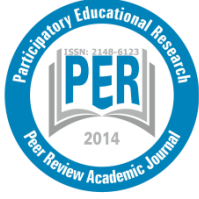TITLE: A Scale Development Study To Determine The Self-efficacy Perception Of Students On Written Exams

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A Scale Development Study To Determine The Self-efficacy Perception Of Students On Written Exams

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Abstract

Institutions such as The ministry of Education and student selection and placement center place importance on assessment and evaluation techniques in recent years to measure efficacy of students. The institutions are trying to carry out written examinations and provide the adaptation of students to this kind of evaluation technique. In this study, general survey model is used. The application scale of the self-efficacy towards written examination was developed in the direction of Mamak Anatolia high school and Sehit Piyade Er Murat Eroglu secondary school students. The validity and the reliability of the scale is done on the data gained from 305 students elected by the method of convenience sampling. At first, the scale was prepared as 61 items. Then 36 items are taken out related to factor analysis and 25 items left eventually. KMO (Kaiser-Meyer Olkin) value is 0.870 and the value of (Cronbach alpha) calculated for the reliability study is .887. As a result of factorial validity of the scale, items change between .416 and .722. According to the factor analysis results, three factors are found. These factors are 'self-confidence', 'higher order thinking' and 'effort'. This study shows that the scale has a valid and reliable form.

Key words: written examination, self-efficacy, assessment and evaluation

Introduction

Competence is a special efficiency which provide special knowledge (Turkish Language Society, 2016). Self-efficacy perception is related with the personal judgements the extent to which people will perform necessary actions when they come across the situations (Bandura, 1993). Thinking skills and knowledge is measured and evaluated at schools. In the end, whereas students develop their self-efficacy easily due to achievement, inactive students have difficulty in developing self- efficacy (Korkmaz, 2002).

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Written examination questions are used to reflect complicated thoughts when the students are asked to organize, integrate and interpret the knowledge, discuss, give explanations, evaluate the thoughts and practice various questioning methods. Although there are more objective formats in measuring the knowledge, written examinations are the best for specializing in complicated knowledge and deep comprehension. When students know that they will have written examination, they study on themes, dealings, organizing knowledge and the effect of knowledge (McMillan, 2015). Open-ended questions are asked in a specific subject so as to get detailed information (The Ministry of Education, 2012). Multiple choice tests measure the learnings that are experienced and in the remembering level. Measuring skills must be capable of measuring high level skills. Preparation of these questions requires a special effort (Demirtaşlı, 2010). The evaluation of student achievement is made at the end of the teaching process. Assessment method affect how students work, styles of preparing for the evaluation, the level of students' learning and that helps students to get high level thinking skills (Büyüköztürk & Gülbahar, 2008). When we look at the assessment and evaluation methods applied in secondary education up to now, open-ended questions have been used in the aftermath of the 1991-1992 period. Open-ended questions and different measuring techniques were used, and those questions were generally at knowledge or comprehension level. Examples in different levels of questions or tasks have been presented in curriculum in 2005 and beyond (Erman & Ulutaş, 2012).

Thinking is the capability of examining the skills such as talent, creativity and logic (Duman , 2014). Reflective thinking is one of the higher-order thinking skills that is important for the students to be more successful in education. Reflective students reflect their ideas by thinking in logical and thoughtful way (Demirel, 2015). Open –ended questions are used for the students to analyse and synthesize knowledge by using critical thinking skills. In this way, Students need to demonstrate their thinking skills. Students not only need to remember the knowledge, but also they need to remember similarity / contrast and get in contact with cause/effect, interpret and discuss. Students generally need to associate their new learning situations to their old learning situations to make functional new thoughts (McMillan, 2015). Students must develop their thinking skills. Parents and also teachers must not make decisions on the behalf of students. The students who develop critical thinking skills also get the problem solving skills but for logic thinking (Atalay & Köksal, 2015). They can reach the solution easily by using right and left parts of the brain together (Tuncel, 2015).

Test anxiety is a kind of anxiety which gives uneasy feelings mixed with fear and observed in the evaluation of individuals. Considering all the countries around the world, anxiety that occurs during the exams is one of the very important issues that cause many adverse situations. The study of Sallabaş and Temizkan (2011) shows that students were more successful with multiple choice tests than open- ended questions in terms of reading comprehension level. SAT (Scholastic Aptitude Test), Gre (Graduate Record Examination) tests, TOEFL tests made in America use open-ended question format besides multiple choice questions (Demirtaşlı, 2010). Measuring method with the open-ended questions in the exams that is applied around the world is tried to be developed in our country.

Test development project consisting of open-ended questions is put into practice so as to improve students' higher-order thinking skills such as critical thinking, problem solving and interpreting. According to the PISA results, Students in Turkey failed to answer the questions consisting open-ended questions. The Ministry of Education has developed Monitoring and Assessment of Academic Skills (ABİDE) project in order to work up their critical thinking skills with open- ended questions (MEB, 2016). OSYM decided to prepare

exams consisting of open-ended questions in recent years and prepared exams for the purpose of measuring of high level cognitive skills such as writing by organizing, originality, critical thinking and problem solving. With the exam conducted on 30th April 2016, OSYM aimed to measure high-level cognitive skills by taking multiple choice tests off that have the answering possibility 20 percent by chance. Open-ended question format has been expanded rapidly in our country to catch up with the world standards in evaluation and assessment. In this study, a scale development study has been made by examining the perspectives of students concerning the written examinations.

Purpose and Significance

Today, students give direction to their education lives by having a variety of exam in early stages of their lives. Students' perception of self-efficacy and thoughts concerning with the written examinations greatly affect whether they will be successful in the examinations or not. The evaluation of written examinations need to be studied by the important institutions such as The Ministry of Education and Assessment and Selection and Placement Center . In this study, it is aimed to develop a scale related with the self-efficacy of students about written examinations.

Method

Research Design

In this study, general survey model is used. Survey researches collect data and opinion from a sample that represents a population or large mass (Blackwood, 2006). In this study, the self-efficacy perception of secondary and high school students is tried to be described in relation to written examinations. The study data is collected from secondary and high school students through survey.

Population and Sample

The population of the study consists of secondary and high school students in Mamak in academic year of 2015-2016. The sample of the study consists of students who study in Sehit Piyade Er Murat Eroglu Secondary School and Mamak Anadolu İmam hatip high school in academic year of 2015-2016. In this study, convenience sampling technique is used. Convenience sampling is easy for the researcher to reach and a technique for the participants to answer wistfully (Cresswell, 2007). The size of sample and dispersion pattern has an impact on sampling value (Ergün, 1995). 305 students are included in the sampling for the scale development study. 176 girls (57,7 %) , 129 boys (42,3 %) , 156 secondary school students (51,1 %) and 149 high school students (48,9 %) appear in this study.

Data Collection

Data is collected by using a 5 likert-type self efficacy scale on written examinations. Rensis Likert was developed likert-type scale to calculate the extent of which respondent agree with the situation or not (Artino &Sullivan, 2013). Before developing the scale, a

literature survey was made. Accordingly, scale items were formed. The questions were asked to develop the scale which would be used in the research: what are the advantages and disadvantages of written examinations for you? Do written examinations affect your test anxiety? Totally, 61 items have been written including 8 negative items based on the literature survey .Written exams in 5 likert-type is graded as 'always', 'often', 'sometimes', 'rarely' 'never'. Items were applied a group of 10 people by presenting experts' opinion after corrections. According to the results of pre-application, 305 scales were received for consideration by doing pilot implementation of sample group.

In the study, the data obtained as a result of pre- analysis performed to determine the suitability of factor analysis ; KMO Kaiser Meyer Olkin value is ,870 and Barlett Test result is founded as p=.00. (P < .05). KMO coefficient checks out the suitability of factor analysis for the data matrix and the suitability of factor analysis for extraction factor of data matrix. KMO for factorability is expected to show more than 0.60 (Büyüköztürk, 2015).

Exploratory factor analysis consisting of 61 items with "self-efficacy perception of students on the written examinations' is to determine whether it is single or multi-factorial. 61 items have been initiated and a total of 17 factors are obtained with the factor analysis. 17 factors explain 60,780 of total variance. In the factor analyses, 1., 2., 3., 4., 5., 6., 7., 8.,9., 10., 11., 12., 13., 14., 15., 16., 17., 19., 20.,21., 22., 24., 25.,26.,33., 34., 40., 43., 47.,48., 25., 28., 34., 37., 51., 52., 53., 55., 58., 59., 60., 61. items are omitted from scale because the values of these items are below the value of 0.35 and difference between the two factor load is below 0.10. Scree plot can be used to decide how many factors or structures it measures. Vertical axis shows the amount of core values in the graph whereas the horizontal axis shows the factors. High acceleration factors of rapid decline determined the important factor numbers in the graphic (Büyüköztürk, 2015). Eigenvalues show the explanatory power of each factor. Each factor has eigenvalues. Eigenvalues that are one and more than one must be taken into consideration (Tekindal, 2015). The number of factors is determined as three because of the large number of factors by taking into account scree plot.

Figure 1. The Scree Plot of self-efficacy on written examinations
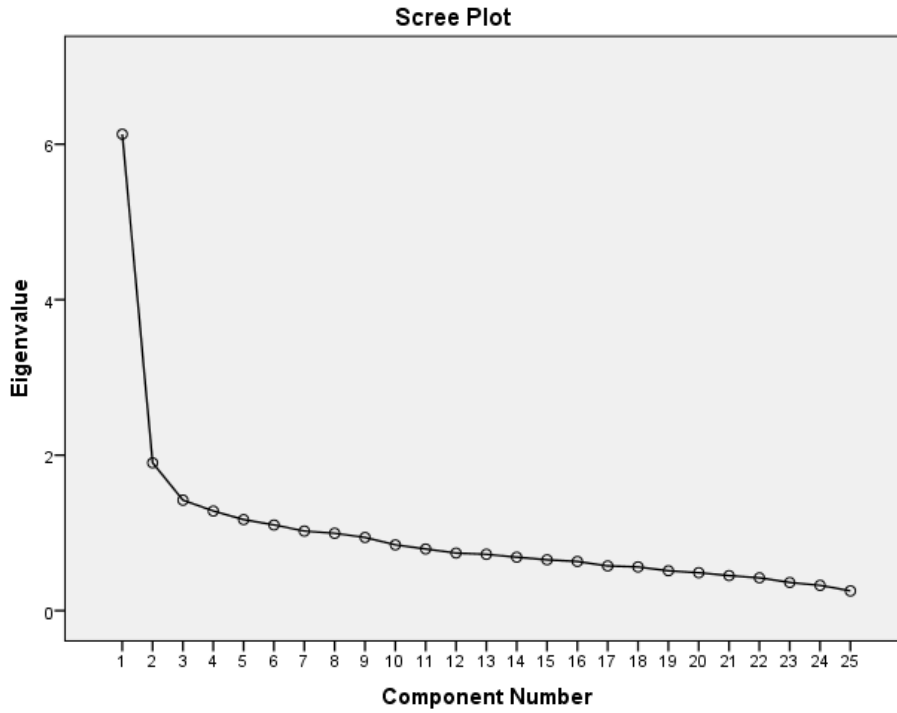
Kaiser Meyer Olkin value has risen to ,887 as a result of newly constructed exploratory factor analysis and 3 factors explain 40,779 of total variance. It is accepted as adequate at the changing variance rate of 40 % to % 60 in the social sciences analysis (Scherer, Wiebe, Luther & Adams, 1988; Tavşancıl ,2014). The items that are greater than one are included into the scale. Variance explained value of total factor analysis for self-efficacy scale of students is shown in Table 1. Looking at the table 2, Rotated Component Matrix shows that first factor has 15 items, second factor has 7 items and third factor has 3 items.

Table 1.Total variance explained table of self-efficacy scale of students on written examinations

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	**% of variance**	**Cumulative**	**Total**	**%of Variance**	**Cumulative**	**Total**	**%of Variance**	**Cumulative**
1	6,955	27,819	27,819	6,955	27,819	27,819	4,864	19,454	19,454
2	1,771	6,843	34,662	1,711	6,843	34,662	3,219	12,878	32,332
3	1,529	6,118	40,779	1,529	6,118	40,779	2,112	8,448	40,779
4	1,257	5,027	45,806						
5	1,094	4,375	50,181						
6	1,015	4,061	54,242						
7	,978	3,912	58,154						
8	,866	3,462	61,616						
9	837	3,346	64,962						
10	,787	3,149	68,112						
11	,765	3,061	71,173						
12	,737	2,947	74,120						
13	,683	2,734	76,854						
14	,641	2,563	79,416						
15	,624	2,497	81,913						
16	,570	2,280	84,193						
17	,534	2,138	86,331						
18	,517	2,067	88,398						
19	,504	2,018	90,416						
20	,481	1,924	92,339						
21	,443	1,773	94,112						
22	,429	1,716	95,828						
23	,386	1,544	97,371						
24	,349	1,394	98,765						
25	,309	1,235	100,00						

Table 2. Rotated Component Matrix

Items	component		
I29	,614		
I42	,598		
I38	,596		
I36	,595		
I35	,593		
I18	,589		
I30	,558		
I45	,546		
I27	,544		
I44	,522		
I41	,518		
I57	,489		
I31	,458		
I32	,447		
I37	,416		
I47		,669	
I54		,630	
I46		,587	
I28		,580	
I56		,569	
I39		,471	
I23		,446	
I49			,722
I48			,679
I50			,641

Item analysis of scale is examined with the significance of the difference between the averages by using t-test. As a result of factor analysis, the scale has 3 dimensions (self-confidence, higher-order thinking skills, effort) which reflects 3 basic structure of students' self-efficacy perception on written examinations.

In the self-confidence dimension, there are items which express the self-confidence of students on written examinations. 15 items in the same dimension take part by looking at the factor loadings. Items express the level of students' self-confidence about written examinations in this dimension. The names that are given to the dimensions are related with

the questions including same content with the collected items. For example, the first dimension is related with the students 'beliefs of getting score on written examination, feeling relax on written examination, writing freely without being restricted, the beliefs on giving logic answers by making connections and getting down what they think. For that reason, it is named as 'self-confidence'. Second dimension is about critical thinking, reflective thinking and creative thinking on written examinations. This sub-dimension is named as 'higher-order thinking'. The third dimension is named as 'effort'. The items are related with struggling of students, racking brain to understand questions and tendency to their best on written examinations.

36 items are taken out of scale by analysing 61-items scale. It is observed that factor loadings of items for three dimensions change between ,416 and ,722. The scale is considered as having three dimension and for each dimension item total correlations change for the first factor, self-confidence; between ,416 and ,614, for the second factor, higher-order thinking; between ,446 and ,669, for the third factor , effort ; ,641 and ,722. Looking at these values, each item measures what it intends to measure. Items which item total correlation is 0.30 or higher than it distinguishes the respondents well (Büyüköztürk, 2015).

When we examine the self-efficacy scale on written examination, reliability -validity analysis of sub-dimension 'self-confidence' is given in table 3. Examining table 3, the items in the first dimension measure the self-efficacy perception on written examinations that they can do. It is seen that factor loadings of items in 'self-confidence' dimension changes between ,416 and ,614.

Table 3. The Results of reliability-validity of sub-dimension 'self-confidence' about self-efficacy scale on written examinations

Items and factors I.Factor (self-confidence)	$\overline{X}$	Sd	Communality	Component	Varimax	Total item	t	p
18. I can write in a readable way on written examinations.	4,36	,887	,383	.391	,589	41	6,043	,000
27. I can increase my self-confidence by being successful on written examinations.	4,54	,877	.448	,588	.544	47	9,148	,000
29. I can get points on written examinations by writing something more or less.	4,31	, 887	.422	,549	,614	46	9,061	,000
30.I advise individuals to trust themselves on written examinations.	4,50	,906	,349	,558	,558	45	8,591	,000
31. I can write without being restricted on written examination.	4,14	1,031	.361	,601	,458	43	9,363	,000
32. I feel relax on written examinations as they understand me better.	4,26	,832	,380	,613	,447	54	11,663	,000
35.I can write the things that I need to put down by organizing in my mind on written examinations.	4,56	,704	.497	,701	,593	45	13,678	,000
36.I can answer by thinking critically on written examinations.	3,95	1,041	,459	,536	,595	47	8,541	,000
37. I can make inferences from questions on written examinations.	3,93	1,009	,291	,457	,416	47	6,842	,000
38. I can use the ability of interpret on written examinations.	4,36	,882	,404	,579	,596	47	9,608	,000
41. I can make logical comments on written examinations.	4,19	,837	,390	,618	,518	34	9,575	,000
42. I can express the answers of the questions clearly on written examinations.	4,17	,782	,404	,592	,598	38	8,992	,000
44. I can express by interpreting rather than learn by heart on written examinations.	4,17	1,040	,356	,582	,522	34	9,288	,000
45. I can answer by understanding and making connections on written examinations.	4,26	,903	.401	,626	,546	38	10,519	,000
57. I can be successful on written examinations when I study.	4,41	,888	,330	,547	,489	38	9,645	,000

Reliability -validity analysis of sub-dimension 'higher-order thinking ' is given in table 4. Examining table 4, the items in the second dimension measure the effect of thinking skills to self-efficacy perception on written examinations. It is seen that factor loadings of items in 'self-confidence' dimension change between ,446 and ,669.

Table 4. The Results of reliability-validity of sub-dimension 'higher-order thinking' about self-efficacy scale on written examinations

Items / Factors II.FACTOR (higher-order thinking)	$\overline{X}$	SD	Communality	Component	Varimax	Total item	t	p
23. I can develop new learning techniques on written examinations to be successful.	3,73	1,20	,357	,490	,446	41	6,559	,000
28. I can answer by drawing figures, tables and diagrams on written examinations.	3,71	,972	,375	,480	,580	47	8,623	,000
39. I can answer in a quick way on written examinations.	3,69	,989	,398	,584	,471	46	9,060	,000
46. I can apply memory techniques to succeed on written examinations.	3,79	1,302	,363	,387	,587	43	6,206	,000
47. I can give creative answers on written examinations.	3,09	,963	,479	,511	,669	43	8,014	,000
54. I can remember the answer without losing too much time on written examinations.	3,96	,838	,459	,541	,630	43	8,303	,000
56. I can get the point that I expect on written examinations.	3,65	1,068	,356	,445	,569	43	6,290	,000

When we examine the self-efficacy scale on written examination, reliability -validity analysis of sub-dimension 'effort' are given in table 5. Examining table 5, the items in the third dimension express the level of students' struggle on written examinations. It is seen that factor loadings of items in 'effort' dimension change between ,641 and ,722.

Table 5.The Results of reliability-validity of sub-dimension 'effort' about self-efficacy scale on written examinations

Item /Factors 3.FACTOR (Effort)	$\overline{X}$	SD	Communality	Component	Varimax	Total item	t	p
48. I try very hard to answer questions on written examinations.	4,13	1,16	,466	,449	,679	41	4,197	,000
49. I can use more than my mind to understand on written examinations.	4,37	,883	,554	,494	,722	47	5,392	,000
50. I can write all the details that I know on written examinations.	4,51	,671	,512	,477	,641	46	7,475	,000

The results of total variance explained and Cronbach alpha coefficients in self-efficacy scale on written examinations are given table 6.

Table 6. The Results of reliability-validity of self-efficacy scale on written examinations

Factor	Total variance explained	Alpha
1.self-confidence	19,454	,86
2.higher-order thinking	12,878	,72
3.effort	8,448	,63
Total	**40,779**	**,887**

Table 7. Mean, Standard Deviation, Maximum, Minimum Rate Value and Correlation Coefficients of self-efficacy scale on written examinations related with sub-dimensions.

Factor	N	$\overline{X}$	SD	Min	Max	self-confidence	higher-order thinking	effort
1.Factor (self-confidence)	305	49,34	9,91	3,5	3,9	1	,464**	393**
2.Factor (higher-order thinking)	305	21,63	5,01	3,1	3,9	,574**	1	269**
3.Factor (effort)	305	11,28	2,55	3,1	3,9	,393**	,269**	1

Examining the table 6, total variance explained for dimensions are for the first factor, self-confidence, 19,454; for the second factor, higher-order thinking 12,878; for the

third factor, effort 8,448. Cronbach alpha coefficient for the first factor ,86 ; for the second factor ,72; for the third ,63. Total Cronbach alpha value of scale is ,887. Cronbach α coefficient is a measurement of internal consistency (uniformity) of items in the scale. When α coefficient is high,It is considered that the items in the scale are consistent with each other and consist of searching items as elements of same property (Tezbaşaran, 2008).

When it is examined the correlation coefficients of self-efficacy scale on written examinations in table 7, it is observed that there are mostly meaningful relations in middle level among factors. Correlation coefficient of 1.00 shows perfect positive relationship, correlation coefficient of -1.00 shows perfect negative relationship, correlation coefficient of 0.00 shows no relationship (Büyüköztürk, 2015).

Table 8. Correlation Coefficients of Self-efficacy on Written Examination

Item number	Item-total r
Item1	,485
Item 2	,524
Item 3	,512
Item 4	,465
Item 5	,637
Item 6	,330
Item 7	,493
Item 8	,563
Item 9	,527
Item 10	,523
Item 11	,549
Item 12	,489
Item 13	,535
Item 14	,546
Item 15	,392
Item 16	,457
Item 17	,480
Item 18	,348
Item 19	,427
Item 20	,383
Item 21	,514
Item 22	,302
Item 23	,351
Item 24	,241

Draft number	Factor Load	Items in the Scale
1	.589	I can write in a readable way on written examinations.
2	.544	I can increase my self-confidence by being successful on written examinations.
3	.614	I can get points on written examinations by writing something more or less
4	.558	I advise individuals to trust themselves on written examinations.
5	.458	I can write without being restricted on written examination.
6	.447	I feel relax on written examinations as they understand me better.
7	.593	I can write the things that I need to put down by organizing in my mind written examinations.
8	.595	I can answer by thinking critically on written examinations.
9	.416	I can make inferences from questions on written examinations.
10	.596	I can use the ability of interpret on written examinations.
11	.518	I can make logical comments on written examinations.
12	.598	I can express the answers of the questions clearly on written examinations.
13	.522	I can express by interpreting rather than learn by heart on written examinations.
14	.546	I can answer by understanding and making connections on written examinations.
15	.489	I can be successful on written examinations when I study.
16	.446	I can develop new learning techniques on written examinations to be successful. .
17	.580	I can answer by drawing figures, tables and diagrams on written examinations.
18	.471	I can answer in a quick way on written examinations.
19	.587	I can apply memory techniques to succeed on written examinations.
20	.669	I can give creative answers on written examinations.
21	.630	I can remember the answer without losing too much time on written examinations.
22	.569	I can get the point that I expect on written examinations.
23	.679	I try very hard to answer questions on written examinations.
24	.722	I can use more than my mind to understand on written examinations.

Table 9. Items and factor loads in draft scale

| 25 | .641 | I can write all the details that I know on written examinations. |

Conclusion and Disscussion

In this study, it is aimed to prepare valid and reliable scale to measure the self-efficacy perception of secondary and high school students on written examinations. At first, testing scale with 61 items is carried out for 305 students. Then, 36 items are taken out related to factor analysis and 25 items left. It is shown that these items reveal three basic structure (self-confidence, higher order thinking and effort). Factor loadings of items change between ,416 and ,722. As a result of factor analysis, the first factor which measures self-confidence of students consists the 18th, 27th, 29th, 30 th, 31st, 32nd, 35th, 36 th, 37th, 38 th, 41st, 42nd, 44th, 45th, 57 th items, second factor measures higher order thinking skills consists 23rd, 28 th, 39th, 46th, 47th , 54th , 56th and the third factor measures the self-efficacy effort of students consists 48th, 49th , 50th items.

The development of students' self-efficacy perception on written examinations has great importance in the process of assessment and evaluation. If researchers use the scale in this direction, it will serve the purpose of the study.

There is no scale that measures self-efficacy perception of secondary and high school students on written examinations considering literature. Examining the similar studies, 'test anxiety inventory' developed by Ali and Mohsin (2013) has stated that Cronbach alpha value is ,893. Factor loadings change between, 36 and ,71. In the study of test anxiety of children developed by Benson and Wren (2004) , it is shown that Cronbach alpha is ,92. Factor loadings change between ,37 and ,76. Cronbach Alpha value for 'writing anxiety scale of Turkish students 'developed by Yaman (2010) is , 80. Factor loadings change between, 32and, 55.

Factor loadings of items change between ,416 and ,722. When we look at the values of self-efficacy scale on written examinations, Cronbach alpha value is found as ,887. KMO Kaiser Meyer Olkin value is ,870. We can conclude that the scale has a valid and reliable form with this study on written examinations. In order to have construct validity, Exploratory Factor Analysis is done. The scale can be reviewed by making confirmatory factor analysis. Research can be applied to different levels of student groups to make generalization.

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