modeling (SEM). The analyses revealed that fear of COVID-19 positively influenced the quality perception associated with the distance education system. It was found that technical service, education, and information quality related to distance education had a significant impact on satisfaction and intention to use. Furthermore, the study results showed that satisfaction and intention to use had a positive effect on actual usage behavior.

Keywords: COVID-19 Pandemic, Distance Education, Higher Education, Information Systems Success Model, Türkiye

The novel coronavirus epidemic (SARS-CoV-2), recently declared a pandemic by the World Health Organization, has spread across over 140 countries globally (World of Health Organization, 2020). The first case of this COVID-19 pandemic, initially identified on January 13, 2020, was reported in Türkiye on March 11, 2020. Since then, the continuing threat of the COVID-19 pandemic has necessitated prompt and protective action by governments worldwide, with "curfew" and "social isolation" being the key measures implemented. As of April 24, 2021, COVID-19 has affected over 147 million individuals globally, leading to more than 3 million deaths (Worldometers, 2021). When this study conducted, Türkiye reported over 4.5 million COVID-19 cases and more than 38,000 fatalities (Republic of Türkiye Ministry of Health, 2021).

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Besides all the basic measures and regulations like masks, social distancing and hygiene to prevent the spread of the COVID-19 virus, all the experts and administrators decided that the best practice that could do this in the field of education is distance learning (Terzi et al., 2021). Thus, distance learning was put into practice at all levels of education (Telli Yamamoto & Altun, 2020). The question of how to keep the basic academic and communication skills and the basic elements of many areas in universities was important for Türkiye as well as for many other countries. All of these brought educational technologies in general and distance learning applications in particular to the fore at all levels from pre-school to higher education.

In the COVID-19 crisis, a lot was demanded of the students. The hygiene rules were constantly changing; usual routines could not take place, and new tasks had to be mastered. With the increasing number of new infections, every day was accompanied by uncertainty about how things would continue. And the concern of getting infected was also growing. Some students had worries and fears about the pandemic that had not been adequately discussed with them. Many students worried that friends and family might get sick. They also had less social support because they were isolated at home.

The concept of fear is a type of psychological phenomenon that occurs when a negative stimulus triggers a person's cognitive and affective effects. Similar to diseases, epidemics can make people feel anxious. There were many unknown factors related to COVID-19 and this created fear among the people. It has been reported that the negative effects of COVID-19 on people are often triggered by the changes in daily life. According to a study by Shigemura et al. (2020), the impact of the pandemic on people's mental health is severe. Even if a person does not have any mental health problems, the stress felt as the pandemic progresses can exacerbate the symptoms. Anxiety disorder is a condition that can affect physical health quality. It can manifest itself in various chronic and acute conditions such as blood pressure and anxiety. Multiple factors can influence the emergence and maintenance of anxiety during the pandemic. In addition to cultural factors, other factors such as being infected with COVID-19 (Egunjobi, 2020), the lack of information about the disease and the alarming death toll (Banerjee, 2020) also raise concerns.

This study aims to answer the question, "Which factors are effective in using the distance education system during the COVID-19 pandemic process" in the context of the Extended Information Systems Model. Although there are studies on the subject in the literature, it can be said that studies examining the effects of variables other than information system success variables in the actual use are limited. Adding the fear of COVID-19 to the model as a variable makes the current study different from other studies. It is believed the original value of the research will make up for this deficiency in the literature and the results of the study will make significant contributions to the field of higher education.

COVID-19 Pandemic and Distance Education

Before the COVID-19 pandemic, cases of pneumonia were first observed in Wuhan, central China. In March 2020, the World Health Organization (WHO) declared a global coronavirus pandemic. The epidemic, which quickly spread to Europe, America and Asia, led to the implementation of measures such as social distancing and curfews and has been determining the lives of people in many countries around the world for months. In addition to health, economy and social life, the pandemic has severely affected higher education. During the COVID-19 pandemic, many universities around the world canceled face-to-face classes and decided to switch to online distance learning to prevent the spread of the COVID-19 virus and not disrupt classes (Garrote et al., 2021; Grynyuk et al., 2022; Keskin & Özer Kaya, 2020; Koyuncuoğlu, 2020; Koyuncuoğlu, 2021a; Masalimova et al., 2022; Sennheiser, 2021). The Turkish Ministry of Health announced the first COVID-19 case on March 11, 2020. With this announcement, educational institutions were temporarily closed on March 25, 2020 (YÖK, 2020).

The pandemic has brought about unprecedented changes in the way education is conducted globally. Its impact on employment and the development of new strategies is also unprecedented. The rapid emergence and evolution of virtual and distance learning have allowed schools to address the challenges they face while minimizing the impact of closures of education institutes (Godoy et al., 2021; Hsu, 2022; Iflahen & Benkhallouq, 2022; Kantipudi et al., 2021; Linnes et al., 2022).

Through the use of technology, universities and lecturers have been able to create a variety of effective teaching methods that are designed to meet the needs of their students. These include online learning platforms, video conferencing, and in-school networks. In some countries, learning materials and lessons are broadcast on state television and radio programs (Furrer et al., 2023; Resch et al., 2022).

Despite the rapid development of effective pandemic response strategies, some regions and universities still need to be equipped to handle the challenges that arise due to the situation. This is because they have the necessary resources and technological infrastructure to address their students' needs effectively. The increasing popularity of virtual learning has raised concerns about its potential to widen the inequalities in the education system. In developing countries, for instance, it can be difficult for students with low family incomes or disabilities to access distance learning programs (Morgan, 2020; UNESCO, 2021). Unfortunately, distance learning can prevent universities and lectures from meeting

their social responsibilities. They can also not provide the necessary services to their students.

Before the outbreak of the COVID-19 disease, the implementation of distance learning and virtual learning programs had been hindered by the lack of proper training for teachers and the necessary equipment. During the crisis, the main focus was providing the required technology to schools. Due to the increasing popularity of virtual learning, it is important to take a closer look at how technology and learning can be integrated effectively. During this process one should take into account the central role of teachers and the competencies that students need for self-regulated learning (Internationale Arbeitsorganisation, 2020).

With the suspension of face-to-face education, many studies have been conducted on universities, which platforms to use, how to help faculty and students technically, how to reach those with limited online opportunities, how to monitor and evaluate students' learning outcomes and how patience tendencies evolve during virus epidemic. (Dikmen & Bahçeci, 2020; Doğan & İmamoğlu, 2020; Koyuncuoğlu, 2020).

A study evaluating students' reactions to distance learning during the pandemic period (Uçkaç, 2020), found that students' fears and unease caused by the virus infection and death exceed concerns about their careers and future. In a study by Keskin and Özer Kaya (2020) conducted in the first months of the pandemic, the contribution of internet-based distance learning to the level of theoretical knowledge was determined as 4.07±2.42 (out of 10). The contribution to general culture was determined as 3.46±2.38 and the contribution to skills in professional practice as 2.48±1.98. In the same study, 84.4% of students claimed that face-to-face classes are not as effective as online learning, while 45.7% stated that distance learning is an alternative. According to the study, distance learning can be inconvenient for students as it can prevent them from communicating with their teachers (49.9%). It also allows them to study at their own pace (60.7%), but they quickly forget what they learned (74.6%). According to the study, some students experienced systemic technical issues (53.9%) during distance learning. Several studies examine how students respond to the distance education system during the pandemic (Keskin & Özer Kaya, 2020; Uçkaç, 2020) and which factors affect and to what extent limited.

Information Systems Success Model and Distance Education System

Studies have shown that implementing information systems in learning and teaching can improve organizational efficiency and effectiveness (Rokhman et al., 2022). Therefore, the evaluation of the distance learning system of educational institutions must be carried out.Due to the importance of evaluating the information system, different models have been developed to support the stakeholders in the development of the system. Some of these include the Technology Acceptance Model developed by Davis et al. (1989), the ISS model developed by DeLone and McLean (1992), the Extended Technology Acceptance Model developed by Dishaw and Stromg (1999), and the Updated ISS model developed by DeLone and McLean (2003). These models were developed in response to the needs of the information system stakeholders. Studies have shown that the success of an information system can be measured using the above models (Ouajdouni et al., 2021; Safsouf et al., 2020; Yakubu & Dasuki, 2018). These models were developed to support the stakeholders in the development of the system.

Assessing the usage and perspectives of distance education by university students has become more important due to the emergence of COVID-19. The Information Systems Success (ISS) Model was developed by DeLone and McLean (1992) to evaluate information systems and draw attention to the problems encountered and proposed as an evaluation model (Petter et al., 2012). The ISS Model is among the most effective theories in explaining and predicting user satisfaction, system usage and system success (Guimaraes et al., 2009). DeLone and McLean (2003) updated the model by taking into account the criticisms and comments received later. The updated model has six components: System quality, information quality, service quality, user satisfaction, system usage, and net system benefit. The aim of this study is to analyze the effectiveness of distance education system using the Information Systems Success Model. This research uses this method because the technology used in the development of distance learning is information-based.

Wang et al. (2007) proved the validity of six factors in the ISS Model they developed to evaluate distance education systems in modern businesses. These factors include system quality, service quality, satisfaction, perceived usefulness, information quality and system usage. Cheng (2012) supported the ISS Model empirically and stated that the quality components that affect the use of distance education system, information, service and technical service quality, as well as the quality of education, play an important role in the perceptions of the education system. In the study of Efiloğlu-Kurt (2015) in which Technology Acceptance and ISS Models were used together, it was that the quality of information affects the perceived usefulness positively. It has been reported that quality of education and perceived usefulness are the main factors affecting satisfaction, and satisfaction also has a significant effect on use. Freeze, Alshare, Lane, and Wen (2010) used the ISS model to study the success of distance education systems. The results showed that system and information quality had significant positive effects on user satisfaction and system usage.

The study was conducted using a structural equation model to test the effects of information quality and user satisfaction on the success of distance education systems. The results indicated that system and information quality had a positive impact on the system usage and user satisfaction. In addition, the study revealed that the user's satisfaction had a stronger influence on the system's success than the usage. Ouajdouni et al. (2021) examined the success of distance learning using the ISS model in their study conducted in Morocco. They found that the success of the distance learning system depends on user perception, system effectiveness and student satisfaction. Cidral et al. (2020) add the variable "learning orientation of students". They find that the success of distance learning depends on student satisfaction and system usage.

In the current study, in addition to variables such as perceived education quality, technical service quality, information quality, user satisfaction, intention to use, and usage behavior, the fear of COVID-19 was included. This study aims to reveal the effects of distance learning and learning on perceived intention to use, satisfaction and behavior of use. In this context, the scope of the subject covered in the research was determined as higher education students and the limit was determined as Necmettin Erbakan University students.

Method

Research Model and Hypotheses

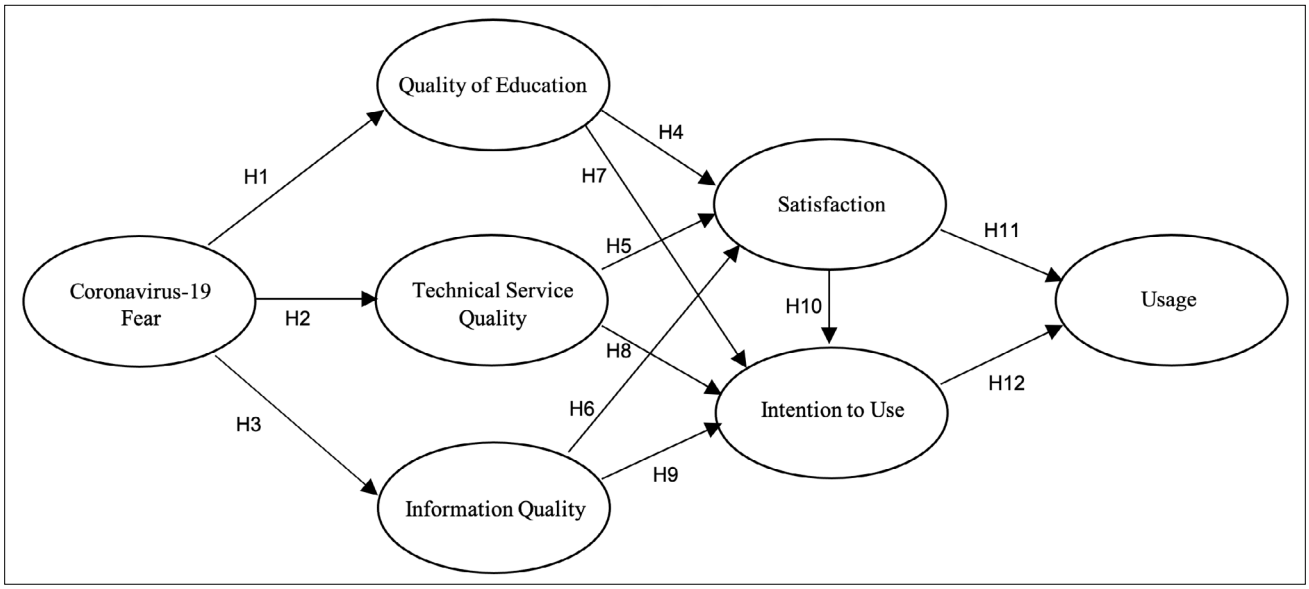
The aim of this study is to analyze the factors influencing students' distance learning system usage behavior so that universities can organize their distance learning activities more effectively. The study was conducted using the Information Systems Success Model. The research model was formed from the variables education quality, technical service quality, information quality, intention to use, user satisfaction, and actual use. Fear of COVID-19 was included as an exogenous variable.

The education quality variable included in the Information System Success Model by Hassanzadeh, Kanaani, and Elahi (2012) refers to the quality of the system in terms of the characteristics and qualities it can offer to facilitate learning. Hassanzadeh et al. (2012) and Kim et al. (2012) found that the quality of education has a significantly positive effect on user satisfaction. For this reason, it is assumed that the quality of education has a positive effect on the satisfaction and consumption intention of individuals. The variable technical service quality refers to the perceived support quality (system usage training, helpdesk, etc.) by the users within the framework of the distance education system. Although the variable of technical service quality can be considered under the quality of education, some researchers think that it would be more appropriate to consider this variable as an independent variable due to the development of distance education systems in recent years (Wang & Liao, 2008). In the studies conducted, the perceived technical service quality in the context of the distance education system lies in satisfaction (Poulova & Simonova, 2014; Tajuddin vd., 2013; Wang & Chiu, 2011) and intention to use the distance education system (Cheng, 2012; Hassanzadeh et al., 2012; Wang & Chiu, 2011) are significant. In this study, the quality of technical service positively affects both satisfaction and intention to use.

Another variable of the ISS model is the information quality. *Information quality* represents the desirable characteristics of the educational system's output (Petter & McLean, 2009; Freeze et al., 2010). In other words, information quality is measured based on various factors such as quality of information, its usefulness to the user, content requirements, reliability and timely delivery of information (Efiloğlu-Kurt, 2016; Freeze et al., 2010; Mohammadi, 2015). Information quality captures issues with distance learning content. The basic goal of distance learning is to provide students with learning information (Bhatti et al., 2000). Therefore, the decision as to which content should be made available as learning material is extremely important. Studies have shown that information quality has positive effects on user satisfaction (DeLone & McLean, 1992; Eom et al., 2006; Roky & Meriouh, 2015; Saba, 2013; Hassanzadeh et al., 2012; Wang & Chiu, 2011) and the intention to use (Cheng, 2012; Roky & Meriouh, 2015; Wang & Chiu, 2011). Therefore, in the current study, it is assumed that the information quality has a positive effect on both user satisfaction and the intention to use the distance learning system. *User satisfaction* is defined as users' perception or level of belief that their needs, desires, and goals are being fully met (Bharati, 2002; DeLone & McLean, 1992; Sanchez-Franco, 2009). Hassanzadeh et al. (2012) found that satisfaction has a positive effect on the actual use of the distance education system. Some studies have observed that satisfaction has a significantly positive effect on intent to use distance education services (Hassanzadeh et al., 2012; Levy, 2007; Petter et al., 2008). In this study, satisfaction was assumed to have a positive effect on both actual use and intention to use. *Intent to use* is defined as the attitude of the user. (DeLone & McLean, 2003). Davis (1989) found that intention to use plays an important role using a new technology. Vebyatesh et al. (2003) found that there is a positive correlation between intention to use and actual use. Similar results have been obtained in other studies examining the relationship between intention and actual use (Alkhalaf et al., 2012; Chow et al., 2012). It is therefore assumed in this study that the intention to use has a positive effect on actual use. *The system usage* variable is an important component for measuring the success of information systems (Efiloğlu-Kurt, 2016). System usage relates to frequency of use, extent of use and purpose of use, and system usage is used to measure likelihood and tendency of use (DeLone & McLean, 2003). Adding the fear of COVID-19 to the model as an exogenous variable makes the research different from other studies.

In light of the theoretical background and previous studies, 12 hypotheses were developed. The hypotheses put forward in the study are listed below (Figure 1).

Figure 1. Research Model.



Hypotheses

H1: The fear of COVID-19 affects the quality of education positively.
H2: The fear of COVID-19 affects the technical service quality positively.
H3: Fear of COVID-19 affects the quality of information positively.
H4: Education quality affects satisfaction positively.
H5: Technical service quality affects satisfaction positively.
H6: Information quality affects satisfaction positively.
H7: The quality of education positively affects the intention to use it.
H8: Technical service quality positively affects the intention to use it.
H9: Information quality positively affects the intention to use it.
H10: Satisfaction positively affects the intention to use.
H11: Satisfaction positively affects actual usage.
H12: The intention to use affects the actual use positively.

Population and Sample Selection

The population of the research is undergraduate students studying at universities in Türkiye. Since reaching all students requires serious time, effort and budget, the sample of the research was determined as students studying at the Faculty of Applied Sciences of Necmettin Erbakan University in the 2020-2021 academic year. According to the Information Management System of the Council of Higher Education in Türkiye, the Faculty of Applied Sciences had around 1800 students in the fall semester. When the sample determination formula is applied, taking into account the 95% confidence interval and the 5% margin of error, it is sufficient to select the sample size as 306 (Yazıcıoğlu & Erdoğan, 2011). Before starting the study, ethics committee approval was obtained for the research from the Social Sciences Ethics Committee of Necmettin Erbakan University on 20.10.2020 and on 18.06.2021 (No: 2020/37 and No: 2021/382). University students who attended classes through the distance education system and volunteered to participate in the study were included in the research. This cross-sectional study was conducted between November 2020 and December 2020. The "Google Forms" application was used on the internet and the link of the structured questionnaire form was sent to the students who volunteered to participate in the study. The purpose of the study was briefly explained in the questionnaire form, and participants were asked to participate voluntarily. As a result, 1011 students participated in the research and the required sample size was more than met. 49.3% of the students included in the study are male and 50.7% are female. 25.3% of the students are first, 27.7% are second, 23.6% are third and 23.4% are fourth year students. The average age of the students was calculated as 20.83 (Sd=2.28). It was determined that 4.8% of the students have low, 79.7% medium and 15.5% high perceived academic success levels. 10.3% of the students stated that they were in low socio-economic status, 84.4% in medium and 5.3% in high socio-economic status. A large number of students indicated that they use their laptops (47.8%) and mobile phones (30.4%) when participating in distance learning. 33.8% of the students studied finance and banking, 13.3% studied transportation and logistics management, 20.4% studied accounting and finance management, 20.3% were international trade, and 12.2% were management informatics. The characteristics of the students included in the study are presented below (Table 1).

Table 1. Distribution of Students to Demographic Characteristics.

		f	%
Gender	Male	498	49,3
	Female	513	50,7
Class	1	255	25,3
	2	280	27,7
	3	239	23,6
	4	237	23,4
Perceived academic success	Low	48	4,8
	Middle	806	79,7
	High school	157	15,5
Socio-economic status	Low	104	10,3
	Middle	853	84,4
	High school	54	5,3
How do you access distance education?	Mobile phone-tablet-computer together	114	11,2
	Mobile phone	307	30,4
	Laptop	483	47,8
	Desktop computer	98	9,7
	Tablet	9	0,9
Department of study	Finance and banking	343	33,8
	Transport and logistics management	134	13,3
	Accounting and finance management	206	20,4
	International trade	205	20,3
	Management information systems	123	12,2
n=1011			

Data Collection Tool

To obtain data, the questionnaire method was used. The questionnaire contains seven scales. Literature studies were used to determine the scale items. The items expressing the intention to use the distance education system were adapted from Lin (2011)'s study, the items related to the quality of information and technical service were from Wang et al.'s (2007) study, the items related to satisfaction and using were from DeLone and McLean (2003). Items related to the quality of education were adapted from the study of Hassanzadeh et al. (2012) and the articles related to the fear of Coronavirus-19 are in Ahorsu et al. (2007). The measurement tool used is a 5-point Likert type (1 – "strongly disagree" to 5 – "strongly agree").

"Distance education enables students to participate in the lesson", "The distance education system is aesthetically pleasing", "The distance education system provides information suitable for my needs", "I tend to use the distance education system", "I am satisfied with the distance education system", "The distance education system is daily I use it" and "I feel uncomfortable when thinking about COVID-19" are some examples of the items in the questionnaire. The questionnaire also asked about the students' socio-demographic characteristics.

Statistical Analysis of Data

The two-stage approach proposed by Anderson and Ginberg (1988) was used as the basis for the analyses to be carried out in this study. The first stage is called the measurement model. At this stage, the construct validity of the measurement model is tested. In addition, validity and reliability analyses were carried out using items and factors. The construct validity of the measurement model was tested using confirmatory factor analysis. Cronbach alpha coefficients were calculated to determine the confidence levels of the factors. However, CR (composite reliability), AVE (average variance extracted), MSV (maximum shared variance), MaxR(H) (maximum reliability) values were calculated for convergent and discriminant validity calculations. In addition, discriminant validity was examined using the HTMT (heterotrait-monotrait ratio of correlations) method (Henseler et al.,

2015). The second stage is called the structural model. At this stage, a structural equation model analysis was applied and the fit values of the tested model were reported. The research hypotheses were evaluated by examining the relationships between the variables in the model.

Before carrying out the structural equation model analysis, the existence of extreme values that can complicate the distribution in the data set was examined. Cook distance values were calculated to show the presence of these extremes. Cook distance values greater than one indicate the presence of extreme values (Stevens, 2002). It was determined that the data set does not have an extreme value. The next step was to check the normal distribution assumption by considering the kurtosis and skewness coefficients. The skewness and kurtosis coefficients in the range of ±1, indicate that the distribution conforms to the normal assumption (Tabachnick & Fidell, 2007). The coefficients calculated for the scale total scores were within the specified range ($-0.77 \leq$ skewness ≤ 0.32; $-0.85 \leq$ kurtosis ≤ -0.22). The obtained results showed that it met the normal distribution assumption. The next step of the study examined whether there is a multicollinearity problem between the factors. The correlation coefficients were calculated for this. High-level relationships ($r > 0.90$) indicate a multicollinearity problem (O'brien, 2007). After the analysis, it was concluded that there is no multicollinearity problem between the factors. As a result, the scale scores were suitable for multivariate analysis. The analyses were performed using the AMOS 24.0 and SPSS 25.0 software.

Findings

Validity and Reliability

Confirmatory factor analysis (CFA) was applied to test the measurement model according to the data obtained from the measurement tools. Calculated goodness of fit values ($\chi2$=2252.06, $\chi2$/df = 3.26, GFI = 0.89; AGFI= 0.87, TLI= 0.95, CFI= 0.96, IFI= 0.96, RMSEA = 0.05) showed that the data were in good agreement with the model tested (Browne & Cudeck, 1993; Jöreskog & Sörbom, 1998; McDonald & Marsh, 1990). In the tested model, the factor loads of the items varied from 0.67 to 0.91. The significance of the calculated factor loads was found to be at the 0.001 level (Table 2).

Cronbach Alpha coefficients were calculated to determine the reliability levels of the factors in the model. The alpha coefficient should be 0.70 and higher (Cortina, 1993). The alpha coefficients calculated for the factors took values between 0.89 and 0.95. The coefficients obtained indicated that the reliability of the items in the factors was high due to internal consistency. CR, AVE, MSV, MaxR(H) values were calculated for convergence and segregation validity calculations. In addition, the HTMT method was used to calculate discriminant validity. The scale items, factor loadings, convergent and discriminant validity results are presented in Table 2.

Table 2. Validity and Reliability Analysis Results.

Factors	Factor load	α	CR	MSV	AVE	MaxR (H)
Education quality						
Distance education enables students to participate in the lesson.	0,75	0,90	0,89	0,75	0,59	0,90
Distance education enables collaborative learning	0,78					
Distance education provides necessary facilities such as chat and forum.	0,71					
The distance education system provides the opportunity to communicate with other students.	0,69					
The distance education system provides learning and evaluation opportunities.	0,86					
The distance education system is suitable for my learning style.	0,80					
Technical service quality						
The distance education system is aesthetically pleasing.	0,82	0,94	0,94	0,85	0,61	0,95
The distance education system works fast enough.	0,77					
The distance education system is user friendly.	0,84					
The distance education system provides interactive features between users and the system.	0,83					
The distance education system has a regular design.	0,77					
The distance education system has flexible features.	0,74					
E-learning has attractive features.	0,80					
The distance education system is reliable (it can fulfill a purpose perfectly.).	0,78					
Distance education system is secure (data security).	0,69					

Information quality						
Provides information suitable for my distance education needs.	0,88	0,95	0,93	0,85	0,73	0,94
Distance education provides comprehensive knowledge.	0,85					
The distance education system provides exactly the information I want.	0,86					
Distance education provides me with organized content and information.	0,86					
Distance education provides up-to-date content and information.	0,82					
The distance education system provides the necessary content and information.	0,85					
Intention to use						
I tend to use the distance education system.	0,88	0,89	0,89	0,61	0,74	0,90
I believe that the distance education system is available.	0,86					
There is a possibility that I will use the e-learning system in the near future.	0,84					
Satisfaction						
Distance education is fun.	0,87	0,95	0,94	0,73	0,76	0,95
I am satisfied enough with the distance education system.	0,91					
The distance education system meets my educational needs.	0,88					
I am satisfied with the performance of the distance education system.	0,87					
Distance education is enjoyable for me.	0,87					
Distance education gives me self-confidence.	0,84					
Usage						
I use the distance education system every day.	0,89	0,92	0,92	0,42	0,80	0,93
I use the distance education system regularly (at the same intervals).	0,90					
I log in to the distance education system frequently.	0,89					
Fear of Coronavirus-19						
I am most afraid of COVID-19.	0,69	0,92	0,90	0,10	0,57	0,91
I get uncomfortable when I think about the COVID-19.	0,75					
When I think of COVID-19, my hands start to sweat.	0,74					
I am afraid of losing my life because of the COVID-19.	0,80					
I get nervous watching news about COVID-19 on social media.	0,86					
I can't sleep because I'm worried about getting COVID-19.	0,67					
My heart beats fast when I think about catching COVID-19.	0,76					

When the table was examined, it was observed that the internal reliability criteria CR>0.70, and AVE>0.50 conditions were met. The concordance validity condition (CR>AVE) was also fully met. This indicated that convergent validity was achieved (Malhotra & Dash, 2011). IRegarding discriminant validity, it was observed that the MSV<AVE condition was mainly met. The values calculated by the HTMT method (0.17<HTMT<0.89) did not exceed 0.90, ,which indicated that discriminant validity was achieved (Henseler et al., 2015). In addition, the fact that the MaxR (H) reliability value is larger than the CR values supports that discriminant validity is achieved (Hu & Bentler, 1999). The reliability and validity analysis of the measurement tool revealed that its seven-factor structure was confirmed. The reliability level of the scale factors due to internal consistency is high. It was determined that divergent and convergent validity between the scale factors was achieved to a great extent.

Correlation Analysis Results

The relations between the variables in the model were examined without performing the structural equation model analysis. Pearson correlation coefficients were calculated to examine the relationships between the variables. The coefficients obtained are given in Table 3.

When the table is examined, it is understood that there are low, medium and high-level significant relationships between the usage behavior scores and quality of education (r=0.50; p<0.01), technical service quality (r=0.55; p<0.01), information quality (r=0.55; p <0.01), intention to use (r=0.60; p<0.01), satisfaction (r=0.47; p<0.01), Fear of COVID-19 (r=0.28; p<0.01), and It was observed that the tendency to use the distance education system increased as the quality of education, technical service quality, information quality, intention to use, perception of satisfaction and fear of COVID-19 related to distance education increased.

Structural Equation Model Analysis Results

In the tested structural equation model, fear of COVID-19 was included as an exogenous variable. Education quality, technical service quality, user satisfaction, information quality, intention to use, and usage were included as endogenous variables in the model (Figure 2).

The quality of education (β=0.31, p<0.001), technical service quality β=0.43, p<0.001) and information quality (β=0.33, p<0.001) have a positive effect on satisfaction. Technical service quality (β=0.55, p<0.001) and information quality (β=0.32, p<0.001) have a positive effect on intention to use. On the other hand, satisfaction (β=0.12, p<0.01) and intention to use (β=0.56, p<0.001) have a positive effect on usage.

Table 3. Pearson Correlation Coefficients of the Relationships Between Factors.

Variables	Avr	Sd	1.	2.	3.	4.	5.	6.	7.
1. Quality of education	2,99	1,00	1						
2. Technical service quality	2,95	0,98	0,76**	1					
3. Information quality	2,98	1,06	0,76**	0,85**	1				
4. Intention to use	3,45	1,15	0,58**	0,73**	0,72**	1			
5. Satisfaction	2,60	1,16	0,74**	0,77**	0,78**	0,59**	1		
6. Usage behavior	3,64	1,16	0,50**	0,55**	0,55**	0,60**	0,47**	1	
7. Covid-19 Fear	2,69	1,06	0,28**	0,24**	0,26**	0,12**	0,31**	0,16**	1

***p<0,01; n=1011*

Goodness of fit values obtained as a result of the analysis (χ2=3570.05; χ2/df = 4.62; GFI= 0.87; AGFI= 0.85; TLI= 0.92; CFI= 0.93; IFI= 0, 93; RMSEA = 0.60) showed that the data were agreeable with the model tested (Browne & Cudeck, 1993; Jöreskog & Sörbom, 1998; McDonald & Marsh, 1990).

When the statistically significant relationships in the tested model are examined, it is seen that the fear of COVID-19 was found to have a positive effect the education quality (β=0.36, p<0.001), technical service quality (β=0.31, p<0.001) and information quality (β). =0.33, p<0.001).

In the model, the rate of disclosure of satisfaction with the distance education system is 70%, the rate of disclosure of the intention to use the distance education system is 72%, and the rate of disclosure of the behavior of using the distance education system is 41% (Figure 2). The critical values (t) and significance levels (p) of the path coefficients in the tested model are shown in Table 4.

Figure 2. Tested Structural Equation Model, χ2=3570,05; Sd= 773; p<0.001.

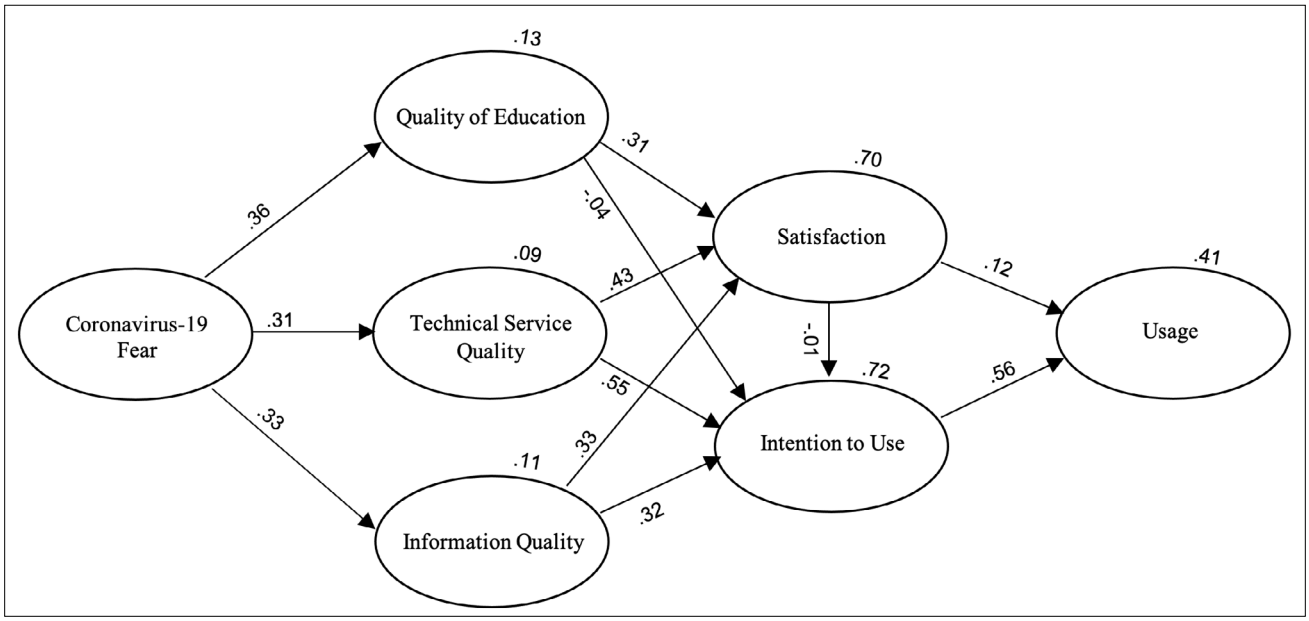


Table 4. Relationships Between Variables in the Tested Model.

	Method	β	t	Hypothesis
H1	Fear of COVID-19 ---> Quality of education	0,36	9,63***	Accepted
H2	Fear of COVID-19 ---> Technical service quality	0,31	8,56***	Accepted
H3	Fear of COVID-19 ---> Quality of information	0,33	9,24***	Accepted
H4	Education quality ---> Satisfaction	0,31	12,79***	Accepted
H5	Technical service quality ---> Satisfaction	0,43	5,58***	Accepted
H6	Information quality ---> Satisfaction	0,33	4,35***	Accepted
H7	Education quality ---> Intention to use	-0,04	-1,64 ad	Refused
H8	Technical service quality ---> Intention to use	0,55	7,62***	Accepted
H9	Information quality ---> Intention to use	0,32	4,61***	Accepted
H10	Satisfaction ---> Intention to use	-0,01	-0,29 ad	Refused
H11	Satisfaction ---> Usage	0,12	3,27**	Accepted
H12	Intention to use ---> Usage	0,56	14,85***	Accepted

****p<0,001; **p<0,01; ad Not meaningful*

Discussion, Conclusion and Recommendations

This study investigated students at the Faculty of Applied Sciences of Necmettin Erbakan University, who were studying through in distance learning. The research focused on the factors influencing these students' actual use of the distance education system during the pandemic, employing the Information Systems Success (ISS) Model as a framework. Relationships between variables within the model were evaluated using Structural Equation Modeling. The findings revealed that fear of COVID-19 positively influences the quality perceptions associated with the distance learning system. The quality of technical service, education, and information related to distance learning significantly impacted both usage intention and satisfaction. Additionally, the study determined that both usage intention and satisfaction substantially influence actual usage behavior.

The fear of COVID-19, according to the results obtained, has a positive impact on the quality of the technical service, the quality of education and the quality of information related to distance learning. During the pandemic, students had to meet their basic education needs through the distance education system. Research conducted in this period revealed that individuals' tendency to use technology increased and technological tools were used more frequently (Statista, 2020). It is also noted that the pandemic acted as a catalyst for more effective use of digital devices, e-learning activities, and social media technologies (Mulenga & Marbán, 2020). The fear of COVID-19 may have led students to understand, evaluate and use the distance education system.

The findings also indicate that, the quality of education does not have a significant effect on the intention to use it. One of the possible reasons for this may be that the quality of technical service and the quality of information have a stronger effect on the intention to use than the quality of education. On the other hand, it was determined that the quality of education has a positive effect on the satisfaction from distance education. The quality of the distance education system is directly related to the level of enabling the interaction of the environment provided to the users. Quality distance education systems allow the creation of a collaborative learning environment, ensure the continuation of communication inside and outside the classroom with applications such as chat and form, are suitable for the learning styles of the users and offer the opportunity to evaluate what has been learned (Hassanzadeh et al., 2012). In this respect, it is expected that as students' quality perceptions of distance education increase, their satisfaction with the distance education system will increase. The findings obtained in this study are consistent with the results of studies in the literature (Hassanzadeh et al., 2012; Kim et al., 2012).

The findings revealed that the technical service quality positively affects satisfaction and intention to use. Technical service quality determines the accuracy and efficiency of communication systems (DeLone & McLean, 2003). Distance education systems with high technical service quality work fast enough, satisfy users in terms of aesthetics, offer flexible features, are reliable in terms of data storage and protection, and are completely user-friendly (Wang et al., 2007). In this respect, it is expected that as students' perceptions of technical service quality related to distance education increase, their satisfaction with distance education

and their intention to use it increase as well. The findings of this study corroborate previous research suggesting that satisfaction with technical service quality (Alsabawy et al., 2013; Hassanzadeh et al., 2012; Tajuddin et al., 2013; Kim et al., 2012; Wang & Chiu, 2011) and intention to use (Cheng, 2012; Hassanzadeh et al., 2012; Li et al., 2012; Ramayah et al., 2010) significantly influence outcomes in the context of distance education systems.

It was also determined that the quality of information positively affects satisfaction and intention to use it. Information quality is extremely important in order to meet the needs and expectations of users in distance education systems (Petter & McLean, 2009). Distance education systems with high information quality offer comprehensive content and information suitable for users' needs (Wang et al., 2007). It is expected that the students who reach the content and information suitable for their needs and expectations will be satisfied and their intention to use will increase. The findings of this study align with prior research demonstrating a positive impact of information quality on satisfaction (Freeze et al., 2010; Roca et al., 2006; Saba, 2013; Wang & Chiu, 2011) and intention to use (Cheng, 2012; Freeze et al., 2010; Wang & Chiu, 2011; Ramayah et al., 2010) in the context of distance education systems.

The findings of this study revealed that usage intent and satisfaction have a positive impact on user behavior. From the point of view of system designers and vendors, it is nowadays more important to meet user needs and to achieve a satisfactory level of performance, thereby increasing users' intent to use, than to achieve high sales figures only in terms of classical marketing approaches because increasing satisfaction and intention to use leads to product or service sales (Dominici & Palumbo, 2013). The fact that the distance education system meets the needs, has sufficient performance, gives self-confidence and is fun increases the users' satisfaction (DeLone & McLean, 2003). Intention is a critical factor in using a new product. In the distance education system, the individual's intention to use affects the probability of participating in the system and is an important determinant on the actual use (Mohammadi, 2015). The results obtained in this study are consistent with these explanations. Furthermore, the results are consistent with previous research suggesting that both satisfaction (Hassanzadeh et al., 2012; Hsieh & Cho, 2011; Mohammadi, 2015) and intention to use (Mohammadi, 2015; Venkatesh et al., 2003) positively influence actual usage behavior.

This study carried out during the pandemic, determined that the fear of COVID-19 positively affects the quality of technical service, education, and information related to distance education. The fear of COVID-19 positively affects the tendency to use educational technologies and the quality of technical service, education quality and information quality associated with distance education have a significant effect on satisfaction and intention to use. Satisfaction and intention to use were found to have a significant effect on the actual use behavior. During the pandemic, the ISS Model related to the distance education system was largely confirmed. It was observed that the fear of COVID-19 indirectly directs students to use the distance education system.

A study on distance education by Neuenschwander (2021) shows that the lack of social interaction between students, teachers and parents is a major challenge. The fact that students had to work alone at home made it difficult for teachers to compensate for the disadvantages of individual students. Specifically, the research shows that the social class community not only has a synergy effect (saving of financial resources), but also has a motivating and socializing function with the aim of integrating students into society. These important functions cannot be fulfilled in distance learning, so distance learning cannot be equated with face-to-face learning (Neuenschwander, 2021). Distance learning should, therefore, take place with intensive support from the lecturers. The focus should not be on the use of digital learning materials, but rather on achieving the characteristic personal atmosphere of the students in distance education. On the other hand, Güneş (2020) recognized that students improved their research skills in educational activities conducted during the pandemic. According to Güneş, distance learning can help students develop soft skills like critical thinking, creativity, communication and emotional intelligence. Likewise, the positive effects of students staying at home are also reflected in education. For example, distance learning activities conducted during the COVID-19 epidemic increased individual learning efforts, the use of different learning strategies, and the effectiveness of these strategies (Gonzalez et al., 2020).

Lang (2020) predicts three scenarios for the COVID-19 pandemic: (1) The formation of peaks and plateaus for one to two years. (2) Big waves in autumn and winter. (3) The disappearance of the virus over time. This uncertainty will only fuel the rapid digital transformation in education. The creation of distance learning technologies will also facilitate innovation in the education industry. Many universities struggled with distance learning and digital technologies, especially as they had to be implemented in a short amount of time. Some online courses are interrupted from time to time and there are problems with access. Due to the sudden increase in online access, some of the university servers were also inadequate. All these negativities will not prevent the digital transformation in the universities (Koyuncuoğlu, 2021a).

With the outbreak of the pandemic, traditional teaching and learning methods have taken a back seat and smartphones, tablets and laptops have suddenly become the main communication and information transmission tools. It remains to be seen whether this "sudden digitization" (Döbeli Honegger & Stajic, 2020) will have a lasting impact on the education system (Tengler 2020).

Digital and traditional learning have strengths and weaknesses. In the future, distance learning can offer students more options than the traditional learning model. On the one hand there is the uncertainty of new outbreaks of pandemics, on the other hand distance learning should be a topic of interest both locally and globally to make the concept of lifelong learning accessible to all. During COVID-19, it was important to determine the competencies, skills and attitudes of distance learning students towards this practice and the factors influencing them, and to take the necessary precautions to improve students' competencies.

During the pandemic in Türkiye, distance learning became the new normal in higher education. Some universities introduced some degree of distance learning for students bedore to the COVID-19 pandemic. Therefore, exemplary teaching models were derived from previous experiences. In this regard, the introduction of distance learning in universities was smoother than expected compared to primary and secondary education (Koyuncuoğlu, 2021a).

Although distance education is widely used in higher education, it should not be seen as a single method, but as a different type of method that completes the education process. It should be used to support formal education and create equal opportunities. In addition to the latest technology, it is also important that distance learning institutions employ a culture and management system that encourages the use of e-learning. Online learning can be very cost effective but should still be carefully considered to ensure the quality of education is not compromised.

According to Armstrong-Mensah et al. (2020), teachers should be more collaborative and supportive to provide more options and accountability for their students' learning. They should also be able to innovate their teaching materials and approaches to achieve the goals of their courses. One of the most important factors that can help students embrace e-learning is innovation. In order to implement distance education systems, various technologies are needed, such as the internet, smartphones and applications. When it comes to making higher education more accessible, the availability of accessible technology is extremely important. This can be done through the use of various forms of assistive technology. In addition, other factors such as the accessibility of learning materials and the principle of hearing and seeing should also be considered to provide the best possible experience for the students. For example, image-formatted audio text can be used to ensure that students with visual impairments can access the information they need. In foreign language learning, video clips can also be used to help students understand the lesson.

In order to ensure the accessibility of their online courses, universities should set up media and didactic centers. These facilities should be equipped with the necessary equipment and resources to support the needs of the students. For most students, distance learning is the best choice when it comes to fulfilling their mandatory requirements. This type of teaching offers them more advantages than disadvantages and allows them to work from anywhere. It can also be beneficial for students from other cities who wish to study at major universities. Through this method, they can easily connect to online courses and follow their schedule at their own pace.

The digitization of universities has the potential to further advance the internationalization of educational institutions. According to Koyuncuoğlu (2020), online exams and distance learning courses can help increase the number of students from other countries. In addition, universities can further develop course content and subject areas together with their international partners. Digitization has the potential to change the way universities approach internationalization. In order to use this potential optimally, the university management should consider both topics in their strategic plans. In addition to the technical infrastructure and the quality of the content, the digitization of universities also requires the establishment of effective change processes. This can be done through the development of strategic plans and procedures. In addition, other factors such as the establishment of an organizational culture and the development of a personnel structure are taken into account in order to ensure the success of the institute's operations. The various departments and university management should work together to implement the necessary changes. In this way, they can make the most of the digitization process.

Issues such as fear, anxiety, helplessness and burnout are important in higher education because these feelings can significantly affect the quality of education and the interaction between students. The COVID-19 pandemic has caused feelings of fear, anxiety, and burnout (Koyuncuoğlu, 2021b). The lack of effective treatments and uncertainty about the effectiveness of the vaccine have caused fear and anxiety among people. The pandemic makes it necessary to look for ways to cope with emotions such as fear and burnout, along with the working methods that faculty members and students need to adapt to. As such, higher education institutions should be aware of psychological effects such as fear and burnout and should directly support their staff and students with structural arrangements and various assistance opportunities. More research is needed on emotions such as fear and burnout. Research results can be compared between regions and countries, and best practices can be applied by adapting them to country's conditions. Researchers are recommended to address the negative effects of fear and the COVID-19 virus on a scientific basis and develop strategies and models to reduce organizational stressors.

In this research, the factors influencing the actual use of the distance education system by students were examined based on the ISS Model. Apart from the variables included in the Information Systems Success Model, adding the fear of COVID-19 as a variable constitutes the original aspect of the

study. It was observed that the fear of COVID 19 positively affects the quality of technical service, quality of education, quality of information and the tendency to use related to distance education. The fact that the study's sample consists of students studying at the Faculty of Applied Sciences of Necmettin Erbakan University limits the generalizability of the results to university students across the country. Further research can examine the factors affecting the actual use of the distance education system based on various models. Conducting similar studies to cover different universities and faculties may be recommended. Research into teachers' competencies and experiences can also contribute to optimizing distance education. Even if the qualitative approach does not draw a representative picture for all universities and provides arguments, concepts and examples for experience-based, gender-oriented distance learning, the results should be combined with qualitative studies and further quantitative research. This will provide a more comprehensive picture of the state of distance education.

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References

Ahorsu, D. K., Lin, C. Y., Imani, V., Saffari, M., Griffiths, M. D., & Pakpour, A. H. (2020). The fear of COVID-19 scale: Development and initial validation. *International Journal of Mental Health and Addiction*, *20*, 1537-1545. https://doi.org/10.1007/s11469-020-00270-8

Alkhalaf, S., Drew, S., AlGhamdi, R., & Alfarraj, O. (2012). E-learning system on higher education institutions in KSA: Attitudes and perceptions of faculty members. *Procedia - Social Behavioral Sciences*, *47*, 1199-1205.

Alsabawy, A. Y., Cater-Steel, A., & Soar, J. (2013). IT infrastructure services as a requirement for e-learning system success. *Computers & Education*, *69*, 431-451.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411 –423. https://doi.org/10.1037/0033-2909.103.3.411

Armstrong-Mensah, E., Ramsey-White, K., Yankey, B., & Self-Brown, S. (2020). COVID-19 and distance learning: Effects on Georgia State University School of Public Health Students. *Front. Public Health*, *8*, 576227. https://doi.org/10.3389/fpubh.2020.576227

Banerjee, D. (2020). The impact of COVID-19 pandemic on elderly mental health. *International Journal of Geriatric Psychiatry 35*(12), 1466-1467. https://doi.org/10.1002/gps.5320

Bharati, P. (2002). People and information matter: Task support satisfaction from the other side. *The Journal of Computer Information Systems*, *43*(2), 93-102.

Bhatti, N., Bouch, A., & Kuchinsky, A. (2000). Integrating user perceived quality into web server design. *Computer Networks Journal*, *33*(1-6), 1-16.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), *Testing Structural Equation Models* (pp. 136-162). Sage.

Cheng, Y. (2012). Effects of quality antecedents on e-learning acceptance. *Internet Research*, *22*(3), 361-390.

Chow, M. K., Herold, D., Choo, T. M., & Chan, K. (2012). Extending the technology acceptance model to explore the intention to use second life enhancing healthcare education. *Computers & Education*, *59*, 1136-1144.

Cidral, W., Aparicio, M., & Oliveira, T. (2020). Students' long-term orientation role in e-learning success: A Brazilian study. *Heliyon*, *6*(12), article e05735. https://doi.org/10.1016/j.heliyon.2020.e05735

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of applied psychology*, *78*(1), 98 –104. https://doi.org/10.1037/0021-9010.78.1.98

Davis, F. D. (1989). Perceived usefulness, perceived ease of use and user acceptance of technology. *MIS Quarterly*, *13*(3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research*, *3*(1), 60–95. https://doi.org/10.1287/isre.3.1.60

Delone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of management information systems*, *19*(4), 9-30.

Dikmen, S., & Bahçeci, F. (2020). Strategies of higher education institutions towards distance education during the COVID-19 pandemic: Fırat University sample, *Turkish Journal of Educational Studies*, 7(2), 78-98.

Dishaw, M. T., & Strong, D. M. (1999). Extending the technology acceptance model with task - technology fit constructs. *Information & Management*, *36*(1), 9–21. https://doi.org/10.1016/S0378-7206(98)00101-3

Doğan, E., & İmamoğlu, O. (2020). Investigation of patience trends in the corona virus outbreak process of university students. *Turkish Studies*, *15*(4), 315-324. https://dx.doi.org/10.7827/TurkishStudies.44382

Dominici, G., & Palumbo, F. (2013). How to build an e-learning product: Factors for student/customer satisfaction. *Business Horizons*, *56*(1), 87-96.

Dobeli Honegger, B., & Stajic, O. (2020). *Frau avatar statt frau fessa? Der Standard*. https://www.derstandard.at/story/2000117356265/frau-avatar-statt-frau-fessa

Efiloğlu-Kurt, Ö. (2015). Determining university students' perspectives on distance education with the integration of technology acceptance model and information systems success model. *International Journal of Alanya Business Faculty*, 7(3), 224-229.

Efiloğlu-Kurt, Ö. (2016). An e-learning system evaluation with the information systems success model. *Journal of Management Information Systems*, *1*(3), 140-149.

Egunjobi, J. P. (2020). *The perception of COVID-19 as a fear factor in the preparation for the pandemic aftermath*. https://doi.org/10.13140/RG.2.2.14933.17125

Eom, S., Wen, J., & Ashil, N. (2006). An empirical investigation the determinants of students' perceived learning outcomes and satisfaction in university online education. *Decision Sciences Journal of Innovative Education*, *4*, 215-235.

Freeze, R. D., Alshare, K. A., Lane, P. L., & Wen, H. J. (2010). IS Success Model in E-Learning Context Based on Students' Perceptions. *Journal of Information Systems Education*, *21*(2), 173-184.

Furrer, F., Bührer, W., Wyss, C., Degonda, A., & Hiss, J. A. (2023). Lernen mit Augmented Reality Technologie in der Hochschullehre. Erkenntnisse einer Videostudie mit angehenden Sekundarlehrpersonen. *MedienPädagogik: Zeitschrift für Theorie und Praxis der Medienbildung*, *51*, 87-113. https://doi.org/10.21240/mpaed/51/2023.01.13.X

Garrote, A., Neuenschwander, M. P., Hofmann, J., Mayland, C., Niederbacher, E., Prieth, V., & Rosti, I. (2021). *Fernunterricht wahrend der Coronavirus-Pandemie. Analyse von Herausforderungen und Gelingensbedingungen*. Fachhochschule Nordwestschweiz. https://www.fhnw.ch/de/forschung-und-dienstleistungen/paedagogik/institut-forschung-und-entwicklung/zentrumlernen-und-sozialisation/fernunterricht-2020-lernen-waehrendder-coronavirus-pandemie/short_fernunterricht_garrote_etal_2021.pdf

Godoy, L. D., Falcoski, R. M., Incrocci, R. M., Versuti, F. M., & Padovan-Neto, F. E. (2021). The psychological impact of the COVID-19 Pandemic in remote learning in higher education. *Education Sciences*, *11*, 473. https://doi.org/10.3390/educsci11090473

Gonzalez, T., De La Rubia, M. A., Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. *PloS One*, *15*(10), e0239490.

Grynyuk, S., Kovtun, O., Sultanova, L., Zheludenko, M., Zasluzhena, A., & Zaytseva, I. (2022). Distance learning during the COVID-19 Pandemic: The experience of Ukraine's Higher Education System. *Electronic Journal of e-Learning*, *20*(3), 242-256. https://doi.org/10.34190/ejel.20.3.2198

Guimaraes, T., Armstrong, C. P., & Jones, B. M. (2009). A new approach to measuring information systems quality. *The Quality Management Journal*, *16*(1), 42-51.

Guneş, A. (2020). *Pandemic could be an opportunity for Turkish higher education*. https://www.universityworldnews.com/post.php?story=20200506061559172

Hassanzadeh, A., Kanaani, F., & Elahi, S. (2012). A model for measuring e-learning systems success in universities. *Expert Systems with Applications: An International Journal*, *39*(12), 10959-10966.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115-135.

Hsieh, P. A. J., & Cho, V. (2011). Comparing e-Learning tools' success: The case of instructor–student interactive vs. self-paced tools. *Computers & Education*, *57*(3), 2025-2038.

Hsu, Y. (2022). Impact of emergency remote education in the 2021 COVID-19 Pandemic: A case of higher education students in the department of mechanical engineering. *Higher Education Studies*, *12*(2), 71-83.

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

Iflahen, F., & Benkhallouq, F. (2022). *The impact of remote education on university students at Cadi Ayyad University in Morocco: Situation and perceptions.* Environment-Behaviour Proceedings Journal. 10th AMER International Conference on Quality of Life Shangri-la Rasa Sayang, Malaysia, 16-17 Mar 2022. https://doi.org/10.21834/ebpj.v7i19.3195

Internationale Arbeitsorganisation (2020). *COVID-19 und der Bildungssektor*. https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/briefingnote/wcms_749063.pdf

Jöreskog, K. G., & Sörbom, D. (1998). *LISREL 8: Structural equation modeling with the simplis command language*. Scientific Software International, Inc.

Kantipudi, P., Moses, C. J., Aluvalu, D., & Goud, G. T. (2021). Impact of COVID-19 on Indian Higher Education. *Library Philosophy and Practice (e-journal)*, 4991. https://digitalcommons.unl.edu/libphilprac/4991

Keskin, M., & Özer Kaya, D. (2020). Evaluation of students' feedback on web-based distance education during the COVID-19 process. *Journal of Izmir Katip Celebi University Faculty of Health Sciences*, *5*(2), 59-67.

Kim, K., Trimi, S., Park, H., & Rhee, S. (2012). The impact of CMS quality on the outcomes of e-learning systems in higher education: An empirical study. *Decision Sciences Journal of Innovative Education*, *10*(4), 575-587.

Koyuncuoğlu, Ö. (2020). Yükseköğretimde yeni normalleşme senaryoları ve önerileri. *Turkish Studies*, *15*(6), 635-662. http://dx.doi.org/10.7827/TurkishStudies.44686

Koyuncuoğlu, D. (2021a). Pandemi sürecinde yükseköğretimde dijital teknoloji kullanımı ve uzaktan eğitim modelleri. In A. Çatalcalı-Ceylan (Ed.), *Sosyal, Beşeri ve İdari Bilimlerde Yeni Araş*ışlar *ve* Çalışmalar (pp. 77-104). Serüven Publishing.

Koyuncuoğlu, Ö. (2021b). COVID-19 Pandemi sürecinde yükseköğretim kurumlarında tükenmişlik. In A. Çatalca-Ceylan (Ed.), *Sosyal, Beşeri ve* İdari *Bilimlerde Yeni Arayışlar ve* Çalışmalar (pp. 14-42). Serüven Publishing.

Lang, C. (2020). *Pandemi-Progose. Drei Szenarien zum weiteren Verlauf. Pharmazeutische Zeitung*. https://www.pharmazeutische-zeitung.de/drei-szenarien-zumweiterenverlauf-117609/

Levy, Y. (2007). Comparing dropouts and persistence in e-learning courses. *Computers and Education*, *48*(2), 185–204. https://doi.org/10.1016/j.compedu.2004.12.004

Li, Y., Duan, Y., Fu, Z., & Alford, P. (2012). An empirical study on behavioural intention to reuse e-learning systems in rural China. *British Journal of Educational Technology*, *43*(6), 933-948.

Lin, K. (2011). E-learning continuance intention: Moderating effects of user e-learning experience. *Computer & Education*, *56*(2), 515-526.

Linnes, C., Ronzoni, G., Agrusa, J., & Lema, J. (2022). Emergency remote education and its impact on higher education: A temporary or permanent shift in instruction? *Education Sciences*, *12*(10), 721. https://doi.org/10.3390/educsci12100721

Malhotra, N. K., & Dash, S. (2011). *Marketing research: An applied orientation*. Pearson

Masalimova, A. R., Khvatova, M. A., Chikileva, L. S., Zvyagintseva, E. P., Stepanova, V. V., & Melnik, M. V. (2022). Distance learning in higher education during COVID-19. *Frontiers in Education*, *7*, 1-6. https://doi.org/10.3389/feduc.2022.822958

McDonald, R. P., & Marsh, H. W. (1990). Choosing a multivariate model: Noncentrality and goodness of fit. *Psychological Bulletin*, *107*(2), 247-255.

Mohammadi, H. (2015). Factors affecting the e-learning outcomes: An integration of TAM and IS success model. *Telematics and Informatics*, *32*, 701-719.

Morgan, B. (2020). *Commentary: Many students in developing countries cannot access education remotely*. The University of Chicago. Harris School of Public Policy. https://harris.uchicago.edu/news-events/news/commentary-many-students-developing-countries-cannot-access-education-remotely

Mulenga, E. M., & Marbán, J. M. (2020). Is COVID-19 the gateway for digital learning in mathematics education? *Contemporary Educational Technology*, *12*(2), ep269. https://doi.org/10.30935/cedtech/7949

Neuenschwander, M. P. (2021). *Chancengleichheit im Fernunterricht während Corona-Pandemie: Einschätzungen von schulischen Akteuren*. Institut Forschung und Entwicklung Padagogische Hochschule der Fachhochschule Nordwestschweiz. https://irf.fhnw.ch/bitstream/handle/11654/32488/Schlussbericht_R2.pdf?sequence=1&isAllowed=y

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & quantity*, *41*(5), 673-690.

Ouajdouni, A., Chafik, K., & Boubker, O. (2021). Measuring e-learning systems success: Data from students of higher education institutions in Morocco. *Data in Brief*, *35*. https://doi.org/10.1016/j.dib.2021.106807

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems*, *17*, 236–263.

Petter, S., DeLone, W., & McLean, E. (2012). The past, present and future of "IS Success". *Journal of the Association for Information Systems*, *13*(5), 341-362.

Petter, S., & McLean, E. R. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. *Information & Management*, *46*(3), 159-166.

Poulova, P., & Simonova, I. (2014). E-learning Reflected in Research Studies in Czech Republic: Comparative Analyses. *Procedia - Social and Behavioral Sciences*, *116*, 1298-1304. https://doi.org/10.1016/j.sbspro.2014.01.386

Ramayah, T., Ahmad N., H., & Lo, M. C. (2010). The role of quality factors in intention to continue using an e-learning system in Malaysia. *Procedia-Social Behavioral Sciences*, *2*(2), 5422-5426.

Republic of Türkiye Ministry of Health (2021). *Ministry of Health COVID-19 Patient Table*. https://covid19.saglik.gov.tr/?clid=CjwKCAiAirb_BRBNEiwALHlnD57UJ2X-hwUKmAsUqRa0jbcBc4uRwZjbQMpG1q7WgsildQ_OZVxgqBoC6p8QAvD_BwE

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*, *42*(1), 215-229. https://doi.org/10.1080/07294360.2022.2040446

Roca, J., Chiu, C. M., & Martinez, F. J. (2006). Understanding e-learning continuance intention: An extension of the technology acceptance model. *International Journal of Human – Computer Studies*, *64*(8), 683–696.

Rokhman, F., Mukhibad, H., Hapsoro, B. B., & Nurkhin, A. (2022). E-learning evaluation during the COVID-19 pandemic era based on the updated of Delone and McLean information systems success model. *Cogent Education*, *9*(1), 2093490, https://doi.org/10.1080/2331186X.2022.2093490

Roky, H., & Meriouh, Y. A. (2015). Evaluation by users of an industrial information system (XPPS) based on the DeLone and McLean model for IS success. *Procedia Economics and Finance*, *26*, 903–913. https://doi.org/10.1016/s2212-5671(15)00903-x

Saba, T. (2013). Implications of e-learning systems and self-efficiency on students' outcomes: A model approach. *Human-Centric Computing and Information Sciences*, *2*, 6(2012). https://doi.org/10.1186/2192-1962-2-6

Safsouf, Y., Mansouri, K., & Poirier, F. (2020). An analysis to understand the online learners' success in public higher education in Morocco. *Journal of Information Technology Education: Research*, *19*(March), 087–112. https://doi.org/10.28945/4518

Sanchez-Franco, M. J. (2009). The moderating effects of involvement on the relationships between satisfaction, trust and commitment in e-banking. *Journal of Interactive Marketing*, *23*(3), 247-258.

Sennheiser (2021). *World Report: Leitfaden für virtuelle Meetings und Fernunterricht nach COVID-19*. Sennheiser. https://assets.sennheiser.com/global-downloads/file/17027/Sennheiser_World_Report_eBook_German.pdf

Shigemura, J., Ursano, R. J., Morganstein, J. C., Kurosawa, M., & Benedek, D. M. (2020). Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. *Psychiatry and Clinical Neurosciences*, *74*(4), 281. https://doi.org/10.1111/pcn.12988

Statista (2020). *Coronavirus impact: Global in-home media consumption by country 2020*. https://www.statista.com/statistics/1106498/home-media-consumption-coronavirus-worldwide-by country/

Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences*. Lawrence Erlbaum.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Allyn and Bacon.

Tajuddin, R. A., Baharudin, M., & Hoon, T. S. (2013). System quality and its influence on students' learning satisfaction in UiTM Shah Alam. *Procedia-Social and Behavioral Sciences*, *90*, 677-685. https://doi.org/10.1016/j.sbspro.2013.07.140

Tengler, K., Schrammel, N., & Brandhofer, G. (2020). Lernen trotz Corona. Chancen und Herausforderungen des distance learning an österreichischen Schulen. *Medienimpulse*, *58*(02). https://journals.univie.ac.at/index.php/mp/article/view/3637 (22.08.2022).

Terzi, B., Azizoglu, F., & Ozhan, F. (2021). Factors affecting attitudes of nursing students towards distance education during the COVID-19 pandemic: A web-based cross-sectional survey. *Perspectives in Psychiatric Care*, *1*(9). https://doi.org/10.1111/ppc.12747

Telli Yamamoto, G., & Altın, D. (2020). Coronavirüs ve çevrimiçi (online) eğitimin önlenemeyen yükselişi. *Üniversite Araştırmaları Dergisi*, *3*(1), 25-34.

Uçkaç, K. (2020). The effects of distance education related to the COVID-19 pandemic process on student emotions and behaviors in health vocational high school students. *Journal of Education in Health Sciences*, *3*(1), 34-44.

UNESCO (2021). *Report on blended education and educational poverty*. https://unesdoc.unesco.org/ark:/48223/pf0000380190

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425-478.

Wang, H. C., & Chiu, Y. F. (2011). Assessing e-learning 2.0 system success. *Computers & Education*, *57*(2), 1790-1800.

Wang, Y. S., & Liao, Y. W. (2008). Assessing e-government systems success: A validation of the Delone and Mclean model of information systems success. *Government Information Quarterly*, *25*(4), 717–733.

Wang, Y. S., Wang, H. Y., & Shee, D. Y. (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. *Computers in Human Behavior*, *23*(4), 1792-1808.

World of Health Organization (2020). *Director-General's remarks at the media briefing on 2019 nCoV on 11 February 2020*. https://www.who.int/dg/speeches/detail/who-directorgeneral-s-remarks-at-the-media-riefing-on-2019ncov-on-11-february-2020

Worldometers. (2020). *COVID-19 Coronavirus Pandemic*, *Worldometer*. https://www.worldometers.info/coronavirus/

Yakubu, M. N., & Dasuki, S. I. (2018). Assessing eLearning systems success in Nigeria: An application of the Delone and McLean information systems success model. *Journal of Information Technology Education: Research*, *17*, 183–203. https://doi.org/10.28945/4077

Yazıcıoğlu, Y., & Erdogan, S. (2011). *SPSS applied scientific research methods* (3. Baskı). Detay Detail Publishing.

YÖK (2020). Press briefing. https://www.yok.gov.tr/Sayfalar/Haberler/2020/universitelerde-uygulanacak-uzaktan-egitimeiliskin-aciklama.aspx