

The Validity and Reliability Study of the Turkish Version of the E-Learning Satisfaction Scale

ABSTRACT

Objective: With the widespread adoption of e-learning during the COVID-19 pandemic and advances in internet technology, the need for a validated tool to assess student satisfaction has become increasingly important. This study aimed to examine the validity and reliability of the Turkish version of the e-Learning Satisfaction Scale (e-LSS).

Methods: This cross-sectional, methodological study was conducted with 537 students enrolled in health sciences programs at Erzurum Atatürk University between November 2022 and February 2023. In this study, a non-probability sampling method was used by selecting units that met specific criteria. Content validity was evaluated by expert review of the scale items. Construct validity was assessed through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Reliability and stability of the scale were tested using the equivalent (parallel) forms method.

Results: EFA results showed a Kaiser-Meyer-Olkin value of 0.94 and a significant Bartlett's test result ($\chi^2 = 126.773$, $p < .001$), indicating sample adequacy. Factor loadings ranged from .825 to .354 for the "Content" subscale, .859 to .571 for "Interface," and .802 to .654 for "Communication." CFA demonstrated acceptable model fit indices: $\chi^2/df = 4.332$, TLI = .915, RMSEA = .079, SRMR = .0481, AGFI = .857, GFI = .896, IFI = .931, and CFI = .930. The final scale consisted of 17 items across 3 subscales. Cronbach's alpha values were 0.86, 0.86, and 0.83 for the subscales, and 0.93 for the overall scale.

Conclusion: The scale was found to be a valid and reliable tool for measuring e-learning

Keywords: E-Learning, Factor Analysis, Health Sciences Students, Satisfaction, Scale Adaptation, Turkish Version, Validity and Reliability

Zeynep KARAMAN 
ÖZLÜ¹

Department of Surgical Nursing, Faculty of Nursing, Ataturk University, Erzurum, Türkiye

Azime GÜNAYDINLI ²

Department of Surgical Nursing, Faculty of Health, Bayburt University, Bayburt, Türkiye

Merve KAYA ³

Department of Surgical Nursing, Faculty of Nursing, Ataturk University, Erzurum, Türkiye

İzzet UÇAN ⁴

Department of Physical Education and Sports, Faculty of Sports Sciences, Ataturk University, Erzurum, Türkiye

Adnan TAŞGIN ⁵

Department of Educational Sciences, Faculty of Education, Ataturk University, Erzurum, Türkiye

İbrahim ÖZLÜ ⁶

Emergency Department, Atatürk University, Erzurum, Türkiye

Adnan KÜÇÜKOĞLU ⁵

Department of Educational Sciences, Faculty of Education, Ataturk University, Erzurum, Türkiye

Ayhan SARAÇOĞLU ⁷

Ibrahim Hakki Science High School, Erzurum, Türkiye

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Corresponding author: Zeynep KARAMAN ÖZLÜ

E-mail: zynp_krmnzl@hotmail.com

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Introduction

Worldwide pandemics and natural disasters that have occurred recently have caused compulsory face-to-face education to be continued as online education. There has been a quick transition to e-learning, which is widely used, particularly in online education (Maatuk et al., 2022). As a result, both instructors and learners have adapted to emerging e-learning technologies, gaining firsthand experience of their respective strengths and limitations.

E-learning refers to the implementation of educational activities through the use of computers, mobile devices, and internet technologies with the aim of improving learners' knowledge and performance (Lee & Hwang, 2005). E-learning can be conducted through a variety of methods, including online education via social media platforms, mobile apps, kiosks, and interconnected computer systems (Sinclair et al., 2016). In recent years, the integration of virtual reality environments into education, along with the incorporation of tools such as artificial intelligence, virtual simulations, gaming, and the metaverse, has transformed the pedagogical approaches within e-learning (Mystakidis et al., 2021).

E-learning offers numerous advantages, including user-friendliness, a student-centered approach, flexibility in terms of time and location, cost-effectiveness, equal access to education, support for lifelong learning, and the delivery of information in creative and innovative formats. Furthermore, by managing data volume efficiently, it contributes to a more positive learning experience (Mazanec et al., 2019). Another notable benefit of e-learning is its relative independence from time limitations, owing to the ease with which content can be reproduced and disseminated. It also offers financial advantages by lowering educational costs and addressing accessibility challenges associated with traditional face-to-face instruction. The flexibility in terms of time and space positions e-learning as an effective and efficient alternative to conventional educational methods (Lara et al., 2020).

Among the drawbacks of e-learning are limited accessibility for students lacking reliable internet connections or sufficient digital literacy, and the ongoing need to update educational content in line with evolving user needs and technological advancements (Duffecy et al., 2019). The development of e-learning materials, especially the development of content with enhanced virtual richness (images, videos, animations, etc.), can increase the cost considerably (Cantoni et al., 2004). It can cause a feeling of isolation in students because it reduces physical interaction. Since virtual classroom simulation is difficult in applied units such as laboratory applications, it is a negative situation for individuals who want to participate in learning activities.

Because e-learning requires more responsibility and discipline, it reveals the necessity for students to have some characteristics (asking questions, ability to evaluate theory and practice, ability to plan study hours carefully, etc.) (Forman et al., 2002).

In the rapid and continuous expansion and advancement of online education, there is a need for scientific tools developed to objectively measure the effectiveness of e-learning. Moreover, these tools are expected to generate essential data that can support efforts to enhance the quality of e-learning. In this context, the use of a valid satisfaction scale would make a valuable contribution to the literature by informing the planning, implementation, facilitation, and evaluation of e-learning in health education. In light of these considerations, the current study aimed to examine the validity and reliability of the Turkish adaptation of the e-Learning Satisfaction Scale.

Methods

Type of the Study

This study aimed to evaluate the validity and reliability of the Turkish adaptation of the e-Learning Satisfaction Scale and was designed as a methodological research study.

Place and Time of the Study

Data collection was conducted between November 2022 and February 2023 with students enrolled in the Faculties of Nursing, Health Sciences, Medicine, Pharmacy, and Dentistry at Erzurum Atatürk University.

Population and Sample of the Study

The study population included students enrolled in health-related faculties at Atatürk University, namely the Faculties of Nursing, Health Sciences, Medicine, Pharmacy, and Dentistry. The sample consisted of students from these faculties who met the inclusion criteria and voluntarily participated in the study during the specified period, selected through a non-probability sampling method. To increase the representative power of the study population, all health sciences students were included in the study instead of only health group students.

Data Collection Tools

The Personal Information Form, the E-Learning Satisfaction Scale, and the Satisfaction Scale for e-Course were used to collect research data. In the data collection process, research forms were applied using the online data collection method, "Google Forms" electronic questionnaire method. In line with this, an online data collection link was created with an accessible link prepared via Google Documents. It was delivered to all students through the messages section on the student information system of the university. To ensure that the form was completed by the intended participant, students who consented to join the study were

asked to provide feedback upon submission. Additionally, settings on the Google Forms platform were adjusted to prevent multiple submissions from the same individual.

Criteria for participating in the study:

- Students over the age of 18,
- Students who are willing to communicate and cooperate and agree to participate in the study,
- Students studying in the field of health sciences,
- Students who have e-learning experience.

Questionnaire Form

The Personal Information Form, which was prepared by the researcher by reviewing the literature, includes questions about the sociodemographic characteristics of students and their experiences with e-learning.

E-Learning Satisfaction Scale (e-LSS)

The scale was originally developed by Hwang and Kyoung Kim (2022) to evaluate students' satisfaction with electronic learning environments. It consists of 17 items measured on a 5-point Likert scale, where responses range from 1 ("strongly disagree") to 5 ("strongly agree"). The scale is composed of three subdimensions: 'Content' (8 items), 'Interface' (5 items), and 'Communication' (4 items). The total possible score ranges from 17 to 85, with higher scores reflecting greater levels of satisfaction with the e-learning experience. In the current study, the Cronbach's alpha coefficients were 0.93 for the total scale, 0.86 for the Content subscale, 0.86 for the Interface subscale, and 0.83 for the Communication subscale, indicating high internal consistency across all components.

Satisfaction Scale for e-Course

The Satisfaction Scale for e-Course was developed by Geçer and Topal (2015). The scale is a 5-point Likert scale consisting of 35 items and is rated as "Strongly Agree" (5), "Agree" (4), "Neutral" (3), "Disagree" (2), and "Strongly Disagree" (1). Cronbach's alpha reliability coefficient of the scale was computed as 0.96.

Language validity

The steps of Rojjanasrirat (2011) were used as a guide concerning the translation process of the study, while English items in the original scale were translated into Turkish. As a first step, the scale items were independently adapted to Turkish by an expert and a lecturer working at the school of foreign languages, who knew both languages and cultures well, to ensure the language and culture compatibility and language validity of the scale. Then, the opinions of the relevant experts were taken, and the comparison between the translations was made by four persons, and the first version of the scale was created by

determining the items that best expressed the original item. For the finalized Turkish version of the scale, a back-translation was conducted by a native English-speaking expert and a faculty member from the School of Foreign Languages, both of whom were fluent in Turkish and had no prior exposure to the original English version. The back-translated form was then compared with the original scale by the researcher and an expert from a different field, and a high level of semantic similarity was observed. Once finalized by the researcher, the back-translated version was submitted to the original authors, Hwang and Kyoung Kim (2022), for approval. The authors granted final approval, thereby confirming the linguistic equivalence of the Turkish version of the scale.

Construct validity

"In this study, both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were utilized to assess the construct validity of the scale. Prior to factor analysis, the suitability of the data was evaluated through item-total correlation coefficients, Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin (KMO) measure. As all items exhibited item-total correlation values above 0.30, none were excluded from the scale. A KMO value exceeding 0.80 was considered indicative of sufficient sample adequacy (Beavers et al., 2013). Bartlett's test was conducted to examine inter-item correlations within the initial scale, with statistical significance set at $p < .001$ (Çokluk et al., 2012)."

"To investigate the underlying factor structure of the scale, principal component analysis was conducted using varimax rotation, an orthogonal rotation technique. The number of factors was identified by analyzing the total variance explained and inspecting the scree plot of eigenvalues. Factor loadings equal to or greater than 0.50 were considered statistically significant (Yaşlıoğlu, 2017)."

After EFA, CFA was carried out to validate the construct. The said analysis represents a dimensionality test commonly utilized in scale development studies (Brown, 2015). Moreover, the suitability of the scale structure to the structure created in the EFA was assessed by utilizing fit indices.

Reliability tests

"Cronbach's alpha coefficient was employed to evaluate the internal consistency and reliability of the scale, with values between 0.70 and 1.00 interpreted as indicating acceptable reliability levels (Bergmann, 2022). In addition, average variance extracted (AVE) and construct reliability (CR) values were calculated to assess the scale's convergent validity."

Stability reliability

The equivalent (parallel) form reliability method was

employed to test the stability of the e-Learning Satisfaction Scale. For this purpose, the Turkish version of the Satisfaction Scale for e-Course, originally developed by Geçer and Topal (2015), was utilized with its established validity and reliability.

Statistical Analysis

"This study, which aimed to evaluate the validity and reliability of the Turkish version of the e-Learning Satisfaction Scale, involved the assessment of language, content, and face validity prior to finalizing the scale for implementation. Data collected throughout the research were analyzed using the Statistical Package for the Social Sciences (IBM SPSS Corp., Armonk, NY, USA) version 22.0. Descriptive statistics, including frequency and percentage distributions, were employed to examine the responses obtained from the Personal Information Form." For the validity analysis, expert evaluations were utilized alongside statistical procedures such as Bartlett's test, the Kaiser-Meyer-Olkin (KMO) measure, exploratory and confirmatory factor analyses, principal component analysis, and varimax rotation to assess both content and construct validity. To assess the scale's internal consistency and item homogeneity, the reliability analysis included the calculation of Cronbach's alpha coefficients, Average Variance Extracted (AVE), and Construct Reliability (CR) values.

Ethical Consideration of the Study

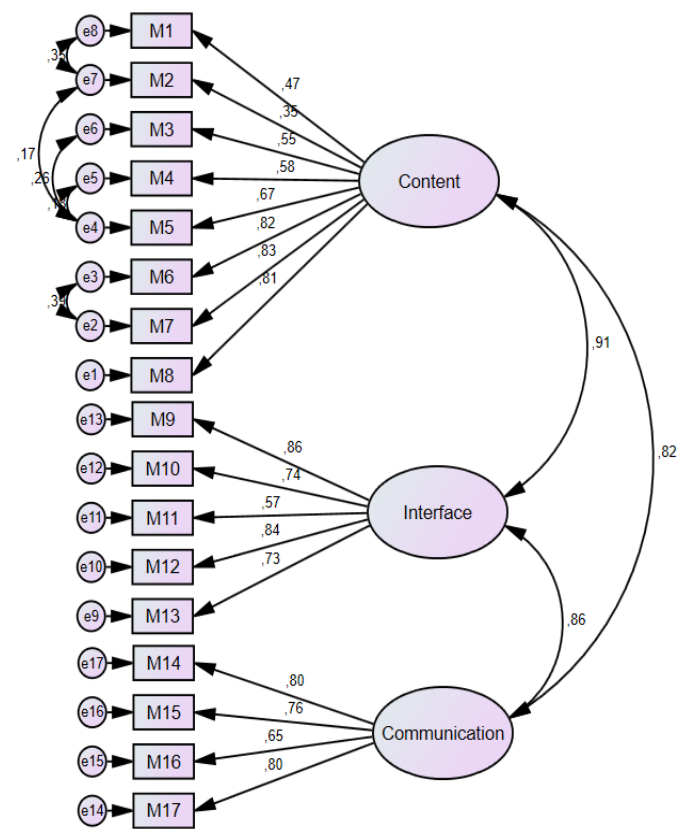
Permission to adapt the e-Learning Satisfaction Scale (e-LSS), originally developed by Hwang and Kyoung Kim (2022), into Turkish was obtained from the original authors. Ethical approval for the study was granted by the Ethics Committee of the Atatürk University Faculty of Medicine (Date: October 27, 2022, Number: 653), and formal written authorization was secured from the institution where the study was carried out. Prior to participation, students were informed about the purpose and procedures of the research, the estimated time commitment, the voluntary nature of their involvement, and the assurance that participation would pose no harm. Both verbal and written informed consent were obtained from all participants.

Results

Table 1 contains the distribution of the students' descriptive characteristics. The factor loading values of the "e-Learning Satisfaction Scale," adapted to Turkish, are shown in Table 2.

As presented in Table 2, the factor loadings for the items in the 'Content' subscale of the Turkish version of the e-Learning Satisfaction Scale ranged from .354 to .825. The loadings for the 'Interface' subscale were between .571 and .859, while those for the 'Communication' subscale ranged from .654 to .802.

Figure 1.
Path diagram of confirmatory factor analysis



CMIN=480,885; DF=111; CMIN/DF=4,332; p=.000; RMSEA=.079; CFI=.930; GFI=.8

Figure 1 presents the path diagram of the confirmatory factor analysis conducted to assess whether the structure of the adapted e-Learning Satisfaction Scale is supported within the Turkish cultural context, while the corresponding fit indices and analysis results are summarized in Table 3. As presented in Table 2, the factor loadings for the items in the 'Content' subscale of the Turkish version of the e-Learning Satisfaction Scale ranged from .354 to .825. The loadings for the 'Interface' subscale were between .571 and .859, while those for the 'Communication' subscale ranged from .654 to .802. Figure 1 presents the path diagram of the confirmatory factor analysis conducted to assess whether the structure of the adapted e-Learning Satisfaction Scale is supported within the Turkish cultural context, while the corresponding fit indices and analysis results are summarized in Table 3. In the original structure of the "e-Learning Satisfaction Scale," there are 8 items in the "Content" subscale, 5 items in the "Interface" subscale, and 4 items in the "Communication" subscale.

Table 1.
Distribution of students' descriptive characteristics

Characteristics		Number (n=537)	Percentage (%)
Age	18-20	131	24.4
	21-23	351	65.4
	24-26	41	7.6
	27-29	9	1.7
	30 and above	5	0.9
Gender	Female	411	76.5
	Male	126	23.5
Marital Status	Single	524	97.6
	Married	13	2.4
Your father's education level	Primary school	116	21.6
	Secondary school	94	17.5
	High school	160	29.8
	Associate degree	24	4.5
	Bachelor's degree	114	21.2
	Postgraduate degree	29	5.4
Your mother's education level	Primary school	236	43.9
	Secondary school	97	18.1
	High school	86	16.0
	Associate degree	18	3.4
	Bachelor's degree	92	17.1
	Postgraduate degree	8	1.5
Faculty where you are currently studying	Faculty of Nursing	145	27.0
	Faculty of Health Sciences	137	25.5
	Faculty of Medicine	70	13.0
	Faculty of Pharmacy	100	18.6
	Faculty of Dentistry	85	15.8
Computer used at home	Yes	399	74.3
	No	138	19.0
Active computer use	0-2 years	182	33.9
	3-5 years	92	17.1
	6-8 years	87	16.2
	9 years and above	176	32.8
Internet used at home	Yes	468	87.2
	No	69	12.8
Average internet usage time per day	0-1 hour	21	3.9
	2-4 hours	226	42.1
	5-7 hours	210	39.1
	7 hours and above	80	14.9
Average computer usage time per day	0-1 hour	239	44.5
	2-4 hours	138	25.7
	5-7 hours	18	3.4
	7 hours and above	7	1.3
	I never use it	135	25.1
Device used frequently to access the Internet	Smartphone	519	96.6
	Computer	16	3.0
	Tablet computer	2	0.4

A confirmatory factor analysis (CFA) was carried out to evaluate the applicability of the original scale's factor structure within the Turkish cultural context. Following the

analysis, suggested modifications were reviewed, and adjustments were made within the same subscales. The model fit indices obtained from the CFA were as follows: CMIN = 480.885, DF = 111, $p < .001$; RMSEA = 0.079;

Table 2.
Factor loading values of the scale

Item No	Item	Content	Interface	Communication
7	The content fits my needs.	.825		
6	The content is sufficient.	.822		
8	The content is interesting.	.808		
5	The content is up-to-date.	.675		
4	The e-learning program is easy to use.	.579		
3	New techniques are used.	.554		
1	I can choose the content.	.472		
2	I can record the content.	.354		
9	I want to recommend this system.		.859	
12	The system function is overall satisfactory.		.844	
10	The system enhances immersion.		.736	
13	The system is stable.		.727	
11	The cost of education is reasonable.		.571	
14	The system makes it easy to communicate with learners.			.802
17	The system provides feedback, questions, and answer from teachers.			.796
15	One-on-one communication is available.			.759
16	The system makes it easy to share content.			.654

TLI=0.915; SRMR = 0.0481; AGFI = 0.857; GFI = 0.896; IFI = 0.931; and CFI = 0.930. Based on these indices, the Turkish version of the scale was found to demonstrate acceptable to good model fit in line with established reference values. The

Table 3. <i>Fit Values Acquired as a Result of Confirmatory Factor Analysis</i>				
Indices	Reference Value		Measurement	Result
	Good Fit	Acceptable Fit		
CMIN/DF	$0 < \chi^2/df \leq 3$	$3 < \chi^2/df \leq 5$	4.332	<i>Acceptable Fit</i>
TLI	$.95 < TLI \leq 1$	$.90 < TLI \leq .94$	.915	<i>Acceptable Fit</i>
RMSEA	$0 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .08$	.079	<i>Acceptable Fit</i>
SRMR	$0 \leq SRMR \leq .05$	$0.05 \leq SRMR \leq .1$	.0481	<i>Good Fit</i>
AGFI	$.90 < AGFI \leq 1$	$.80 < AGFI \leq .90$	.857	<i>Acceptable Fit</i>
GFI	$.90 < GFI \leq 1$	$.85 < GFI \leq .90$	.896	<i>Acceptable Fit</i>
IFI	$.95 < AGFI \leq 1$	$.90 < AGFI \leq .95$	.931	<i>Acceptable Fit</i>
CFI	$.95 < CFI \leq 1$	$.90 < CFI \leq .94$	.930	<i>Acceptable Fit</i>
Sd			111	

measurement values acquired were interpreted by considering the reference values of Byrne (2011). Table 4 contains the correlation coefficients between the subscales of the "e-Learning Satisfaction Scale."

Table 4.
Correlation values between the subscales of the "e-Learning Satisfaction Scale"

	Content	Interface	Communication
Content	1	.908**	.824**
Interface	.908**	1	.855**
Communication	.824**	.855**	1
Total			
** $p < .001$			

As seen in Table 4, it is concluded that the correlation coefficients between the subscales are also positive and high. The relationship between the adapted E-Learning Satisfaction Scale and the existing E-Learning Satisfaction Scale was examined. A positive and significant correlation was obtained between the two scales at the level of $r = .773$, $p < .01$. This result shows that the adapted scale measures e-learning satisfaction similarly to the original scale. Therefore, it can be said that the scale has high convergent validity and reliably reflects the satisfaction levels of students with their online learning experiences.

"The AVE" values calculated for the discriminant validity of the scale are in the range of .431-.570. These values must be higher than .50. In the "Content" subscale, although the relevant value is lower than .50, it is close to .50. In addition,

the internal consistency coefficient and the composite reliability (CR) of the scale were computed to further assess its reliability. Cronbach's alpha internal reliability coefficients of the subscales are between .837 and .861. The above-mentioned results demonstrate that the internal reliability of the subscales is high. It is seen that the CR values calculated within the scope of composite reliability are in the range of .840-.866.

When the reliability and validity findings of the scale are examined, it is observed that the scale demonstrates generally satisfactory psychometric properties. The total Cronbach's Alpha coefficient of the scale was 0.933, indicating a very high level of internal consistency. When evaluated in terms of subdimensions, the content (0.861), interface (0.860), and communication (0.837) dimensions all have values above 0.80, demonstrating that each subdimension possesses a high level of reliability.

In terms of convergent validity, the Average Variance Extracted (AVE) values for the interface (0.569) and communication (0.570) dimensions exceed the recommended threshold of 0.50, indicating that adequate convergent validity is achieved for these dimensions. However, the AVE value for the content dimension (0.431) falls below this threshold. Nevertheless, considering that the composite reliability (CR = 0.850) and Cronbach's Alpha (0.861) values for this dimension are above acceptable levels, it can be argued, in line with criteria suggested in the literature, that convergent validity for this dimension is still acceptable.

An examination of the composite reliability (CR) values shows that all subdimensions exceed the threshold of 0.70 (ranging between 0.840 and 0.866), indicating that construct reliability is ensured. In conclusion, these findings support that the scale is both reliable and valid, and can be considered a sound and usable measurement instrument.

Table 5 contains the KMO and BTS results. The KMO value was higher than 0.80 (KMO=0.94), and Bartlett's test of sphericity was found to be statistically significant at the 99% confidence level ($p<.01$).

Table 5. <i>Kaiser-Meyer-Olkin (KMO) and Bartlett's Test (BTS) Results of the Scale</i>		
Tests	Results	p-value
Kaiser-Meyer-Olkin (KMO)	0.94	$p<.000$
Bartlett's Test of Sphericity (BTS)	126.773	

Discussion

In this period when educational activities are undergoing a rapid transformation and development, the importance of e-learning is increasing every day. At this point, it is thought

that it is very important to examine students' satisfaction with e-learning with a reliable measurement tool. "This study was planned and carried out with the objective of testing the validity and reliability of the Turkish version of the e-LSS. In this regard, the language, content validity, and face validity of the e-LSS were provided, and the scale was finalized before the application. To evaluate the construct validity of the scale, a series of analyses were conducted, including item analysis, reliability analysis, item-total correlation, as well as exploratory and confirmatory factor analyses."

According to the literature, factor loadings—which represent the degree to which each item contributes to explaining a construct—are generally classified as high (≥ 0.70), moderate (≥ 0.50), or low (≥ 0.35) (Clark & Bowles, 2018). In the current study, exploratory factor analysis revealed that the factor loadings of all items ranged between 0.55 and 0.85, indicating a moderate to high level of item adequacy. Additionally, each item demonstrated a correlation value greater than 0.30 with the total scale, suggesting acceptable item consistency; therefore, no items were removed from the scale.

The equivalent (parallel) forms reliability method was employed to test the stability of the e-LSS. "To this end, the Satisfaction Scale for e-Course with proven validity and reliability in Turkish, developed by Geçer and Topal (2015), was used." A positive and highly significant correlation was determined between the scales. The equivalent forms reliability method was also used in the original scale developed by Hwang and Kim (2022), and a significant positive correlation was revealed ($p<.001$). These findings indicate that the reliability of the e-LSS is high.

The internal consistency of the scale was examined as part of the reliability analysis. To evaluate item homogeneity and overall consistency, Cronbach's alpha coefficient—commonly used in scale development studies—was applied. A Cronbach's alpha coefficient ranging between 0.70 and 1.00 is considered indicative of acceptable to high reliability (Bergmann, 2022). Cronbach's alpha value of the original scale developed by Hwang and Kim (2022) was found to be 0.93, 0.89 for the Content subscale, 0.85 for the Interface subscale, and 0.85 for the Communication subscale. It was determined that the original scale developed consisted of 17 items, had a three-factor structure, and each factor was highly reliable. In this study, after the factor analysis, three factors were reached as in the original study. These factors were named "Content (8 items)," "Interface (5 items)," and "Communication (4 items)." It was revealed that the reliability level of each factor was 0.86, 0.86, and 0.83, respectively, and the values

had a high level of reliability. In the present study, the total Cronbach's alpha coefficient of the scale was found to be 0.93. The internal consistency coefficients for both the overall e-LSS and its subdimensions were above the 0.70 threshold, indicating that the scale possesses a high degree of reliability.

In the current research, following the factor analysis, after three factors ("Content," "Interface," and

"Communication") were reached as in the original study, confirmatory factor analysis was conducted to test the factorial and construct validity. The scale's structure was examined using χ^2/df , TLI, GFI, AGFI, CFI, IFI, RMSEA, and SRMR fit tests. It was determined that confirmatory factor analysis, fit indices, and factor loadings were at an adequate level, and a valid model-data fit of the scale consisting of three subscales was at an acceptable level. "The results of the confirmatory factor analysis (CFA) indicated that the model demonstrated acceptable fit, with a chi-square/df ratio of 4.332. The RMSEA value was 0.076, falling within acceptable thresholds, and the other fit indices also supported model adequacy." The CFA confirmed the three-factor structure derived from the original exploratory factor analysis, indicating an overall acceptable level of model fit.

"Convergent validity of the scale was assessed by calculating the Average Variance Extracted (AVE) and Construct Reliability (CR) values." According to the findings, it was determined that the standardized factor loadings of the scale items were above 0.50, the AVE values were above 0.50 for all except the Content subscale, and the "Content" subscale was 0.43. In the "Content" subscale, although the relevant value was lower than 0.50, it was close to 0.50. The fact that the CR values were above 0.70 in the study indicates that the composite reliability was ensured. The standardized AVE values of the "Content," "Interface," and "Communication" subscales for the scale items of the original scale were found to be 0.61, 0.52, and 0.49, respectively, and the CR values were above 0.70, and the discriminant validity was proven.

Conclusion and Recommendations

As a result, it was revealed that the e-LSS, which was adapted to Turkish within the scope of this study, was a valid and reliable measurement tool that could be utilized to quickly and easily measure the distance education experiences and the effectiveness of e-learning. The e-LSS was proven to be an easy and objective measurement tool to evaluate the e-learning experiences of health sciences students, which is increasingly needed at a time when society is gravitating toward new educational environments, roles, and institutions. The scale can be used not only for health science students but also to evaluate the

experiences of other student groups experiencing e-learning.

The limitation of the present research is its application to health science students in a particular region. It is recommended to apply the e-LSS to different student groups in various regions and evaluate their e-learning experiences.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Ataturk University (Date: October 27, 2022, Number: 653).

Informed Consent: Ethical committee approval was obtained before the study, and informed consent was received from the participants.

Peer-review: Externally peer-reviewed.

Author Contributions:

Concept – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Design – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Supervision – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Resources – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Data Collection and/or Processing – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Analysis and/or Interpretation – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Literature Search – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Writing Manuscript – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.; Critical Review – Z.K.Ö., A.G., M.K., İ.U., A.T., İ.Ö., A.K., A.S.

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