A Study on the Validity and Reliability of the University Placement Exam Success Scale

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ABSTRACT This paper aims to provide a scale in order to determine teachers' perspective on the *LYS* success. A 45-item scale was developed as a result of literature review. In order to check the validity and reliability, the scale was applied to 638 high school teachers working in 36 public schools in *Kocaeli*. In this paper we show that the *LYS*-success scale can be used due to its high validity and reliability assured through confirmatory and exploratory factor analysis and due to the fact that components, 12 item and 4 factors, forming the *LYS*-success scale have desired qualifications. *LYS* about the success of students, parents and administrators in the area will contribute to the development of scales.

INTRODUCTION

Today, University Placement Exam *(LYS)* is of great importance because of the fact that the future of a students' professional career depends on this exam. Students living in certain cities make very high scores in *LYS*, while in some others exam scores are low. In order to guarantee success in *LYS* understanding the factors that affect students' academic failure is of great value.

In Turkey, both for the society and the actors of the education system, it is an important issue that students are successful in the *LYS* and they are admitted to a university. University entrance exams have been continuously discussed over the past years. One of the reasons for the ongoing discussion is the eagerness that both high school students and their parents have about attending to a college, as well as the effort they make for this aim. The success level at the university entrance examination depends on various factors. Main purpose of this paper is to develop and check a scale usable for determinig teachers' perpective on the *LYS* success in Kocaeli.

Importance and Factors of Success in *LYS*

Education is the most important factor for the development of a country and the increase

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of the welfare in a society. For this reason, providing education equally across the country, between different regions, genders and urban-rural areas is essential. The state, by assuming it as its foremost task, should aim to provide a science-based, enlightening and awareness raising education system that is equally available to all citizens. Providing equal opportunity in education and integrating the education to society are requirements for being a social-state (Sarier 2010). In this context, education policies that ensure students continue from a secondary education to a higher education should be built. In Turkey, University Placement Exam which is conducted to students when they apply to become a university student can be an important source of anxiety for students, and senior students at high schools are an important risk group (Kars et al. 2014).

There has been a rapid increase in the imbalance between the demand-supply of higher education. This imbalance, creating a break between secondary and higher education, has been significantly disturbing for all segments of the society including the government officials, teachers and school administrators, parents and students (Kose 1999). In this regard, investigation of the success in *LYS* and its effecting factors and development of related measurement tools are crucial for the identification of the related problems. In the determination of factors affecting the success level in an examination, opinions of teachers are of great value. Teaching is a profession which induces efficiency in education and directs the society. The contribu-

tion of the teaching profession is immense for the protection, sustainability and enrichment of the values of society (Tanel et al. 2007).

A school is an institution established for the teaching of students and where the education facilities are performed. A school is a regulated environment where the knowledge, skills and attitudes given to a student are predetermined. These subjects are provided to students by teachers via organized training activities (Erden, 1996). According to Hanusheck (2003), factors determining the effectiveness of a teaching-learning environment and the success of a school are student-teacher ratio and experience and education levels of teachers (Mohammadi et al. 2011).

Both *LYS* candidates and their parents believe that attending an educational institution that offers better physical facilities and a better education environment is important for a better future career (Bal 2011). This is because one of the factors affecting the success of the students is the school in which they are educated. To this end, school administrations should provide students with the best learning environment. Because when researchers take the schools aim of preparing students for real-life into consideration, it becomes very important to increase the quality of education at schools. In this sense, national and international exams are of great importance (Inan and Bekler 2014).

In Turkey, overall school success is very important for the success of students in *LYS*. This is due to the fact that the high-school score directly affects the university entrance exam score of the student. On the other hand, the concept of failure is rated as a situation where the student fails in almost every class, for a very long period of time (longer than a semester) and is not able to compensate for this failure (Yasar and Belkis 2004). School failure is a complex concept with a multi-component character. Hence, using merely exam scores to evaluate the learning capacity of students in school is an inaccurate approach. When assessing a student, the teacher should also take the environmental conditions into account (Ozabaci and Acat 2005). Successes and failures of students lead the educators to focus on these issues and to understand the reasons behind them. Since education is a team work, and not just the responsibility of schools, it requires contributions from families, directorate of national education and non-gov-

ernmental organizations (Akbaba-Altun and Cakan 2004, as cited in Altun 2009). School authorities should record students' successes and failures, and use them throughout the evaluation process. Also they should use exam results to increase both their students' and schools' success level (Bilen et al. 2014).

As cited in Dursun and Dede (2004), according to Aysan, Tanriogen and Tanriogen (1996) the factors that affect students' academic failure includes, a) behavior of teacher, b)teaching methods, c) inadequate training or lack of study, d) problems related to the training environment, e) curriculum, f) psychological factors, g) family dissatisfaction, h) the relationship between the field of ongoing education and the future career, and i) problems in time management (Students inability to efficiently allocate the time between studying and other everyday activities)

In addition to those mentioned above, the number of available quotas in universities is a factor affecting the success in *LYS*. In Turkey, the gap between the number of students who wish to pursue higher education and the capacity of higher education institutions has been rapidly growing (Kose 1999). Even if students make an effort systematically, the lack of educational opportunities and the presence of a university entrance system based on an elimination mechanism leave most of the demand for higher education unmet (Barlas et al. 2010).

Educational performance of a society has to be improved in order to catch up developed countries and modern civilization. The way of this is to provide the individuals with the highest level of educational opportunities. For the development of educational policies about the resolution of problems in the education system that occur during the transition from secondary to higher education and for the enhancement of *LYS* success, teachers' opinions are very important. The aim of this study is to develop a scale for the measurement of teachers' perception on the *LYS* success.

METHOD

Research Design

This study was done with a sample group of 638 people. 62 items scale was determined after expert opinions were received regarding a scale

which was formed after litterateur review. This scale was implemented on teachers and explanatory and confirmatory factor analyses were done. The University Placement Exam (LYS) Success Scale which is secured as reliable and valid was formed.

Sample

The sample of this study is composed of 638 high school teachers working in 36 public schools in *Kocaeli* during the academic year of 2012-2013. In order to choose the sample, ''Simple Random Sampling'' method is used. This is a type of a sampling where each unit in the population is equally likely to be selected, and the selection of one unit does not affect which is selected next. In this way, this method possesses the unbiasedness property (Cingi 1990; Balci 2001; Altunisik et al. 2005).

In the sample, 50.8% of the teachers are female and 49.2% are male. 20.4%, of the sample has been working in their profession for at most 5 years, 15.7% has been working for between 6-10 years, 29.3% of them between 11-15 years and 34.6% of them has been working in their profession for more than 16 years. In addition, 62.8% of the teachers have never performed any administrative duties, 32.4% of them performed less than 5 years, 1.9% of them between 6-10 years, 1.6% of them between 11-15 years and 1.3% of the teachers performed administrative duties for more than 16 years.

Scale Development

Research Instrument and Procedure

Reviewing the literature on the development of a measurement tool and interviewing with the students, parents, teachers and school administration, the selection and arrangement of different items on the scale was accomplished. A 45-item scale was developed as a result of these studies and after a preliminary application of the scale, items with low factor loadings were excluded. With the addition of new items, a draft scale was prepared. This draft was send to 5 experts on measurement. After having had expert opinions, the draft scale was converted into a 4-factor 62-item scale. Then, the face and the content validity of the scale were examined by the experts. What the measurement tool mea-

sures, what the measurement tool can measure and what features the measurement tool measured are all decided by the experts (Balci 2001).

Validity and Reliability

For the validity and reliability studies, the scale was applied to 638 high school teachers working in 36 public schools in *Kocaeli* and by performing exploratory and confirmatory factor analyses, construct validity was examined. For assessing the reliability, Cronbach's alpha coefficient of internal consistency was used. Additionally, the Pearson product moment correlation was utilized to investigate the correlation between the scale factors. The exploratory factor analysis and the Pearson product moment correlation procedures were performed in SPSS 17.0 and confirmatory factor analysis was carried out with the help of the LISREL 8.54 software package.

In order to examine the structure of the scale, an exploratory factor analysis was performed. On the other hand, to investigate the compliance between the structure of the scale and the data, a confirmatory factor analysis was conducted.

Within the context of the adaptation of the scale, to ensure construct validity and to create sub-scales, researchers conducted an exploratory factor analysis and confirmatory factor analysis, respectively. These analyses were performed in SPSS 17.0. Overall, arithmetic mean, percentage, KMO, Barlett test, factor analysis and reliability analysis were conducted.

Factor analysis is a statistical method which aims to describe the variability among observed variables in terms of a lower number of variables (factors). Particularly, the exploratory factor analysis is based on the relationship between variables and aims to uncover the underlying structure of these variables. On the other hand, in a confirmatory factor analysis (CFA) the model-data conformity is investigated by testing the developed hypotheses about the relationship between the variables (Kline 1994; Tabachnick and Fidell 2001; as cited in Gulbahar and Buyukozturk, 2008). In a CFA, various fit indices are used. The most commonly used indices are, Chi-square test, goodness-of-Fit index (GFI), Adjusted goodness-of-Fit index (AGFI), residual mean square (RMS), and root mean square error of approximation (RMSEA).

In the literature, obtaining the (χ^2/sd) ratio smaller than 3 as a result of a CFA is rated as an indicator of a good model fit (Kline 2005; Sumer 2000; as cited in Cokluk et al. 2010). Also, to ensure the model-data conformity it is expected to have GFI and AGFI values which are greater than 90, and standardized RMS and RMSEA values which are less than 0.05. On the other hand, having GFI value which is greater than 0.85, AGFI value which is greater than 0.80 and RMS value which is less than 0.1 are accepted as a criterion for the good model fit (Anderson and Gerbing 1984; Cole 1987; Marsh et al. 1988; as cited in Duyan and Gelbal 2008).

Cronbach's alpha coefficient of internal consistency is calculated for the scales and subscales whose factor structure is determined. During the exploratory factor analysis, researchers take the following criteria into consideration: items of each factor should be consistent in terms of the meaning and the content; the eigenvalue of the factor should be at least 1; on each of the factors an item takes place, the corresponding loadings should be at least 0.40; the difference between the loadings corresponding to any two factors that an item takes place should be at least 0.1 (Buyukozturk 2009).

OBSERVATIONS AND DISCUSSION

Researchers conducted the exploratory factor analysis by taking all of the 62 scale items into account. Before starting the analysis, researchers first run a Kaiser-Meyer-Olkin (KMO) test to check the sampling adequacy and obtain a KMO measure of .713. Having a KMO value larger than 0.7, researchers convince that the data is appropriate for a factor analysis. Secondly, researchers run the Barlett's Test of Sphericity. Researchers find that the test is significant ($\div^2$ =1709.863 p=0.000) implying that the strength of the relationship among variables is strong. Overall, researchers conclude that the data is appropriate for a factor analysis. To establish the construct validity researchers run a principle component analysis (Gulbahar and Buyukozturk 2008; Usluel and Vural 2009). The factor analysis yielded 4 main factors each of which has eigenvalue greater than equal to 1. These 4 factors together explain the 57.909% of the total variance. Table 2 demonstrates the result of the factor analysis, including the eigenvalues and explained variance values for all factors.

Table 1: Factor analysis results before rotation

Items	Factor Loadings			
	1	2	3	4
s44	.567	.055	-.046	.230
s19	.489	-.389	-.276	-.193
s21	.470	.046	-.163	.114
s51	.470	.139	.308	-.029
s2	.466	-.035	.185	-.400
s8	.459	-.164	.003	-.384
s48	.459	-.205	-.093	.138
s39	.456	-.026	.002	.015
s62	.452	.327	.248	-.069
s28	.447	-.334	-.423	-.002
s35	.446	-.189	-.177	.129
s20	.443	-.302	-.179	-.136
s50	.439	-.009	-.240	.137
s59	.428	.235	-.228	.244
s27	.418	-.326	-.361	-.078
s43	.416	.084	-.403	.122
s30	.411	-.032	-.060	.129
s49	.410	.067	.312	.040
s52	.408	.179	.162	.092
s3	.406	.072	.101	-.353
s60	.406	.239	.087	.212
s40	.401	-.245	-.131	-.072
s4	.378	.022	.228	-.203
s29	.354	-.086	-.302	.091
s57	.341	.038	-.221	.249
s41	.335	.303	-.095	.321
s45	.313	-.039	.245	.254
s15	.310	-.054	-.095	-.241
s11	.308	.011	.155	-.199
s38	.289	.145	.094	.150
s54	.268	.238	.117	.149
s13	.218	.176	-.075	-.078
s7	.192	-.071	-.147	.001
s16	.024	.520	.198	-.146
s25	.129	.491	.110	-.119
s22	.168	.485	-.151	-.095
s24	.110	.445	-.165	-.247
s14	.275	-.440	-.162	.065
s53	.236	.430	-.140	.109
s61	.325	.428	.171	-.063
s12	.106	.358	.191	-.037
s18	.287	-.349	-.009	.020
s17	.245	-.343	.331	.174
s36	.178	-.337	.181	.048
s34	.174	-.325	.290	-.028
s58	.244	.278	.036	.105
s26	.175	.268	-.138	.081
s56	.110	-.251	.132	.015
s23	-.017	.210	-.038	.102
s47	.301	-.140	.496	.182
s46	.287	-.159	.457	.204
s37	.185	-.117	.436	.239
s32	.159	.219	-.394	.003
s55	.291	-.046	.389	.250
s33	.170	.319	-.367	.152
s31	.230	-.232	.258	.070
s1	.400	-.110	.138	-.416
s10	.352	-.076	.008	-.391
s9	.274	.331	.039	-.340
s6	.170	.124	.054	-.325
s42	.242	.240	-.009	.324
s5	.182	.126	.059	-.305

Explanatory factor analysis concerning 62 items trial form of scale related to factor analysis result before rotation can be seen in Table 1.

Eigenvalues Graph which was obtained from rotating explanatory factor analysis is given in Figure 1.

Fig. 1. Eigen values graph

Scale items, which are less than 0.70 in the first dimension, less than 0.60 in the second di-

mension and less than 0.80 in the third direction, were omitted from the scale. Similar statistical analysis techniques and their applications are also used in Gulbahar and Buyukozturk (2008), Usluel and Vural (2009) and Kilicer and Odabasi (2010).

Table 2: Results of the factor analysis: Eigen values and explained variances

Factor	Eigen value	Explained variance	Total variance
1	3.065	18.581	18.581
2	1.812	14.447	33.028
3	1.351	13.232	46.260
4	1.301	11.649	57.909

Factor loadings provide a concrete basis for the assessment of exploratory factor analysis results. In the current study, after performing the exploratory factor analysis researchers obtain factor loadings which range between 0.858 and 0.656. Table 3 demonstrates the factor loadings and total item correlations for LYS-success scale.

Table 3 indicates that the loading corresponding to the first factor ranges between 0.806 and 0.661. Also, items in the first factor have been observed to cluster around the sub-scale of "efforts of teachers toward students' success". The

Table 3: Factor analysis results of 12 items scale after varimax rotation

Items	Total item correlation	Factor Loadings			
		1	2	3	4
28. I guide students to develop their existing abilities via suitable field of proffession.	.710	.809			
27. I practise studies which help my students increase their self-esteem.	.737	.800			
19. I fight in order to annihilate the situations blocking LYS students' motivation.	.679	.707			
20. I prepare excellent study plan for my LYS students	.673	.661			
1. Very first aim of my school is to prepare my students for higher-education.	.487		.879		
2. Preparatory work to higher education of my students is to be the most significant agenda topic.	.412		.878		
51. Only LYS success can give back the real identity of this city.	.812		.484		
59. LYS success in Kocaeli can be possible only if the mothers are involved to the education process.	.452			.766	
43. Parents education is compulsary in order that Kocaeli becomes a city of culture.	.492			.685	
44. Local press, syndicates, private sector, artists and local leaders should hold a being voluntary teacher campaign for students' success and motivation.	.516			.682	
47. University is so sensitive for LYS success of this city.	.409				.819
46. Human relations is more prone to ability leadership than labors.	.409				.810

alpha coefficient of internal consistency, which is calculated from the scores of sub-scale of "efforts of teachers toward students' success", has been computed as 0.79.

The second factor loading ranges between 0.879 and 0.484. Items in the second factor have been observed to cluster around the sub-scale of "efforts of school administration". The alpha coefficient of internal consistency, which is calculated from the scores of sub-scale of '' efforts of school administration'', has been computed as 0.68.

The third factor loading ranges between 0.766 and 0.682. Items in the third factor have been observed to cluster around the sub-scale of "studies of social environment". The alpha coefficient of internal consistency, which is calculated from the scores of sub-scale of studies of social environment, has been computed as 0.59.

The fourth factor loading ranges between 0.819 and 0.810. Items in the fourth factor have been observed to cluster around the sub-scale of "university and education". The alpha coefficient of internal consistency which is calculated from the scores of sub-scale of "university and education", has been computed as 0.58.

Findings Related to Confirmatory Factor Analysis

Four factor 12-item structure of the original scale was tested with CFA. Confirmatory factor analysis was also done to the scale to which the explanatory factor analysis had been done.

The most common model-data conformity related statistics, estimated via confirmatory factor analysis, are Chi-square (χ^2), χ^2/sd, RMSEA, RMR, GFI and AGFI. That the calculated $\div 2$/df ratio is less than 3 and the values for GFI and AGFI are greater than 0.90, and that values for RMR and RMSEA are less than 0.05 indicate a good model-fit (Joreskog and Sorbom 1993; as cited in Cokluk et al. 2010). Moreover, the fact that GFI and AGFI is greater than 0.85 and 0.80, respectively and that the values for RMR and RMSEA are less than 0.05, can be regarded as minimally acceptable for a good model-fit (Anderson and Gerbing 1984; Cole 1987; Marsh, et al. 1988; as cited as Duyan ve Gelbal, 2008).

According to the conformity index established from the conformity factor analysis related to the applicability of the postulated model, we have model-data fit. The ratio, $\div 2$/sd=3,20 indicates a good fit (Kline 2005; Sumer 2000; as cited in Cokluk et al. 2010). When the RMSEA is analyzed, a fit of 0.074 is observed. The fact that the RMSEA is smaller than 0.05 indicates a perfect fit, whereas RMSEA smaller than 0.08 indicates a good fit (Joreskog and Sorbom 1993; as cited in: Cokluk et al. 2010). Values for GFI and AGFI indexes are seemed to be 0.94 and 0.90, respectively (Hooper, Caughlan and Mullen 2008; as cited in: Cokluk et al. 2010). CFI was found to be 0.89. The fact that values regarding to CFI and GFI, indicators of model-data fit, are greater than 0.80 shows that there is a good model-data fit (Duyan and Gelbal 2008).

The standardized path coefficients of four factors "The University Placement Exam Success Scale" is given in Figure 2.

Factor loads acquired from explanatory factor analysis were kept as high as possible. Afterwards, confirmatory factor analysis was done in order to obtain expected values of fit index. That this idea is true is supported by explained variance ratio and obtained fit index data since set points were reached at the end of the study.

It is believed that the *LYS*-success scale, which has been validated through exploratory and confirmatory factor analysis, is a remarkable contribution for todays' education system where *LYS* success is   immense in students' future career. Ministry of National Education and teachers at schools can determine the factors which affect the success firstly, and then they can suggest some methods to improve success(Guvendir 2014). In order to do this, schools can benefit from national exams such as University Placement Exam (*LYS*) into consideration while evaluating whether they have managed their aimed academic outputs besides program evaluation methods. Also this exams can be beneficial to evaluate the schools among the similar schools effectively (Bilen et al. 2014).

In particular, the *LYS*-success scale can be potentially used in the determination of teachers' perception on success in University Placement Exam (*LYS*). In this context, it can provide policy makers with valuable information which can be utilized in the development of education policies. As a future study, it is possible to develop further scales in order to measure students', families' and school administrators' perception on University Placement Exam *LYS* success.
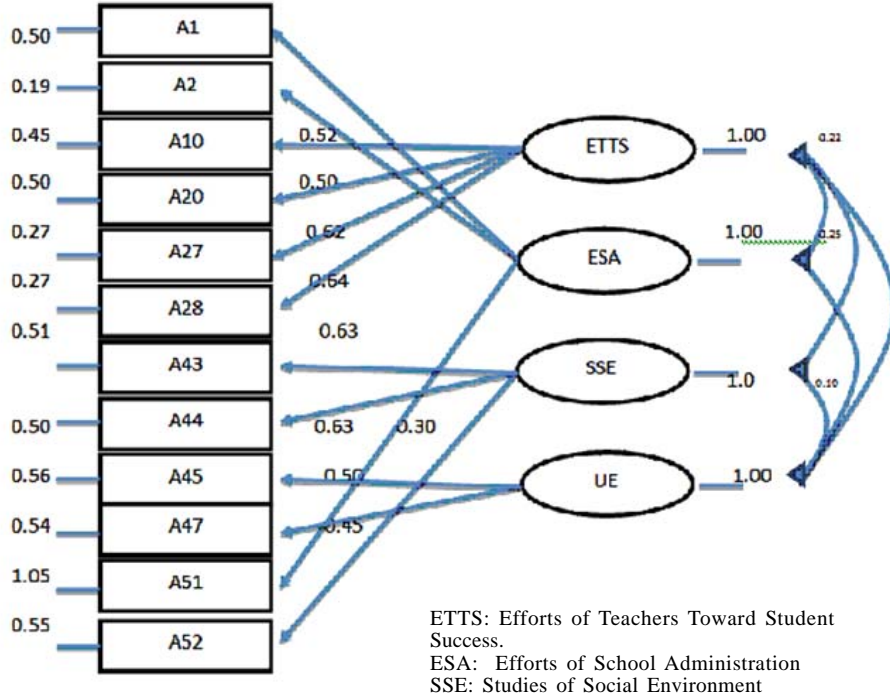
ETTS: Efforts of Teachers Toward Student Success.
ESA: Efforts of School Administration
SSE: Studies of Social Environment

Fig. 2. The standardized path coefficients of four factors.

CONCLUSION

In this paper researchers show that the *LYS*-success scale can be used due to its high validity and reliability assured through confirmatory and exploratory factor analysis and due to the fact that components, 2 item and 4 factors, forming the *LYS*-success scale have desired qualifications. While deciding on items and factors, expert opinions are received from people who work on assessment and evaluation in education concerning this topic and literature is viewed again. As a consequence, information obtained (acquired) is as below:

"Each factor in factor analysis should consist of at least two questions. That's why, when factors which are formed by one item is found, the item which forms this factor needs to be removed from analysis and analyse should be renewed."

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