DEVELOPMENT OF ONLINE COURSE SATISFACTION SCALE

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ABSTRACT

Higher education institutions consider student satisfaction to be one of the main factors in determining the quality of their online learning. The purpose of this study was to develop a reliable, valid, and practical instrument to measure online students' satisfaction as well as to explore the psychometric and theoretical concerns surrounding the construct validity of existing satisfaction scales. The study was carried out in 2017–2018 fall and spring with participants consisting of freshmen who took the online course in a state university (N_{fall}=1585; N_{spring}=1206). In this study exploratory factor analysis (EFA) (Study 1-N_{EFA}=921) and confirmatory factor analysis (CFA) (Study 1-N_{CFA}=664; Study 1-N_{CFA}=1206) were performed to assess the construct validity of the scale's measures. As proof of validity, the effect of gender on satisfaction was examined, for which independent sample t-test was performed. For the criterion validity, the relationship between computer and internet self-efficacy and satisfaction scores of the learners was examined. The finalized version of satisfaction scale, consisting of eight items, demonstrated that the scale is suitable for general use. Suggestions for future researchers and practioners are proposed.

Keywords: Online learning, student satisfaction, scale development.

INTRODUCTION

Online learning has grown dramatically during the last decade in most parts of the world. Different reasons account for the increasing growth of online courses and programs. Green (2010) stated that universities and colleges are willing to develop and grow their online learning programs because they can attract more students at a lower cost. In addition, the students themselves are asking for more online courses since they claimed they save money and time when they do not drive to campus, and they are still able to maintain their work schedule while completing their educational goals (Green, 2010). For university and college leaders, student demand is the number one reason for increasing online offerings (Green, 2010). It is also to be stated that the continuous development of information and communication technologies helps in making the online teaching and learning experience smoother.

Despite the popularity of online learning, student satisfaction with online learning remains one of the most important indicators of the quality of online learning experiences (Ilgaz ve Gulbahar, 2015; Yukselturk &

Yildirim, 2008) and for higher education institutions one of the major elements in determining the quality of their online learning programs (Parahoo, Santally, Rajabalee & Harvey, 2016). Student satisfaction with online learning can be related to several factors like online interactions (i.e. student-student, student-instructor, student-content), course quality, assessment, computer/internet self-efficacy, perceived learning and student learning can be affected by student satisfaction with the learning experience (Harsasi & Sutawijaya, 2018; Kirtman, 2009; Turhangil Erenler, 2019; Uusiautti, Maatta & Leskisenoja, 2017; Young & Norgard, 2006). When students are satisfied with their experience of online learning this will determine if they more likely will continue to enroll in other online courses. Knowledge of the factors that influence student satisfaction with online learning can help improve such online courses (Kaufmann, 2015; Kurucay & Inan, 2017; Martin-Rodriguez, Fernandez-Molina, Montero-Alonso & Gonzalez-Gomez, 2015). It is therefore important for faculty members involved in designing, developing and delivering online courses to seek the opinions and perceptions of online students about their successful learning experiences and share this information to advance the knowledge related to online learning.

Researchers have identified several factors that promote student satisfaction and motivation in online learning which include academic challenge and supportive learning activities (An, Kim & Kim, 2008; Chen, 2014; Lister, 2014; Tibi, 2015); timely and explanatory feedback (Britto & Rush, 2013; Sebastianelli, Swift & Tamimi, 2015; Wallace, 2003); regular interaction with the instructor (Lister, 2014; Roper, 2007; Uusiautti et al., 2017); and positive interactions with peers (Kurucay & Inan, 2017; Liaw & Huang, 2013; Lister, 2014; Wallace, 2003). Gil (2008) found that administration, functionality, instruction, and interaction are the most four categories that affected online learning satisfaction. Among those categories, instruction and interaction were found to be the most important factors that have impacts on satisfaction with online learning.

Ralston-Berg, Buckenmeyer, Barczyk and Hixon (2015) investigated student perceptions of online course quality. The study included about 3000 participants taking an online college-level course. The results showed that participants rated clear instructions for getting started and ease of navigation at a high level. Also clearly stated assignment and grading policy were found to be important as one of the specific criteria for student expectations (Ralston-Berg et. al., 2015). Fedynich, Bradley and Bradley (2015) surveyed 249 graduate students to identify positive components that led to their satisfaction in online courses. The results indicated that interaction among students, interaction between the students and the instructor, and the instructor's role has a major impact on student satisfaction (Fedynich, el al., 2015). On the other hand, lowest levels of satisfaction by the research participants was found related to explanatory feedback given by the instructor, the wide range of content provided by the course, and the ample opportunities to interact with one another (Fedynich, el al., 2015). In addition, Jaggars and Xu (2016) investigated the impact of online course design on Student end-of-semester performance in 23 online courses at two community colleges. The results of their research indicated that quality of interpersonal interaction within the online courses relates positively and significantly to student grades. They also found that frequent and effective learner–instructor interaction creates an online learning environment that encourages students to commit themselves to the course and perform at a stronger academic level. Eom and Ashill (2016) investigated 372 responses from students who have completed at least one online course at a university in the United States according to critical success factors that influence quality of online learning. They concluded that instructor-student dialogue, student-student dialogue, and course design significantly affect students' satisfaction and learning outcomes. Research also indicated that perceived usefulness, perceived ease of use and compatibility of the online learning environment improves user's satisfaction of the information system (Chiu, Hsu, Sun, Lin & Sun, 2005; Rios, Elliott & Mandernach, 2018). Sahin and Shelly (2008) stated that student perceptions and needs should be considered central in designing, developing, and delivering online courses.

Research on students' perceptions of online learning quality (Milheim, 2012; Ward, et al., 2010; Young & Norgard, 2006) emphasize that the key factors that affect students satisfaction with online learning are: interactivity (e.g., Croxton, 2014;, instructor variables (e.g., Fedynich et al., 2015; Martin-Rodriguez et al., 2015), course design and content (e.g., Jaggars & Xu, 2016; Lister, 2014; Ralston-Berg et. al., 2015), and technical issues of the online learning environment (e.g., Bolliger, 2004). So far, most research was done with off site learners and/or blended learning students. Yet, which factors would emerge or whether the previous constructs could be replicable in on-site and fully online learning experiences is scare. Therefore, the current

study is, first, designed to develop a fully online (with synchronous and asynchronous modules) on-campus e-learning satisfaction questionnaire; secondly, it was aimed to report validity and reliability scores of the developed questionnaire.

METHODOLOGY

Research Participants

Starting from 2016-2017, a state university at Central Anatolia has started providing online courses to undergraduate students with Turkish Language I and II. These courses were offered by 57 faculty through a learning management system with both synchronous and asynchronous features. These courses were coordinated by 57 departments from various colleges and the Distance Education Research and Application Center. Each department supported the program with their teaching staff and the Center had the role of guiding the process, administering the process, and training the teaching staff for online learning.

The study was carried out in 2017–2018 fall and spring with participants consisting of freshmen who took the online course in a state university. After the completion of the 14-week course in the 2017-2018 Fall and 2017-2018 Spring terms, the scale was distributed to the students via e-mail trough the learning management system. The demographic information of the students who participated in the study is presented in the Table 1 and Table 2. The majority of students who answered the questionnaire (2017-2018 Fall 79%; 2017-2018 Spring 86%) had no previous experience of taking an online course (Table 2).

Table 1. Participants and Performed Statistical Procedures

Course	Study	Term	Study Groups	Performed Statistical Procedures
Turkish Language I	Study I	2017-2018 Fall	N_{total}=1585	
			N_{EFA}= 921	EFA
			N_{CFA}= 664	CFA
Turkish Language II	Study II	2017-2018 Spring	N=1206	CFA

Table 2. Participants according to gender and pre-online course experience

	2017-2018 Fall (EFA)	2017-2018 Fall (CFA)	2017-2018 Spring
Gender	N_{Female}=617	N_{Female}=428	N_{Female}=827
	N_{Male}=304	N_{Male}==236	N_{Male}==279
Has taken an online course before	N_{Yes}=203	N_{Yes}=135	N_{Yes}=170
	N_{No}=718	N_{No}=529	N_{No}=1036

Research Instruments

Two instruments were utilized in order to measure undergraduate students' satisfaction with their online learning experiences. In the following section, these instruments are described in detail.

Online Course Student Satisfaction

The literature was searched and the data collection tools (Alshare, Freeze, Lane and Wen, 2011; Arbaugh, 2000; Bolliger and Halupa, 2012; Eryilmaz, 2012; Gecer and Topal, 2015; Gunawardena, Linder-VanBerschot, LaPointe and Rao, 2010; Gunawardena and Zittle; 1997; Ilgaz, 2008). Prepared to measure the satisfaction structure were examined and a pool of 10 items was formed (Appendix 1). The items are rated in a 5-point Likert type, between 1 - strongly disagree and 5 - strongly agree. Six experts were reached to determine the scope validity of the substances created. Kappa statistics were calculated for each item since

it was suggested to examine the kappa statistics when a small number of experts were reached within the scope validity (Yurdugul and Bayrak, 2012). After determining the Kappa statistics (Fleiss, 1981), it was decided to remove two items (item 5, item8). Both items (item 2, item 10) were found to be inadequate by some of the experts and it was determined that the kappa value was at the limit. Therefore, it was decided to examine the factor loadings of the two items as a result of factor analyzes and the data collection tool was finalized with eight items. The validity and reliability studies of the scale were reported in detail in the title of the findings.

Computer/Internet Self-efficacy

When the studies on satisfaction structure are examined, it is determined that there is a relationship between satisfaction and computer and/or internet self-efficacy (Kirmizi, 2015; Kuo, Walker, Belland, & Schroder, 2013; Kuo, Walker, Schroder, & Belland, 2014; Lim, 2001). Therefore, it was decided that there is a need to look at the relationship between computer and internet self-efficacy and satisfaction scores of the learners for the criterion validity. The adaptation of Online Learning Readiness Scale (Hung, Chou, Chen and Own, 2010) into Turkish was conducted by Yurdugul and Alsancak Sirakaya (2013). For this structure, Cronbach's alpha coefficient was reported as 0.92 and in this study it was calculated as 0.855.

FINDINGS

Study I

Before conducting analyses, data were cleared and skewness values were examined and it was checked whether normality assumption was met. In order to examine the construct validity of the scale, an exploratory factor analysis was conducted with 921 observations randomly chosen in the 2017-2018 Fall term. Maximum likelihood (ML) extraction method was used in exploratory factor analysis. Then, confirmatory factor analysis was performed with the rest of the data (n = 664) in order to test its structure determined by Exploratory Factor Analysis. The results of exploratory and confirmatory factor analysis were reported below.

In 2017-2018 Fall term, a random part of the data was chosen and factor analysis was performed with 921 observations. The KMO value was 0.924 and the Barlett test was significant ($p < 0.05$). Principal component analysis was utilized and it was determined that the extraction values of factors were between 0.501 and 0.786 at acceptable value ranges.

When deciding the number of factors in a questionnaire, Kaiser's criteria, the Scree test and parallel analysis methods were usually utilized (Williams, Onsman, Brown, 2010). Single factor (5.604) was found to be greater than 1 according to Kaiser's criteria. According to the Scree test, the break is observed after one (1) factor. It was also observed that a single factor existed according to parallel analysis (Patil, Singh, Mishra & Donavan, 2017). Based on these results, the OCSS consists of eight items in a single factorial structure, which explained 70,051% of the total variance. The reliability of the scale was tested using both the construct validity (0.949) and the Cronbach Alpha (0.938). Both values were above 0.70 and found to be valid as reported by Nunnully and Berstein (1994). AVE value was calculated as 0.701 (See, Table 3.).

Convergent validity was also examined since the scale was unidimensional in the context of construct validity. For convergent validity, it was determined whether factor loads and average variance extracted (AVE) values were greater than 0.50. As shown in Table 3, it was observed that the standardized factor loads of the scale items ranged between 0.708 and 0.887. In addition, the average variance extracted (AVE) values were found to be greater than 0.50 (Fornell & Larcker, 1981). Based on the findings, one-dimensional scale scores can be said to be valid and reliable.

The CFA was run on the other randomly determined portion of the data gathered in 2017-2018 Fall period. Once the data was cleared, confirmatory factor analysis was performed with 664 observations. The KMO value was 0.929 and the Barlett test was significant ($p < 0.05$). For the confirmatory factor analysis, the recommended number of samples should be 5 or 10 times the number of items (Kline, 2005). Since the number of observations was 664, this proposal was met. In the confirmatory factor analysis, error and fit indexes and proposed modifications were examined. The error and fit indices were found to be appropriate

according to the expected criteria ($X^2_{(32)}$ = 51.964, RMSEA = 0.056, GFI = 0.981; CFI = 0.993; NNFI = 0.988). Accordingly Hu and Bentler (1995, 1999), the fit index values above 0.90 and RMSEA value 0.06 below are considered acceptable.
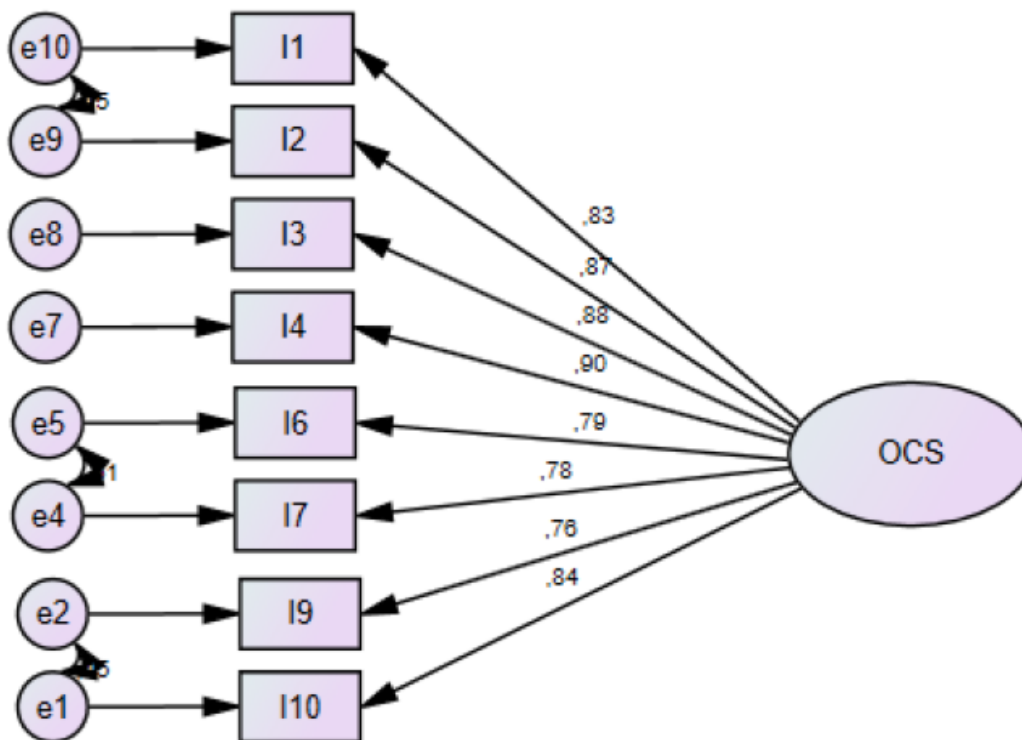

Figure 1. Satisfaction Scale (Standardized Factor Loadings)

The standardized factor loads of the scale items ranged between 0.78 - 0.90 and the t values for these factor loads were significant. In addition, the average variance extracted (AVE) values were found to be greater than 0.50 (Fornell & Larcker, 1981; Hair, Black, Babin, & Anderson, 2009). These values can be taken as evidence of convergent validity for the scale.

To determine the reliability of the scale, both construct reliability and Cronbach's alpha coefficient were calculated (Table 3). Both reliability levels were found to be greater than 0.70 for each dimension (Nunnully and Bernstein, 1994), confirming that the scale had a uni-dimensional structure.

Study II

To examine the construct validity of the scale, another confirmatory factor analysis was performed on the data collected in the 2017-2018 Spring term. After clearing the data, confirmatory factor analysis was performed with 1206 observations. The KMO value was 0.932 and the Barlett test was significant (p <0.05). Based on these values, it was found that the data could be factorized and the recommended number of samples was also met (n = 1206). As a result of the analysis, it was determined that the error and fit indices were also appropriate according to the expected criteria ($X^2(17)$ = 61.272, RMSEA = 0.046, GFI = 0.988; CFI = 0.995; NNFI = 0.992).
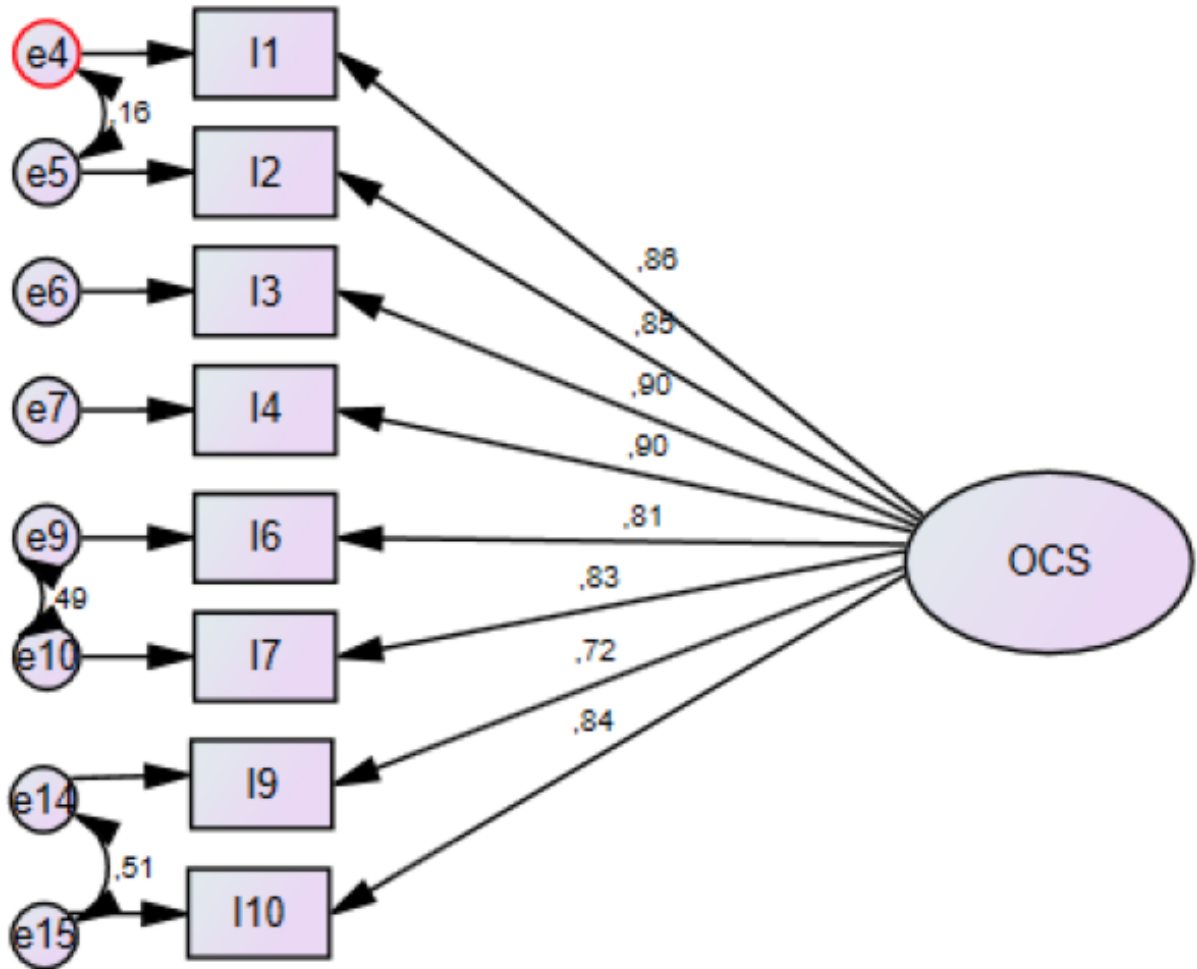
Figure 2. Satisfaction Scale (Standardized Factor Loadings)

The standardized factor loadings of the scale items ranged from 0.72 to 0.90. In addition, it was determined that the average variance extracted (AVE) values were greater than 0.50. These values can be seen as evidence of convergent validity for the scale. Both structural reliability and Cronbach's alpha coefficient were found to be greater than 0.70 (Table 3) (Nunnully and Bernstein, 1994). Based on these findings, it was confirmed that the scale was unidimensional, valid and reliable.

Table 3. Findings of Study I and Study II

Item	Kappa	Study I EFA Factor Loading	Study I EFA AVE	Study I EFA Croanbach Alpha	Study I EFA Construct Validity	Study I CFA Factor Loading	Study I CFA AVE	Study I CFA Croanbach Alpha	Study I CFA Construct Validity	Study II CFA Factor Loading	Study II CFA AVE	Study II CFA Croanbach Alpha	Study II CFA Construct Validity
Item 1	0.816	0.853				0.83				0.86			
Item 2	0.564	0.842				0.87				0.85			
Item 3	1.000	0.872				0.88				0.90			
Item 4	1.000	0.887				0.90				0.90			
Item 5*	0.129	-				-				-			
Item 6	0.564	0.839	0.701	0.938	0.949	0.79	0.693	0.951	0.947	0.81	0,706	0.952	0,950
Item 7	1.000	0.818				0.78				0.83			
Item 8*	0.129	-				-				-			
Item 9	1.000	0.708				0.76				0.72			
Item 10	0.564	0.864				0.84				0.84			

* Depending on expert opinions, these items were removed from the questionnaire.

It is important to elaborate the test with a number of methods based on evidence collection (Kelecioglu & Sahin, 2014). In this process, it is suggested to examine the group differences and their relationships with different structures along with factor analysis (Cronbach, & Meehl, 1955). From this point of view, although it is stated that gender has an effect on the satisfaction structure and there is a difference in favor of women (Gonzalez-Gomez, Guardiola, Rodriguez, & Alonso, 2012); it is expressed that gender does not have an effect on satisfaction in individuals who grew up in the millennium age (Harvey, Parahoo, & Santall, 2017). Therefore, the gender variable was examined for group comparison and independent sample t-test was performed. As a result of the analysis (Table 4) there was no statistically significant difference observed between the groups (p> 0.05). It can be said that this is evidence for the validity of test scores.

Table 4. The independent sample t-test to show gender differences in satisfaction.

	N	Mean	SD	df	t	p
Female	827	29.157	7.679	1204	-1.283	0.200
Male	379	29.791	8.578			

For the criterion validity, the relationship between computer and internet self-efficacy and satisfaction scores of the learners was also examined. After examining the normality assumption, Pearson correlation coefficient was calculated. Descriptive analysis results are shown in Table 5. It was determined that there was a statistically significant relationship between computer and internet self-efficacy and satisfaction scores of students (r = 0.302, p <0.05, Table 6). This finding is evidence for the validity of the developed scale.

Table 5. Descriptive statistics between satisfaction and Computer/Internet Self-Efficacy Scores

	N	Min Score	Max Score	$\bar{x}$	SD	Skewness	Skewness Standard Error
Satisfaction	1206	8	40	29.357	7.975	-.926	.070
Computer / Internet Self Efficacy	1179	3	15	11.137	2,705	-.812	.071

Table 6. Correlation Matrix between satisfaction and Computer/Internet Self-Efficacy Scores

		Satisfaction
Computer /Internet Self Efficacy	Pearson Correlation	,302**
	p	.000
	N	1179

CONCLUSIONS AND IMPLICATIONS

On-site online experiences are valuable learning experiences for undergraduate students to live through the online learning experiences which would definitely be a part of their professional learning journey; increase their exposure to learning materials regardless of time and space; and, to provide learning materials in various medium to address learners' variability. Thus, we need valid, reliable, and easy-to-administer instruments to report back about how online learning is experienced by undergraduate students. Furthermore higher education institutions consider student satisfaction to be one of the main factors in determining the quality of their online learning (Dziuban, et. Al, 2015; McGorry, 2003).

The purpose of this study was to develop a reliable, valid, and practical instrument to measure online students' satisfaction. The research consists of two studies. In study I, an exploratory factor analysis was conducted with 921 observations randomly chosen in the 2017-2018 Fall term. Then, confirmatory factor analysis was performed with the rest of the data (n = 664) in order to test its structure determined by Exploratory Factor Analysis. Based on the findings, one-dimensional scale scores can be said to be valid and reliable. To examine the construct validity of the scale, another confirmatory factor analysis was performed on the data

(n = 1206) collected in the 2017-2018 Spring term. Based on the findings, it was confirmed that the scale was unidimensional, valid and reliable. The finalized version of satisfaction scale, consisting of eight items, demonstrated that the scale is suitable for general use.

After the factor analysis, different evidences for construct validity were collected. First, the effect of gender on satisfaction was examined. As a result of the analysis, there was no statistically significant difference observed between the groups. The reason for this can be said that the students currently studying at the university are millennium age students. Harvey, Parahoo, and Santall (2017) also reached this conclusion in their research. Secondly, the relationship between computer and internet self-efficacy and satisfaction was examined and a medium level relationship was found. Alqurashi (2016) found a similar result in her literature review. Based on these conclusions, this scale can be used both as a quality indicator in higher education institutions for online learning and to examine undergraduate students' perception of satisfaction in online and blended learning programs.

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APPENDIX

ORLS Dimensions and Items

	Turkish	English
Item 1	Donem boyunca ogretmenlerimle etkili bicimde iletisim halinde bulunmaktan memnunum.	I am satisfied to communicate effectively with my teachers throughout the semester.
Item 2	Ogretmenlerimin derse iliskin cesitli egitsel materyallere ulasabilmem konusunda desteginden memnunum.	I am satisfied with the support of my teachers in accessing various educational materials related to the course.
Item 3	Ogretmenlerimin cevrimici ogrenme konusunda hevesli olmasindan memnunum.	I am satisfied that my teachers are enthusiastic about online learning.
Item 4	Cevrimici ortamda ogretmenlerimden geribildirim alabilmekten memnunum.	I am satisfied to receive feedback from my teachers online
Item 5*	Unitelerin belirli bir plan dahilinde acilmasindan memnunum.	I am satisfied that the units have been set up on a specific schedule.
Item 6	Unitelerin sunum sekillerinin tutarli olmasindan memnunum.	I am satisfied that the presentation of the units is consistent.
Item 7	Icerigin sunumunda kullanilan dilin acik ve anlasilir olmasindan memnunum.	I am satisfied that the language used in the presentation of the content is clear and understandable.
Item 8*	Cevrimici sistemin hizindan memnunum.	I am satisfied with the speed of the online system.
Item 9	Cevrimici sistemin kullaniminin kolay olmasindan memnunum.	I am satisfied that the online system is easy to use.
Item 10	Cevrimici ogrenme ortaminda gereksinimlerimin karsilanmasindan dolayi memnunum.	I am satisfied that my needs are met in the online learning environment.