INDERSCIENCE PUBLISHERS
Linking academia, business and industry through research

International Journal of Higher Education and Sustainability

ISSN online: 2056-4031 - ISSN print: 2056-4023
https://www.inderscience.com/ijhes

Determining the satisfaction of students according to learning content used in emergency distance education

Mustafa S. Abdüsselam, Fatmanur Özen

DOI: 10.1504/IJHES.2023.10060118

Article History:

Received:	28 March 2023
Last revised:	31 May 2023
Accepted:	31 May 2023
Published online:	21 March 2024

Determining the satisfaction of students according to learning content used in emergency distance education

Mustafa S. Abdüsselam* and Fatmanur Özen

Education Faculty,
Giresun University, Turkey
Email: mustafa.serkan@giresun.edu.tr
Email: fatma.nur.ozen@giresun.edu.tr
*Corresponding author

Abstract: The aim of the study is to determine the satisfaction of higher education students studying in a virtual learning environment (VLE) during the COVID-19 pandemic. The descriptive survey model was conducted in a study conducted with 481 university students. The virtual learning environments student satisfaction scale was used in the study. Data obtained from the scale were then analysed with correlation, t-test, and ANOVA. It was concluded that the participant students' satisfaction levels were moderate based on the VLE offered to the students, that their satisfaction differed in favour of male students, that those enrolled in practice-based courses wanted to see more guidance in the VLE according to the type of courses recorded, and that the learning resources offered in the environment caused student satisfaction to differ according to their level of internet usage.

Keywords: satisfaction; virtual learning environment; VLE; emergency distance education; higher education students.

Reference to this paper should be made as follows: Abdüsselam, M.S. and Özen, F. (2023) 'Determining the satisfaction of students according to learning content used in emergency distance education', *Int. J. Higher Education and Sustainability*, Vol. 4, Nos. 3/4, pp.203–226.

Biographical notes: Mustafa S. Abdüsselam received his BS and MS degrees in Computer Education and Instructional Technology, and PhD degree in Mathematics and Science Education from Karadeniz Technical University, Trabzon, Turkey, in 2002, 2006, and 2014, respectively. He is currently an Associate Professor at the Department of Computer Education and Instructional Technology and the Director of Augmented Reality Research and Application Centre at Giresun University.

Fatmanur Özen received her MS and PhD degrees in Educational Administration, Supervision and Planning from Ankara University, Ankara, Turkey, in 2005, and 2011, respectively. She is currently an Associate Professor at the Department of Educational Administration. She has been working in a higher education institution for over ten years. She is a specialist in education administration and supervision. The current research topics of the researcher are: accountability in educational organisations, the reflections of positive psychology on educational organisations, the quality of distance education.

1 Introduction

E-learning, which is included in the wider concept of distance education, was formed along with the development of information and communication technologies (Perveen, 2016). Offering a variety of opportunities in terms of digital technologies, distance education experience of instructors, and access to a network of support services, e-learning has significantly improved the quality of the distance education environment, which has positively affected variables such as student success, student satisfaction, and student attitude (Buzzetto-More, 2008; Moore and Kearsley, 2011; Al-Fraihat et al., 2020). In order to conduct efficient educational services within this environment, certain dynamics come into play, such as social, cultural, technological, and environmental factors (Shahmoradi et al., 2018). In this context, the structuring of an efficient e-learning environment can only be achieved through the harmonious functioning of components such as information resources, course design, content delivery, interaction, learning environments, practice, and management (Moore and Kearsley, 2011). The preparation, implementation, and maintenance of e-learning within the higher education context is seen as a process that requires significant preparation and planning in many respects. Prior to the onset of the COVID-19 pandemic, there was really only limited interest in e-learning within higher education, and that was not even significantly widespread; however, due to the emergent nature of the pandemic, it was repositioned almost overnight as the most appropriate learning environment for use across all higher education institutions (Khlaif et al., 2021). Thus, teaching activities in universities soon started to be conducted within e-learning environments, with the changeover made compulsory in most cases.

The educational processes were implemented rapidly in many countries, aimed at all age groups and using mostly web-based communication tools in order to offer sustainable educational activities that had been otherwise abruptly halted due to the pandemic (Sułkowski, 2020). The main focus of this process was the urgent need for temporary solutions to bring educational activities back into play (Leonardi, 2020). Therefore, attempts were made to create a learning ecosystem that brought together institutions or instructors using various information technologies within an online or sometimes face-to-face environment. With solutions rushed into place, attempts were made to minimise learning losses by providing some form of basic continuity; aiming to prevent any prolonged interruption to educational activities in seeking to deliver a perfect system (Hodges et al., 2020). Universities' action plans were rapidly updated according to the latest developments of the pandemic, whilst interruptions to teaching and learning activities were minimised wherever possible. University lecturers were soon able to continue their teaching through compliance with the urgently made decisions from institutional administrators in accordance with national-level guidance. In this context, most researchers have examined the teaching and learning activities introduced during the pandemic and the concept of emergency remote teaching (ERT) or emergency remote learning (ERL) as a different concept from e-learning (Khlaif et al., 2021).

In contrast, e-learning is actually a long-term, systematic, theoretical approach, which includes planned teaching and learning activities (Valverde-Berrocoso et al., 2020). ERL, on the other hand, is a system born out of necessity, that simply aims to provide temporary remote access to learning activities via the internet (Barbour et al., 2020). Therefore, in the context of the COVID-19 pandemic, ERL refers specifically to the temporary transition of education conducted under 'normal' conditions to alternative

options due to the rapid crisis situation that had developed in a matter of weeks if not days (Ferri et al., 2020; Hodges et al., 2020; Saeed et al., 2022). In this context, educational practices conducted during the pandemic also tend to be referred to generically as ERL (Bozkurt et al., 2020; Hodges et al., 2020).

According to the Cognitive Theory of Multimedia Learning, the human brain has a limited capacity for processing information through aural and visual channels. Students may experience cognitive overload as a result of being exposed to so many elements in virtual learning environment (VLE). A vast number of components and options in the learning environment might divert students' attention and distract them, thus harming their learning experience in VLE. In this regard, removing or deactivating the least relevant components of VLEs can aid in the elimination of this negative effect. While educational activities implemented under ERL present certain benefits for both educators and students at first glance, they may also be associated with a number of problem issues (Kulikowski et al., 2021). For this purpose, it is of significant importance to examine this process in terms of both educators and students (Lmaiah et al., 2020). During this process, educators developed new learning resources related to the courses that they were tasked with delivering. In a very short space of time, educators at all levels had to learn to use and present new technologies, as well as to cope with significant new situations such as managing the ethical issues they encountered in the digital world.

Students, on the other hand, similarly faced many new situations, such as reliance upon internet access, financial problems (Sarker et al., 2022), self-managing their own learning activities, taking on an increased level of responsibility, and learning to improve their communication skills through different mediums (Aulia and Utami, 2021). Informing and educating students facing such difficulties, many of whom had not previously gained any significant or relevant experience during the adaptation process, was vital during the initial changed process in order to promote the healthy conduct of ERL. Analysing and understanding the experiences and satisfaction levels associated with ERL as a process is considered of vital importance to shaping the next stage of the higher education learning strategy (Telli and Altun, 2020). The current study will guide educators who work in different countries at the international level in choosing learning resources that they can be most satisfied with, and can best support students in self-managing their learning activities in the VLE. During the pandemic, many higher education institutions took extraordinary preventive measures, having fundamentally changed the way that most of their courses functioned (Bacow, 2020). In this context, the current study aims to determine the satisfaction of higher education students studying within the ERL environment of the COVID-19 period. Based on this general purpose, answers to the following research questions were sought:

1 What is the satisfaction level of students towards the VLE?

2 Does student satisfaction with VLE differ significantly according to their gender?

3 Does student satisfaction with VLE differ significantly according to their registered course type?

4 Does student satisfaction with VLE differ significantly according to their internet usage levels?

5 What is the relationship between learning resources and VLE satisfaction according to the type of course registered?

6 What is the relationship between learning resources and VLE satisfaction according to students' internet usage levels?

2 Literature review

Satisfaction, as defined by Elliott and Healy (2001), involves the subjective assessment of learning outcomes and experiences. In contrast, Weerasinghe et al. (2017) describe it as the process of forming an attitude by evaluating students' learning experiences, and Pino et al. (2017) define it as the fulfilment of students' expectations from the educational institution. The assessment of teaching effectiveness heavily relies on the satisfaction of students with distance education, which has been extensively studied during and after the COVID-19 pandemic (Alqurashi, 2018; Rothman et al., 2011). This satisfaction is defined as the students' achievement in learning and their overall enjoyment of the online education experience (Alqurashi, 2018). Consequently, numerous research studies have been conducted to evaluate students' satisfaction with distance education in the context of the COVID-19 pandemic.

Various factors can influence students' satisfaction levels (Harsasi and Sutawijaya, 2018). When examining studies on emergency distance education, it was found that students generally displayed lower efficiency, satisfaction, and personal time with online education compared to regular classes (Tomar and Daruwala, 2022). However, students did show some preference towards online education and appreciated the flexibility it provided in their schedules (Tomar and Daruwala, 2022). Bodur and Koşan (2021) found that a majority of students had no problems using the distance education program offered by their university, and appreciated the ability to re-watch course recordings. However, many students still believed that practical courses should be conducted face-to-face. According to Taşçı (2021), students experienced the most difficulties with technology and found it challenging to focus and stay motivated. Lack of interaction in the learning environment was also identified as an important issue by students. Overall, these studies highlight the benefits and challenges of emergency distance education, and suggest areas for improvement in the delivery of online education.

According to Fatani (2020), the utilisation of video conferences in distance education resulted in an enhancement of educational quality and a notable increase in student satisfaction levels. Similarly, Loton et al. (2020) found that online learning during the COVID-19 pandemic had a significant impact on both the performance and satisfaction of students. Korkmaz et al. (2015) discovered a positive relationship between students' satisfaction levels in distance education environments and their achievements. In their study, Almusharraf et al. (2020) examined the satisfaction level of students with online learning amidst the COVID-19 outbreak. The findings revealed that all participants expressed high levels of satisfaction with the online learning tools, platforms, and the support extended by staff during the crisis. Gonzalez et al. (2020) found that COVID-19 confinement had a positive impact on the performance of students at the higher education level, helping to enhance their learning strategies. However, Realyvásquez-Vargas et al. (2020) found that environmental factors during the pandemic had a negative effect on students' academic performance. In their research, Chen et al. (2020) examined how satisfied students were with online teaching during the COVID-19 outbreak. They found that personal factors did not have a direct impact on student satisfaction, but the availability of online applications had the most significant influence on students' level of

satisfaction. Kim and Kim (2021) created a model to investigate how various factors impact student satisfaction and success in online learning. Their analysis revealed that the structure of the course has a more significant influence on student satisfaction and success than other factors like student-student interaction, instructor presence, and student participation.

Overall, these studies demonstrate the varied impacts of COVID-19 on online learning and student performance. While some studies report positive effects, others highlight the challenges and negative impacts of the pandemic on students' satisfaction with the VLE. Students' satisfaction is a critical aspect of distance learning, especially during the COVID-19 pandemic, which has significantly impacted education. Researchers have been evaluating and addressing student satisfaction with ERT. But, it's important to determine the satisfaction of higher education students who are studying in VLEs with different resources during the pandemic. This study will provide valuable insights into how the VLE can be improved to better meet the needs of students during emergency distance education situations.

3 Method

3.1 Research pattern

This research was planned according to the descriptive survey model and with the application of the 'VLEs Student Satisfaction Scale' developed by Hamutoglu et al. (2020). First, the scale was adapted to the Turkish context, and validity and reliability studies were carried out.

3.2 Scale adaptation

Measurement tools developed to measure a specific structure prepared in different languages can be adapted to other languages and sociocultural contexts. The main reasons for scale adaptations are to determine differences by comparing national or cultural groups, to identify and reveal existing trends in terms of variables such as the opinions, abilities, attitudes, and skills of individuals across different countries or societies (Rapp and Allalouf, 2003). A scale developed in one particular culture embodies the characteristics of that culture. The process of systematic preparations for the application of a scale in different cultures or languages is called scale adaptation (Brislin el al., 1973). The purpose of scale adaptation is, therefore, to evaluate and modify scales prepared specifically for one culture into another culture through a process of translation, adaptation, or standardisation to other cultures.

However, it is significantly important to follow and implement certain steps in this adaptation process in order to adapt a scale in an appropriate manner (Hambleton and Patsula, 1999). The steps were followed in adapting the 'VLEs student satisfaction scale' to the Turkish context in the current study are summarised as follows:

- Consisting of 3 factors (benefit, satisfaction, and guidance) and 11 items within the scope of the research purpose, the 'VLEs student satisfaction scale' scale which was developed by Hamutoglu et al. (2020) was chosen. The study used mixed-method research to develop a scale to examine students' satisfaction and preferences of the use of a VLE in a higher education setting.
- Permission was obtained from the original authors of the scale for its adaptation.
- The original scale was translated into the Turkish language for the Turkish context.
- The translated scale was sent to the original scale's authors for opinion regarding original-translated item matching, with relevant suggested corrections subsequently applied.

The scale's suitability for translation into Turkish was checked by three fluent English-speaking, native Turkish educational sciences experts, with corrections applied according to their opinions.

The adapted scale was applied to a small group of bilingual graduate students to determine language equivalence and intelligibility of the instrument. The group consisted of 16 postgraduate students studying at Giresun University Social Sciences Institute during the 2019–2020 academic year, who were each fluent in both Turkish and English. Correlation between the scores of the applications was examined, and comprehensibility of the Turkish scale was tested.

- The adapted scale was applied to 161 undergraduate students studying at Giresun University during the 2019–2020 academic year. This group determined the factor structure and reliability level through the application of the translated scale to individuals in the Turkish culture. Confirmatory factor analysis (CFA) was performed to determine confirmation of the factor structure of the original scale within the adapted Turkish scale.
- The adapted scale was finalised in line with the obtained findings. After removing 24 students who filled in incompletely from the collected scales, the study group consisted of 481 students studying at Giresun University during the 2019–2020 academic year. The group's demographic characteristics are presented in Table 1. Moodle was used for course content management, and Google Meet application was used to conduct the courses.

As can be seen from Table 1, of the 481 student participants, 127 (26.4%) were male and 354 (73.6%) were female. In terms of the participants' internet usage level, 21 (4.4%) stated that were beginners, 327 (68%) were intermediate, and 133 (27.7%) were advanced users. In terms of the type of course to which the participants were registered, 99 (20.6%) were enrolled in theoretical courses, 14 in practical courses (2.9%), and 368 were enrolled to mixed courses consisting of both theory and practice (76.5%).

Table 1 Study group

	Demographic	*Total*	
		f	*%*
Gender	Male	127	26.40
	Female	354	73.60
	Total	*481*	*100.00*
Use of social media	Yes	443	92.10
	No	38	7.90
	Total	*481*	*100.00*
Internet access	Personal internet connection	472	98.13
	Public hotspots/WiFi	9	1.87
	Total	*481*	*100.00*
Internet usage level	Beginner	21	4.40
	Intermediate	327	68.00
	Advanced	133	27.70
	Total	*481*	*100.00*
University education	Associate degree	20	4.20
	Undergraduate degree	452	94.00
	Postgraduate degree	9	1.90
	Total	*481*	*100.00*
Course type	Theoretical	99	20.60
	Practical	14	2.90
	Theoretical and practical	368	76.50
	Total	*481*	*100.00*
Technological equipment	Tablet	5	1.04
	Mobile phone	143	29.73
	Laptop	75	15.59
	Desktop computer	8	1.66
	Tablet and laptop	1	0.21
	Mobile phone and tablet	6	1.25
	Mobile phone and laptop	189	39.29
	Mobile phone and desktop computer	33	6.86
	Mobile phone, laptop, and desktop computer	6	1.25
	Mobile phone, tablet, and laptop	11	2.29
	Mobile phone, tablet, and desktop computer	2	0.42
	Mobile phone, tablet, laptop, and desktop computer	2	0.42
	Total	*481*	*100.00*

3.3 Data analysis

The obtained data were analysed with IBM's SPSS and Lisrel's analytical package programs. The reliability coefficient was found to be $\alpha = .84$ in the Turkish version of the 'VLEs student satisfaction scale' that was originally developed by Hamutoglu et al. (2020), whilst the reliability coefficient was established as being $\alpha = .82$. The KMO coefficient of the scale used to determine students' satisfaction with the VLE was found to be .858 and the Bartlett Sphericity test significance level was determined as .000. The scale consists of three dimensions. There are three items in the 'benefit' dimension, five items in the 'satisfaction' dimension, and three items in the 'guiding' dimension. Students' views on these dimensions were examined in terms of different variables by correlation, t-test and ANOVA analysis.

4 Findings

4.1 Language equivalence

In order to determine the consistency level between the original English language version of the scale and the version adapted to the Turkish culture, the revised scale was applied to 16 postgraduate students who were each fluent in both languages. The English form, which is the original version of the scale, was first applied to these students in the electronic environment, and four weeks later, the Turkish form of the scale was applied. The data obtained as a result of the application were converted into total scores for the whole scale and also for its three dimensions, and then analysed with the Pearson product-moment correlation coefficient.

In order to examine the correlation using this technique, the data should be normally distributed. Normal distribution was tested with the Kolmogorov–Smirnov Test. As a result of the test, the total score of the scale, as well as the Benefit, Satisfaction, and Guidance dimensions were each determined to be normally distributed ($p > .05$). The normally distributed dimensions were then examined using the 'Pearson product moments correlation coefficient', the results of which are presented in Table 2.

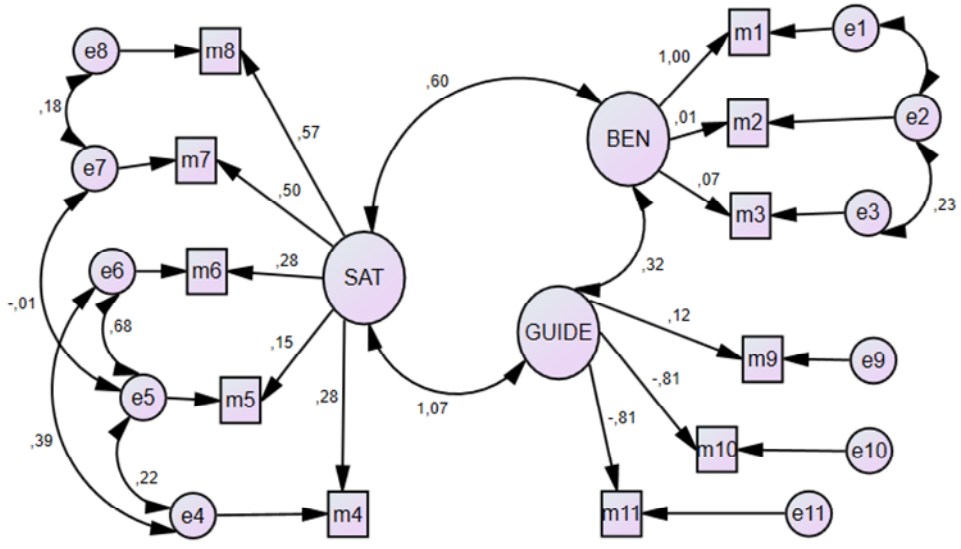
Table 2 Correlation values

Variables	*N*	*r*	*p*
Whole scale total score (Turkish scale * English scale)	16	.842	.000
Benefit dimension score: (Turkish scale * English scale)	16	.714	.002
Satisfaction dimension: (Turkish scale * English scale)	16	.598	.014
Guidance dimension: (Turkish scale * English scale)	16	.521	.038

When Table 2 was examined, according to the findings, it was found that there was a high level of positive and significant correlation ($r = .842$, $p < .001$) between the English form and the Turkish form of the scale. In terms of the sub-dimensions of the scale, a significant positive relationship was also found in the Benefit dimension ($r = .714$, $p < .05$), the Satisfaction dimension ($r = .598$, $p < .05$) and the Guidance dimension ($r = .521$, $p < .0$).

In this case, it may be said that there is consistency and linguistic equivalence between the Turkish and English forms of the scale.

Figure 1 CFA model of the scale (see online version for colours)



When Figure 1 is examined, it can be seen that the chi-square (χ^2) and degrees of freedom (*df*) values obtained as a result of CFA is χ^2 = 65.346 and the ratio χ^2/SD = 1.922 is obtained. The fact that this ratio obtained from the selected sample is below the value of '3' indicates a perfect fit (Jöreskog and Sörbom, 1993; Kline, 2005). In this study, it can be said that the fit between the model obtained as a result of CFA and the data corresponds to a perfect fit.

One of the most commonly used indices to determine lack of fit in CFA is RMSEA. The fact that the RMSEA index was found to be .05 or less in the CFA analysis is an indicator of model-data compatibility. However, it is stated that this value can also be accepted up to .08 (Browne and Cudeck, 1992; Hu and Bentler, 1999; Vieira, 2011). In Table 3, the fit values obtained as a result of CFA are summarised.

Table 3 Fit values obtained as a result of CFA

Fit index	*Good fit*	*Acceptable fit*	*Compliance values*
χ^2/SD	$0 \leq \chi^2/SD^2 \leq 2$	$2 \leq \chi^2/SD \leq 3$	1.922
RMSEA	0 < RMSEA < .05	.06 ≤ RMSEA < .08	.076
CFI	.97 ≤ CFI ≤ 1	.90 ≤ CFI ≤ .96	.923
GFI	.97 ≤ GFI ≤ 1	.90 ≤ GFI ≤ .96	.933
IFI	.97 ≤ IFI ≤ 1	.90 ≤ IFI ≤ .96	.927

When Table 3 is examined, it may be said that the RMSEA value has an acceptable value at .076. Additionally, the AGFI value in CFA was higher than .80, RMR was higher than .10 (Anderson and Gerbing, 1984; Marsh et al., 1988), and SRMR was shown to be lower than .08 (Hu and Bentler, 1999), which indicates that the model may be considered acceptable for compliance with real data. The fact that the CFI (.923) and IFI (.927) values in CFA are .90 or above indicates that model data compliance is considered acceptable (Hu and Bentler, 1999). According to these results, it may be said that the data of the model corresponds to a perfect fit. The main purpose of CFA is to determine the

level of agreement of a previously defined model with the data obtained (Vieira, 2011). In this context, it may be said that the three-dimensional structure of the scale was confirmed according to the fit values obtained from the CFA.

When the values obtained within the scope of the study are examined in terms of the dimensions of the scale; m1, m2 and m3 constitute the benefit (BEN) dimension; m4, m5, m6, m7, and m8 constitute the satisfaction (SAT) dimension; and m9, m10, and m11 constitute the guiding (GUIDE) dimension. The normal distribution values of these dimensions are shown in Table 4.

Table 4 Analysis results related to normal distribution

Dimension	*N*	*Skewness*	*Kurtosis*	*Average*
Benefit	481	–.323	–.503	9.31
Satisfaction	481	–.338	–.323	16.22
Guidance	481	.101	–.357	8.11
Total	481	–.286	.014	33.64

When Table 4 is examined, it can be seen that the skewness and kurtosis values of the three dimensions are between –1 and 1. According to Hair et al. (2013), if the arithmetic mean, median, and mode values are found to be close to each other in the distribution of scores, and if the Skewness and Kurtosis values are between –1 and +1, it may be said that the scores show a normal distribution, and therefore parametric tests may be employed.

It was determined that the students' satisfaction with the VLE offered to them was considered 'moderate' (33.64). In the study, the difference between the students' satisfaction scores, according to their gender, in terms of the benefits of the VLE offered to them and the dimensions of guidance were tested with t-test. The results of this analysis are presented in Table 5.

Table 5 Analysis results of students' scale scores in terms of gender

Dimension	*Gender*	*N*	$\bar{X}$	*SS*	*SD*	*t*	*p*
Benefit	Female	354	9.18	2.887	200.945	–1.505	.134
	Male	127	9.68	3.266			
Satisfaction	Female	354	15.76	4.757	479	–3.430	.001*
	Male	127	17.44	4.466			
Guidance	Female	354	8.04	2.712	479	–.917	.360
	Male	127	8.29	2.492			

Note: *$p < .05$

When Table 5 is examined, it can be seen that the difference in terms of the benefit and guidance dimensions was not found to be significant ($p > .05$) according to the scores taken from the satisfaction scale according to the gender of the student participants. It may be said, therefore, that both the male and female students thought similarly regarding the benefit and guidance from the VLE offered to them. It was observed that the difference in the score in the Satisfaction dimension for the VLE offered to the students in terms of their gender was significant ($p < .05$). It was determined that the male students were more satisfied with the VLE offered to them than were their female student peers.

The difference between the scores of the students in the satisfaction scale in terms of the dimensions of Benefit and Guidance from the VLE offered to them in the courses to which they were enrolled was tested with ANOVA, and the results obtained are presented in Table 6.

Table 6 Analysis results of students' scale scores in terms of the registered course

Dimension	*Group*	*N*	$\bar{X}$	*SS*	*F*	*df*	*p*	*Significant difference*
Benefit	Theoretical	99	9.52	3.364	.292	2	.747	-
	Practical	14	9.14	3.505				
	Theoretical and practical	368	9.27	2.876				
Satisfaction	Theoretical	99	16.28	4.880	.597	2	.551	-
	Practical	14	14.86	4.975				
	Theoretical and practical	368	16.25	4.691				
Guidance	Theoretical	99	7.94	3.033	3.821	2	.023*	Pr > To
	Practical	14	10.00	1.754				Pr > To&Pr
	Theoretical and practical	368	8.08	2,551				

Note: *$p < .05$, Theoretical (To), Practical (Pr), Theoretical and Practical (To&Pr)

When Table 6 is examined, it can be seen that the theoretical, practical, or mixed (theoretical and practical) status of the courses in which the groups were recorded did not make sense in terms of the Benefit and Satisfaction dimensions ($p > .05$). Students from all course types have reported similar benefits and satisfaction with the VLE that they used. However, it was also determined that the difference in terms of the scores for the Guidance dimension were significant ($p < .05$). It may be stated that those students enrolled in practical courses were more willing to receive guidance compared to those enrolled to theoretical of mixed theory/practice courses. The difference between the students' satisfaction scores in terms of the benefits of the VLE offered to them in terms of their internet usage were tested with ANOVA, the results of which are presented in Table 7.

Table 7 Analysis results of students' scale scores in terms of internet usage levels

Dimension	*Group*	*N*	$\bar{X}$	*SS*	*F*	*df*	*p*	*Significant difference*
Benefit	Beginner	21	7.57	3.203	7.658	2	.001*	Bg < In
	Intermediate	327	9.15	2.939				Bg < Ad
	Advanced	133	9.99	2.958				
Satisfaction	Beginner	21	12.57	4.261	15.552	2	.000**	Bg < In
	Intermediate	327	15.82	4.597				Bg < Ad
	Advanced	133	17.78	4.646				
Guidance	Beginner	21	8.14	3.103	.863	2	.423	-
	Intermediate	327	8.21	2.617				
	Advanced	133	7.85	2.678				

Note: *$p < .05$. **$p < .001$, Beginner (Bg), Intermediate (In), Advanced (Ad)

When Table 7 is examined, the difference in the guidance dimension was not found to be significant ($p > .05$) when the scale was examined in terms of the students' ability to use the internet. At all levels of internet usage, the participant students' levels of guidance from the environment offered by ERL were shown to be similar. However, it was also determined that the difference between the benefit and satisfaction dimensions' scores were found to be significant ($p < .05$). It may be stated, therefore, that the students who considered themselves at the beginner level, in terms of their internet usage levels, benefitted less from ERL and were less satisfied than their intermediate or advanced levelled peers.

The learning resources presented to the students in the ERL environment were examined and are listed in Table 8, coded from K1 to K10.

Table 8 Learning resources offered in the ERL environment

Learning resource	
Code	*Content*
K1	Discussion forums or chatrooms
K2	Video
K3	Audio recordings/Podcasts
K4	Key concept videos of course content (short video lasting 5–10 minutes)
K5	PowerPoint slides and audio recordings prepared by the course lecturer
K6	PowerPoint slides and video recordings prepared by the course lecturer
K7	Self test (quizzes)
K8	Online reviews and feedback
K9	Use of social media to support learning (e.g., Messenger, Twitter, Facebook, etc.)
K10	Online live lectures, seminars, and workshops

The relationship between the learning resources presented in Table 8 and the total score of the scale, as well as the scores of the dimensions are visualised in Table 9.

Table 9 Relationship levels between learning resources and dimensions

	K1	*K2*	*K3*	*K4*	*K5*	*K6*	*K7*	*K8*	*K9*	*K10*
Benefit	.186**	.337**	.282**	.295**	.308**	.370**	.212**	.318**	.275**	.302**
Satisfaction	.211**	.342**	.297**	.294**	.305**	.360**	.311**	.374**	.209**	.361**
Guidance	.159**	.061	.079	.124**	.031	-.001	.124**	.073	.110*	.027
Total	.255**	.360**	.318**	.336**	.315**	.362**	.314**	.376**	.271**	.346**

Notes: **Correlation is significant at the 0.01 level (two-tailed).
*Correlation is significant at the 0.05 level (two-tailed).

When Table 9 is examined, it may be said that a positive relationship was found to exist between learning resources and all three of the dimensions (benefit, satisfaction, and guidance). However, it is seen that these relationships were less than the level of .4. In terms of total scale scores, the least associated was K1 ($r = .255$), whilst K8 ($r = .376$) was found to be most associated. In terms of the benefit dimension, the least associated was K1 ($r = .186$), whilst the most was K6 ($r = .370$). For the Satisfaction dimension, the least associated was K1 ($r = .211$), whilst the most was K8 ($r = .374$). In terms of the guidance dimension, the least associated was K6 ($r = –.001$), whilst K1 ($r = .159$) was the most associated.

Table 10 Relationship levels between learning resources and dimensions according to course type

	Total			*Guidance*			*Satisfaction*			*Benefit*		
	Pr	*To&Pr*	*To*	*Pr*	*To&Pr*	*To*	*Pr*	*To&Pr*	*To*	*Pr*	*To&Pr*	*To*
K1	.387	.172**	.408**	–.296	.164**	.152	.397	.153**	.275**	.212	.089	.417**
K2	.598*	.266**	.592**	–.074	.078	.005	.401	.252**	.552**	.614*	.248**	.567**
K3	.551*	.213**	.535**	.214	.089	–.054	.088	.205**	.556**	.592*	.185**	.494**
K4	.187	.232**	.613**	–.327	.111*	.143	.652*	.191**	.485**	.020	.201**	.560**
K5	.730**	.222**	.438**	–.095	–.003	.203*	.596*	.230**	.348**	.648*	.257**	.337**
K6	.730**	.289**	.462**	–.152	–.026	.134	.606*	.293**	.383**	.632*	.331**	.397**
K7	.705**	.250**	.376**	–.250	.125*	.122	.778*	.257**	.368**	.589*	.148**	.260**
K8	.527	.330**	.330**	–.286	.087	.104	.835*	.314**	.308**	.438	.324**	.258*
K9	.340	.202**	.394**	.207	.066	.202*	.006	.148**	.303**	.700**	.232**	.346**
K10	.131	.305**	.475**	–.600*	.042	.096	.338	.304**	.480**	.244	.302**	.331**

Notes: **Correlation is significant at the 0.01 level (two-tailed)
*Correlation is significant at the 0.05 level (two-tailed)
To = Theoretical; Pr = Practical; To&Pr = Theoretical and practical

Table 11 Relationship levels between learning resources and dimensions according to internet usage

	Total			*Guidance*			*Satisfaction*			*Benefit*		
	In	*Ad*	*Bg*	*In*	*Ad*	*Bg*	*In*	*Ad*	*Bg*	*In*	*Ad*	*Bg*
K1	.263**	.067	.216*	.142*	.166	.177*	.205**	.095	.237**	.227**	.074	.048
K2	.368**	.532*	.264**	.054	.346	.036	.340**	.309	.291**	.366**	.641**	.199*
K3	.301**	.408	.229**	.062	.148	.068	.302**	.305	.224**	.268**	.360	.220*
K4	.317**	.514*	.303**	.088	.250	.103	.279**	.448*	.262**	.265**	.537*	.269**
K5	.275**	.479*	.276**	.043	.372	–.060	.269**	.349	.277**	.262**	.459*	.348**
K6	.334**	.489*	.327**	.010	.364	–.099	.323**	.415	.337**	.346**	.476*	.402**
K7	.264**	.157	.378**	.089	.028	.204*	.262**	.389	.380**	.182**	.091	.200*
K8	.309**	.442*	.349**	.080	.037	.107	.306**	.261	.320**	.282**	.537*	.315**
K9	.253**	.493*	.222*	.143**	.312	–.007	.182**	.309	.169	.246**	.469*	.310**
K10	.322**	.237	.328**	.063	.222	–.026	.353**	.075	.303**	.253**	.233	.380**

Notes: **Correlation is significant at the 0.01 level (two-tailed).
*Correlation is significant at the 0.05 level (two-tailed).
Bg = Beginner, In = Intermediate, Ad = Advanced

The relationship levels of the learning resources with the three dimensions of benefit, satisfaction, and guidance in terms of the participant students' course type (i.e., theoretical, practical, theoretical and practical) are presented in Table 10.

When Table 10 is examined, the relationship levels of the learning resources in cases related to the guidance dimension were found to be weakly positive to theoretical (To) courses, and also to the mixed theoretical and practical (To&Pr) courses; additionally, it may be said that a negative relationship was found in terms of the practical (Pr) courses. In terms of total scale scores, in the benefit dimension, the students who had enrolled to theoretical courses had the least association to K8 (r = .258) and the most to K2 (r = .567), whilst the students enrolled to theory and practice mixed courses had the least association to K1 (r = .089) and the most to K6 (r = .331), and the students who had enrolled to the practical courses had the least association to K4 (r = .020) and the most association to K9 (r = .700). In the satisfaction dimension, students enrolled to the theoretical courses had the least association to K1 (r = .275) and the most to K2 (r = .552), whilst the students enrolled to the theoretical and practical mixed courses had the least association to K9 (r = .148) and the most to K8 (r = .314), and the students enrolled to the practical courses had the least association to K9 (r = .006) and the most association to K8 (r = .835). In the Guidance dimension, among the learning resources of those enrolled to the theoretical courses, K2 (r = .005) was the least associated and K5 (r = .203) was the most, while for those enrolled to theory and practice mixed courses, the least association was to K5 (r = –.003) and K1 (r = .164) was the most, and those enrolled to practical courses had the least association to K2 (r = –.074) and the most association to K10 (r = –.600).

The relationship levels of learning resources in terms of internet usage levels and the dimensions of benefit, satisfaction, and guidance in VLEs are presented in Table 11.

When Table 11 is examined, it can be stated that a low-level positive relationship exists in the guidance dimension in terms of the relationship levels between learning resources and students as beginners (Bg), intermediate (In), or advanced (Ad) internet users. In terms of total scale scores, in the benefit dimension, among the learning resources of the students who described their level of internet usage as beginner, K1 (r = .048) was the least correlated and K6 (r = .402) was the most, whereas for those who were advanced, K1 (r = .074) was the least correlated and K4-K8 (r = .537) the most, and those who were identified as intermediate, K7 (r = .182) was the least and K2 (r = .366) was the most correlated. In the Satisfaction dimension, among the learning resources at the beginner level, K9 (r = .169) was the least correlated and K7 (r = .380) was the most, whilst for the advanced, K10 (r = .075) was the least correlated and K4 (r = .448) was the most, and for those at the intermediate level, K9 (r = .182) was the least correlated and K10 (r = .353) was the most correlated. In the Guidance dimension, it was determined that among the learning resources for those at the beginner level, K9 (r = -.007) was the least relevant and K7 (r = .204) was the most, whereas for those who were advanced, K7 (r = .028) was the least relevant and K5 (r = .372) was the most, and for those at the intermediate level, K6 (r = .010) was the least relevant and K9 (r = .143) was the most relevant.

5 Discussion

In this study, which aims to determine students' satisfaction with a VLE environment, 'VLEs student satisfaction scale', which was developed by Hamutoglu et al. (2020), was implemented by carrying out language adaptation. CFA analysis was performed in order to test the construct validity of the scale, and Cronbach's alpha internal consistency coefficient item-total score was used to calculate the scale's reliability. Correlation between the three dimensions of the scale were examined, and descriptive analysis was conducted to reveal the findings as to the students' satisfaction levels with the ERL.

During adaptation to the Turkish context, the language adaptation part of the study was conducted first. In this context, the adapted scale was created by consulting with the developers of the original scale for both the target and the original language, through consultation during the translation process, and in seeking their opinion on the textual conversions according to both languages. The adapted scale was then applied to a small group in order to evaluate the language used. The total scores of the Turkish and English variants of the scale were determined as portraying a positive and significant relationship between the dimension scores ($r = .842$, $p < .05$); proving that linguistic equivalence existed. The scale then took its final form after having sought expert opinion, and then CFA was conducted so as to examine the construct validity of the adapted scale. All fit index values obtained from the CFA showed that the model of the scale had a sufficient goodness of fit and consistency.

Sun et al. (2008) determined six aspects that determine satisfaction in e-learning, which are; student aspect, instructor aspect, course aspect, technology aspect, design aspect, and environment aspect. Satisfaction is one of the factors that can determine the usability of a system and is the level of acceptance by the user of the system (Voorhees, 2020). In this context, the current research was conducted with the focus on student satisfaction of ERL, and specifically, to determine student satisfaction with the VLE offered in the ERL environment. The study's findings showed that the general satisfaction of the students towards the VLE was moderate. It is considered of significant importance to evaluate the VLEs offered to students by higher education institutions. This state of satisfaction can also be related to many situations in the VLE that Zhang et al. (2004) referred to. Some learning resources are considered purely functional by educators, because they are seen as too time consuming to use, difficult through which to prepare and manage e-learning content, potentially unsuited to online teaching, significantly costly; all of which can lead educators to prefer easier forms of content over certain learning resources, and which can lead to a failure in meeting students' expectations. Khan and Joshi (2006) mentioned that users face some 35 roles and responsibilities in the preparation and management of e-learning content. Therefore, in terms of the urgent needs of teaching within the ERL, any inability to organise these situations better or a teacher's failure to fulfil their roles and responsibilities can impact on student satisfaction. It is therefore considered important to prioritise certain digital content within the ERL process and to manage the processes accordingly.

In terms of the Satisfaction dimension regarding the students' use of the VLE, the levels revealed for the male students were found to be significantly higher than for the female students. However, no difference was found in terms of either the Benefit or Guidance dimensions. This difference may be explained by the technical problems experienced with e-learning having caused negative emotions such as stress and anxiety,

and may therefore change according to the perceived support in reducing negative emotions, as stated in the study of Naylor and Nyanjom (2021).

According to the research findings of Karadağ and Yücel (2020), in which they conducted a multidimensional examination of undergraduate student satisfaction regarding the distance education practices of universities in Turkey, it was revealed that student satisfaction levels may differ in terms of certain variables. When socio-economic structures similar to Turkey are examined, it is stated that student satisfaction in eastern Asian countries is directly or indirectly related to students' competencies in informatics and the ease of use provided by the platforms used in learning to students (Jiang et al., 2021). In South America, it has been observed that the satisfaction of students in terms of accessing digital resources and meeting their socio-emotional needs is not at the desired level (Hettiarachchi et al., 2021). In the Middle East, it has been stated that the most dissatisfied situation for students is student-content interaction (Hamdan et al., 2021). In this context, it was considered appropriate in the current study to focus upon overcoming problems experienced with the ERL process and the provision of support.

The more recent developments in educational sciences and educational technologies has enabled well-designed, learner-centred, interesting, interactive, efficient, easily accessible, and flexible e-learning environments to be more easily created (Al-Fraihat et al., 2020; Khan and Joshi, 2006). Today, through the infrastructural affordances of current information and communication technologies, educational activities such as live lessons, exams and tests, homework, messaging, discussions, and digital course contents can be offered to individuals within online environments as part of the overall learning process, as well as through blended and face-to-face learning (Buzzetto-More, 2008). Limited learning resources have been provided within VLEs for some time, but which expanded exponentially in response to the urgent teaching needs brought about due to the COVID-19 pandemic. In recent research, the importance of educational and technical support for educators as part of the ERL process has been frequently emphasised (Bozkurt et al., 2020; Erkut, 2020; Huang et al., 2020; Naylor and Nyanjom, 2021).

In the current study; in terms of students' benefit and satisfaction levels arising from being educated within the VLE, similarities were observed in the types of theoretical, practical, and mixed courses that offered both theory and practice. According to the Guidance dimension of the study, students were found to require increased levels of guidance in practical courses. On the other hand, while the situation concerning student guidance in the VLE were found to be similar according to whether they were considered beginners, intermediate, or advanced users of the internet, it was observed that beginners lagged behind in terms of their perceived benefit and satisfaction when compared to their peers, and that such a finding may have been due to having experienced user difficulties in the ERL. Zhang et al. (2004) reported there being numerous factors that can affect e-learning effectiveness such as media features, learning context, technology, and student characteristics. Students' usage of the internet or the fact that courses are predominantly applied online may therefore also affects the ERL process. Therefore, as Bozkurt et al. (2020) stated, the creation of educational resources can contribute to the ERL process if its focus is on guiding both educators and students. As Mayer (2020) stated, it is important to present all possible opportunities to both educators and their students in terms of supporting roles within the ERL process, since not only are the cognitive processes of students important during learning, but also affective processes (or emotional reaction) is of considerable importance in the e-learning context.

In the current study, students who were enrolled in purely theoretical courses mostly advanced from video learning resources, whilst those enrolled in mixed courses with both theoretical and practical elements advanced from PowerPoint slides as well as video recordings, and those students who were enrolled in practical courses advanced from content that supports collaborative work such as the use of social media (e.g., Messenger, Twitter, Facebook, etc.) to support their learning. Students enrolled in theoretical courses were the most satisfied with video learning resources, whilst those enrolled in mixed theoretical and practical courses were the most satisfied with online evaluation and feedback, and those enrolled in practical courses were the most satisfied with online assessment and feedback. Most of the students enrolled in theoretical courses were guided by PowerPoint slides and audio recordings, whereas those who were enrolled in theoretical and practical courses were guided by discussion forms or chatrooms, and those who were enrolled in practice-based courses were guided by online live lectures, seminars, and workshop contents. The findings of this study align with previous research, suggesting that emergency distance education presents both benefits and challenges. Students appreciated the flexibility offered by online education but exhibited lower efficiency, satisfaction, and personal time compared to regular classes (Tomar and Daruwala, 2022). While students expressed satisfaction with the distance education program, they still preferred face-to-face interactions for practical courses (Bodur and Koşan, 2021). Difficulties with technology, lack of interaction, and challenges in maintaining focus and motivation were also reported by students (Taşçı, 2021). These studies highlight the importance of addressing these challenges and improving the delivery of online education.

Other studies have found positive relationships between satisfaction levels, educational quality, and student performance in distance education environments (Fatani, 2020; Loton et al., 2020; Korkmaz et al., 2015; Almusharraf et al., 2020). However, conflicting results have also been reported, with some studies showing positive effects on learning strategies and performance during the COVID-19 pandemic (Gonzalez et al., 2020), while others found negative effects on academic performance (Realyvásquez-Vargas et al., 2020). Factors such as the availability of online applications and the structure of the course have been identified as significant influences on student satisfaction and success in online learning (Chen et al., 2020; Kim and Kim, 2021). According to the students' internet usage levels in the current study, those students who described their use of the internet as being at a beginner level mostly advanced from PowerPoint slides and video learning resources, whilst those at an advanced level advanced from key concept videos, online evaluations, and feedback of the course content, and those at an intermediate level mostly advanced from video content. Students who described using the internet at only a beginner level were the most satisfied with viewing past exams, while the advanced level student users were most satisfied with key concept videos regarding the course content, and the intermediate level students with online live lectures, seminars, and workshops. The students who defined themselves as beginner level users of the internet mostly obtained guidance from watching past exams, whereas the advanced users were guided by PowerPoint slides and audio recordings, and the intermediate users from online live lectures, seminars, and workshop contents. Although the application method of learning resources has advantages such as affordability, ease of access and dissemination of information, and rich material opportunities, certain limitations can also be mentioned (Arkorful and Abaidoo, 2015; Arthur-Nyarko et al., 2020). In the study of Karadağ and Yücel (2020), they examined

the satisfaction levels of undergraduate students regarding the ERL process from a multidimensional perspective, and revealed that the area with the lowest satisfaction was digital content and teaching materials, and stated that the technology usage proficiency of the instructors was reportedly low.

Erkut (2020), reporting on experiences during the ERL process, emphasised the need for educators to undergo a qualified reeducation and to restructure their courses in accordance with the online environments they needed to use in order to provide more effective online education as the next stage in the process. In this context, providing the necessary support to students and preparing learning resources developed in accordance with the ERL process and environment is important in order to ensure the satisfaction of the target student body. In addition, it is considered that providing supportive learning resources with visual content for individualised studying in the ERL process for the more theoretical-based courses, and the use of learning resources that support collaborative or group working for practice-based courses will help contribute to the improved management of the ERL process in areas such as students' satisfaction, benefit, and guidance.

6 Conclusions and recommendations

This study aimed to investigate the satisfaction levels of students in using a VLE and the factors that affect their satisfaction levels. The results of the study showed that students from all course types reported similar benefits and satisfaction with the VLE that they used. However, it was also determined that the difference in terms of the scores for the Guidance dimension was significant. Students enrolled in practical courses were more willing to receive guidance compared to those enrolled in theoretical or practice courses. Additionally, the study found that students who considered themselves at the beginner level, in terms of their internet usage levels, benefited less from ERL and were less satisfied than their intermediate or advanced levelled peers.

The study contributes to the existing literature on VLEs by providing insights into the factors that affect student satisfaction in the VLE. The study highlights the importance of providing educational and technical support for educators and students in the VLE. The study also provides insights into the types of courses that offer both theory and practice and the learning resources that are most effective for different types of courses.

The study has practical implications for policymakers and educational institutions in terms of investing in the necessary infrastructure and resources to support online learning. The study suggests that promoting the use of VLEs as a viable alternative to traditional classroom-based learning may be beneficial. Additionally, the study provides insights into the types of learning resources that are most effective for different levels of internet usage. This information can be used to develop more effective and personalised learning resources for students in the VLE. Overall, the study provides valuable insights into the factors that affect student satisfaction in the VLE and may inform policy decisions related to online education.

Acknowledgements

a The data is not accessible.

b The research was carried out following ethical guidelines, and Giresun University approved the research protocol.

c The authors declare that they have no competing interests.

References

Al-Fraihat, D., Joy, M. and Sinclair, J. (2020) 'Evaluating e-learning systems success: an empirical study', *Computers in Human Behavior*, Vol. 102, pp.67–86, https://doi.org/10.1016/j.chb.2019.08.004

Almusharraf, N.M., Khahro, S.H. and Arabia, S. (2020) 'Students' satisfaction with online learning experi-ences during the COVID-19 pandemic', *International Journal of Emerging Technologies in Learning*, Vol. 15, No. 21, pp.246–267, https://www.learntechlib.org/p/218355/.

Alqurashi, E. (2018) 'Predicting student satisfaction and perceived learning within online learning environments', *Distance Education*, Vol. 40, No. 1, pp.133–148, https://doi.org/10.1080/01587919.2018.1553562.

Anderson, J.C. and Gerbing, D.W. (1984) 'The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis', *Psychometrika*, Vol. 49, No. 2, pp.155–173, https://doi.org/10.1007/BF02294170.

Arkorful, V. and Abaidoo, N. (2015) 'The role of e-learning, advantages and disadvantages of its adoption in higher education', *International Journal of Instructional Technology and Distance Learning*, Vol. 12, No. 1, pp.29–42 [online] https://www.itdl.org/Journal/Jan_15/Jan15.pdf#page=33.

Arthur-Nyarko, E., Agyei, D.D. and Armah, J.K. (2020) 'Digitizing distance learning materials: measuring students' readiness and intended challenges', *Education and Information Technologies*, Vol. 25, pp.2987–3002, http://dx.doi.org/10.1007/s10639-019-10060-y.

Aulia, F. and Utami, W.B. (2021) 'Evaluation of e-learning towards improving 21 st century learning skills', in *2021 7th International Conference on Education and Technology (ICET)*, September, IEEE, pp.167–170.

Bacow, L. (2020) *COVID-19 – Moving Classes Online, Other Updates*, Harvard University [online] https://www.harvard.edu/coronavirus/covid-19-moving-classes-online-other-updates/(accessed 28 May 2022).

Barbour, M.K., LaBonte, R., Hodges, C.B., Moore, S., Lockee, B.B., Trust, T., Bond, M.A., Hill, P. and Kelly, K. (2020) *Understanding Pandemic Pedagogy: Differences between Emergency Remote, Remote, and Online Teaching*, State of the Nation: K-12 e-Learning in Canada [online] https://vtechworks.lib.vt.edu/handle/10919/101905 (accessed 28 May 2022).

Bodur, A. and Koşan, N.S. (2021) 'The effect of emergency remote teaching on students: a case of an architecture department course', *Journal of Design Architecture and Engineering*, Vol. 1, No. 3, pp.233–246 [online] https://dergipark.org.tr/en/pub/dae/issue/65809/1024386 (accessed 20 March 2022).

Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G., Lambert, S.R., Al-Freih, M., Pete, J., Olcott, D., Jr., Rodes, V., Aranciaga, I., Bali, M., Alvarez Jr., A.V., Roberts, J., Pazurek, A., Raffaghelli, J. E., Panagiotou, N., de Coëtlogon, P.,…Paskevicius, M. (2020) 'A global outlook to the interruption of education due to COVID-19 pandemic: navigating in a time of uncertainty and crisis', *Asian Journal of Distance Education*, Vol. 15, No. 1, pp.1–126, https://doi.org/10.5281/zenodo.3878572.

Brislin, R.W., Brislin, R.W., Lonner, W.J. and Thorndike, R.M. (1973) *Cross-Cultural Research Methods*, Wiley, Chichester, UK.

Browne, M.W. and Cudeck, R. (1992) 'Alternative ways of assessing model fit', *Sociological Methods & Research*, Vol. 21, No. 2, pp.230–258, https://doi.org/10.1177%2F0049124192021002005.

Buzzetto-More, N. (2008) 'Student perceptions of various e-learning components', *Interdisciplinary Journal of E-Learning and Learning Objects*, Vol. 4, No. 1, pp.113–135 [online] https://www.learntechlib.org/p/44851/ (accessed 28 February 2022).

Chen, T., Peng, L., Jing, B., Wu, C., Yang, J. and Cong, G. (2020) 'The impact of the COVID-19 pandemic on user experience with online education platforms in China', *Sustainability*, Vol. 12, No. 18, pp.1–31, https://doi.org/10.3390/su12187329.

Elliott, K.M. and Healy, M.A. (2001) 'Key factors influencing student satisfaction related to recruitment and retention', *Journal of Marketing for Higher Education*, Vol. 10, No. 4, pp.1–11, https://doi.org/10.1300/J050v10n04_01.

Erkut, E. (2020) 'Higher education after Covid-19', *Journal of Higher Education*, Vol. 10, No. 2, pp.125–133, Turkey, https://doi.org/10.2399/yod.20.002.

Fatani, T.H. (2020) 'Student satisfaction with videoconferencing teaching quality during the COVID-19 pandemic', *BMC Medical Education*, Vol. 20, No. 1, pp.1–8, https://doi.org/10.1186/s12909-020-02310-2.

Ferri, F., Grifoni, G. and Guzzo, T. (2020) 'Online learning and emergency remote teaching: opportunities and challenges in emergency situations', *Societies*, Vol. 10, No. 4, Article 86, https://doi.org/10.3390/soc10040086.

Gonzalez, T., De La Rubia, M.A., Hincz, K.P., Comas-Lopez, M., Subirats, L., Fort, S. and Sacha, G.M. (2020) 'Influence of COVID-19 confinement on students' performance in higher education', *PLoS ONE*, Vol. 15, No. 10, pp.1–23, https://doi.org/10.1371/journal.pone.0239490.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2013) *Multivariate Data Analysis*, 7th ed., Pearson, NY.

Hambleton, R.K. and Patsula, L. (1999) 'Increasing the validity of adapted tests: myths to be avoided and guidelines for improving test adaptation practices', *Journal of Applied Testing Technology*, Vol. 1, No. 1, pp.1–13, http://www.jattjournal.com/index.php/atp/article/view/48345.

Hamdan, K.M., Al-Bashaireh, A.M., Zahran, Z., Al-Daghestani, A., Samira, A.H. and Shaheen, A.M. (2021) 'University students' interaction, internet self-efficacy, self-regulation and satisfaction with online education during pandemic crises of COVID-19 (SARS-CoV-2)', *International Journal of Educational Management*, Vol. 35, No. 3, pp.713–725, https://doi.org/10.1108/IJEM-11-2020-0513.

Hamutoglu, N.B., Gemikonakli, O., Duman, I., Kirksekiz, A. and Kiyici, M. (2020) 'Evaluating students experiences using a virtual learning environment: satisfaction and preferences', *Educational Technology Research and Development*, Vol. 68, No. 1, pp.437–462, http://dx.doi.org/10.1007/s11423-019-09705-z.

Harsasi, M. and Sutawijaya, A. (2018) 'Determinants of student satisfaction in the online tutorial: a study of a distance education institution', *Turkish Online Journal of Distance Education*, Vol. 19, No. 1, pp.89–99, https://doi.org/10.17718/tojde.382732.

Hettiarachchi, S., Damayanthi, B.W.R., Heenkenda, S., Dissanayake, D.M.S.L.B., Ranagalage, M. and Ananda, L. (2021) 'Student satisfaction with online learning during the COVID-19 pandemic: a study at state universities in Sri Lanka', *Sustainability*, Vol. 13, No. 21, p.11749, https://doi.org/10.3390/su132111749.

Hodges, C., Moore, S., Lockee, B., Trust, T. and Bond, A. (2020) 'The difference between emergency remote teaching and online learning', *Educause Review*, 27 March, Vol. 27, pp.1–12 [online] https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning (accessed 28 May 2022).

Hu, L-T. and Bentler, P.M. (1999) 'Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives', *Structural Equation Modeling*, Vol. 6, No. 1, pp.1–55, https://doi.org/10.1080/10705519909540118.

Huang, R-H., Liu, D-J., Tlili, A., Yang, J-F. and Wang, H-H. (2020) *Handbook on Facilitating Flexible Learning during Educational Disruption: The Chinese Experience in Maintaining Undisrupted Learning in COVID-19 Outbreak*, Smart Learning Institute of Beijing Normal University, Beijing, pp.1–54 [online] http://www.alecso.org/nsite/images/pdf/1-4-2.pdf.

Jiang, H., Islam, A.Y.M., Gu, X. and 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*, Vol. 26, No. 6, pp.6747–6769, https://doi.org/10.1007/s10639-021-10519-x.

Jöreskog, K.G. and Sörbom, D. (1993) *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*, Scientific Software International, USA.

Karadağ, E. and Yucel, C. (2020) 'Distance education at universities during the novel coronavirus pandemic: an analysis of undergraduate students' perceptions', *Journal of Higher Education*, Vol. 10, No. 2, pp.181–192, Turkey, http://doi.org/10.2399/yod.20.730688.

Khan, B.H. and Joshi, V. (2006) 'E-learning who, what and how?', *Journal of Creative Communications*, Vol. 1, No. 1, pp.61–74, https://doi.org/10.1177%2F097325860500100104.

Khlaif, Z.N., Salha, S. and Kouraichi, B. (2021) 'Emergency remote learning during COVID-19 crisis: students' engagement', *Education and Information Technologies*, Vol. 26, pp.7033–7055, https://doi.org/10.1007/s10639-021-10566-4.

Kim, S. and Kim, D.J. (2021) 'Structural relationship of key factors for student satisfaction and achievement in asynchronous online learning', *Sustainability*, Vol. 13, No. 12, p.6734, https://doi.org/10.3390/su13126734.

Kline, R.B. (2005) *Principles and Practices of Structural Equation Modelling*, 2nd ed., Guilford Pressm, NY.

Korkmaz, Ö., Çakır, R. and Tan, S.S. (2015) 'Students e-learning readiness and satisfaction levels and effects on the academic achievement', *Ahi Evran University Kırşehir Education Faculty Jorunal*, Vol. 16, No. 3, pp.219–241 [online] https://dergipark.org.tr/en/pub/kefad/issue/59449/854082 (accessed 20 March 2022).

Kulikowski, K., Przytuła, S. and Sułkowski, Ł. (2021) 'E-learning? Never again! On the unintended consequences of COVID-19 forced e-learning on academic teacher motivational job characteristics', *Higher Education Quarterly*, Vol. 76, No. 1, pp.174–189, https://doi.org/10.1111/hequ.12314.

Leonardi, P. (2020) 'You're going digital-now what?', *MIT Sloan Management Review*, Vol. 61, No. 2, pp.28–35 [online] https://sloanreview.mit.edu/article/youre-going-digital-now-what/ (accessed 28 May 2022).

Lmaiah, M.A., Al-Khasawneh, A. and Althunibat, A. (2020) 'Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic', *Education and Information Technologies*, Vol. 25, No. 6, pp.5261–5280, https://doi.org/10.1007/s10639-020-10219-y.

Loton, D., Parker, P., Stein, C. and Gauci, S. (2020) 'Remote learning during COVID-19: student satisfaction and performance', *EdArXiv*, Vol. 7, No. 3, pp.1–9, https://edarxiv.org/n2ybd/download?format=pdf.

Marsh, H.W., Balla, J.R. and McDonald, R.P. (1988) 'Goodness-of-fit indexes in confirmatory factor analysis: the effect of sample size', *Psychological Bulletin*, Vol. 103, No. 3, pp.391–410 [online] https://psycnet.apa.org/doi/10.1037/0033-2909.103.3.391 (accessed 28 May 2022).

Mayer, R.E. (2020) 'Searching for the role of emotions in e-learning', *Learning and Instruction*, Vol. 70, Article 101213, https://doi.org/10.1016/j.learninstruc.2019.05.010.

Moore, M.G. and Kearsley, G. (2011) *Distance Education: A Systems View of Online Learning*, Cengage Learning, CA.

Naylor, D. and Nyanjom, J. (2021) 'Educators' emotions involved in the transition to online teaching in higher education', *Higher Education Research & Development*, Vol. 40, No. 6, pp.1236–1250, https://doi.org/10.1080/07294360.2020.1811645.

Perveen, A. (2016) 'Synchronous and asynchronous e-language learning: a case study of virtual university of Pakistan', *Open Praxis*, Vol. 8, No. 1, pp.21–39, http://doi.org/10.5944/openpraxis.8.1.212.

Pino, G.F., Herrera, M.M., Roca, S.C. and Antúnez, A.M. (2017) 'Grado de satisfacción de los estudiantes de 6° y 7° semestre de comercio y negocios internacionales en la Universidad Simón Bolívar de Barranquilla respecto a su plan de estudio', *Liderazgo Estratégico*, Vol. 7, No. 1, pp.44–58.

Rapp, J. and Allalouf, A. (2003) 'Evaluating cross-lingual equating', *International Journal of Testing*, Vol. 3, No. 2, pp.101–117, https://doi.org/10.1207/S15327574IJT0302_1.

Realyvásquez-Vargas, A., Maldonado-Macías, A.A., Arredondo-Soto, K.C., Baez-Lopez, Y., Carrillo-Gutiérrez, T. and Hernández-Escobedo, G. (2020) 'The impact of environmental factors on academic performance of university students taking online classes during the COVID-19 pandemic in Mexico', *Sustainability*, Vol. 12, No. 21, pp.1–22, https://doi.org/10.3390/su12219194.

Rothman, T., Romeo, L., Brennan, M. and Mitchell, D. (2011) 'Criteria for assessing student satisfaction with online courses', *International Journal for e-Learning Security*, Vol. 1, Nos. 1–2, pp.27–32.

Saeed, S., Saqib, M., Alabaad, D.A., Salam, A.A., Gull, H. and Iqbal, S.Z. (2022) 'Student engagement and assessment during COVID-19: a case study from an information systems undergraduate program in Saudi Arabia', *International Journal of Higher Education and Sustainability*, Vol. 4, No. 1, pp.1–16, https://doi.org/10.1504/IJHES.2022.123436.

Sarker, M.F.H., Tamal, M.A., Khan, N.A., Islam, M.K., Akber, M.F. and Khan, S. (2022) 'Students' experiences of e-learning practices during COVID-19: a qualitative study', *International Journal of Emerging Technologies in Learning*, Vol. 17, No. 14, pp.157–171.

Shahmoradi, L., Changizi, V., Mehraeen, E., Bashiri, A., Jannat, B. and Hosseini, M. (2018) 'The challenges of e-learning system: higher educational institutions perspective', *Journal of Education and Health Promotion*, Vol. 7, No. 1, pp.116–122, https://dx.doi.org/10.4103%2Fjehp.jehp_39_18.

Sułkowski, Ł. (2020) 'Covid-19 pandemic; recession, virtual revolution leading to de-globalization?', *Journal of Intercultural Management*, Vol. 12, No. 1, pp.1–11, https://www.ceeol.com/search/article-detail?id=846210.

Sun, P-C., Tsai, R.J., Finger, G., Chen, Y-Y. and Yeh, D. (2008) 'What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction', *Computers & Education*, Vol. 50, No. 4, pp.1183–1202, https://doi.org/10.1016/j.compedu.2006.11.007.

Taşçı, S. (2021) 'Evaluation of emergency distance language education: perspectives of ELT students', *Nevşehir Hacı Bektaş Veli University Journal*, Vol. 11, No. 1, pp.286–300, https://doi.org/10.30783/nevsosbilen.877657.

Telli, S.G. and Altun, D. (2020) 'The coronavirus and the rising of online education', *Journal of University Research*, Vol. 3, No. 1, pp.25–34, https://doi.org/10.32329/uad.711110.

Tomar, R. and Daruwala, S. (2022) 'Is going online efficient? A comparative study of offline and online mode of working and learning during COVID-19', *International Journal of Higher Education and Sustainability*, Vol. 4, No. 2, pp.81–96, https://doi.org/10.1504/IJHES.2022.128674.

Valverde-Berrocoso, J., Garrido-Arroyo, M.D.C., Burgos-Videla, C. and Morales-Cevallos, M.B. (2020) 'Trends in educational research about e-learning: a systematic literature review (2009–2018)', *Sustainability*, Vol. 12, No. 12, Article 5153, https://doi.org/10.3390/su12125153.

Vieira, A.L. (2011) *Interactive LISREL in Practice: Getting Started with a SIMPLIS Approach*, Springer, NY.

Voorhees, D.P. (2020) *Guide to Efficient Software Design: An MVC Approach to Concepts, Structures, and Models*, Springer, NY.

Weerasinghe, I.S., Lalitha, R. and Fernando, S. (2017) 'Students' satisfaction in higher education', *American Journal of Educational Research*, Vol. 5, No. 5, pp.533–539, https://ssrn.com/abstract=2976013.

Zhang, D., Zhao, J.L., Zhou, L. and Nunamaker Jr., J.F. (2004) 'Can e-learning replace classroom learning?', *Communications of the ACM*, Vol. 47, No. 5, pp.75–79, https://doi.org/10.1145/986213.986216.