

be defined that distributed leadership refers to the sharing authorities, responsibilities, duties, managerial power, and decision-making capabilities.

Distributed leadership proposes to expand its leadership borders. It means that the leaders or the groups increase the contribution by expanding the traditional network of the leadership (Bennett et al., 2003). In distributed leadership, the leaders should move away from the center of the organization and show their capacity to all of the individuals (Gronn, 2003). This kind of leadership sense does not mean that everyone in the group is a leader, it only upholds that there are people who can lead each organization and it is needed to receive support from them (Harris, 2003). Everyone in the organization may not be capable of operating the leadership activities but having the opportunity that everyone can show the leadership activities is important. The existence of valid and reliable instrument to measure all of these leadership activities is also important.

When investigations about distributed leadership had been examined, adopting and scale development studies have been found. The Turkish adaption of Distributed Inventory of Leadership (DLA) studies done by a couple of Turkish researchers. For example, Baloglu (2011) and Ozdemir (2012) adapted DLA in to Turkish which was created by Hulpe, Devos and Rosseel (2009); Korkmaz (2010) adapted the "Leadership Behaviour Inventory" created by Kouzes and Posner (2001); Tasdan and Oguz (2013) developed the "Distributed Leadership Scale for Elementary School Teachers" consisting of 53 items and 5 dimensions; Bakir (2013) developed the "Shared Leadership Scale in School Organization" and Ozer and Beycioglu (2013) developed "Shared Leadership Scale"; Sahin, Ugur, Dincel, Balikci and Karadag (2014) adapted "Distributed Leadership Scale" in to Turkish created by Davis (2009), and they expressed that Davis' (2009) scale is reliable in the adaptation study and due to lack of sufficient validity value about the original 7 dimensional form of the scale, using it as one dimensional scale would be considered appropriate.

Methodology

Research Goal

When the above studies are examined, it is seen that two of these studies have the inventory adjustments, one of them have been developed in order to scale the distributed leadership behaviors in primary schools, two of them are the distributed leadership scale development work and the other study is conducted on less than 250 sample while adapting Davis' (2009) *Distributed Leadership Scale* Which consist of 37 item scale. The purpose of the study is to adapt a scale on a larger sample unlike the methods used before, and on the teachers who works in high schools with the scale

developed by Davis (2009) by making the reliability and validity studies of the Turkish form.

Sample and Data Collection

The population of the research consists of 386 teachers working in the high schools of Tokat Province in the 2nd semester of 2013-2014 academic year. In this research, the disproportionate sampling method was used. In disproportionate sampling, a list of all the clusters in the population is prepared and enough clusters are chosen according to neutrality principle (Karasar, 2005). A list of all the high schools in the research population was prepared and selections were done from these schools according to neutrality principle. Distributed leadership scale was applied to the teachers who work in these selected schools. 33.2% of the sampling the scale was applied were female, and 66.8% were male. 10.9 % of them were between the ages of 21-30, 47.9% were between 31-40, 35.8 were between 41-50, and 5.4% of them were 51 and above. 25.1% of them had professional experience of 1-10 years, 47.2% had 11-20 years of professional experience, 27.7% had 21 years and above professional experience. Also, 48.9% of them had been working for 1-5 years, 24.9% for 6-10 years, 12.7% for 11-15 years, and 13.5 for 15 years and above.

Distributed Leadership Scale

In this study, the "Distributed Leadership Scale" prepared by Davis (2009) was used to identify the scores of distributed leadership behaviors performed at schools. Davis (2009) created this scale by compiling "Distributed Leadership Readiness Scale" prepared by Connecticut State's department of education (2004), "Teacher Leadership School Survey" prepared by Katzenmeyer & Katzenmeyer (1998), and the "School Leadership Survey" by Michigan University (2001). The scale consists of 7 sub-dimensions and 37 items. These sub-dimensions and the original reliability coefficients are school organization (Cronbach's alpha= .83), school vision (Cronbach's alpha= .79), school culture (Cronbach's alpha= .84), instructional program (Cronbach's alpha= .79), artifacts (Cronbach's alpha= .60), teacher leadership (Cronbach's alpha= .75), and principal leadership (Cronbach's alpha= .84). Following items are the examples for the sub-dimensions:

"The school's daily and weekly schedules provide time for teachers to collaborate on instructional issues" is one example for *School Organization*.

"Teachers can clearly describe the school's vision" is one example for *School Vision*.

"It is apparent that many of the teachers at my school can take leadership roles" is one example for *School Culture*.

"Teachers and administrators share accountability for students' academic performance" is one example for Instructional Program.

"Teachers use observation and evaluation feedback from the administration to improve instruction in their classroom" is one example for Artifacts.

"Teachers are interested in participating in school leadership roles" is one example for Teacher Leadership.

"The principal is knowledgeable about the school's instructional issues" is one example for Principal Leadership.

The five likert-type scaling was used with the scale. The scoring was determined as 5 - "Strongly Agree", 4 - "Agree", 3 - "Undecided", 2 - "Disagree", and 1 - "Strongly Disagree". To adapt and use the scale, Monique Whittington Davis was contacted by e-mail and necessary permissions were taken from her.

Translation and Language Validity of Distributed Leadership Scale

Translation and language validity of the Distributed Leadership Scale was achieved in three stages. English-Turkish translation for each scale item was done at the first stage. For this purpose, two academicians and one English teacher who know both languages well translated the scale items from English to Turkish. Later on considering the common points between the translated items the Turkish form of the scale was created. At the second stage the Turkish translation of the scale was controlled for meaning and structure by two Turkish language specialists, and recommended editing were done. At the third stage, the re-translations of Turkish version's scale items were done by two pedagogues who master both of the languages. The re-translated English versions and the original English versions of the scale items were checked by two English teachers, and it was seen that the scale was translated correctly. By this way, the Turkish version of the Distributed Leadership scale was prepared for pilot scheme.

Pilot Scheme

A pilot scheme of the Turkish version of Distributed Leadership Scale was done with 26 teachers to see the intelligibility of the scale items. The views of the teachers gathered during and after the application and the last version of the scale was created (e.g.: instead of the expression in item 14 which is "The teachers in my school discuss with each other to solve the problems" we used this expression which is "The teachers in my school exchange of ideas with each other to solve the problems").

Analysis of the Data

The data gathered were analyzed with the SPSS 17.0 (2008) software. For the analysis of the data, the statistical processes below were applied. The descriptive statistical analyses were used to find frequency and percentages of the demographical characteristics of the teachers in the workgroup. For the purpose of identifying the construct validity, first the exploratory factor analysis was applied, and then to test the verifiability of the structure that occur after the exploratory factor analysis, the confirmatory factor analysis was applied. The total item correlation coefficients, item distinctiveness, and Cronbach Alpha internal consistency coefficients were calculated within the scope of reliability works. The results were tested in the level of $p < .05$.

Findings

Exploratory Factor Analysis

The Kaiser-Meyer-Olkin (KMO) and Bartlett's tests of sphericity were primarily applied to determine compliance of the scale for the factor analysis. The KMO should be above .60, and Bartlett's sphericity test result should be meaningful for the compliance of the data with the factor analysis (Buyukozturk, 2014, p.136). The values obtained after the analysis (KMO = .922, Bartlett's sphericity test $\chi^2 = 8505.702$, $p = .000$) show that the data comply with the factor analysis. Basic components analysis and varimax rotation processes were done for the factor analysis. The criteria below (Buyukozturk, 2014, p. 134-136) were considered in eliminating the items that do not test the same structure and in determining the number of important factors while doing exploratory factor analysis in this research:

- The items loaded for each factor should be consistent in terms of meaning and content,
- The items should have high load values for a single factor, or the difference between the highest load value of an item for the factor and the second highest load value should be at least ".10",
- The common factor variance that the important factors give for any item should be high,
- The eigenvalue of each factor should be at least "1",
- The rate of variance given by all the items should be ".30" and higher,
- The number of the factors in which high accelerated, fast declines are seen in the line chart created according to the eigenvalues of the factors.

Table 1. The Sub Dimensions of the Distributed Leadership Scale and Item Numbers

Dimensions	Item Numbers (Davis, 2009)	Item Numbers (Researcher, 2014)
School Organization	1- 2- 3- 5- 6- 7	1- 2- 3- 5- 6- 7
School Vision	8- 9- 10- 11- 12	8- 9- 10- 11- 12
School Culture	13- 14- 15- 16- 17- 18	13- 14- 15- 17- 18- 30- 31
Instructional Program	19- 20- 21	19- 20- 21
Artifacts	22- 23- 24- 25	22- 24- 25
Teacher Leadership	26- 27- 28- 29- 30- 31	27- 28- 29
Principal Leadership	32- 33- 34- 35- 36- 37	32- 33- 34- 35- 36- 37

After the factor analysis done according to the criteria above, it was discovered that some items (16, 23, and 26) were comorbid in more than one factor by having high load values, or their factor loads were lower than .40. Therefore, these three items were excluded from the set of data, and the exploratory factor analysis was applied again. After this analysis it was discovered that the items other than the two (30 and 31) in the adapted form of the scale didn't take place under the same sub-dimensions with the original form. With another saying, after the exploratory factor analysis applied by excluding the three items, the items that group under the dimensions of school organization, school vision, school culture, instructional program, artifacts, teacher leadership, and principal leadership (excluding 30 and 31) comply with the work of Davis (2009). Although 30th and 31st items take place under the dimension of "Teacher Leadership" in the original form of the scale, they take place under the dimension of "School Culture" in this research. By identifying the items (i.30: The teacher in my school discuss their strategies and share their materials; i.31: The teachers in my school exchange ideas in solving problems and help each other) and by having the opinions of three specialists of the field, it was seen favorable that these two items take place under the dimension of "School Culture". To which dimensions the items used in the original form of the distributed leadership scale and the form it that was used in this research can be seen in Table 1.

It was discovered that the 34 items taken for the analysis gathered under the seven dimensions, the eigenvalue of which were higher than 1, and the ratio of variance which these seven dimensions express about the scale was 69.84%. When the eigenvalue and the ratio of variance for each dimension is investigated, it was discovered that, for the first dimension (School Organization), the eigenvalue and the ratio of expressing variance were 2.37 and 6.97 %, respectively, and these values were 1.76 and 5.19 % for the second dimension (School Vision), 1.57 and 4.63 % for the third dimension (School Culture), 1.48 and 4.36 % for the fourth dimension (Instructional Program), 1.23 and 3.60 % for the fifth dimension (Artifacts), 1.03 and 3.03 % for the sixth dimension (Teacher Leadership), and 13.32 and 39.18 % for the seventh dimension (Principal Leadership). Buyukozturk (2014) states that the total ratio of variance expressed by the

factors of the multi-dimensional scales can be regarded as satisfactory if it is between 40 % and 60 %. In this case it can be said that the total ratio of variance (69.84 %) expressed for the distributed leadership scale is at a satisfactory level. The line chart drawn according to the eigenvalues is shown on Figure 1, and the results of the exploratory factor analysis that were obtained by excluding the necessary items from the data set are shown on Table 2.

Table 2. The Results of the Exploratory Factor Analysis for the Distributed Leadership Scale

Sub Dimension	Items	Factor Load
School Organization	i3	.76
	i5	.73
	i4	.72
	i6	.69
	i2	.58
	i1	.56
	i7	.56
School Vision	i9	.81
	i8	.72
	i12	.69
	i11	.65
School Culture	i10	.65
	i14	.81
	i18	.74
	i17	.71
	i31	.70
	i15	.64
Instructional Program	i30	.58
	i13	.56
	i21	.78
Artifacts	i20	.72
	i19	.53
	i22	.49
Teacher Leadership	i25	.40
	i24	.40
	i28	.81
Principal Leadership	i27	.76
	i29	.64
	i34	.81
	i33	.78
	i37	.78
	i35	.78
	i36	.77
	i32	.68

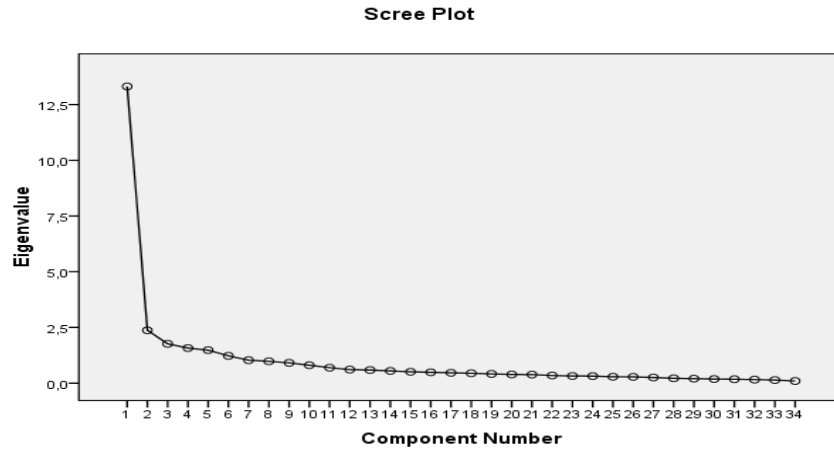


Figure 1. The Eigenvalue Line Chart about the Distributed Leadership Scale

At the end of the exploratory factor analysis, it was discovered that the factor loads for school organization consisted of 7 items higher than .56, the ones for School vision consisted of 5 items higher than .65, the ones for School culture consisted of 7 items .56, the ones for Instructional program consisted of 3 item higher than .53, the ones for Artifacts consisted of 3 items higher than .40, the ones for Teacher leadership consisted of 3 items higher than .64, and the ones for Principal leadership consisted of 6 items higher than .68 .

In order to be sure the correctness of the seven-factored structure emerging as a result of exploratory factor analysis, parallel analysis has been carried out. Findings are summarized in the table below.

Table 3. The findings obtained from the Parallel Analysis

Factor Names	Real-Data Eigenvalues	Random-Data Eigenvalues Mean	%95 Percentile
Principal Leadership	13.317	9.389014	7.998347
School Organization	2.371	1.654623	1.723442
School Vision	1.764	1.534224	1.528763
School Culture	1.574	1.312356	1.335635
Instructional Program	1.481	1.205678	1.240120
Artifacts	1.235	1.081236	1.119882
Teacher Leadership	1.031	.965724	1.003412

As it can be understood from the table above, it can be seen that the real eigenvalues obtained from the original data are higher than average and %95

eigenvalues derived from the coincidence data set. O'Connor (2000) states that being higher of eigenvalues calculated from real data than eigenvalues calculated from coincidence data denotes that the number of the factor obtained from original data is correct. In this case, it has been decided that seven-factored structure obtained as a result of exploratory factor analysis is true.

Item Analysis

The distributed leadership scale consists of 34 items with 7 dimensions. At this stage, the scale was investigated with two different methods of analysis regarding the item qualifications. These are: the item analysis based on the total item correlation, and the item analysis based on the difference of upper - lower groups. The results of the analyses are as follows.

Item Analysis Based on the Total Correlation of Items

The coefficients of correlation between the item scores of each item in the scale and the scale score consisting of the total score of all the items in the scale are calculated. The correlation coefficients between the total item score for each item and the scale score alter between .40 (m4) and .72 (m11, m36), and they are statistically significant at the level of .05.

Distinctiveness of Items

For the purpose of specifying how much qualified the Distributed Leadership Scale is in distinguishing the individuals regarding the specification it measures, an item analysis based on the difference of averages between the groups of upper 27 % and the lower 27 % which were determined according to the total score of the scale was done. With regard to this, the given answers in the scale were collected, and they were ordered from higher scores to lowers. From the sampling consisting of 386 individuals, the 105

individuals who had the highest scores were coded as higher group, and the 105 individuals who had the lowest scores were coded as the lower group. According to the coding done, the difference between the averages of the scores obtained from the lower group and the averages of the scores obtained from the higher group for each item was analyzed by using t-test for independent groups. The results of analysis are shown on Table 3.

Table 4. The t-test Result for the Averages of Higher-Lower Groups

Groups	N	Ort	Ss	df	sd	t	p
Higher Group	105	138.79	10.09	208	3	36.68	.000*
Lower Group	105	85.72	10.90				

*p<0.05

As it is seen on Table 4, there is a statistically meaningful relationship between the higher group and lower group.

Reliability

The reliability coefficients of the distributed leadership scale were calculated, and they compared to the values in the original form of the scale. The results are shown on Table 5.

Table 5. Comparing the Reliability Coefficients Based on the Dimensions of the Distributed Leadership Scale

Dimensions	Davis (2009)	Researcher (2014)
School Organization	.83	.85
School Vision	.79	.87
School Culture	.84	.82
Instructional Program	.79	.82
Artifacts	.60	.75
Teacher Leadership	.75	.78
Principal Leadership	.84	.92
Total of the Scale	.95	.95

p<.05

As it is seen on Table 5, the reliability coefficients calculated in this research comply with the coefficients Davis (2009) expresses. According to the data of this research the Cronbach's alpha value of the almost all of the scale is .95. It was also observed that the Cronbach's alpha values of the dimensions of the scale are between .75 and .92. The Cronbach's alpha value

being above .60 is an acceptable result (Gall and Borg, 1996). In addition, Ozdamar (2004) states that the Cronbach's alpha value being below 0,40 shows that the scale is not reliable, and being above 0,80 shows that the scale is highly reliable. Regarding this, it can be said that the reliability of the whole scale and its sub dimensions is high.

Confirmatory Factor Analysis

To which extent the distinctive factor structure of the distributed leadership scale consisting of seven dimensions is valid for the Turkish teachers was identified with the "Confirmatory Factor Analysis". In the confirmatory factor analysis, proving of a predetermined hypothesis, theory, or a model about the interrelation between the variables is a matter of discussion, and it is one of the basic methods used in investigating construct validity (Kline, 2000; Tabachnick and Fidell, 2001). Confirmatory factor analysis is method of identifying validity used in adapting the measuring tools that were created especially in other cultures and samplings. According to Sumer (2000), Confirmatory factor analysis is an analysis that is supported by a theoretical basis, and is based on evaluating how much the factors that consist of numerous variables comply with the real values. In confirmatory factor analysis, a large number of fit indexes are used to evaluate the factorial structure of the scale. In this study, Goodness of Fit Index, (GFI), Root Mean Square Residuals, (RMR or RMS) and Root Mean Square Error of Approximation, (RMSEA), Normed Fit Index, (NFI), Non-Normed Fit Index, (NNFI), and Comparative Fit Index, (CFI) were used. The fit indexes to evaluate the validity of the scale's structure are shown on Table 6.

At the end of the analysis done, the RMSEA value about the conformity of the model was found as .08. The RMSEA value being lower than .05 indicates that it is in good level, being lower than .08 indicates that it is in an acceptable level (Tabachnick and Fidell, 2001). Regarding this, the value of .08 is an acceptable level. It is seen that the (χ^2/df) ratio of the seven-factor model is $1989.41/506 = 3.93$. The χ^2/df ratio being two and lower than two indicates that there is good conformity in literature, but Sumer (200) states that the values lower than 5 are also acceptable (Kline, 2005). In this sense the ratio of χ^2/df (3.93) is at an acceptable level. For a model, the CFI, NFI, NNFI and GFI values being higher than .90 indicates that it is at an acceptable level, and being above .95 indicates that it is in good level (Tabachnick and Fidell, 2001). Besides, Kayri and Gunuc (2009) state that .70 is a threshold value. In this

Table 6. Fit Indexes of the Confirmatory Factor Analysis

Model	χ^2	χ^2/sd	RMSEA	RMR	CFI	NFI	NNFI	GFI
DLS (7 dimensions)	1989.41	3,93	.08	.08	.95	.94	.95	.77

p<.05

ratio is 3.93, CFI, NNFI values are .95, NFI value is .94, and GFI value is .77, the values obtained with the study are at an acceptable level. The Path Diagram of the seven-factor structure is given on Figure 2.

Discussion, Results and Suggestions

In this study, adapting the Distributed Leadership Scale to Turkish is aimed. The adaptation process started with the translation of the scale from the resource language to the target language, the last version of the scale was tried to be created by the linguistic validity studies and the former pilot study before the application. In addition, in various stages of the adaptation process, the opinions of specialists were utilized. Consequently, the scale was applied to a workgroup consisting of 386 participants, and analyses were done by using the data obtained. The Exploratory factor analysis results done to specify the factor structure of the scale showed that the scale is formed by a seven-dimension structure. The original form of the scale has also a seven-dimension structure. In this sense, this finding shows that the factor structure of the scale's original form and that of the one adapted to Turkish are overlapping. Sahin, Ugur, Dincel and Karadag (2014) studied the adaptation of Davis's (2009) Distributed Leadership Scale into Turkish on a minor sample. In their study, they found that the scale was reliable but has insufficient proofs of validation. So they stated that the scale must be used as one-dimensional scale. Sahin and his friends (2014) also reported that the results of the confirmatory factor analysis such as (RMSEA = .068; GFI = .78; AGFI = .74; CFI = .90). In the current study, it is seen that the number of samplings is increased, and meeting the criteria that requires the number of samplings to be more than 250 for over 30 items, it is suitable for the criteria values of the table named as the 'characteristics of different fit indices demonstrating goodness-of-fit across different model situations' (Hair, Black, Babin and Anderson, 2013). Therefore, the seven-factored structure revealed by the EFA (Exploratory Factor Analysis) for this study is verified by the CFA (Confirmatory Factor Analysis).

The Confirmatory Factor Analysis results done to prove the factor structure that revealed after the Exploratory Factor Analysis indicate that the scale has an acceptable fitting goodness, however, they also indicate that some of the fit indexes (ex: GFI) are at lower levels, but still being above the threshold value. Consequently, the Distributed Leadership Scale was found as consisting of 34 items under 7 sub dimensions. The total ratio of variance these 7 sub dimensions express is 69.84 %. Buyukozturk (2014) states that the total ratio of variance the factors express in multi-factor structured scales can be sufficient if it is between 40% and 60%. According to this, the amount of expressing the total variance given for the Distributed Leadership Scale (69.84%) can be regarded as in good level. The

dimension of "School Organization" consists of 7 items, "School Vision" consists of 5, "School Culture" consists of 7, "Instructional Program" consists of 3, "Artifacts" consist of 3, "Teacher Leadership" consists of 3, and "Principal Leadership" consists of 6 items. The factor load values of the scale items vary between .56 and .76 in the dimension of "School Organization", .65 and .81 in "School Vision", .56 and .81 in "School Culture", .53 and .78 in "Instructional Program", .40 and .49 in "Artifacts", .64 and .84 in "Teacher Leadership", and .68 and .81 in "Principal Leadership". To test the reliability of the scores obtained from the scale, the internal consistency coefficient, total item correlation and item distinctiveness were investigated. According to this, the internal consistency coefficient varies between .75 and .92 in the sub dimensions, and the internal-consistency score calculated for the whole scale is .95. In addition, the total item correlations of the 7 items forming the dimension of "School Organization" vary between .40 and .60, of the 5 items forming the dimension of "School Vision" between .55 and .72, of the 7 items forming the "School Culture" vary between .46 and .57, of the 3 items forming the "Instructional Program" between .61 and .64, of the 3 items forming the "Artifacts" between .63 and .67, of the 3 items forming the "Teacher Leadership" between .53 and .61, and of the 6 items forming the "Principal Leadership" between .57 and .72. Buyukozturk (2014) state that the total item correlation being higher than .30 and above shows that the power of distinctiveness of the items is higher. With regard to this, it can be said that the power of distinctiveness of the current scale's is also higher.

At the end of the research, a valid and reliable scale consisting of 34 items in 7 dimensions was created for the purpose of finding the scores of distributed leadership behaviors seen in schools. When the related literature was investigated, the scales created or adapted for identifying the capacity of the distributed leadership behaviors in the schools in the country were seen. In this sense, the scale adapted to target language in the scope of the related research is thought to contribute to the literature. Besides, regarding that the scale was adapted from a different language and culture, it can be recommended for the researchers who will use the Distributed Leadership Scale in various sampling groups that they create new validity and reliability findings about the scale. In this study, to investigate the factor structure of the scale the Exploratory Factor Analysis and Confirmatory Factor Analysis were applied on the data sets that were gathered from the same sampling. This case can be regarded as a restriction of the study. As it presented further evidence for the validity of the factor structure obtained with the Exploratory Factor Analysis, the Confirmatory Factor Analysis was applied.

The current study has some implications for further studies: first, for this study we collected data from high school teachers. So, data for future research can be

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