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Research Paper

The Scale of Learning Strategies for Distance Education Students: The Study of Adaptation to Turkish

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ABSTRACT

The aim of this study is to conduct a validity and reliability study for adaptation of the scale of learning strategies (the Motivated Strategies for Learning Questionnaire) to Turkish, which was developed by Pintrich, Smith, Garcia and McKeachie (1991) and adapted by Meijs et al. (2019) for distance education students. The Scale of Learning Strategies for Distance Education Students is a scale consisting of 25 items and 5 factors (management of time and effort, complex cognitive strategies use, simple cognitive strategies use, communication with others, and academic thinking). After testing equivalance of Turkish form, the validity and reliability studies of the Scale of Learning Strategies for Distance Education Students were conducted with participation of 411 students studying in different departments of Kocaeli University in the fall semester of the 2021-2022 academic year. Confirmatory Factor Analysis (CFA) method was used for the adaptation of the scale, the significance of the differences between item average scores of the groups over and below 27% were examined with Cronbach's alpha internal consistency coefficients, corrected item-total correlations, and t-test in order to determine the relability. As a result of normality test and first CFA, the 2nd and 6th items in the time and effort management sub-dimension were excluded from the scale in accordance with expert opinions due to fact that their standardized regression coefficients were not significant (p>.05). When the fit indices were examined as a result of the analysis, the findings were as follows $\chi 2$ /sd =2.594, RMSEA= 0.064, SRMR= 0.0616, GFI= 0.894, NFI= 0.879, TLI= 0.908, CFI= 0.921 and IFI=0,922. The corrected total correlations of the scale items ranged between 0.37 and 0.68. The results of t-test applied to the scores of the groups over and below 27% were found to be significant for all items. Cronbach's alpha coefficient for the reliability of the overall scale was calculated as 0.915. Reliability for sub dimensions: Management of time and effort α=0,69; Complex cognitive strategy use α= 0,82; Simple cognitive strategy use α=0,87; Contacts with others α=0,76; Academic thinking α=0,88. A significant correlation was determined between the sub-dimensions of the scale and between the sub-dimensions and the total. According to these findings, adaption of the scale to Turkish is valid and reliable.

INTRODUCTION

Students in the education system use various learning strategies to realize their learning for their goals and be successful. For many years, there has been a lot of research on the effectiveness of learning strategies in various courses and teaching levels (Baker and Boonkit, 2004; Credé and Phillips, 2011; Erdem 2005; Weinstein and Mayer, 1986; Efe et al. 2009, Bayındır 2006, Lynch 2006, Wolters, 1999). Erdem (2005) states that students who are aware of their own learning strategy and are able to direct themselves in this regard are largely successful. When the studies on learning strategies (Duman, 2008; Güven, 2004; Hamurcu, 2002; Yeşilyurt, 2013) are examined, it is understood that most of the studies are directed towards students who learn face-to-face. When the literature was examined, no other study other than the study by Meijs et al. (2019) on learning strategies in distance education was found. Students who continue their education with distance education have differences compared to students who have face-to-face education. Individuals who learn through distance education have to take responsibility for learning and often work individually. Distance learning is a structure based on self-directed learning, leaving the responsibility for learning largely to the individual (Holmberg, 2005). Especially in distance education, the learner who does not know how to study can give up very quickly and face failures up to dropping out of school. In cases where people know how to learn, studying and learning are easier and create a sense of satisfaction (Taltekin, 2019). Determining the learning strategies of the students in distance education can help them to work more efficiently and consciously, and therefore to be successful and achieve their goals. There is various information in the literature about what the learning strategy means and how the classifications are.

Learning strategies

Learning strategies mean that students know what, how, and when they need to learn by constructing and leading their own learning (Weinstein & Mayer, 1986; Wittrock, 1986). Learning strategies are the tools that help to achieve the learning goal in the shortest time with the least effort. In other words, they are the tools that help students achieve their goals (Şahin, 2016). Mayer (1989, p.47) explained learning strategies as behaviors that are expected to affect students' information processing.

It is important for students to know how to learn the necessary knowledge and skills permanently (Weinstein & Underwood, 1985). Knowing the learning strategies in distance education will be useful for teachers and managers who provide distance education services, as it is important for students, in determining effective teaching methods and techniques and in designing the most appropriate teaching in achieving the objectives of their courses. In the examination of the studies on learning strategies, it is observed that strategies are classified in many different ways. Levin (1986) set forth a triple classification for learning strategies. These strategies are understanding, remembering, and applying strategies. Weinstein and Mayer (1986) classified learning strategies into eight different groups. They expressed their classification as basic rehearsal, complex rehearsal, basic elaboration, complex elaboration, basic organization, complex organization, comprehension monitoring, and affective strategies. Pintrich et al. (1991) divided learning strategies into two main groups: cognitive-metacognitive strategies and resource management strategies. Gagné divided learning strategies into five groups (Gagné, 1988). These strategies are: attention strategies, strategies that increase short-term memory storage, strategies that increase encoding, strategies that facilitate retrieval, and monitoring strategies. All these classifications and strategies are strategies developed for face-to-face learning. Developing learning strategies specific to students taking courses in distance education is important for distance education and students to achieve their goals. Erdem (2005) states that learners who are aware of their own learning style and can direct themselves in this regard are largely successful. Meijs et al (2019), tried to adapt the MSLQ scale to students in distance education. In this study, this scale is adapted to Turkish culture.

In terms of the effectiveness and sustainability of distance education systems, there is a need to develop and use learning strategies that can be used for students in the distance education system. When the studies on learning strategies used in distance education are also examined, it is seen that students frequently use different learning strategies such as elaboration, repetition, critical thinking and self-regulation, time and study, organizational skills, effort regulation and peer learning (Avila et al, 2020). On the other hand, Martinez (2012) classified learning strategies in distance education into three categories: Metacognitive strategies (tracking mistakes, self-management, emotion awareness), cognitive strategies (memorizing, reasoning, practice) and social strategies (explanation, communicating with natives, exploring cultural artifacts).

In distance education, students and teachers are in different physical locations. Education is provided particularly with digital technology and courses are held synchronously or asynchronously (Auld, Blumberg, & Clayton, 2010). Generally, distance education students study distance education lessons in the time left from their jobs, families, etc. (Brand- Gruwel, Camp, & Timmermans, 2016). The students who plan their own learning time and take on the responsibility of their own learning are more likely to quit or drop out of their education compared to the students who have face-to-face education (Moore & Kearsley, 2005; Lee & Choi, 2011). Determining the learning strategies of distance education students, obtaining findings on successful strategies, guiding researchers and practitioners, and helping them determine strategies can help students stay in the system and continue their education and be successful.

Today, the number of students studying via distance education is gradually increasing. Especially in times of disaster when urgent and distance education is needed, number of students in distance education increases extraordinarily. Before the Covid19 pandemic, the student profile in distance education mostly consisted of adults and working segments, while after the pandemic, students studying at all education levels, starting from primary education, had to study via distance education. Determining the learning strategies of students in distance education systems, introducing the ones that can be successful and effective for students may be important for the sustainability of these systems in the future. Determining the learning strategies used by students studying in an online environment can be beneficial for both students in this system and the institutions in question (Jacobson & Harris, 2008). Studying in such an environment requires more detailed instructional design and more self-regulation skills than formal education (Artino & Stephens, 2009).

Investigation of whether the scales that question the use of learning strategy developed for university students receiving formal education are also valid for students receiving distance education may contribute to studies on this subject. The Scale of learning strategies for students in distance education, adapted by Meijs et al. (2019), was developed to seek an answer to this need.
The aim of this study is to conduct a validity and reliability study for the adaptation of the scale of learning strategies to Turkish, developed for distance education students (Meijs et al. 2019). The Scale of Learning Strategies for Distance Education Students adapted to Turkish culture is considered important both for determining the learning strategies for distance education students and as it will form the basis for future activities and research related to the development of these strategies.

METHOD

Study Group

The validity and reliability studies of the Scale of Learning Strategies for Distance Education Students were conducted with students studying in different departments of Kocaeli University in the fall semester of the 2021-2022 academic year. Büyüköztürk (2012)

and Seçer (2015) stated that when carrying out CFA (Confirmatory Factor Analysis) for adaption studies, it should be performed with at least 300 participants for the validity of the adapted scale. In the study, 411 participants participated in the data collection process, but 15 of the total data were deleted due to extreme values. Demographic information of the students is presented in Table 1. Among the students participating in the study, 1st-grade students had at least 4 courses through distance education, 2nd grade students attended all the courses through distance education for at least 2 semesters, and 3rd and 4th grade students had all the courses through distance education for at least 3 semesters.

Table 1. Demographical information of the participants

Gender	**N**	**F(%)**	**Computer usage level**	**N**	**F(%)**
Female	314	79	Low	40	10
Male	82	21	Medium	193	49
Grade	**N**	**F(%)**	Good	122	31
1. grade	93	27	Very good	41	10
2. grade	78	23	**Internet usage level**	**N**	**F(%)**
3. grade	87	25	Low	8	2
4. grade	86	25	Medium	101	25,5
Have a computer	**N**	**F(%)**	Good	196	49,5
Yes	317	81	Very good	91	23
No	73	19	**Total**	**396**	**100**

Adaptation of the Scale to Turkish

In order to adapt the Scale of Learning Strategies for Distance Education Students, firstly permission was obtained by e-mail from the researchers who developed the scale. The English form of the scale was translated into Turkish by three linguist academicians, who had good command of English and Turkish. The scale translated into Turkish by the two linguists was translated back into English by another two linguists. After retranslation, the Turkish version of the scale was found to be similar to the English version. In order to get opinions on whether the translated scale was in complience with its language, it was sent to the experts with a form containing original items (English version), translated items (Turkish version), and sections where the suggestions of the experts can be written. For expert opinions on the scale, 2 faculty members working in the field of Computer and Instructional Technologies Education who has studies at distance education and 2 faculty members working in the department of Turkish Language Education were consulted. In addition, the experts were asked to examine the compliance of the items for the study group. The researchers re-examined the items within the scope of the feedback from the experts and the scale was finalized. At this stage, no items were excluded from the scale. In its revised form, the scale includes 25 items.

Data Collection Tool

The Scale of Learning Strategies for Distance Education Students is a scale consisting of 25 items and 5 factors (Management of time and effort (MTE), Complex cognitive strategy use (CCSU), Simple cognitive strategy use (SCSU), Contacts with others (CO) and Academic thinking (AT)) adapted by Meijs et al. (2019). The original scale is the Motivated Strategies for Learning Questionnaire (Pintrich et al.1993). The scale was developed by the National Research Center for improving Teaching and Learning strategies of college students between 1982 and 1986. The final version of the Motivated Strategies for Learning Questionnaire (MSLQ) contains 81 items consisting of two main parts: the motivation section (31 items) and a learning strategies section (50 items) (Duncan & McKeachie, 2005; McClendon, 1996; Pintrich et al., 1991, 1993). The MSLQ-B was first developed for university students in formal education. Since distance education students adopt different learning strategies than university students in formal education (Agricola, Blind, & Traas, 2012; McKenzie & Gow, 2004), factor structures suitable for distance education students were created by Meijs et al. (2019). While the MSLQ initially consisted of 9 factors, they found that a 5-factor structure is more suitable for distance education students. For example, items from one of the MSLQ-B subscales, "help-seeking and peer learning", were combined to form a single subscale, namely "communication with others" subscale. When the adaptation studies conducted in Turkey were examined, it was determined that all of the studies were for students according to face-to-face education, one was adapted at primary school level and only the motivation part was adapted (Erbil & Kocabaş, 2019), one was adapted for high school students (Erturan İlker, Aslan, & Demirhan, 2014) and two were adapted for university students (Altun & Erden, 2006; Büyüköztürk, Akgün, Özkahveci, & Demirel, 2004). Since the adapted version of the MSLQ-B created by Meijs et al. (2019) is more suitable for distance education students than the original, the adapted version was used in this study.

Motivation section (MSLQ-A) and Learning strategies section (MSLQ-B). All subscales can be used separately. This study was conducted with the learning strategies (MSLQ-B) section. Because this section specifically focuses on learning strategies that students can use while studying. The scale was applied to 2040 students enrolled in a distance education institution in the Netherlands. As a result, confirmatory and exploratory factor analyzes of the questionnaire filled out by 1154 students were performed. All items were scored on a 7-point Likert scale, ranging from 1 (strongly disagree), 4 (Neither disagree/ nor agree means undecided) and 7 (strongly agree). The researchers stated that they focused on adult distance education students in the current study because although there is an increase in the number of distance education students, the number of studies aiming to determine learning strategies for distance education students is low (Eurostat, 2016). Confirmatory factor analysis results of the questionnaire

applied were: NNFI 0.887. SRMR 0.068. RMSEA 0.057 and CFI 0.900 ($\chi 2(265.000)=744.991$, $p < .000$). The Kaiser-Meyer-Olkin statistic (KMO) of the questionnaire was 0.860 and it was interpreted as very well (Meijs et al., 2019).

As a result of the analysis, the newly prepared five subscales were categorized as follows: time and effort management (for example, I make good use of my study time for this course); use of complex cognitive strategies (for example, when reading for this course, I try to relate the material to what I already know); use of simple cognitive strategies (for example, as I study the texts for this course, I outline the material to help me organize my thoughts); communication with others (for example, I try to study with other students from this course to complete the tasks) ; and academic thinking (for example, when a theory, interpretation, or conclusion is given in lecture or reading, I try to decide whether there is good supporting evidence). The Cronbach's α coefficients of the subscales of the Scale of Learning Strategies for Distance Education Students range from 0.70 to 0.80 (Meijs et al. 2019).

DATA ANALYSIS

The reliability of the scale was tested by calculating the Cronbach's Alpha internal consistency coefficient for the overall scale and its sub-factors. Confirmatory Factor Analysis (CFA) of the data obtained from the sample was performed to determine the similarity between the structures of the scale and the original one. The purpose of CFA is not to define the factor structure, but to analyse the the extent to which the result obtained by testing all observed and unobserved variables together is consistent with the available data is to ensure that it is compatible (Özdamar, 2016). The most common problem in scale adaptation studies is which of the exploratory and confirmatory factor analysis methods to prefer. In the scale adaptation study in this research, only confirmatory factor analysis was performed on the data since it was known that the original scale had a five-factor structure. In the literature, it is stated that confirmatory factor analysis is appropriate in scale adaptation studies (Gözüm and Aksayan, 2003; Güngör, 2016).

As a result of the reliability analysis performed with all items before the confirmatory factor analysis, the Cronbach's Alpha value was found to be 0.90 and it was interpreted to have a high level of reliability (reliability for sub dimensions: Management of time and effort α=0,8; Complex cognitive strategy use α= 0,7; Simple cognitive strategy use α=0,79; Contacts with others α=0,8; Academic thinking α=0,74). The most important assumption to obtain accurate and reliable CFA results is that the data have a multivariate normal distribution. For this, the maximum likelihood estimation method was used. Thus, it was checked before the analysis process whether both the observed variables and latent variables had multiple normal distributions. In the cases where the multivariate normal distribution is violated, the Chi-square value will be high and the result will be significant and the model will be rejected even if it is correct (Ayyıldız and Cengiz, 2006). However, the probability of significant Chi-Square analysis results increases as the sample becomes larger (Büyüköztürk, Akgün, Özkahveci, Demirel, 2004). Also, in the absence of a multivariate normal distribution, the measurement errors in the model will get lower values than usual. As a result, path coefficients will have more significance value than they should be (Ayyıldız and Cengiz, 2006). Data with values in the range of +1.5 or -1.5 for skewness and kurtosis are considered to have a normal distribution (Tabachnick & Fidel, 2013). As a result of the normality analysis for the scale of learning strategies in distance education, it was determined that the scale had a normal distribution (Appendix 1: Table).
In addition, the validity, reliability, and correlations between the sub-dimensions of the final version of the scale were analyzed. In addition to the KMO value, convergent and divergent validity values were also calculated to ensure the construct validity of the scale. Convergent validity refers to the relationship between the statements in the variables and each other and the factors they constitute (Coşkun et al., 2010). In order to ensure convergent validity, CR>AVE; AVE>0.5 and CR>0.7 (AVE: average variance extracted, CR: composite reliability). Divergent validity refers to the fact that the statements related to the variables should be less related to factors other than the factor to which they belong than the factor to which they belong (Yaşlıoğlu, 2017). To ensure divergent validity, MSV (maksimum shared variance) is calculated and MSV<AVE. SPSS and AMOS software were used in the analysis of the data.

FINDINGS

Five sub-factors of the scale of learning strategies in distance education were examined. Meydan and Şeşen (2015) stated in a scale adaptation study that CFA should be done at least at two levels. For these reasons, CFA was performed twice and the findings of each step are presented in Table 2. The analysis performed by preserving the originality of the scale is presented in the first line of the table. Since the model compliance criteria obtained as a result of this analysis were not within the desired limits, the modification indices were examined. Standardized regression coefficients and fit indices values were examined. As a result of this analysis, it was decided to exclude the 2nd and 6th items in the management of time and effort sub-dimension from the scale and the analysis was repeated since their standardized regression coefficients were not significant.

After excluding two items from the analysis, the fit indices calculated as a result of the analysis for the model with 5 latent variables (factors) are presented in the second line of the Table 2. These values indicate insufficient compliance. Therefore, according to the fit values, a significant correlation was determined between the error covariances between the 22nd and 23rd, the 17th and 18th, and the 15th and 16th items (0.28, 0.47, and 0.25, respectively). This means that the item pairs are under the same latent variable and are similar to each other in meaning. It can be considered to exclude these items that measure the same feature, but the high error correlations observed between the items whose accuracy was determined by expert opinion were added to the model and the analysis continued. As a result of the analysis, when the fit indices of the model are examined, it can be said that the Chi-square value (χ^2=2.5, *sd=262, N=396, p< .001) has a good compliance and is significant, and* when the SRMR and RMSEA values and fit indices are taken into account, the model has an acceptable compliance. In the examination of Table 3 and Figure 1, it is observed that the factor loading values for all items of the scale vary between 0.43 and 0.91 and these values are significant. Other fit indices

were found to be as follows: GFI=.894, NFI=0.879, TLI=0.908, CFI=0.921 and TLI=0.908. Also, that CFI, TLI, NFI, and GFI values were above .85 indicate a good model (Büyüköztürk, Akgün, Özkahveci, Demirel, 2004). The model with the smallest value among the compared values for AIC, CAIC and ECVI is considered the best (Byrne, 2001). When the fit indices were analyzed together, it was found that all indices showed good fit.

Table 2. Fit values obtained as a result of CFA.

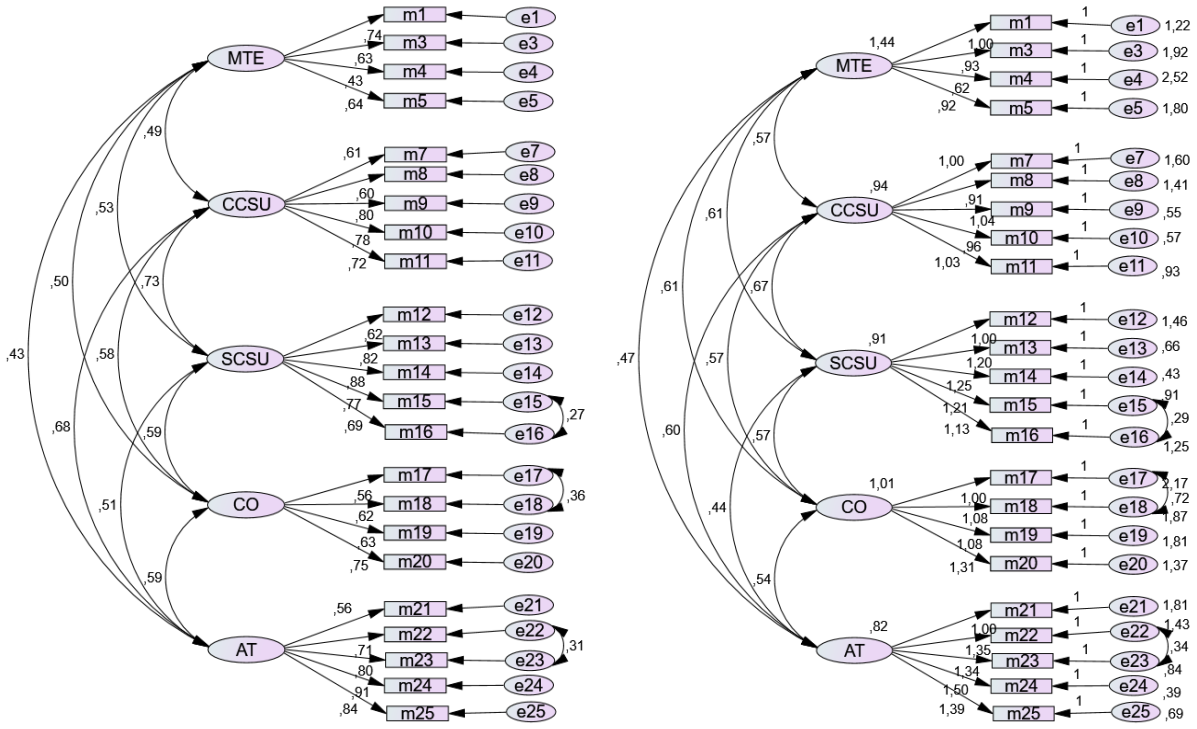
	χ^2/df	RMSEA	SRMR	CFI	TLI	NFI	GFI	AIC	CAIC	ECVI
Analysis with 25 items	654.376/262=2.498	0.62	0.0644	0.911	0.899	0.862	0.884	780.376	1094.205	1.976
Analysis with 23 items	646.809/220=2.940	0.070	0.671	0.903	0.888	0.860	0.880	758.809	1037.768	1.921
Post-modification analysis	562.901/217=2.594	0.064	0.0616	0.921	0.908	0.879	0.894	680.901	974.805	1.724

Obtained path coefficients in CFA were found to be statistically significant (Table 3). In the examination of the standardized path coefficients, it was observed that the item that had the most effect on management of time and effort was 3rd one (β_1=0.934), the 9th item in the use of complex cognitive strategies (β_1=1.037), the 14th item in the use of simple cognitive strategies (β_1=1.245), the 20th item in the communication with others (β_1=1.308) and and 24th item in academic thinking (β_1=1.505).
The critical ratio (C.R.), which is the parameter estimate divided by the standard error, should be greater than +1.96 or -1.96 at the 0.05 significance level (Khine, 2013). The closer the standard error (S.E.) value, which shows the difference between the actual value of the measured property and the observed measurement result, is to zero, the more accurate the prediction is (Office for National Statistics, 2023). The estimation results show that all parameters are statistically significant (P<0.001). S.E, C.R and P values in Table 3 provide the desired conditions.

Table 3. Standard and non-standard path coefficients obtained as a result of CFA

Items	Factors	β_0	β_1	S.E.	C.R.	P
m1	MTE	0.736	1			
m3	MTE	0.629	0.934	0.095	9.876	***
m4	MTE	0.425	0.62	0.087	7.107	***
m5	MTE	0.637	0.922	0.093	9.955	***
m7	CCSU	0.607	1			
m8	CCSU	0.596	0.912	0.093	9.807	***
m9	CCSU	0.803	1.037	0.086	12.101	***
m10	CCSU	0.778	0.964	0.081	11.871	***
m11	CCSU	0.72	1.031	0.091	11.266	***
m12	SCSU	0.619	1			
m13	SCSU	0.816	1.202	0.094	12.772	***
m14	SCSU	0.875	1.245	0.094	13.318	***
m15	SCSU	0.771	1.215	0.099	12.267	***
m16	SCSU	0.694	1.132	0.1	11.335	***
m17	CO	0.564	1			
m18	CO	0.623	1.082	0.099	10.965	***
m19	CO	0.629	1.082	0.125	8.635	***
m20	CO	0.748	1.308	0.141	9.281	***
m21	AT	0.56	1			
m22	AT	0.715	1.347	0.127	10.602	***
m23	AT	0.798	1.338	0.118	11.329	***
m24	AT	0.908	1.505	0.125	12.047	***
m25	AT	0.836	1.393	0.12	11.624	***

β_0 : Standardized path coefficients
β_1: Non-standardized path coefficients



(a) (b)

Şekil 1a. Standardized path coefficients **1b:** Non-standardized path coefficients

For the reliability of the sub-dimensions examined by CFA, Cronbach's alpha internal consistency coefficients, item-total correlations, and the significance of the differences between the factor and item average scores of the groups over and below 27% were calculated with the independent samples t-test (Table 4). As a result of the analysis, the corrected total correlations of the scale items ranged between 0,37 and 0,68. As a result of the t-test, the differences between the item average scores of the groups over and below 27% were found to be significant for all items and subscale total scores. This result shows that all items and subscales in the scale are distinctive. Cronbach's alpha coefficient for the relability of the overall scale was 0.915, and the coefficients of its subscales ranged from 0.69 to 0.88 (Table 5). The KMO value made to determine the validity of the scale was found as 0.909. It was found that all CR values calculated to ensure convergent validity were greater than AVE values, but the AVE values obtained from two sub-dimensions were close to the critical value of .50. However, it can be stated that convergent validity was achieved to a great extent with the fulfillment of other reliability criteria (Fornell and Larcker, 1981). It can be said that the MSV values in all sub-factors are smaller than the AVE values and thus divergent validity is ensured. These results demonstrate that the scale is valid and reliable.

Table 4: Cronbach's alpha internal consistency coefficients, item-total correlations, and independent sample t-test findings between the scores over and below 27% of the scale

Factors	Items	Corrected Item-Total Correlation	t (Low%27-High%27)
Management of time and effort	m1	,483	11,63
	m3	,365	8,670
	m4	,373	9,070
	m5	,434	10,810
Complex cognitive strategy use	m7	,551	12,160
	m8	,471	10,100
	m9	,617	13,008
	m10	,611	12,012
	m11	,647	15,660
Simple cognitive strategy use	m12	,638	17,690
	m13	,627	14,002
	m14	,634	14,430
	m15	,607	13,213
	m16	,583	13,089
	m17	,416	9,980

Contacts with others	m18	,491	13,289
	m19	,540	14,667
	m20	,544	14,313
Academic thinking	m21	,525	13,542
	m22	,557	14,246
	m23	,606	15,623
	m24	,682	18,136
	m25	,639	16,519

Table 5: Reliability and validity analysis (convergent and discriminant) of the scale and sub-factors

Factor	**Cronbach's alpha**	**AVE**	**CR**	**MSV**
Management of time and effort	0,688	0,39	0,71	0,37
Complex cognitive strategy use	0,818	0,5	0,83	0,45
Simple cognitive strategy use	0,865	0,58	0,87	0,45
Contacts with others	0,763	0,41	0,74	0,37
Academic thinking	0,876	0,6	0,88	0,36
The overall scale	0,915			

The dimension of the relationship between the sub-dimensions and the total of the scale and the average and standard deviation values are presented in Table 6. According to the table, a significant correlation was determined between the sub-dimensions of the scale and between the sub-dimensions and the total.

Table 6: Average and standard deviations of the scale and correlation values between factors

Factors	$\underline{x}$	**sd**	**f1**	**f2**	**f3**	**f4**	**f5**	**Total**
Management of time and effort	17,30	4,98	1	,413**	,449**	,380**	,371**	,665**
Complex cognitive strategy use	26,52	5,29		1	,643**	,456**	,575**	,808**
Simple cognitive strategy use	26,32	5,94			1	,492**	,512**	,817**
Contacts with others	17,05	5,37				1	,471**	,729**
Academic thinking	22,86	6,45					1	,789**
Total	110,04	21,44						1

**. Correlation is significant at the 0.01 level (2-tailed).

CONCLUSION AND DISCUSSION

Within the scope of this research, the "Scale of Learning Strategies for Distance Education Students", which was developed by Meijs et al. (2019), was adapted to Turkish. The scale, which has a 5-factor structure in its original form, consists of time and effort management, use of complex cognitive strategy, use of simple cognitive strategy, communication with others, and academic thinking dimensions. The participants of the scale adapted in this study were students attending formal education in a university.

The results of the study were limited to a sample group of 396 participants at the university level. The language equivalence results of the scale adapted to Turkish demonstrated that the Turkish form could be considered equivalent to the original scale except 2 items. Confirmatory factor analysis (CFA) was applied to test the structure of the scale based on the data obtained. As a result of the normality test and first CFA analysis, since the standardized regression coefficients of the 2nd and 6th items in the time and effort management sub-dimension were not found to be significant, these items were excluded from the scale in line with expert opinions. Thus, the best solution appropriate for the current data in terms of validity was found out and a 23-item scale was obtained. The results of the t-test conducted between the scores of the groups over and below 27% demonstrated that there was a significant difference for all items.

As a result of confirmatory factor analysis, in the examination of the fit indices, it was observed that the ratio of chi-square value to degrees of freedom (562.901/217=2.594) was below 5. The compliance of the scale is indicated to be good owing to the fact that A $\chi 2$ /sd value is 5 or below 5 and an RMSEA value is 8 or below 8 (Şimşek, 2007; Byrne, 1998). Other fit indices were found to be as follows: RMSEA=0.064, SRMR=0.0616, GFI=.894, AGFI=0.866, NFI=0.879, TLI=0.908, CFI=0.921 and IFI=0.922. Also, that IFI, CFI, NFI and NNFI values were above .90 indicate a good model. Besides, that AGFI was .80 or greater and AGFI was .85 or greater indicate acceptable compliance (Cokluk, Şekercioğlu, & Büyüköztürk, 2010). The calculated KMO=0.909, convergent and divergent validity values indicate that the construct validity conditions were provided. Considering these results, it can be said that the scale has acceptable fit indices.

Cronbach's alpha internal consistency coefficients were examined for consistency in the reliability of the scale. The Cronbach alpha coefficient obtained in the reliability study for the overall scale was calculated as 0.915. Reliability for sub dimensions calculated as Management of time and effort α=0,69; Complex cognitive strategy use α= 0,82; Simple cognitive strategy use α=0,87; Contacts with others α=0,76; Academic thinking α=0,88. This finding demonstrates that the scale is reliable (Büyüköztürk, 2012). According

to the table, a significant correlation was determined between the sub-dimensions of the scale and between the sub-dimensions and the total.

Although there were some differences between the original scale and the Turkish form, a structure similar to the original scale was determined. Hambleton, Merenda, and Spielberger (2005) stated that scale adaptation is not only a translation, but cultural differences can also cause such differences, and Jesus and Valente (2016) suggested that when the new target population, cultural background, country, and language are different from the culture in which the scale is developed, the scale should be adapted culturally.

Considering the publications to be carried out as this adapted scale is used and the suggestions of the researchers using this scale, it is important to apply the scale to different target groups and to continue the development studies of the scale with more participants to update the scale. In addition, it is recommended that the scores obtained from this scale be used to determine the learning strategies of students attending distance education and to conduct new studies that will contribute to the improvement of distance education studies.

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APPENDIX

Uzaktan Eğitim için Öğrenme Stratejileri Ölçeği (UE-ÖSÖ)

Zaman ve çaba yönetimi

1. Ders çalışma zamanımı iyi kullanırım.
2. Bir ders için haftalık olarak okumam gerekenleri ve ödevleri takip ettiğimden eminim.
3. Derse düzenli katılırım.
4. Ders materyalleri ilgimi çekmese ve sıkıcı olsa da, onları bitirinceye kadar çalışmaya devam ederim.

Karmaşık bilişsel strateji kullanımı

5. Bir dersle ilgili önemli kavramları hatırlamak için anahtar kelimeleri ezberlerim.
6. Bir konuyu baştan sona okumaya çalışmaktansa ondan ne öğrenmem gerektiğine karar vermeye çalışırım.
7. Ders materyalini daha önce bildiklerimle ilişkilendirmeye çalışırım.
8. Ders çalışırken hangi kavramları iyi anlamadığımı belirlemeye çalışırım.
9. Bir derste okuduklarımdan edindiğim fikirleri diğer bir dersin etkinliklerinde uygulamaya çalışırım.

Basit bilişsel strateji kullanımı

10. Ders çalışırken düşüncelerimi düzenlememi sağlayacak materyalin taslağını oluştururum.
11. Derse çalışırken, derste aldığım notları ve okunacak kaynakları tekrar tekrar okurum.
12. Ders çalışırken ders notlarımı gözden geçirir, önemli kavramların taslağını oluştururum.
13. Ders çalışırken okuma metinlerinin ana fikirlerinin ve ders notlarımın kısa bir özetini yazarım.
14. Ders için önemli maddelerin listelerini yapar, bunları ezberlerim.

Başkalarıyla iletişim

15. Ders ödevlerimi tamamlamak için diğer öğrencilerle çalışmayı denerim.
16. Birlikte dersi aldığım bir grup öğrenciyle ders materyallerini tartışmak için sık sık zaman ayırırım.
17. Eğitmenden iyi anlamadığım kavramları açıklamasını isterim.
18. Bir derste gerektiğinde yardım isteyebileceğim öğrencileri belirlemeye çalışırım.

Akademik düşünce

19. Bir ders için okuma yaparken, okumaya odaklanmaya yardımcı olacak sorular oluştururum.
20. Bir derste duyduğum veya okuduğum şeyleri inandırıcı bulup bulmadığıma karar vermek için sık sık kendimi sorgularken bulurum.
21. Derste veya okumalarda sunulan herhangi bir teori, açıklama ya da sonuç olduğunda iyi bir destekleyici kanıtının bulunup bulunmadığına karar vermeye çalışırım.
22. Ders materyalini bir başlangıç noktası olarak ele alır ve bu konuda kendi fikirlerimi geliştirmeye çalışırım.
23. Bir dersle ilgili ne zaman bir iddia ya da sonuç okusam ya da duysam, bunun olası alternatiflerini düşünürüm.