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Developing an Effective Lifelong Learning Scale (ELLS): Study of Validity & Reliability*

Etkili Yaşam Boyu Öğrenme Ölçeğinin Geliştirilmesi: Geçerlik & Güvenirlik Çalışması

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Abstract

The purpose of the present study was to develop an "Effective Lifelong Learning Scale (ELLS)" in Turkish language. The 48-item initial version of the ELLS was applied to a total of 742 (528 for EFA and 214 for CFA) student teachers. For item analysis, the results of the item loadings, the item analysis based on the correlations and the item analysis based on the difference between the upper and lower group means were evaluated together. The single-factor construct and the 33 items were obtained. The percentage of the variance that the single-factor construct was able to explain was 41.68%. The fit indices obtained (χ2/df: 3.39; RMSEA: .057; GFI: .84; AGFI: .82; RMR: .033; SRMR: .044; NFI; .97; NNFI: .98; CFI: .98) were evaluated, and the construct was confirmed to have a good fit. The Cronbach's alpha (α) internal consistency coefficient was computed to be .96. This scale is a supplementary tool for the evaluation of individuals' success in lifelong learning as well as their level of characteristics that will lead to effective lifelong learning.

Keywords: Lifelong learning, lifelong learner, scale development, validity, factor analysis.

Öz

Bu çalışmanın amacı Türkçe dilinde "Etkili Yaşam Boyu Öğrenme Ölçeği (EYBÖÖ)" geliştirmektir. EYBÖÖ'nün 48 maddelik ilk formu 742 (528 birey AFA için ve 214 birey DFA için) öğretmen adayına uygulanmıştır. Madde analizi için, madde yükleri, madde-toplam korelasyonları ve alt-üst grup ortalamaları farkları birlikte değerlendirilmiştir. Tek faktörlü 33 maddelik ölçme aracı elde edilmiştir. Tek faktörlü yapının açıklanan varyansı %41.68'dir. Uyum indeksleri (χ2/sd: 3.39; RMSEA: .057; GFI: .84; AGFI: .82; RMR: .033; SRMR: .044; NFI; .97; NNFI: .98; CFI: .98) değerlendirilmiş ve modelin iyi bir uyuma sahip olduğu doğrulanmıştır. Cronbach alfa (α) iç tutarlılık katsayısı .96 olarak hesaplanmıştır. Bu ölçek, bireyin yaşam boyu öğrenmedeki başarısını ve bireyde etkili bir yaşam boyu öğrenmeyi gerçekleştirmeyi sağlayacak özelliklerin bulunma düzeyini değerlendirmek için yardımcı bir araçtır.

Anahtar kelimeler: Yaşam boyu öğrenme, yaşam boyu öğrenen, ölçek geliştirme, geçerlik, faktör analizi.

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Introduction

Lifelong learning is defined as all the activities aimed at developing the knowledge, skills, and competences of individuals throughout their lives on the personal, social or professional levels (European Commission, 2002) and was first mentioned in the conference organized by UNESCO in 1960. In the 1970s and 1980s, theoretical and applied studies on lifelong learning were carried out by a number of researchers. The concept of lifelong learning includes formal and non-formal learning; informal, professional and technical education and all in-service and out-of-service trainings (Dunn, 2003; Merriam, Caffarella and Baumgartner, 2007). Therefore, lifelong learning could be said to occur at home, at work, at school or in any place where an individual is. Lifelong learning moves the limitations to concepts as place, time, age and socio-economic level and provides all individuals with equal opportunities (Dinevski and Dinevski, 2004). Lifelong learning not only contributes to the society but also helps individuals achieve their goals, gain a career and improve their health and well-being (Dunn, 2003). Nordstrom and Merz (2006) offer the benefits of lifelong learning such as self-fulfillment, to make new friends, to involve as active contributors to society, to find meaning in our lives, to adapt to change, to make the world a better place, to increase our wisdom, to enable us to put our lives in perpective, to create a curious and to open the mind so on.

Lifelong learning can be considered in personal, social and professional contexts (Gunuc, Odabasi and Kuzu, 2012; Livneh, 1988) and a lifelong learner fulfills all these three contexts. Individuals achieve their own personal, social and professional development through lifelong learning. In the personal context, lifelong learning aims at helping individuals perform better in their own area of interest and achieve their personal development. Individuals are exposed to various physical, psychological and sociological factors during their personal development. In the social context, lifelong learning aims at gathering a group of individuals to share information for a specific purpose. In the professional context, lifelong learning aims at developing individuals' functional knowledge to help them perform better in their profession. In this respect, it is necessary for universities to cooperate with institutions, foundations and other organizations (Dowling et al., 2004). Quite important in professional development are higher education institutions. Higher education institutions and university teaching have an important role in the processes of acquisition, spread, and application of the culture of lifelong learning (De La Harpe and Radloff, 2000; Su, Feng, Yang and Chen, 2012; Knapper and Cropley, 2000). These institutions provide opportunities and support for professional development; develop the ways for spreading information and such methods as e-learning, virtual university and Internet-based education (Dinevski and Dinevski, 2004). Therefore, the attitudes, views and positions of educational faculties that train future teachers are of great importance in terms of lifelong learning. Thus, it is important to examine the higher education process, which is the last phase of formal education. In addition, the lifelong learning measurement tool will help evaluate student teachers' levels of lifelong learning not only at the beginning of their higher education and but also after their graduation and will allow taking the necessary precautions to develop lifelong learners' characteristics (De La Harpe and Radloff, 2000).

The review of the related literature regarding the scales developed for lifelong learning revealed three outstanding studies. The most comprehensive of these studies was the "Effective Lifelong Learning Inventory" conducted by Deakin Crick, Broadfoot and Claxton (2004). For the validity-reliability study of this inventory, data were collected from 1064 students between the ages of 6 and 18 from 12 different schools. An inventory of 7 dimensions with reliability values ranging from .50 to .71 was developed.

The study conducted by Kirby, Knapper, Lamon and Egnatoff (2010) also developed a lifelong learning scale which was applied to 309 university or vocational higher education school students. Following the validity-reliability study of the scale, a five-point Likert-type scale of 14 items with a reliability of .71 was developed. Another study, which was performed by Coskun and Demirel (2010), developed a six-point Likert-type attitude scale for lifelong learning. In the validity-reliability study,

data were collected from 642 university students, and a 27-item scale with a reliability of .89 was developed.

In this study, considering the characteristics of lifelong learners, their skills, competences, attitudes and activities, the purpose was to develop an effective lifelong learning scale. In addition, it was believed that in related literature, there was a need for a scale with a high level of validity-reliability. In this respect, in the present study, the results were compared using three different statistical techniques for the analysis of the items in the scale; as a result, the robust items remained in the final scale. Thus, the present study is thought to be important. One of the studies constituting the theoretical basis of this study and developing the item pool were the study "Factors Affecting Lifelong Learning" carried out by Gunuc, Odabasi and Kuzu (2012). The measurement tool was developed as a five-point Likert-type scale. Likert-type scales are measurement tools that aim at measuring thoughts, views, beliefs and attitudes (DeVellis, 2003).

Method

Participants

The scope of the study was limited to student teachers attending education faculties. It is important to determine the effective lifelong learning levels of student teachers as they are regarded as future teachers. In addition, higher education institutions are important institutions as they help gain the characteristics of successful lifelong learners (De La Harpe and Radloff, 2000). In this respect, student teachers' lifelong learning gains are important not only for teachers' professional developments but also for the transfer of their lifelong learning characteristics to future generations.

The sample of the study was comprised of a total of 742 participants; 528 of whom were student teachers attending Anadolu University, and 214 were student teachers attending Eskişehir Osmangazi University in the academic year 2010-2011 in Turkey (Table 1). The Anadolu University data were used for exploratory factor analysis, while the Eskisehir Osmangazi Universtiy data were used for confirmatory factor analysis. The research data were collected from student teachers from a total of 10 different departments of Computer Education and Instructional Technologies, Social Studies Education, Arts and Crafts Education, German Language Teaching, English Language Teaching, Education of the Mentally-Disabled, Education of the Hearing-Impaired, Pre-School Teaching, Guidance and Psychological Counseling and Mathematics Teaching in the Education Faculties of the two universities.

Table 1.
Frequency distribution of gender and university

Gender	Anadolu University (for EFA)	Osmangazi University (for CFA)
Female	321	106
Male	173	52
Missing	34	56
Total	528	214

Table 2.
Frequency distribution of year level and university

Year level	Anadolu University (for EFA)	Osmangazi University (for CFA)	Total
Freshmen	217	90	317
Second-grade	87	44	131
Third-grade	183	47	263
Seniors	41	-	41
Missing	-	33	33
Total	528	214	742

Of all the students constituting the sample, 441 (59%) were female, 245 (33%) were male and 56 (8%) did not respond to the gender-related question (Table 1). In terms of year level; 307 (41%) were

freshmen; 131 (18%) were second-grade; 263 (35%) were third-grade; and 41 (6%) were seniors (Table 2).

Instruments

The first place of the study consisted of the development of an item pool. In forming the item-pool, literature about the factors influencing lifelong learning and the characteristics of a lifelong learner was reviewed, related measurement tools previously developed were examined, and experts and students were asked for their views (Matsunaga, 2010). While generating the item pool, individuals' lifelong learning characteristics, skills, competences, attitudes and activities were taken into consideration. Although the items were in general related to "characteristics of successful lifelong learners", these characteristics could be said to cover the skills, competencies, attitudes and activities. In addition, the items include statements which, rather than measuring whether individuals have these characteristics or not, aim at measuring the degree of putting these characteristics into practice in the lifelong learning process. Therefore, this scale is a tool that helps measure indivduals' success in lifelong learning. The following topics were considered for realizing the item-pool: to own a positive attitude towards learning, self-evaluation for learning level, to develop motivation towards learning, to manage and plan learning process, and to own skills and competences (Adams, 2007; European Commission, 2002; European Parliament, 2006; Bryce, 2006; Candy, Crebert and O'Leary, 1994; Coskun and Demirel, 2010; Cropley and Dave, 1978; Crow, 2006; De La Harpe and Radloff, 2000; Deakin Crick, Broadfoot and Claxton, 2004; Dowling et al., 2004; ELLI, 2010; Goeller, 2008; Holmes, 2002; Jarvis, 2004; Jovanova-Mitkovska and Hristovska, 2011; Kirby et al., 2010; Knapper and Cropley, 2000; Kulich, 1982; Love, 2011; OECD, 2000; Parkinson, 1999; Saisana and Cartwright, 2007; Scales, 2008; Tan and Morris, 2006).

The item-pool formed after the participating researchers finalized the items was presented to a group of linguists and field experts for their views. After the revisions made based on expert views, the ELLS was pilot-tested with a group of 10 students. The purpose of this pre-application was to reveal whether the students understood the items in the scale or not, to correct the spelling mistakes if any and to see how long it takes to respond to all the items in the scale. As a result of the feedback received, 48 items in the initial form of the ELLS were applied to the sample group for the validity and reliability study. The ELLS included five-point Likert-type gradings and was scored ranging from 1 (I completely disagree) to 5 (I completely agree). Data regarding the participants' gender, the department, and the class grades were also collected from the sample group.

Data Analysis

For the analysis of the research data, exploratory factor analysis was conducted, using the SPSS 18.0 program. The Lisrel 8.5 program was used for confirmatory factor analysis. The assumptions of the exploratory factor analysis and confirmatory factor analysis on missing data, outliers, normality, linearity and multicollinearity were first examined (Hutcheson and Sofroniou, 1999; Tabachnick and Fidell, 2007). The multicollinearity problem can occur due to a high correlation level among certain items. One way of revealing whether or not the multicollinearity problem exists is to determine the items with a correlation coefficient of .85, .90, or higher by examining the item-item correlation matrix (Field, 2005; Kline, 2005). The item-item correlations of the 48 items found in the ELLS items were examined, and the correlation coefficients of all the items were found to be lower than .90. The z-scores were calculated to find out if there were any outliers in the sample. It was suggested that the z-scores be in the range of ±3 (Hutcheson and Sofroniou, 1999), and no outliers were found in the sample. The assumption that the data came from multivariate normal structure was examined using the Bartlett's Test of Sphericity.

After computing for the descriptive statistics, the validity/reliability studies for the ELLS were conducted. For the validity analysis, the content validity, face validity and construct validity were examined. For the construct validity of the ELLS and item analysis, the results of the factor analysis, the item analysis based on correlations and the item analysis based on the difference between the upper and lower group means were evaluated together (Gorsuch, 1997; Tezbaşaran, 1996). The

method of Principal Components Analysis was used for factor analysis. The number of factors of the ELLS was determined, and the item loadings for each item were found. For the item analysis based on correlations, the item-item and item-total Pearson correlation coefficients were calculated, and the items with low correlation coefficients were determined. For the item analysis based on the difference between the upper and lower group means, the scale total scores of all the individuals in the sample were calculated and put in order from the highest to the lowest. Starting from the top extreme, 27% of the 528 individuals in the sample (n=142) constituted the top group, and from the bottom extreme, 27% of them (n=142) formed the bottom group. *t*-test analysis for independent groups was applied between these two groups, and the items were arranged from the highest to the lowest with respect to their t values. As a result of these three analyses, the number of factors was found, and the items to be included in the ELLS were determined.

The appropriateness of the construct of the ELLS obtained through exploratory factor analysis and other item analyses were tested using the confirmatory factor analysis method. The indices of χ^2 (Chi-Square Goodness of Fit), GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), CFI (Comparative Fit Index), NFI (Normed Fit Index), NNFI (Not-Normed Fit Index), RMR (Root Mean Square Residuals), SRMR (Standardized Root Mean Square Residuals) and RMSEA (Root Mean Square Error of Approximation) helped in determining the appropriateness of the model. For the reliability analysis of the items obtained as a result of these analyses, the Cronbach's Alpha (α) value, which is also called the internal-consistency coefficient, was calculated.

Results

The findings on scale development were presented in relation with the validity and reliability analyses. The findings regarding the validity analyses were presented in relation with the construct validity, as the content validity and face validity were tested based on expert views. For the construct validity, the results of the factor analysis, item analysis based on correlations and those of the item analysis based on the difference between the upper and lower group means were presented. Both the factor construct of the ELLS and the item loadings were determined in the factor analysis. The factor analysis findings were evaluated together with the finding of the item analysis based on correlations and the item analysis based on the difference between the upper and lower group means. Ultimately, the items that will remain in the final form of the ELLS were determined, and the construct of the ELLS was confirmed using the confirmatory factor analysis. The findings on the reliability of the ELLS were presented through the remaining items in the final form of the ELLS.

Exploratory Factor Analysis

To determine the factor construct of the measurement tool, exploratory factor analysis was performed on the data obtained from the initial form of the ELLS that was used on 528 students (n=528) to determine the characteristics of a lifelong learner. Johanson and Brooks (2009) suggested that 30 representative participants from the population of interest is a reasonable minimum recommendation for a pilot study with the purpose of scale development. However, they emphasized that larger samples are always better. It was suggested that there be at least 300 participants to conduct exploratory factor analysis (Field, 2005; Tabachnick and Fidell, 2007). Although the sample size was appropriate for factor analysis, the results of the Bartlett's Test of Sphericity and the value of Kaiser-Meyer-Olkin (KMO) were first examined to test the sample size before conducting the exploratory factor analysis. The KMO value helps in determinig whether the samples chosen are appropriate to obtain a factor. A KMO value higher than .50 means that factor analysis can be carried out. The higher the rate is, the better the data set is for factor analysis. In this analysis, the KMO value was calculated as .95, which could be considered as "marvelous" (Hutcheson and Sofroniou, 1999). The computed value in the Bartlett's Test of Sphericity, which was used for the same purpose was .000 [$\chi^2_{(1128)} = 12473.602$; $p < .01$]. In line with these findings, it was concluded that the data set was appropriate for exploratory factor analysis and multivariate normality can be assumed. To determine the factor construct of the ELLS, Principal Components Analysis was chosen as the factoring method, and the Varimax method among the orthogonal rotation methods was chosen as the rotation methods.

In exploratory factor analysis, there are various ways to decide on the number of factors (examining the eigenvalues, examining the scree plot graphic, examining the contributions to the variance and so on) (Brown, 2006; DeVellis, 2003; Gorsuch, 1997). In examining the eigenvalues, the criterion is to consider the factors with an eigenvalue higher than 1. However, as deciding on the number of the factors by examining only the eigenvalues results in an increase in the number of factors, it should not be used alone. Table 3 presents the eigenvalues obtained in the first phase of the exploratory factor analysis and the variance rates they explain.

Table 3.
Results of the exploratory factor analysis: Total variance explained (first)

Fac.	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.461	32.210	32.210	15.461	32.210	32.210
2	2.138	4.454	36.664	2.138	4.454	36.664
3	1.989	4.144	40.808	1.989	4.144	40.808
4	1.450	3.021	43.830	1.450	3.021	43.830
5	1.305	2.719	46.549	1.305	2.719	46.549
6	1.291	2.689	49.238	1.291	2.689	49.238
7	1.162	2.422	51.660	1.162	2.422	51.660
8	1.108	2.308	53.968	1.108	2.308	53.968
9	1.039	2.165	56.133	1.039	2.165	56.133

Table 3 shows that there are 9 factors with an eigenvalue higher than 1. There are various reasons in the related literature that are reported to be the indicators of a single-factor construct: the eigenvalue of the first factor was prominently higher than the other factors, the explained variance rates and the eigenvalues for the first factor and for the following second factor were quite different, and the second factor and all the other following factors produced very close eigenvalues and explained variance rates (Lord, 1980). Therefore, it was concluded that the ELLS had a single-factor construct. Examining the scree plot graphic presented in Figure 1, it is seen that a sharp decrease is observed in transition from the first factor to the second. In addition, according to Table 3, the fact that the other factors simply constitute a plato with eigenvalues quite close to each other supports the decision made on the single-factor scale.

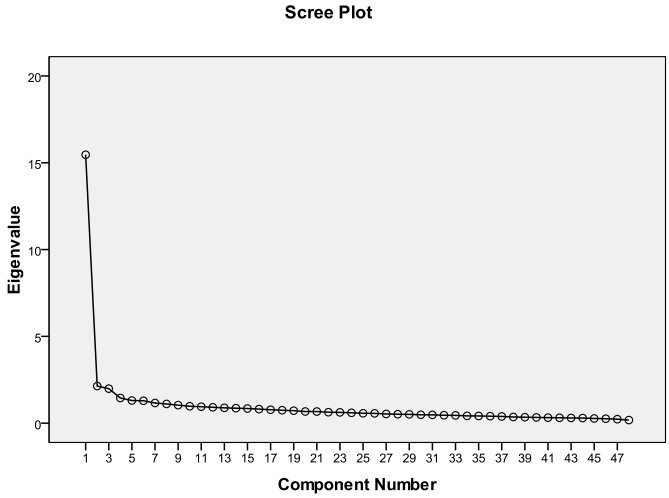

Figure 1. Scree plot graphic based on the exploratory factor analysis

Following the decision made on the single-factor scale, the number of the factors was limited to 1, and the exploratory factor analysis was repeated. Item loadings were used as a popular criterion for item deletion in the process of scale development (Worthington and Whittaker, 2006). The lower bound of the item loading was adopted to be .40 in deciding on the items that will remain in the ELLS.

The results of the analysis revealed 10 items that did not meet this criterion (1, 3, 9, 15, 22, 27, 28, 34, 37, and 41). Before excluding these items from the ELLS, the capability of the items to discriminate between the individuals who received low scores from the ELLS and those who received high scores from the ELLS was examined through the item analyses based on the difference in the upper and lower group means and on the item-item and item-total correlations.

Item analysis based on the difference in the upper and lower group means

The item analysis based on the difference in the upper and lower group means helped reveal the capability of the ELLS to discriminate between the individuals who received low scores and those who received high scores and decide on the items that will remain in the final form of the ELLS. The students (528) in the sample were arranged from highest to lowest based on their total scores in the ELLS. As a result, 142 individuals (27%) each from the upper and lower group were identified. An independent samples *t*-test was the performed to determine whether there was a significant difference between these two groups regarding the 48 items. All the items were found to be capable of discriminating between the two groups, and the discrimination capability of the items was significant (p=.000) (Table 4). The t values obtained through the *t*-test comparison of the two groups were put in order from highest to lowest, and the items with lower discrimination capability were identified.

Item analysis based on the correlations

The item analysis based on the correlations helped examine the relationship of each item in the ELLS with other items and with the item-total score. Item that were not strongly correlated with one another were excludes from the scale to preserve the validity and reliability of the ELLS (Tezbaşaran, 1996). In the related literature, it was reported that correlation values with r < .40 are considered to be low. The item-total correlation values for the 48 items are presented in Table 4. As can be seen in Table 4, the 3rd, 9th, 15th, 22nd, 27th, 34th, 37th, and 41st items had correlation values lower than .40 (r<.40). In addition, when the item-item correlation values were examined, it was seen that the 1st, 4th, 10th, 28th, 39th, 44th and 45th items had quite low correlation values among themselves and that their Pearson correlation significance levels were higher than .05 (p>.05). However, the Pearson correlation significance levels among the items should be lower than .05 (p<.05) to be considered statistically significant. The item loadings obtained as a result of factor analysis and the findings of the item analysis based on the difference in the upper and lower group means and the item analysis based on the correlations are also presented in Table 4.

Table 4.

Values regarding item loadings, item-total correlations and the difference in the upper and lower group means

Item loadings		Item-total correlations		The difference in the upper and lower group means			
Component Matrix		Item	r	Item	t	df	*p*
V18	.778	V18	.724	V12	18.678	395	.000
V25	.756	V20	.709	V13	17.261	395	.000
V20	.756	V25	.701	V18	17.095	396	.000
V30	.725	V31	.692	V25	17.018	394	.000
V31	.718	V43	.690	V46	16.137	395	.000
V43	.715	V6	.685	V33	16.04	396	.000
V6	.714	V30	.676	V47	15.939	395	.000
V16	.709	V16	.675	V6	15.804	387	.000
V24	.707	V48	.657	V43	15.7	397	.000
V21	.698	V21	.652	V16	15.508	393	.000
V48	.677	V33	.647	V20	15.308	395	.000
V13	.675	V46	.647	V31	15.214	393	.000
V46	.667	V24	.646	V21	15.18	392	.000
V35	.657	V12	.636	V48	14.921	398	.000
V12	.648	V47	.633	V30	14.638	395	.000

V47	.647	V13	.631	V17	14.613	392	.000
V7	.642	V35	.631	V11	14.531	390	.000
V33	.636	V36	.609	V24	14.486	393	.000
V36	.623	V7	.608	V32	14.297	396	.000
V17	.617	V5	.593	V36	14.108	393	.000
V42	.614	V42	.583	V26	14.046	397	.000
V5	.610	V17	.580	V8	13.336	396	.000
V29	.597	V29	.573	V14	13.324	394	.000
V32	.591	V32	.571	V29	13.227	395	.000
V11	.572	V11	.564	V5	13.205	397	.000
V26	.564	V26	.564	V7	13.185	396	.000
V38	.560	V14	.545	V35	12.965	397	.000
V14	.557	V8	.537	V42	12.623	397	.000
V23	.553	V23	.534	V45	12.527	397	.000
V19	.548	V2	.526	V44	12.36	396	.000
V8	.548	V40	.526	V23	12.245	394	.000
V2	.532	V38	.521	V40	12.162	396	.000
V40	.527	V39	.518	V10	12.092	395	.000
V39	.490	V19	.509	V28	11.971	392	.000
V45	.478	V44	.492	V39	11.653	395	.000
V44	.432	V45	.468	V2	11.649	398	.000
V4	.410	V28	.433	V38	11.532	392	.000
V10	.407	V1	.419	V1	10.879	398	.000
V28	.398	V4	.418	V41	10.824	393	.000
V1	.397	V10	.401	V4	10.254	394	.000
V41	.314	V41	.393	V19	9.984	392	.000
V3	.296	V3	.346	V3	8.773	396	.000
V27	.278	V9	.329	V9	8.326	394	.000
V9	.276	V15	.286	V15	8.204	394	.000
V15	.236	V27	.266	V27	7.09	395	.000
V37	.211	V37	.239	V37	6.928	391	.000
V34	.081	V22	.153	V22	4.678	396	.000
V22	.075	V34	.131	V34	4.51	391	.000

Evaluation of the three analysis findings

The results of the exploratory factor analysis, the item analysis based on the difference between the upper and lower group means and the item analysis based on the correlations were evaluated together. For a strong and robust construct validity of the measurement tool, the item loading should be high. In the literature, the lower bound for the item loading was determined as .30, .32 and .40 (poor loading) (Comrey and Lee, 1973; Field, 2005; Fives and Buehl, 2010; Hogarty et al., 2005; Tabachnick and Fidell, 2007; Worthington and Whittaker, 2006). However, in some cases, .45 and .50 were also reported to be acceptable cutoff criterion (Büyüköztürk, 2010; Costello and Osborne, 2005; Tabachnick and Fidell, 2007). An item loading close to +1 points to a robust construct. For a strong construct of a measurement tool as well as for its objective measurement function, the cutoff criteria of the item loading can be kept high (Costello and Osborne, 2005). For this reason and as a result of the three different analyses, the items with low values were determined, and .50 was taken as the cutoff criterion. Guided by expert opinions on this threshold value, the lowest values below the item loading of .50, the 1st, 3rd, 4th, 9th, 10th, 15th, 22nd, 27th, 28th, 34th, 37th, 39th, 41st, 44th, and 45th items were excluded from the ELLS one by one. A single factor was determined through the remaining 33 items, and factor analysis was run. The KMO value was .97, and the value derived from the Bartlett's Test of Sphericity was .000 [$\chi^2_{(528)}$ =10356.287; p < .01]. The results of this analysis are presented in Table 5.

Table 5.
Results of the exploratory factor analysis: Total variance explained (second)

Fac.	Initial Eigenvalues		Extraction Sums of Squared Loadings			
	Total	% of Variance	Total	% of Variance	Total	% of Variance
1	13.756	41.684	41.684	13.756	41.684	41.684
2	1.311	3.972	45.656			
3	1.154	3.498	49.153			
4	1.060	3.211	52.364			
5	1.020	3.092	55.456			

The ELLS was constructed on a single factor, and the contribution of the ELLS to the variance explained was 41.68% (Table 5). In the literature, it is reported for social sciences that the variance explained in single-factor constructs with a value of 30% or above is considered to be sufficient (Büyüköztürk, 2010). The findings obtained regarding the 33 items of the ELLS revealed that the item-item correlations were significant at the level of p<.01 and that the item loadings ranged between .52 and .79. Table 6 shows sample ELLS items, descriptive statistics, and item-total correlations.

Findings Regarding the Reliability Study

The reliability of the 33-items scale obtained as the final ELLS form was calculated, and the Cronbach's Alpha (α) internal consistency coefficient was found to be .96. Cronbach's Alpha (α) values higher than .90 interpret the internal consistency as being highly reliable (DeVellis, 2003). The construct of the ELLS was confirmed by the confirmatory factor analysis.

Table 6.
ELLS items, descriptive statistics, item-total correlations and item-total p-value

	Item*	Item mean	df	Item-total (r)	Item-total (*p***)
V2	I make self-evaluation on how much I learn.	3.74	0.83	.53	.000
V5	-	3.96	0.86	.61	.000
V6	-	3.97	0.84	.71	.000
V7	-	4.13	0.89	.63	.000
V8	-	3.63	0.90	.54	.000
V11	-	3.97	0.95	.58	.000
V12	I am in continuous need of learning.	3.75	0.89	.65	.000
V13	-	3.64	0.86	.63	.000
V14	I have trainings on topics which I want to improve myself.	3.73	0.95	.55	.000
V16	I make an effort for improving my competences and skills.	3.91	0.79	.69	.000
V17	I am aware of my competences and skills.	3.84	0.84	.59	.000
V18	-	4.19	0.86	.76	.000
V19	I am aware of weaknesses and strengths.	4.01	0.85	.56	.000
V20	-	4.02	0.83	.74	.000
V21	-	4.00	0.88	.69	.000
V23	-	3.76	0.87	.53	.000
V24	-	3.96	0.84	.68	.000
V25	-	3.98	0.81	.73	.000
V26	-	3.59	0.90	.58	.000
V29	-	3.92	0.81	.57	.000
V30	-	4.16	0.81	.70	.000
V31	-	4.32	0.82	.72	.000
V32	I keep a budget for personal development.	3.83	1.03	.59	.000
V33	-	3.95	0.88	.67	.000

V35	I use technologies that are coherent with my learning targets.	4.01	0.80	.66	.000
V36	-	3.84	0.82	.62	.000
V38	I perceive critics as an opportunity to improve myself.	3.71	0.91	.53	.000
V40	-	3.89	0.92	.51	.000
V42		4.13	0.93	.61	.000
V43	-	4.16	0.84	.71	.000
V46		3.86	0.83	.65	.000
V47		3.77	0.88	.65	.000
V48		3.95	0.83	.66	.000

* This scale was developed in Turkish language and some items were translated from Turkish version only for this article.
** p<.001

Results of the Confirmatory Factor Analysis

As a result of the analysis conducted, the t values regarding the capability of latent variables to explain the variables observed were found significant. The fit of the model was evaluated using the confirmatory factor analysis (n=214). When the fit indices of the measurement model were examined, it was seen that χ^2 = 1678.98 and the degree of freedom was df = 495. The rate of χ^2/df (1678.98/495) was calculated to be 3.39. A value lower than 3 indicates a good fit; a value lower than 5 but higher than 3 indicates an average fit (Kline, 2005; Sümer, 2000). As the value of chi-square (χ^2) is influenced by the sample size, it is considered sufficient only for the evaluation of the model so other fit indices were also examined.

Table 7
Evaluation of the Confirmatory Factor Analysis

Index	Good fit	Value	Rationale
χ^2 /df	χ^2 /df ≤ 5	3.39	(Sümer, 2000)
RMSEA	RMSEA ≤ .06	.057	(Hu and Bentler, 1999; Thompson, 2008)
RMR	RMR ≤ .05	.033	Brown (2006)
SRMR	SRMR ≤ .05	.044	Brown (2006)
NFI	NFI ≥ .95	.97	(Hu and Bentler, 1999; Sümer, 2000)
NNFI	NNFI ≥ .95	.98	(Hu and Bentler, 1999; Sümer, 2000)
CFI	CFI ≥ .95	.98	(Hu and Bentler, 1999; Thompson (2008)
GFI	GFI ≥ .90	.84	Hooper, Coughlan and Mullen (2008)
AGFI	AGFI ≥ .90	.82	Hooper, Coughlan and Mullen (2008)

χ^2: 1678.98; df: 495

The RMSEA index in the path diagram was also computed, and the result was .057 (Table 7). A RMSEA value lower than .06 refers to good fit. The GFI was computed to be .84, and the AGFI was .82. GFI and AGFI values of .90 or higher indicate a good fit. As the values of GFI and AGFI obtained were lower than .90, the model was considered to have a poor fit. The RMR fit index was .033, and the SRMR fit index was .044. RMR and SRMR values lower than .05 indicate a perfect fit. The other fit index values were as follows: NFI .97; NNFI and CFI .98. NFI, NNFI, and CFI values higher than .95 indicate a perfect fit. The path diagram for the model is presented in Appendix 1.

Discussion and Conclusions

In this study, an effective lifelong learning scale was originally developed and administered in the Turkish language. The items in the ELLS were related to the characteristics that an individual is supposed to have in lifelong learning and helped reveal the extent to which the individual has achieved these characteristics. Therefore, the ELLS also included the characteristics that an individual should have to be successful in lifelong learning.

These characteristics that ELLS may measure the single-factor construct include such as enthusiasm to learn, to own a positive attitude towards learning, self-evaluation for learning level, to develop motivation towards learning, and to manage and plan learning process (Adams, 2007; European Commission, 2002; European Parliament, 2006; Bryce, 2006; Candy, Crebert and O'Leary, 1994; Cropley and Dave, 1978; Crow, 2006; Dowling et al., 2004; ELLI, 2010; Goeller, 2008; Holmes, 2002; Jarvis, 2004; Knapper and Cropley, 2000; Kulich, 1982; OECD, 2000; Parkinson, 1999; Saisana and Cartwright, 2007; Scales, 2008; Tan and Morris, 2006).

The 48-item initial version of the ELLS was applied to a total of 742 (528 for EFA and 214 for CFA) student teachers. The data obtained were encoded in the SPSS program to conduct the validity study. The results of the exploratory factor analysis helped decide on the single-factor construct. For item analysis, the results of the item loadings, item analysis based on the correlations and item analysis based on the difference between the upper and lower group means were evaluated together. The breakpoint for the item loading was determined to be .50, and 15 items with values lower than .50 were excluded from the ELLS.

These 15 items excluded from the scale were found to include statements regarding certain skills, attitudes and activities related to learning activities, foreign language skills, motivation and group work. It was also seen that except for the items related to group work and foreign language skills, other items that cover the other excluded items were found in the final scale. It was also seen that 33 items remaining in the final scale still covered individuals' lifelong learning characteristics, skills, competences, attitudes and activities.

It was revealed that the item loadings on the remaining 33 items in the final form of the ELLS ranged between .52 and .79. The variance rate explained by the single-factor construct of the ELLS was 41.68%. The correlations among the 33 items in the final form of the ELLS and the correlations of these items with the total scale score were found significant ($p<.01$). The construct obtained as a result of the exploratory factor analysis was tested using the confirmatory factor analysis. The fit indices obtained (χ^2/df: 3.39; RMSEA: .057; GFI: .84; AGFI: .82; RMR: .033; SRMR: .044; NFI; .97; NNFI: .98; CFI: .98) were evaluated, and the construct was confirmed to have a good fit. Finally, the reliability study for the final form of the 33-item scale was conducted, and the Cronbach's Alpha (α) internal consistency coefficient was computed to be .96. As a result of the study, a measurement tool with high validity and high reliability was developed.

As a result of the study, "effective lifelong learning scale" with a high level of validity-reliability was developed. This scale is a supplementary tool for the evaluation of individuals' success in lifelong learning as well as their level of characteristics that will lead to effective lifelong learning. The scale will also help evaluate student teachers' strengths and weaknesses in lifelong learning.

In future studies, it is suggested that the necessary steps be taken to determine the deficiencies by identifying higher education students' lifelong learning levels and to decide what kind of settings will be made for the development of characteristics of lifelong learning.

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Appendix 1. Standardized path diagram