Development of Teacher Feedback Use Evaluation Scale

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Abstract

Feedback is an important factor used in learning and teaching process. The effective use of feedback by teachers fosters learning. Therefore, it plays a crucial role to evaluate the feedback system of teachers according to students' views. As a result, valid and reliable instruments are required in this process. This study aimed to develop a scale to evaluate teachers' feedback usage according to high school students' views. A trial form of 44 items in Likert-type was prepared and applied in the fall semester of the 2016-2017 academic year. The validity and reliability of the scale was conducted on the data obtained from 220 high school students selected by convenience sampling. Explanatory factor analysis was conducted to prove the construct validity of the scale. Confirmatory Factor Analysis (CFA) was conducted to impose the structure on the data. The KMO Kaiser-Meyer-Olkin value was obtained as 0.87. The value of Cronbach alpha calculated for reliability was 0.84 for this study. In the confirmatory factor analysis, it was found that the values of the "Teacher Feedback Evaluation Scale" were acceptable ($\chi 2$ / df = 2,05; RMSEA = .069; CFI = .90; RMR = .08). When the values of the other goodness of fit of the Feedback Evaluation Scale were examined, the values were obtained as GFI = .84, AGFI = .81, NNFI = .89. Findings related to the validity and reliability show that the scale is a valid and reliable measurement tool.

Key words: Feedback, learning, reliability, scale development, validity

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INTRODUCTION

Learning is a complex and dynamic process. On the other hand, learning is not only transmission of knowledge and many concepts affect the learning process. Feedback is one of the important concepts improving the learning experiences of students (Askew, 2000). Feedback is a way of informing learners about their performance (Sadler, 1998). It refers to the structures which help students learn effectively and analyze their own learning processes (Kangalgil, 2013). Shute (2008) defines feedback as communicative information given to students to think and correct their behaviors in order to improve their learning. In this context, feedback is the message that regulates students' thinking and behavior.

Feedback is an issue which has been studied extensively in the educational settings and which has a significant impact on student learning (Hattie & Timperley, 2007; Shute, 2008; Burkšaitienė, 2012; Naylor et al., 2014). Sadler (1998) stated that learning is accelerated and improved with the feedback given to students. In addition, feedback plays a crucial role in individualization of learning process (Nottingham & Nottingham, 2017). Moreover teachers can make curricular decisions in terms of diagnosis and improvement in classroom environment and students use feedback to monitor the strengths or weaknesses of their performance (Sadler, 1998).

In some cases, students can perceive feedback as a threat, as a personal attack or as a factor threating their ego, and therefore they can reject the feedback they receive (Cannon & Witherspoon, 2005). Moreover, while students can be sometimes satisfied with the evaluation of their performance, in some cases they may be dissatisfied with the amount or quality of the feedback. All these elements are important for students' learning. Therefore, feedback given to students should not be given arbitrarily and should be given in such a way that supports learning (Orrell, 2006) and contributes to the learning process (Cannon & Witherspoon, 2005). In this context, feedback should be effective, appropriate for the purpose and given correctly.

The feedback given to students is complex and can be difficult for students to understand. Therefore, students should be able to make sense of the feedback given to them. In this way, it is possible for students to organize their own performances (Nicol & Macfarlane-Dick, 2006). As a result, feedback should be arranged, transmitted and formed in a way that enables students to participate actively in the learning process (Havnes et al., 2012). In other words, feedback should be given effectively to support the learning process.

It is stated that an effective feedback should be clear and understandable, appropriate for the purpose, motivating the student, stimulating the students' pre-learning and filling the knowledge gaps of students (Burkšaitienė, 2012). Naylor et al. (2014) emphasized that an effective feedback has a significant role on the quality of the learning process as well as increasing student motivation.

Sadler (1989) stated that in order to benefit from feedback academically, students should know the following three conditions:

- To know what good performance is (students need to know what the intended purpose and standards are)

- The relationship between the current performance of the students and the good performance (For this, the students should be able to compare the current performance with the good and the required performance)

- Knowing what should be done to fill the gap between the current performance and the required performance

Nicol and Macfarlane-Dick, (2006) stated that effective feedback should have the following characteristics:

- It helps explain what performance should be (goals, criteria, and expected standards)

- It helps students develop self-assessment skills in learning.

- It provides students with qualified information about their learning.

- It helps students and individuals in the class to make comments and criticism about performance.

- It provides the development of beliefs and self-esteem about positive motivation in students.

- It helps students close the gap between the current performance and the desired performance.

- It provides useful information to students to shape the teaching process.

In this context, students should clearly know what the evaluation criteria are in the evaluation process conducted by the teacher, his/her friends or by themselves. Similarly, Brown and Knight (1994) emphasized that the evaluation criteria should be clearly defined for the feedback to be meaningful and valuable. In addition, feedback should be given in a way that students can have information about the level of their performance and can understand how they can develop themselves (Sendziuk, 2010) and can see the positive aspects of feedback directly. In order to do this, the tasks given to students should be divided into stages and feedback should be given about the most important stage or task. On the contrary, feedback should not be given for each stage and students should know how feedback helps them in the learning process (Spiller, 2009).

The feedback given to the students should be meaningful for students, be used by the student and include some information. More importantly, students should have some assessment skills like their teachers by comparing their performances with a specific performance in line with the feedback they receive. Therefore, teachers need to focus on developing self-assessment skills of the students as well as the quality of the feedback they give (Yorke, 2003). In the light of these data, it is seen how important the feedback is in terms of learning.

In the literature, it is seen that generally oral and written feedback are used in the feedback system. Oral feedback is among the most regular and interactive form of feedback, which helps learners know what they need to do to move forward with their work. Oral feedback is considered as a natural part of verbal interaction between students and teachers, or students and students (Yang, Badger and Yu, 2006). In contrast to oral feedback, written feedback is considered as optional as it is slightly different from oral feedback. Written feedback requires written comments and a correction of a different kind. It is usually not immediate and the teacher has time to think about how to give feedback and on what. As a result, the strategies used for oral and written feedback differ (Book, 1985). Ramsden and Entwistle (1981) developed the *"Course Perceptions Questionnaire (CPQ)"* to measure the experiences of British students in particular degree programmes and departments. Gibbs, Habeshaw and Habeshaw emphasized that this measurement toll could be used for teaching evaluation and course review (Cited in. Richardson, 2005). Ramsden (1991) developed the *"Course Experience Questionnaire (CEQ)"*, to determine the quality of teaching. In their study Koka and Hein (2003) developed the Perceptions of Teacher's Feedback (PTF) questionnaire by revising previously used feedback categories in the sport domain. The scale was developed specifically for the field of physical education. McCarty (2015) indicated that audio for feedback delivery is a popular tool in higher education. Beydoğan (2016) developed the feedback correction perception scale for teacher candidates. Kara, Kazak and Aşçı (2018) examined the validity and reliability of Turkish version of the "Perceived Teacher Feedback Scale", which has been developed in by Koka and Hein in 2003. On the other hand, Richardson (2005) stated that student feedback can be obtained in many ways besides administration of formal questionnaires. For this purpose, casual comments can be made inside or

outside the classroom and meetings of staff–student committees can be hold. In addition Day (1995), as a feedback technique, group discussion has distinctive strengths. It provides opportunities for revealing the issues in depth.

Based on these data, it can be concluded that the measurement tools used for feedback are limited. On the other hand, measurement tools are required to evaluate the teachers' feedback usage in the classroom environment to support the learning process and improve the teaching practices. Within this context, this study aims to develop a valid and reliable measurement tool that will help to evaluate the feedback system used by teachers according to high school students' views. It is thought that the scale will improve the effectiveness and efficiency of teaching by evaluating the feedback system of the teachers according to high school students' views. In the light of the obtained data, it is aimed to obtain a valid and reliable tool which will be used in the following studies on feedback.

METHODOLOGY

Participants

The participants of the study consisted of 220 high school students studying at a state school in Bilecik Province, Turkey in the fall semester of 2016-2017 academic year. To determine the participants, convenience sampling, which is one of the purposeful sampling methods, was used. This method gives speed and practicality to the research (Yıldırım and Şimşek, 2006). The participants consisted of 104 female and 116 male students. Moreover, 33 of the students were at 9th grade, 89 students were at 10th grade, 66 students were at 11th grade and 32 students were at 12th grade.

Procedure

In the scale development process, firstly the literature was reviewed on feedback concept and the related studies were examined in order to develop a reliable scale. In this way, a general framework for feedback was formed. Moreover, two expert opinions studying at Afyon Kocatepe University, Turkey were taken. On the other hand, in order to provide the linguistic control of the scale items obtained as a result of examining some studies in foreign literature, an English teacher was consulted. In the light of the information obtained from the literature and expert opinions, an initial item pool consisting of 44 items was developed to determine the feedback system used by teachers. Each item statement was checked from literature and each item was based on literature. 4 of the items were negative. When the literature was examined, it was seen that the scales prepared for the feedback were in accordance with Likert type scale model. Likert scaling is a commonly used tool to measure beliefs, options and attitudes (DeVellis, 2016). Therefore, the present scale comprised 5-point Likert format, each statement was rated on five sequential points as "completely disagree=1, disagree=2, somewhat agree=3, agree=4 and completely agree=5".

After preparing the item pool, the face and content validity was qualitatively performed with the involvement of four experts in the field of curriculum and instruction and who have experience in education. In this respect, it was understood that some items tried to measure semantically similar structures. Considering these data obtained from the experts, 5 items were extracted from the item pool. For example the item, *"Our teacher gives highly detailed feedback about our performance in line with our individual needs"*; "*Our teacher gives feedback on every mistake we make.*" items were removed from the scale. The experts stated that in the scale there were items with similar meanings and they should be extracted. Moreover, the experts expressed their opinions about any ambiguity, vagueness or dual meaning related to statements. Based on the advice from experts, necessary revisions were performed. After these arrangements, a 39-item scale was administered to 220 high school students.

Data Analysis

In order to test the reliability and validity of feedback evaluation scale, it was administered to 220 high school students, who were the participants of the study. The Kaiser-Meyer Olkin (KMO) coefficient was applied to determine whether the sampling size was appropriate for factorization or not. The KMO coefficient varies from 0 to 1 and the acceptable minimum limit of the KMO sampling capability is 0.50. On the other hand, Barlett Test of Sphericity was applied to determine whether there was enough correlation between variables. For this test, the significance value smaller than .05 shows that there is an enough level of correlation between variables (Durmuş, Yurtkoru & Çinko, 2011).

Structural validity was used to examine the validity assessment of the scale. Explanatory Factor Analysis (EFA) was used for the structural validity and Confirmatory Factor Analysis (CFA) was used to determine whether the items measure the same structure. Factor loads are the first criterion to be taken as a basis for factor analysis. Items with a factor load below .30 need to be removed from the analysis. Generally, items with a factor load of .40 or higher are selected (Büyüköztürk, 2010). Another criterion to be taken as a basis for factor analysis is that an item should have load under one factor. Therefore, it is necessary to remove the items that have cross loading (Büyüköztürk, 2010).

On the other hand CFA, which allows the researchers to impose a structure or model on the data, was applied to determine how items are associated with each other, to test how well the model fits, whether the factors are correlated or uncorrelated. Many fit indices are used in order to determine the adequacy of the model tested in CFA (Joreskog & Sorbom, 1993). In this study, the Chi-Square Goodness Test, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA) were examined for CFA.

FINDINGS

In this section, the findings about reliability and validity of "Teacher Feedback Evaluation Scale" are presented.

Exploratory Factor analysis

Firstly, "Principal Component Analysis" was preferred since it is a more widely used technique for factor analysis (Durmuş, Yurtkoru & Zinko, 2011). Then, "Kaiser-Meyer-Olkin" (KMO) and "Bartlett's Sphericity" analyses were applied to determine the appropriateness of the data for factor analysis. The KMO coefficient ranges between 0 to 1 and the minimum acceptable limit of the KMO sampling should be 0.50. On the other hand, Bartlett's sphericity test shows whether there is a sufficient correlation between the variables. For this test, the significance value smaller than .05 shows that there is a sufficient level of correlation between variables (Durmuş, Yurtkoru & Çinko, 2011). The results of KMO and Bartlett test obtained as a result of the study are shown in Table 1.

Table 1. KMO and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.873
Bartlett's Test of Sphericity	Approx. Chi-Square	4497.205
	df	741
	Sig.	.00

As can be seen in Table 1, KMO value for factor analysis of 39 items was calculated as .873. Moreover, it was seen that the results of the "Chi-square" test statistic obtained from the Bartlett's test were significant, $\chi^2 = 4497,205$; df = 741, p <0.05. As a result, the obtained values meet the basic hypotheses at a good level and it was decided that the factor analysis could be conducted.

After this step, exploratory factor analysis was conducted. Factor analysis is used to reveal the underlying structure of a large number of variables (Şencan, 2005). As a result of the analysis, the 39 items of the scale was reduced to 23 items. The items with a factor load below .30 and which had cross loading were removed. The items with the Eigen value greater than 1.00 were included in the scale. The factor analysis revealed a three factor structure. According to the explanatory total variance analysis, the items of the scale explain the 51.321% of the total variance.

Table 2. Total variance explained table of teacher feedback evaluation scale

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% f Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,136	35,374	35,374	7,705	33,501	33,501	5,920	25,738	25,738
2	3,023	13,144	48,519	1,663	7,230	40,732	3,135	13,630	39,368
3	2,079	9,039	57,558	2,436	10,589	51,321	2,749	11,953	51,321
6	,983	4,275	61,833						
5	,893	3,881	65,714						
6	,813	3,535	69,249						
7	,752	3,270	72,518						
8	,689	2,994	75,512						
9	,655	2,850	78,362						
10	,603	2,620	80,982						
11	,524	2,277	83,259						
12	,505	2,194	85,454						
13	,441	1,916	87,370						
14	,394	1,715	89,085						
15	,386	1,678	90,763						
16	,354	1,539	92,301						
17	,338	1,468	93,769						
18	,318	1,381	95,150						
19	,286	1,243	96,393						
20	,277	1,205	97,598						
21	,217	,944	98,542						
22	,184	,802	99,344						
23	,151	,656	100,000						

As can be seen in Table 2, first factor explains 25,738% of the total variance, the second factor explains the 13,630 % of the total variance and the third factor explains the 11,953 % of the total variance.

After these processes, the rotated components matrix, which was converted with Varimax method, and which was obtained as a result of the exploratory factor analysis, was conducted and the results are given in Table 3.

Table 3 . Factor loadings of teacher feedback assessment scale

Items	Factor 1	Factor 2	Factor 3
M26	.812		
M24	.809		
M25	.801		
M32	.749		
M31	.730		
M29	.726		
M27	.720		
M33	.669		
M23	.656		
M34	.640		
M2		.822	
M1		.808	
M3		.666	
M7		.596	
M5		.505	
M13		.462	
M19			.690
M21			.665
M37			.624
M10			.614
M8			.574
M42			.573
M18			.496
Eigenvalue	17,738	13,630	11,953

As seen in Table 3, first factor consists of 10 items, second factor consists of 6 items and third factor consists of 7 items. The factor loads of the scale with 23 items vary between 0.822 and 0.462. The first factor consists of the items related to effect of feedback on learning process; the second factor consists of the items related to the feedback system used by teachers, and the third factor consists of the items related to the negative issues of feedback system. Therefore, based on the literature review, the factors were labeled as *functionality of feedback* (26, 24, 25, 32, 31, 29, 27, 33, 23, 34), *structure of feedback* (2, 1, 3, 7, 5, 13), and *negative feedback structure* (19, 21, 37, 10, 8, 42, 18). Some of the items on functionality of feedback dimension are as, *"The feedback given by the teacher allows me to see my strengths."*; *"Feedback provided by the teacher helps me better understand the issues."* Some of the items on the structure of the feedback dimension are as, *"Feedback that teacher gives is clear.";* *"Our teacher gives individual feedback about our studies".* On the other hand, some of the items on negative feedback structure dimension are as, *"Our teacher gives feedback only for grading.";* *"Our teacher gives too much negative criticism while giving feedback."*
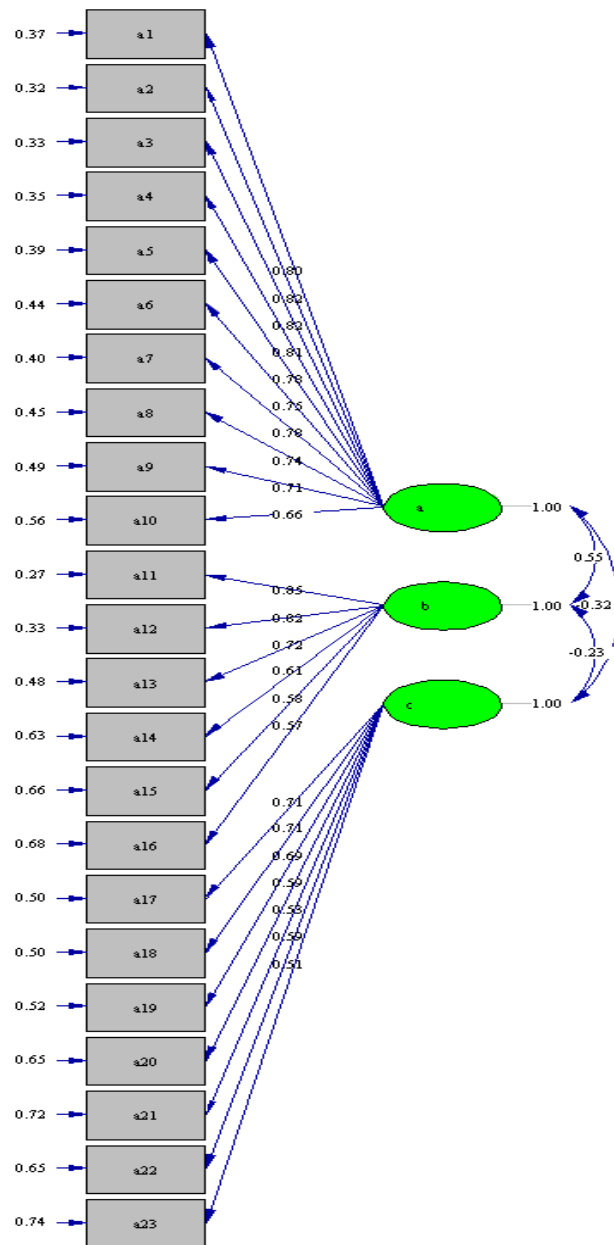
Confirmatory Factor Analysis

In order to test the structure validity of the scale and accuracy of sub-dimensions obtained by the Exploratory Factor Analysis, Confirmatory Factor Analysis (CFA) was applied using LISREL program. CFA is a version of factor analysis which tests the specific hypotheses about structure and relations between the latent variables that underlie the data (Field, 2009).

The obtained fit indexes were evaluated according to the fit indexes stated in the literature. Firstly, fit indices were examined to evaluate the overall fit. Chi Square (χ^2), RMSEA, NFI, NNFI, CFI, GFI, and AGFI are the most commonly used statistical analysis in model data fit structure. The error and fit index in items are presented in Table 4.

Table 4. Error and fit index for teacher feedback Evaluation scale

Fit Index	Values of the Scale	Good Fit Index Values	Acceptable Fit
$\chi 2$ /df	2,05	$0 \leq \chi 2$ /df $\leq$	$2 < \chi 2$ /df ≤ 3
RMSEA	.069	$0 \leq$ RMSEA $\leq .05$	$.05 <$ RMSEA $\leq .08$
comparative Fit Index (CFI)	.90	$.95 \leq$ CFI ≤ 1.00	$.90 \leq$ CFI $< .95$
Standardized RMR	.08	$0 \leq$ SRMR $\leq .05$	$.05 <$ SRMR $\leq .10$
Goodness of Fit Index (GFI)	.84	$.95 \leq$ GFI ≤ 1.00	$.90 \leq$ GFI $< .95$
Adjusted Goodness of Fit Index (AGFI)	.81	$.90 \leq$ AGFI ≤ 1.00	$.85 \leq$ AGFI $<.90$
NNFI	.89	$.95 \leq$ NNFI ≤ 1.00	$.90 \leq$ NNFI $< .95$

As can be seen in Table 4, good fit index values of "Teacher Feedback Evaluation Scale" are at acceptable level ($\chi 2$ /df=2,05; RMSEA= .069; CFI=.90; RMR = .08). On the other hand, when the other good fit indexes of the scale were examined, it was found that GFI=.84, AGFI=.81, NNFI=.89. Firstly, whether $\chi 2$ and degree of freedom (df) were lower than 3 or not was examined. It was seen that these values were at acceptable level with 2.05 value. In the model, good of fitness index (GFI) was found as .84. It is stated that GFI should be between .85 and .90 to be accepted (Scherbelleh-Engel and Moosbrugger, 2003; cited in, Turan and Haşit, 2014). In the study, GFI was found to be very close to the acceptable limit with a value of .84. It is also desirable that the AGFI (Adjusted Goodness Fit Index) value is close to the GFI value and is between .85 and .90. The RMSA value of .06 indicates an acceptable fit (Scherbelleh-Engel and Moosbrugger, 2003; cited in, Turan ve Haşit, 2014). It is seen that the obtained AGFI and RMSA values are within acceptable limits. Therefore, according to the results of CFA, the model consisting of three factors provided a good model fit. Figure 1 below presents the factor distribution and the interaction among the subscales.

Figure 1. First Order Confirmatory Factor Analysis

As seen in Figure 1, The X^2 / df value of 2.05 and the RMSEA value of .069 indicate that the 3-dimensional feedback evaluation scale has an acceptable good fit index.

Reliability Analysis

The reliability of the scale was measured by interpreting the obtained value of Cronbach's Alpha to assess the internal consistency of the scale. The results are given in Table 5.

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Table 5. Reliability Statistics of Teacher Feedback Use Scale

Factors	Cronbach Alpha
Functionality of Feedback	.93
Structure of Feedback	.84
Negative Feedback Structure	.80
Total	.84

As seen, Cronbach's Alpha value for the factors of the scale varies between .80 and .93. Moreover, Cronbach's Alpha value for overall scale was found to be .84. An Alpha value higher than .70 is an expected condition for internal consistency (Tang, Cui and Babenko, 2014). Therefore, for the scale Cronbach's alpha indicated good internal reliability (α= .84).

Intercorrelations of the Teacher Feedback Use Scale

Pearson's coefficient of correlation was conducted to find the correlations between the factors of the scale. The obtained results are given in Table 6.

Table 6. Inter correlations for the Scale Factors

Factors	1	2	3	4
1.Functionality of Feedback	1	55**	-.23**	.84**
2. Structure of Feedback	.55**	1	-.14**	.72**
3. Negative Feedback System	-.23**	-.14**	1	.22**
4. Total	.84**	.72**	.23**	1

n =220, *p*<.05, ** *p*<.01

As can be seen in table, Pearson's coefficient of correlation demonstrated higher levels of significant positive correlations of all dimensions of Teacher Feedback Evaluation Scale. The relationship between the ratio of 0.70-1.00 shows a high relationship (Büyüköztürk, 2010). Table 6 indicates that the model with best fit demonstrated inter-correlation between factors and Teacher Feedback Evaluation Scale.

CONCLUSION

In this study, the process of developing a teacher feedback use scale for high school students' evaluation of the feedback system applied by their teachers was discussed. For this purpose, firstly the literature was reviewed on feedback concept and the related studies were examined in order to develop a reliable scale. In this way, a general framework for feedback was formed. Moreover, expert opinions were taken. In the light of the information obtained from the literature and expert opinions, an initial item pool consisting of 44 items was developed to determine the feedback system used by teachers. However, 5 items were removed from based on the data obtained from expert opinion. Therefore, the scale comprised 5-point Likert format, each statement was rated on five sequential points as "completely disagree=1, disagree=2, somewhat agree=3, agree=4 and completely agree=5".

Then, "Principal Component Analysis" was preferred. In addition, "Kaiser-Meyer-Olkin" (KMO) and "Bartlett's Sphericity" analyses were applied to determine the appropriateness of the data for factor analysis. KMO value for factor analysis of the scale was calculated as .873. Moreover, the results of the "Chi-square" test statistic obtained from the Bartlett's test were found to be significant, $\chi2$ = 4497,205; df = 741, p <0.05. As a result, it was decided that the factor analysis could be conducted for 39 item scale.

The trial form of the scale consisting of the 39 items was administered to 220 high school students. As a result of the analyses, the items were reduced to 23 items. The factor analysis revealed a three factor structure. The first factor consists of the items related to effect of feedback on learning process; the second factor consists of the items related to the feedback system used by teachers, and the third factor consists of the items related to the negative issues of feedback system. Therefore,

based on the literature review, the factors were labeled as *functionality of feedback* (26, 24, 25, 32, 31, 29, 27, 33, 23, 34), *structure of feedback* (2,1, 3, 7, 5, 13), and *negative feedback structure* (19,21, 37, 10, 8, 42, 18).

After the CFA, Teacher Feedback Evaluation Scale were found to be at acceptable level ($\chi2$ /df=2,05; RMSEA= .069; CFI=.90; RMR = .08). On the other hand, when the other good fit indexes of the scale were examined, it was found that GFI=.84, AGFI=.81, NNFI=.89. Moreover, the obtained AGFI and RMSA values were found to be within acceptable limits. Therefore, according to the results of CFA, the model consisting of three factors provided a good model fit.

The Cronbach's Alpha value for the factors of the scale varied between .80 and .93. Moreover, Cronbach's Alpha value for overall scale was found to be .84. On the other hand, Pearson's coefficient of correlation demonstrated higher levels of significant positive correlations of all dimensions of the scale.

Feedback is a tool used to explain whether the instructional responses to learners are true or false; the information obtained about how successfully a task is done. It is particularly used in the formative assessment process (Hattie and Timperley, 2007). Particularly in a supportive classroom environment, feedbacks take part in the learning process. In this case, teachers know which skills to learn, how to recognize and define good performance, how to demonstrate good performance, and how to improve poor performance (Sadler, 1989). On the other hand, Day (1995) stated that most teachers can benefit from eliciting information from both formative and summative feedback. Therefore, the feedback taken from the students on teaching process and performance is important. Based on this information, it can be concluded that feedback system is important and the feedback system used by the teachers should be assess. Therefore, the developed scale will help researchers for the future studies on feedback. Also, the results obtained from the scale can help teachers to improve their teaching performance.

The following suggestions can be made for the following studies.

- The developed scale can be used in quantitative studies on feedback.

- Similar scales can be developed for different grades.

- Similar scales can be developed for determining teachers' perceptions on feedback they use.

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