Sekizinci Sınıf Öğrencilerinin Fen Derslerine Karşı Öz Düzenleme Becerilerinde Motivasyonun Rolü

The Role of Motivation in Self Regulation Skills in Eighth Grade Students' Science Classess

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Özet

Bu çalışmanın amacı Velayutham, Aldridge ve Fraser (2011) tarafından geliştirilen "Motivasyon ve Öz-Düzenleme Ölçeği"nin Türkçeye uyarlanmasıdır. Diğer amacı ise 8. sınıf öğrencilerinin fen bilimleri dersine karşı motivasyon düzeylerinin öz-düzenleme becerilerini yordama gücü arasındaki ilişkiyi belirlemektir. Araştırma tarama (survey) yöntemi kullanılarak yürütülmüştür. Ölçeğin geçerlik ve güvenirlik çalışmasını yapmak üzere 14 farklı okuldan toplam 1128 sekizinci sınıf öğrenci çalışmaya katılmıştır. Ayrıca Türkçeye uyarlanan "Motivasyon ve Öz-Düzenleme" ölçeğiyle sekizinci sınıf öğrencilerinin fen bilimleri derslerine karşı motivasyon düzeyleri, öz düzenleme stratejileri ve fen başarıları arasındaki ilişkiyi belirlemek amacıyla 14 farklı okuldan toplam 1484 öğrenciden veri toplanmıştır. Verilerin analizinde açımlayıcı ve doğrulayıcı faktör analizi, Mann Whitney U testi ve çoklu regresyon analizi yapılmıştır. Sonuç olarak Velayutham, Aldridge ve Fraser (2011) tarafından 32 madde olarak geliştirilen "Motivasyon ve Öz-Düzenleme Ölçeği" Türkçeye uyarlanarak geçerlik ve güvenirlik çalışması yapılmış, ölçeğin 25 maddelik halinin kültürel açıdan Türkiye'de kullanılabilecek geçerli ve güvenilir bir ölçek olduğu belirlenmiştir. Çalışmada motivasyonun alt boyutları olan öğrenme amaçları, görev değeri ve öz-yeterlik ile öz-düzenleme değişkenleri birlikte, öğrenci başarısı ile anlamlı bir ilişki içinde olduğu tespit edilmiştir. Ayrıca motivasyonun alt boyutları olan öğrenme amaçları, görev değeri ve öz-yeterlikle birlikte, öz-düzenleme beceri düzeyleri ile anlamlı bir ilişki içinde olduğu da belirlenmiştir.

Anahtar Sözcük: Görev değeri, motivasyon, öğrenme amaçları, öz-düzenleme, öz-yeterlik.

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Abstract

The purposes of the present study is twofold; firstly, it attempts to translate and adapt the "Motivation and Self-Regulation Scale" developed by Velayutham, Aldridge, and Fraser (2011) into Turkish. Motivation and Self-Regulation Scale is 32-item and four-dimensioned (learning goals, task value self-efficacy, and self-regulation) scale. Secondly, the relationship between students' motivation and self-regulatory skills in science learning was investigated. The study was a survey with a cross-sectional design. For validation and reliability process, 1128 eighth-grade students from 14 different schools participated in the study. In addition, for the motivation and self-regulatory skills relationship investigation the responses provided by the translated version of the scale of 1484 students from 14 different schools were used. Data were analyzed via exploratory and confirmatory factor analysis, Mann Whitney U test and multiple regression analysis. As a result, the 32- item original scale was translated and adapted into Turkish and through the validation and reliability process the translated version of the scale was decreased to 25 items considering cultural adaptation. The findings of this study revealed that both the dimensions of motivation, learning goals, task value and self-efficacy, and self-regulation skills, had a significant correlation with the student's success. Moreover, learning goals, task value, and self-efficacy, were found to be significantly correlated to the level of self-regulatory skills.

Keywords: Learning goal, motivation, self-efficacy, self regulation, task value.

Introduction

Developments in science and technology around the world emphasize the significance of science education. The countries whose scope is to be productive and follow-up the new technologies believe the power of the quality of science education in school and seek for innovations in curricula and education systems. The United Nations Education, Science and Culture Organization (UNESCO) held a convention in India in 2001, gathering 360 technology and mathematics lecturers from 39 countries. In this convention, various suggestions were made on science and technology education and related practices compliant with the 21st century and to countries all around the globe. The global science convention concluded that students did not find science popular; people were not aware of science and technology in their daily lives and students ages six through twelve liked science, while senior students considered science classes unnecessary for their normal living.

In order to promote science learning in schools, people should be aware of the positive effect of science and technology in their eve-

ryday life and to have positive attitude in science in primary period and maintain this attitude in following years science should be taught effectively and meaningfully. Un-Acikgoz (2005) stated that following the paths for effective and meaningful learning are called teaching strategies. Strategy is an implementation of a developed plan to achieve objectives. For effective and meaningful learning, students should be involved in learning process, which promotes the self-regulation concept.

Having been first mentioned by Albert Bandura, one of the pioneers of social cognitive theory, the self-regulation concept focuses on the individual's consideration of his or her own abilities and capacity regarding his or her behaviors. Pintrich (2000) believes that self-regulation is an active and constructive process in which students set their own learning goals and try to regulate their cognition, motivation and behavior. It is also named as the processes fulfilled by students to acquire the intended information and skills that they think to be useful (Zimmerman, 1990).

The important part in self-regulating learning is the students' direction and management of their own cognitive and motivational procedures to attain their learning goals (Boekaerts & Cascallar, 2006). Moreover, self-regulating learning assesses the degree of students' participation in the learning process in behavioral, motivational and meta-cognitive terms (Zimmerman, 2008). Self-motivational beliefs are important in maintaining self-regulating learning (Zimmerman, 2002). Students with high self-regulatory skills have higher motivation for science classes (Pintrich, 2003).

The success of students in science classes is influenced by the students' self-regulatory skills besides their motivation levels regarding science classes (Boekaerts & Cascallar, 2006; Zimmerman, 2000). The motivation of students for learning science is significant in the process of conceptual change, critical thinking, learning strategies, and success in science (Kuyper, van der Werf, & Lubbers, 2000; Lee & Brophy, 1996; Wolters, 1999). According to Zimmerman (2002), motivational beliefs are classified as learning goal orientation, task value, and self-efficacy.

Goal-orientation is one the most important theories that ensures students are motivated (Midgley, 2002). Pintrich (2000) thinks it provides a significant theoretical view to help explain the reasons for

the students' responsibility at a certain task. Learning goal-orientation affects a series of positive learning products in the student's success (Brookhart, Walsh & Zientarski, 2006; Kaplan & Maehr, 1999, 2007). Learning goal-orientation has a noteworthy effect on students' attitudes toward science and their success in science (Tuan, Chin, & Shieh, 2005).

According to Tuan et al. (2005), task value has a great effect on the attitudes of the students toward science and their success in science. Wolters and Rosenthal (2000) state that if learning activities are important, interesting and beneficial to students, they make efforts to complete these activities. If a learning activity is important to students, even those with low self- efficacy make efforts to learn it (Schunk & Zimmerman, 2007). Students who believe learning activities are interesting and important participate cognitively in studies to learn and comprehend the materials presented to them.

Self-efficacy belief is a strong determinacy in the students' choices, and their ability to struggle with the challenges they face and make efforts. Social cognitive theory claims that the belief of students that they can attain their goals encourages them to learn (Bandura, 1986). Therefore, self-efficacy beliefs are strong determinants for students in their choices and attitudes towards struggling with challenges. According to Eccles and Wigfield (2002), the choices of students related to success and performance, expectation-beliefs of students are affected directly. Students' learning based on self-regulation is closely related to self-efficacy (Pajares, 2002). Students with high self-efficacy make more efforts, assess their own improvements, and implement self-regulation strategies (Schunk & Pajares, 2005).

Teachers take the major responsibility for increasing students' self-regulation skills and their motivation to learn science. To this end, the determination of self-regulatory skills of students in science classes and their motivational beliefs regarding science classes is significant.

The Purpose of the Study

This study has two purposes: The first one is the adaptation of "Motivation and Self-Regulation Scale" developed by Velayutham, Aldridge, and Fraser (2011) into Turkish; the second is to identify the correlation between the motivation levels of eighth-grade students for

science classes and their predictive powers of their self-regulatory skills.

Methodology

The research was conducted by the survey method. This method is used to identify the attitudes, beliefs, views, and information on any subject. The survey method is widely used in education as it versatile, efficient and generalizable (Fraenkel & Wallen, 2003; McMillan & Schumacher, 2010).

Sample of the Study

The adaptation of Motivation and Self-Regulation Scale into Turkish and application of it on a sampling group included data collection from five different sampling groups. Regarding these phases, the followings were fulfilled.

The first one is the experts who offered consultation regarding the correspondence of the translated items with the original ones following the translation of the scale items into Turkish by the researchers. 10 experts of science education who are fluent in both languages were assigned in this phase.

In the second phase, six Turkish language experts assessed the linguistic compatibility of scale items with the Turkish language.

The third phase entailed the assignment of 30 students in eighth-grade at a private secondary school to state whether they understand the same things from the Turkish and English versions of the scale items.

In the fourth phase, 1128 students of eighth-grade from 14 different schools participated in the study to conduct the validity and reliability studies of the scale.

In the last phase, data were collected from 1484 students from 14 different schools to identify the correlation among motivation levels of eighth-grade students for science classes, their self-regulation strategies, and success in science classes with the help of the “Motivation and Self-Regulation” scale adapted into Turkish.

Data Collection Instruments

Motivation and Self-Regulation Scale

The English form of 32 items in four sub-dimensions of the "Motivation and Self-Regulation Scale" developed by Velayutham, Aldridge, and Fraser (2011) was used as a means of data collection in the research. These sub-dimensions are task value, learning goals, self-efficacy, and self-regulation. Multi-dimensionality of the original scale was determined through exploratory factor analysis. Items consisted of the Likert-type scale with five ratings. The extent of agreement of the respondents of the scale was divided into five as I Totally Agree (5), I Agree (4), Undecided (3), I Disagree (2) and I Totally Disagree (1). All items in the scale are made of positive sentences. Quantitative data of the original scale were obtained from 1360 students from 78 different classes in eighth, ninth, and tenth- grades. To obtain detailed information, 10 science teachers and 12 students of eighth grade were interviewed.

English-Turkish Compatibility Grading Form

In order to determine to what extent the Turkish translation corresponds to the original version, the grading form developed by Baloglu (2005) was used. The original English items of the scale were placed in the left part of the form, while the Turkish translation was on the right and a scale indicating the "Translation Compatibility Grading" was in the middle. With the help of this form, English language experts assessed the conformity of the translation as (0) if they thought that the Turkish version was completely irrelevant to the original text; and as (10) if they considered that the original and translated versions were a complete match. Google Drive was employed to prepare this form. Thus, the online data collection was enabled in Excel.

Turkish Understandability Grading Form

In order to determine the level of compliance of the items in the Turkish form with the Turkish grammar besides their understandability, the grading form developed by Baloglu (2005) was used. Turkish language experts assessed the scale items in terms of Turkish grammar using the form. This scaling was made within a range between zero (0) (if the item is not understandable due to the failure to comply with the Turkish grammar) and ten (10) (if the items are completely under-

standable). Google Drive was employed to prepare this form as we did in the English-Turkish compliance form. Thus, the online data collection was enabled in Excel.

Process

Prior to the adaptation into Turkish, necessary permits were taken from the developers of the scale. Following the acquisition of permits, items of the scale were translated into Turkish by different researchers. Afterward, the consistency of the translated forms was examined by the researchers. A decision was made among these various translations. Conformity of the English and Turkish versions of the items besides the compliance of the items to Turkish grammar rules and understandability were assessed by the English-Turkish Compatibility and Turkish Understandability Grading Forms. Some changes were introduced to the Turkish version by researchers in line with the views of the experts. Then to verify the translation and linguistic the English and Turkish forms of the scale were given to the same student group with one month interval and the level of consistency between these two forms were examined. The Wilcoxon Signed Ranks Test was applied to the results of this phase, which included the participation of 30 students.

To ascertain an opinion about the multi-dimensional structure, validation, and reliability of the scale (psychometric features), the data collected from 676 students were subject to exploratory factor analysis, and confirmatory factor analysis were carried out on the data collected from 452 students. The data collected from 1128 individuals following the exploratory and confirmatory factor analysis was subject to item analysis to calculate the reliability coefficient. Following the completion of the adaptation phase, the scale was applied to 1484 students in eighth-grade, with a view to determine whether the obtained data indicate that the motivation levels of students for science was a predictor of their self-regulatory skills or not.

Data Analysis

Data analyses were made by SPSS 21.0 and LISREL 8.8 statistics programmes.

Results

Structure, Concept and Language Compliance

10 language experts were consulted to determine the extent of English-Turkish conformity of the items of the scale. Table 1 reveals that the level of conformity of the translated items of the scale with the original English version varies between 7.1 and 9.5 (M=8.7; SD=1.15).

Table 1. Turkish-English compliance and understandability rates of items

Item No.	Turkish-English Conformity		Understandability rates		Item No.	Turkish-English Conformity		Understandability rates	
	M	SD	M	SD		M	SD	M	SD
Item1	8.7	1.70	7.6	1.96	Item17	8.1	2.64	9.0	1.26
Item2	8.9	1.44	8.1	1.47	Item18	7.8	2.03	9.0	1.54
Item3	8.5	1.95	8.1	1.47	Item19	9.2	1.31	8.6	1.50
Item4	7.4	2.87	6.1	3.31	Item20	9.0	1.41	9.0	1.26
Item5	8.3	1.56	9.3	.81	Item21	7.8	2.93	9.8	.40
Item6	8.1	1.96	9.1	.75	Item22	9.0	1.50	8.6	2.16
Item7	9.1	1.28	9.3	1.03	Item23	9.1	2.02	9.8	.40
Item8	8.0	2.10	9.0	2.00	Item24	8.8	2.09	6.8	4.26
Item9	8.9	1.85	8.8	1.94	Item25	9.1	1.69	9.6	.81
Item10	9.1	1.36	9.8	.40	Item26	9.4	.84	8.0	4.00
Item11	8.6	2.50	8.1	1.83	Item27	7.1	2.46	6.5	4.50
Item12	9.2	1.13	10.0	.00	Item28	9.4	1.07	9.6	.51
Item13	9.3	1.05	8.0	2.36	Item29	9.3	1.05	10.0	.00
Item14	9.3	.50	9.3	1.21	Item30	7.6	2.59	9.1	1.6
Item15	9.3	1.15	10.0	.00	Item31	9.3	.86	9.5	.83
Item16	9.3	.94	9.5	.83	Item32	9.5	.88	9.5	.83

M= Mean; SD: Standard deviation

Lecturers of Turkish Language and Literature and Turkish teachers assessed the conformity of the items of the scale in terms of Turkish grammar rules. Table 1 suggests that the understandability levels of the items of the scale in Turkish varies between 6.1 and 10.0 (M=8.8; SD= .68).

Moreover, it was necessary to identify whether the English and Turkish forms of the scale were interpreted identically or not. To this

end, English and Turkish forms were given to the same student group with one month interval. Thirty students participated in this study. The results of the Wilcoxon Signed Ranks Test of this phase are given in Table 2.

Table 2. Results of Wilcoxon Signed Ranks Test

Item No.	Z	p<.01	Item No.	Z	p<.01
Item1	-.711[a]	.477	Item17	-2.500[a]	.012
Item2	-1.134[a]	.257	Item18	-.349[b]	.727
Item3	-1.889[a]	.059	Item19	-2.170[b]	.030
Item4	-2.236[a]	.025	Item20	-.188[b]	.851
Item5	-.905[a]	.366	Item21	-1.732[a]	.083
Item6	-1.890[a]	.059	Item22	-1.469[a]	.142
Item7	-1.732[a]	.083	Item23	-1.604[a]	.109
Item8	-.246[a]	.806	Item24	-1.789[b]	.074
Item9	-1.320[a]	.187	Item25	-2.132[b]	.033
Item10	-1.496[b]	.135	Item26	-.676[a]	.499
Item11	-1.507[b]	.132	Item27	-.074[b]	.941
Item12	-.166[b]	.868	Item28	-3.207[a]	.001
Item13	-3.908[b]	.000	Item29	-.535[b]	.593
Item14	-.342[a]	.732	Item30	-.486[a]	.627
Item15	-2.366[a]	.018	Item31	-1.410[b]	.159
Item16	-.277[b]	.782	Item32	-.758[a]	.448

[a] based on positive ranks, [b] based on negative ranks

Results of the analysis indicate that results belonging to both forms are highly consistent and the difference between the two measurement points is not significant except the items no. 13 and 28 (p< .01). This shows that students interpret the Turkish and English forms of the scale without any difference.

Psychometric Features of the Scale (Structural Validation and Reliability)

Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) was carried out to identify the structural validation of the Motivation and Self-Regulation Scale. Thus, correlation matrices were examined among all items. “KMO”

(Kaiser-Meyer-Olkin) coefficient and "Bartlett Spherecity" tests were made to determine the conformity of the data to factor analysis. In order that the data can be eligible for factor analysis, KMO should be greater than .50 and the Bartlett Spherecity test should give significant results (Cokluk, Sekercioglu, & Buyukozturk, 2012). Items 13 and 28 were excluded from the scale following the Wilcoxon Signed Ranks test analysis, KMO and Bartlett Spherecity test χ^2 value for the remaining 30 items were found to be .953 and 9938.812 ($p< .05$), respectively.

Later, varimax rotation was used in EFA. Following this process, items in the scale were gathered under five factors. Because of overlapping, items with numbers 7, 17, 18, 29 and 32 were excluded from the scale and factor analysis was implemented. At the end of the analysis, a scale of four factors and 25 items was obtained, which had a KMO value of .948 and Bartlett Spherecity test χ^2 value of 7890.746 ($p< .05$). The means of measurement that comprises 25 items and four factors was found to count for 58.132% of the total variance and items in the sub-factors correspond with those in the form. Information on the factor loads and variance ratios of the scale are given in Table 3.

The first of the sub-dimensions obtained via EFA is self-efficacy. This sub-dimension consists of six items and explains the 15.786% of the total variance, and factor loads varies between .720 and .505. The second sub-dimension- learning goals- consists of seven items, and explains 15.592% of the variance, and factor loads varies between .817 and .439. The third sub-dimension- task value- consists of seven items and explains 14.823% of the variance, and factor loads varies between .729 and .466. The fourth sub-dimension- self-regulation- consists of five items and explains 11.932% of the variance, and factor loads varies between .804 and .478.

Table 3. Factor loads (n=676)

Item No	Self-efficacy	Learning goals	Task value	Self-regulation
Item 23	.720			
Item 20	.701			
Item 21	.700			
Item 22	.649			
Item 19	.514			
Item 24	.505			
Item 2		.817		
Item 3		.793		
Item 1		.700		
Item 5		.662		
Item 6		.634		
Item 4		.598		
Item 8		.439		
Item 9			.729	
Item 10			.712	
Item 14			.684	
Item 11			.615	
Item 15			.594	
Item 12			.563	
Item 16			.466	
Item 26				.804
Item 27				.689
Item 25				.679
Item 30				.554
Item 31				.478
58.132	15.786	15.592	14.823	11.932

Confirmatory Factor Analysis

Confirmatory factor analysis was conducted on the Turkish version of the form via LISREL 8.8 statistics program. It was tested if the data collected from different sample groups confirmed the four subdimensions. Table 4 demonstrates the significance levels of t values and error variance of the indicators based on the data collected from the sample group of 452 students.

Table 4. t values and error variances (n=452)

Item No.	t values	Error variances	Item No.	t values	Error variances
Item1	17.46	.46	Item17		
Item2	18.11	.43	Item18		
Item3	17.65	.45	Item19	16.57	.49
Item4	12.20	.69	Item20	15.08	.56
Item5	17.66	.45	Item21	15.52	.54
Item6	16.25	.52	Item22	17.01	.48
Item7			Item23	16.07	.52
Item8	13.90	.62	Item24	14.45	.59
Item9	13.75	.62	Item25	17.18	.46
Item10	14.90	.57	Item26	19.39	.36
Item11	16.80	.49	Item27	15.06	.56
Item12	15.95	.53	Item28		
Item13			Item29		
Item14	16.05	.52	Item30	18.54	.40
Item15	13.87	.62	Item31	14.93	.57
Item16	15.56	.54	Item32		

Table 4 demonstrates the t values in relation to latent variables that able to explain the observed variable, and the error variance of the observed variables. When the t values exceed 1.96, it is statistically significant at .05, and when they exceed 2.56, it is statistically significant at .01. On observing the t values, all indicators are statistically significant at .01. In addition, it was observed that the error variance of the observed variables gets quite appropriate values.

There are many compliance statistics for the analyses in structural equation modeling. The most frequently used compliance statistics indices were used for the data analysis in this study (Table 5). p value was analyzed to get information about the statistically significant difference (χ^2 value) between the anticipated co-variance matrix and the observed co-variance matrix. Even though it is desirable to have an insignificant p value, it is tolerable to have a statistically significant p value in this study as is the case in studies with large sample sizes (Cokluk, Sekercioglu, & Buyukozturk, 2012).

Table 5. Compliance statistics (n=452)

Model	χ^2/df	GFI	AGFI	RMSEA	CFI	NNFI	RMR	SRMR
	3.16	.87	.84	.069	.97	.97	.055	.050

The ratio of χ^2 value to its degree of freedom is important statistics. When the ratio is 3 or below 3, it shows that the compliance is high, but when the ratio is below 5 (Kline, 2005; Sümer, 2000) it shows moderate conformity. Table 5 demonstrates that χ^2/df ratio represents moderate level compliance. As GFI and AGFI values are not over .90, they represent weak compliance (Hooper, Caughlan & Mullen, 2008). When CFI and NNFI values are over .95, it represents perfect compliance (Sumer, 2000). When RMSEA, RMR and standardized RMR values are below .05, it represents perfect compliance whereas it represents good compliance when they are below .08 (Brown, 2006, s.87; Hu & Bentler, 1999; Joreskog & Sorbom, 1993). Furthermore, when they are below .10, it represents weak compliance (Tabachnick & Fidel, 2001). It can, therefore, be considered that RMSEA values of the test conducted represent good compliance. On the other hand, observing RMR (.055) and standardized RMR (.050) values, it can be considered that they are in good compliance. According to compliance statistics, it can be considered that this scale which was translated and adapted into Turkish formed a good model with all compliance statistics and that it is a valid scale with its factor structures.

Reliability

The reliability (internal consistency) of the adapted scale was studied through an item analysis in which it is based both on differences between the mean scores of sub-super groups, and on correlation.

Item Analysis Based on Sub-Super Group Average Difference

The item discrimination of the scale was identifield. For this reason, t value of the difference was estimated between the mean scores of ranking by students in sub-super groups for each item in the motivation and self-regulation scale. Total scores collected from the

scale conducted with 1128 eight-grade students were ranked from the highest to the lowest. The sub-super groups involved 305 students each. Analysis results are given in Table 6.

Table 6. The item averages, standard deviation and t values of 27% sub- groups and 27% super- groups of the scale.

Items	1:Sub 2:Super	M	SD	t	p
Item1	1	2.73	1.247	-22.576	.000
	2	4.60	.724		
Item2	1	2.85	1.238	-23.186	.000
	2	4.67	.573		
Item3	1	2.82	1.292	-22.230	.000
	2	4.67	.649		
Item4	1	3.43	1.423	-17.091	.000
	2	4.88	.350		
Item5	1	3.27	1.274	-20.709	.000
	2	4.87	.370		
Item6	1	3.02	1.226	-22.138	.000
	2	4.71	.501		
Item7	1				
	2				
Item8	1	3.09	1.299	-17.978	.000
	2	4.60	.611		
Item9	1	2.77	1.261	-19.688	.000
	2	4.44	.757		
Item10	1	2.73	1.234	-20.182	.000
	2	4.40	.742		
Item11	1	3.09	1.281	-20.534	.000
	2	4.72	.516		
Item12	1	3.24	1.328	-19.635	.000
	2	4.83	.442		
Item13	1				
	2				
Item14	1	2.84	1.238	-20.790	.000
	2	4.51	.640		
Item15	1	2.89	1.247	-19.378	.000
	2	4.52	.778		
Item16	1	2.84	1.255	-21.540	.000
	2	4.58	.634		

Table 6 (Continuous.). The item averages, standard deviation and t values of 27% sub- groups and 27% super- groups of the scale

Items	1:Sub 2:Super	M	SD	t	p
Item17	1				
	2				
Item18	1				
	2				
Item19	1	2.85	1.144	-22.023	.000
	2	4.52	.644		
Item20	1	3.26	1.234	-19.488	.000
	2	4.76	.523		
Item21	1	3.02	1.202	-21.994	.000
	2	4.69	.542		
Item22	1	3.19	1.201	-20.206	.000
	2	4.70	.493		
Item23	1	3.24	1.197	-20.105	.000
	2	4.76	.500		
Item24	1	2.93	1.139	-21.148	.000
	2	4.53	.649		
Item25	1	2.86	1.244	-20.104	.000
	2	4.52	.700		
Item26	1	2.63	1.226	-20.407	.000
	2	4.37	.831		
Item27	1	2.76	1.239	-18.987	.000
	2	4.38	.807		
Item28	1				
	2				
Item29	1				
	2				
Item30	1	2.91	1.206	-21.901	.000
	2	4.62	.597		
Item31	1	3.00	1.224	-19.901	.000
	2	4.58	.654		
Item32	1				
	2				

According to Table 6, no item was excluded from the scale at this stage because t-test results conducted for the mean scores of sub-super groups are statistically significant for all items ($p < .05$).

Item Analysis Based on Item-Total Correlation

Item-total correlation explains the correlation between the item score and the overall scores. Table 7 shows the item-total correlation data of the scale.

Table 7. Reliability values (Cronbach-Alpha) ve Item-total correlation of the scale items

	Item No	Item-total correlations (r)		Madde No	Item-total correlations (r)
Learning goals (α =.880)	Item1	.590	Self-efficacy (α=.855)	Item17	
	Item2	.644		Item18	
	Item3	.624		Item19	.600
	Item4	.592		Item20	.604
	Item5	.645		Item21	.632
	Item6	.656		Item22	.677
	Item7			Item23	.679
	Item8	.612		Item24	.584
Task value (α=.855)	Item9	.542	Self-regulation (α=.816)	Item25	.560
	Item10	.593		Item26	.532
	Item11	.650		Item27	.533
	Item12	.666		Item28	
	Item13			Item29	
	Item14	.619		Item30	.602
	Item15	.578		Item31	.594
	Item16	.646		Item32	

Table 7 demonstrates that all item scores of the data obtained from the eighth-grade students are in high correlation with the scale scores, and high scores have been obtained varying between .532 and .679. Cronbach's-Alpha reliability coefficient was .942 for 25-item overall scale whereas four sub-dimension values ranged from .816 to .880 (see Table 7). The scores obtained from the total scale show that the adapted form is reliable enough.

According to Table 8, the relationships between the sub-dimensions of the scale are significant and positive. The relationship between the scores of learning goals and those of the sub-dimensions

of the task value is the highest. On the other hand, the relationship between the scores of learning goals and those of the sub-dimensions of the self-regulation is the lowest.

Table 8. The relationships between the sub-dimensions

Sub-dimensions	1.	2.	3.	4.	Total
1. Learning goals	1	.684**	.641**	.514**	.859**
2. Task value		1	.676**	.570**	.880**
3. Self-efficacy			1	.634**	.861**
4. Self-regulation				1	.777**
Total					1

Correlation is significant at the .01 level.

Descriptive Information

After the adaptation of the scale into Turkish, data were collected from a different sample group in order to identify the relationship between students' level of motivation in science courses and their predictive power for self-regulation skill levels. First, Mann-Whitney U test was conducted in a group of 533 students (316 female and 217 male students) to reveal whether there is a statistically significant difference between the scores they obtained from the Test of Transition from Primary to Secondary Education (TTPSE-Science). As a result of the test (see Table 9), no significant relationship was observed between TTPSE-science scores of the female students, and those of the male students ($U=33575.500$, $p> .05$).

Then, it was determined whether there is a significant difference between motivation and self-regulation skills levels of 809 female and 675 male students in science courses. As data showed no normal distribution, Mann-Whitney U test was performed separately for learning goals, task value, self-efficacy and self-regulation. According to test results (see Table 9), there was a statistically significant difference in favor of female students with regards to learning goals ($U = 236996.000$, $p< .05$), task value ($U = 238986.500$, $p< .05$) and self-efficacy ($U=241625.500$, $p< .05$). Furthermore, there is statistically significant difference in favor of female students with respect to their levels of self-regulation skills ($U = 251997.000$, $p< .05$).

Table 9. Comparison of success, motivation levels and self-regulation skills by gender

		Group	n	Mean Rank	Sum of Ranks	U	p
Success	TTPSE	Female	316	269.25	85082.50	33575.500	.684
		Male	217	263.73	57228.50		
Motivation	Learning goals	Female	809	787.05	636724.00	236996.000	.000*
		Male	675	689.11	465146.00		
	Task value	Female	809	784.59	634733.50	238986.500	.000*
		Male	675	692.05	467136.50		
	Self-efficacy	Female	809	781.33	632094.50	241625.500	.000*
		Male	675	695.96	469775.50		
Self-regulation	Self-regulation	Female	809	768.61	621723.00	251997.000	.010*
		Male	675	711.33	480147.00		

*p < .05

Predictive Power of Motivation and Self-Regulation Skills on Success

Multiple linear regression analysis was conducted to determine the predictive power of students' motivation levels and their self-regulation skills in science courses on their success levels. On observing the results (see Table 10), learning goals, task value and self-efficacy, which are the sub-dimensions of the motivation, as well as self-regulation variables, show a statistically significant relationship with students' success (R= .296; R^2 = .088) ($F_{(4-528)}$ = 12.683; p < .01). The four variables in scale explain together the 8.8% of change in test scores. According to standardized regression coefficients, the relative order of importance of the predictor variables of success is as follows: self-efficacy (β= .438), self-regulation (β = -.143), task value (β = -.104) and learning goals (β = -.058). Given the significance tests of regression coefficients, predictor variables such as self-efficacy (p < .01) and self-regulation (p< .01) are significant predictors of success. On observing the relationship between predictor variables and

success, a correlation was found with self-efficacy (r = .277), self-regulation (r=- .112), task value (r=- .076) and learning goals (r=- .038). Regression analysis results showed that regression equation which predicts the test success can be expressed as follows: Test Score= (7.484* Self-efficacy) + (-2.351* self-regulation) + (-1.863* task value) + (-1.0 * learning goals) + (60.598).

Table 10. Multiple linear regression analysis (The predictive power of motivation and self-regulation skills on success)

Variables	B	Std.Error	β	t	p	Zero-order (r)	Part (r)
Constant	60.598	3.285		18.445	.000		
Learning goals	-1.000	1.130	-.058	-.885	.377	.106	-.038
Task value	-1.863	1.059	-.104	-1.758	.079	.050	-.076
Self-efficacy	7.484	1.132	.438	6.613	.000	.242	.277
Self-regulation	-2.351	.909	-.143	-2.586	.010	.048	-.112
R=.296		R^2=.088					
$F_{(4-528)}$ =12.683		p=.000					

The Predictive Power of Motivation for Self-regulation Skills

Multiple linear regression analysis was conducted to identify the predictive power of self-regulation skills for students' motivation levels in science courses. On observing the results (see Table 11), learning goals, task value and self-efficacy, which are the sub-dimensions of the motivation, show a statistically significant relationship with students' self-regulation skills (R=.708; R^2 = .501) ($F_{(3-1480)}$ = 496.039; p <.01). All of these three variables explain together the 50.1% of change in self-regulation skills. Standardized regression coefficients show that the relative order of importance of the predictor variables on self-regulation skills is as follows: self-efficacy (β= .475), task value (β = -.212) and learning goals (β = -.081). Based on the significance tests of regression coefficients, predictor variables such as self-efficacy (p < .01) task value (p < .01) and learning goals (p < .01) are significant predictors of self-regulation. On observing the relation-

ship between predictor variables and self-regulation, a correlation was found with self-efficacy (r = .685), task value (r=- .607) and learning goals (r=- .586). Regression analysis results show that regression equation which predicts self-regulatory skills can be expressed as follows: Self-regulation= (.481* Self-efficacy) + (-.220* task value) + (.079 * learning goals) + (.569).

Table 11. Multiple linear regression analysis (The predictive power of motivation for self-regulation skills)

Variables	B	Std.Error	β	t	p	Zero-order (r)	Part (r)
Constant	.569	.080		7.115	.000		
Learning goals	.079	.029	.081	2.680	.007	.586	.069
Task value	.220	.030	.212	7.392	.000	.607	.189
Self-efficacy	.481	.030	.475	16.180	.000	.685	.388
R= .708		R^2= .501					
$F_{(3-1480)}$ =496.039		p=.000					

Conclusion and Discussion

This study has aimed to identify the relationship between the motivation levels of the eighth-grade students in science courses in terms of self-regulatory skills by using the adaptation into Turkish of "Motivation and Self-Regulation Scale" developed by Velayutham, Aldridge, and Fraser (2011). Exploratory factor analysis was conducted with 676 eighth-grade students to determine the construct validity of the scale. As a result of the analysis, the four-factor and 25 item scale was formed in which the KMO value was .948 and Bartlett Test for Sphericity χ^2 value was 7890.746 ($p<.05$). The Turkish version was comprised of 25 items and 4 factors explained 58.132% of the total variance, and items in the sub-factors are consistent with the items in the original form. Confirmatory factor analysis was conducted with 452 eighth-grade students in order to test whether four sub-dimensions (learning goals, task value, self-efficacy and self-regulation) confirm the data. It can be said that is formed a good model with compliance statistics and is a valid scale with factor structures.

Cronbach's-Alpha reliability coefficient was found .942 for the whole scale whereas other values for the four sub-dimensions of the scale ranged from .816 to .880.

Mann-Whitney U test was conducted to identify if there is a statistical significance by gender in the scores of eighth-grade students from TTPSE-science test. There is no statistically significant difference in the TTPSE-science scores between male and female students. Similarly, the difference between motivation and self-regulatory skills in science courses on gender was analyzed. A statistically significant difference was observed in favor of girls in all sub-dimensions of the scale. In some studies, motivation and self-regulation skill levels of female students were much higher than those of male students (Pajares, Britner & Valiante, 2000; Pajares &Valiante 2001; Zimmerman & Martinez-Pons, 1990). On the other hand, motivation and self-regulatory skill levels of male students were much higher than those of female students in studies conducted by Lynch and Trujillo (2011), Wigfield, Eccles, and Pintrich (1996), and Liou and Kao (2014).

Multiple linear regression analysis was conducted to identify the predictive power of motivation levels and self-regulatory skills in science courses in terms of the success levels of students in science courses. Analysis results reveal that there is a statistically significant relationship between the sub-dimensions of motivation, namely learning goals, task value and self-efficacy as well as self-regulation, and students' levels of success. Additionally, the multiple linear regression analysis that was conducted to identify the predictive power of motivation levels and self-regulatory skills in science courses revealed that the sub-dimensions of motivation, namely learning goals, task value and self-efficacy had a statistically significant relationship with self-regulatory skills ($R=.708$; $R^2 = .501$). The study conducted by Pintrich and De Groot (1990) analyzed the relationship between self-regulatory skills and motivation with academic performance. The results of the study suggested that high levels of self-efficacy and task value is related with the use of high level cognitive strategy whereas high levels of self-efficacy and task value are related with high levels of self-regulation. The result is consistent with the study.

In conclusion, "Motivation and Self-Regulation Scale" developed by Velayutham, Aldridge and Fraser (2011) as 32 items was adapted into Turkish. The validity and reliability studies were con-

ducted, and it was found that 25 items of the scale was validity to and reliable for Turkey in cultural terms. This scale can be utilized to identify the motivation and self- regulation levels of eighth-grade students in science courses.

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Genişletilmiş Özet

Amaç

Bu çalışmanın iki amacı bulunmaktadır. Bunlardan birincisi Velayutham, Aldridge ve Fraser (2011) tarafından geliştirilen "Motivasyon ve Öz-Düzenleme Ölçeği"nin Türkçeye uyarlanmasıdır. İkinci amacı ise 8. sınıf öğrencilerinin fen bilimleri dersine karşı motivasyon düzeylerinin öz-düzenleme becerilerini yordama gücü arasındaki ilişkiyi belirlemektir.

Yöntem

Araştırma tarama (survey) yöntemi kullanılarak yürütülmüştür. Bu yöntem kişilerin tutum, inanış, görüş ve herhangi bir konudaki bilgilerini belirlemek amacıyla kullanılır. Tarama yöntemi çok yönlülük, verimlilik ve genellenebilirliğinden dolayı eğitimde kullanımı oldukça fazladır (Fraenkel & Wallen, 2003; McMillan & Schumacher, 2010).

Örneklem

Motivasyon ve Öz-Düzenleme Ölçeği'nin Türkçeye uyarlanması ve daha sonra adapte edilen ölçeğin uygun bir örneklem grubuna uygulanması aşamasında 5 farklı örneklem grubundan veri toplanmıştır. Bu aşamalardan;

İlki ölçek maddelerinin araştırmacılar tarafından Türkçeye çevrilmesinden sonra çeviri maddelerinin orijinal ölçek maddelerini ne derece karşıladığını belirlemek için görüşlerine başvurulan uzmanlardır. Bu aşamada her iki dili de hâkim 10 fen eğitimi alanı uzmanı görev almıştır.

İkincisi 6 Türk Dili uzmanı ölçek maddelerinin Türk dil kurallarına uygunluğunu değerlendirmişlerdir.

Üçüncüsü ise özel bir ortaokulun 8. sınıfında öğrenimlerine devam etmekte olan 30 öğrenci ölçek maddelerinin Türkçe ve İngilizce ifadelerinden aynı şeyleri anlayıp anlamadıklarını belirleme aşamasında görev almışlardır.

Dördüncüsü ölçeğin geçerlik ve güvenirlik çalışmasını yapmak üzere 14 farklı okuldan toplam 1128 sekizinci sınıf öğrencisi çalışmaya katılmıştır.

Son aşamada ise Türkçeye uyarlanan "Motivasyon ve Öz-Düzenleme" ölçeğiyle sekizinci sınıf öğrencilerinin fen derslerine karşı motivasyon düzeyleri, öz düzenleme stratejileri ve fen başarıları arasındaki ilişkiyi belirlemek amacıyla 14 farklı okuldan toplam 1484 öğrenciden veri toplanmıştır.

Veri Toplama Araçları

Motivasyon ve Öz-Düzenleme Ölçeği

Araştırmada veri toplama aracı olarak Velayutham, Aldridge ve Fraser (2011) tarafından geliştirilen "Motivasyon ve Öz-Düzenleme Ölçeği"nin 4 alt boyutta 32 maddelik İngilizce formu kullanılmıştır. Bu alt boyutlar görev değeri, öğrenme amaçları, öz-yeterlik ve öz-düzenlemedir. Orijinal ölçeğin çok boyutluluğu açımlayıcı faktör analizi ile saptanmıştır. Ölçek maddeleri beşli likert tipinde hazırlanmıştır. Ölçeği cevaplandıranların maddelere katılma dereceleri; Tamamen

Katılıyorum (5), Katılıyorum (4), Kararsızım (3), Katılmıyorum (2) ve Kesinlikle Katılmıyorum (1) şeklinde sınıflandırılmıştır. Ölçekte yer alan tüm maddeler olumlu cümle yapısındadır. Orijinal ölçeğin nicel verileri 8. 9. ve 10. sınıf da öğrenimlerine devam etmekte olan 78 farklı sınıftaki toplam 1360 öğrenciden elde edilmiştir. Detaylı bilgi toplamak içinde 10 fen öğretmeni ve 12 sekizinci sınıf öğrencisi ile mülakat yapılmıştır.

İşlem

Türkçeye uyarlanması çalışmasına başlanmadan önce, ölçeğin geliştiricilerinden izin alınmıştır. İzin alındıktan sonra, ölçek maddeleri araştırmacılar tarafından birbirinden farklı olarak Türkçeye tercüme edilmiştir. Daha sonra araştırmacıların çevirileri arasındaki uyum incelenmiştir. Birbirinden farklı çeviriler arasında ortak bir karara varılmıştır. Türkçeye çevrilen ifadelerin İngilizce-Türkçe uyumluluğu ve Türkçe dilbilgisine uygunluğu ve anlaşılabilirliği İngilizce-Türkçe uyumluluk ve Türkçe anlaşılabilirlik derecelendirme formları kullanılarak belirlenmiştir. Uzman görüşleri doğrultusunda araştırmacılar tarafından Türkçe çeviride bir takım değişiklikler yapılmıştır. Tercüme ve Dil geçerliği sağlanan ölçeğin, önce İngilizce formu bir ay sonrada Türkçe formu aynı öğrenci grubuna uygulanarak iki form arasındaki tutarlık derecesi incelenmiştir. Toplam 30 öğrencinin katıldığı bu aşamaya ait sonuçlara, Wilcoxon Eşleştirilmiş Çiftler Testi (Wilcoxon Signed Ranks Test) uygulanmıştır. Ölçeğin çok boyutlu yapısı, geçerlik ve güvenirliği (psikometrik özellikleri) hakkında fikir elde etmek amacıyla 676 öğrenciden elde edilen veriye açımlayıcı faktör analizi, 452 öğrenciden elde edilen veriye ise doğrulayıcı faktör analizi yapılmıştır. Açımlayıcı ve doğrulayıcı faktör analizinin yapıldığı toplam 1128 kişiden elde edilen veriye ise madde analizi yapılarak güvenirlik katsayısı hesaplanmıştır. Daha sonra adaptasyon aşaması tamamlanan ölçek 1484 sekizinci sınıf öğrencisine uygulanarak elde edilen veriler doğrultusunda öğrencilerin fen bilimleri dersine karşı motivasyon düzeylerinin öz-düzenleme becerilerinin yordayıcısı olup olmadığı belirlenmeye çalışılmıştır.

Verilerin Analizi

Verilerin analizinde SPSS 21.0 ve LISREL 8.8 istatistik programları kullanılarak analizler yapılmıştır.

Sonuç ve Tartışma

Bu çalışmada Velayutham, Aldridge ve Fraser (2011) tarafından geliştirilen "Motivasyon ve Öz-Düzenleme Ölçeği'nin Türkçeye uyarlanması ve ortaokul 8. sınıf öğrencilerinin fen bilimleri dersine karşı motivasyon düzeylerinin öz-düzenleme becerilerini yordama gücü arasındaki ilişkiyi belirlemek amaçlanmıştır. Velayutham, Aldridge ve Fraser (2011) tarafından geliştirilen ve özgün formu İngilizce olan "Motivasyon ve Öz-Düzenleme Ölçeği" (Students' Motivation and Self-Regulation in Science Learning) 4 alt boyutta 32 maddeden oluşmaktadır. Bu alt boyutlar görev değeri, öğrenme amaçları, öz-yeterlik ve öz-düzenlemedir. Ölçek önce araştırmacılar tarafından Türkçeye çevrilmiş ve bu çevrinin dil geçerliğini sağlamak için 10 fen eğitim alanında ve 6 Türk dili alanında uzman akademisyen-

lerin görüşleri alınmıştır. Ölçeğin Türkçe çevirisi özel bir ortaokulun 8. sınıfında okuyan 30 öğrenciye uygulanarak ölçek maddelerinin Türkçe ve İngilizce ifadelerinden aynı şeyleri anlayıp anlamadıkları belirlenmiştir. Ölçeğin yapı geçerliğini belirlemek için 676 sekizinci sınıf öğrencisine açımlayıcı faktör analizi yapılmış ve analiz sonucunda KMO değeri .948 ve Bartlett Küresellik testi χ^2 değeri ise 7890.746 ($p<.05$) olan, 4 faktörlü ve yirmi beş maddeden oluşan ölçek elde edilmiştir. 25 madde ve 4 faktörden oluşan ölçme aracının toplam varyansın %58.132'isini açıkladığı ve alt faktörlerde yer alan maddelerin orijinal formdaki maddelerle örtüştüğü görülmüştür (bkz.tablo 3). Verilerin dört alt boyutu (öğrenme amaçları, görev değeri, öz-yeterlik ve öz-düzenleme) doğrulayıp doğrulamadığını test etmek için 452 sekizinci sınıf öğrencisinden elde edilen veriye doğrulayıcı faktör analizi yapılmıştır. Tablo 5'deki uyum istatistiklerine göre Türkçeye çevrilerek uyarlaması yapılan bu ölçeğin, bütün uyum istatistikleriyle iyi bir model oluşturduğu ve faktör yapılarıyla geçerli bir ölçek olduğu söylenebilir. Ölçeğin tamamı için Cronbach-Alpha güvenirlik katsayısı .942 tespit edilmiş ve ölçeğin dört alt boyutuna ait değerler ise .816 ile .880 arasında değiştiği belirlenmiştir (bakınız Tablo 7).

Çalışmada sekizinci sınıf öğrencilerinin TEOG–fen bilimleri sınavından aldıkları puanların cinsiyete göre anlamlı farklılıklar gösterip göstermediğini belirlemek için Mann- Whitney U testi uygulanmış, kız ve erkek öğrencilerin TEOG–fen bilimleri testi sonuçları arasında anlamlı bir fark bulunmamıştır. Ayrıca fen derslerine karşı motivasyon ve öz-düzenleme beceri düzeyleri arasında anlamlı bir farkın olup olmadığına bakılmış ve ölçeğin tüm alt boyutlarında kızlar lehine anlamlı bir fark gözlemlenmiştir. Bazı çalışmalarda kız öğrencilerinin erkek öğrencilere göre motivasyon ve öz-düzenleme beceri düzeyleri daha iyi olduğu belirlenmiştir (Pajares, Britner, & Valiante, 2000; Pajares &Valiante 2001; Zimmerman & Martinez-Pons, 1990). Lynch ve Trujillo (2011), Wigfield, Eccles, ve Pintrich (1996) ve Liou ve Kao (2014) tarafından yapılan çalışmalarda ise erkek öğrencilerinin motivasyon ve öz-düzenleme beceri düzeyleri kız öğrencilere göre daha iyi olduğu tespit edilmiştir.

Çalışmada fen bilimleri dersine karşı motivasyon düzeyleri ile öz-düzenleme becerilerinin fen bilimleri dersindeki başarı düzeylerini yordama gücünü belirlemek için çoklu doğrusal regresyon analizi yapılmıştır. Analiz sonuçları incelendiğinde motivasyonun alt boyutları olan öğrenme amaçları, görev değeri ve öz-yeterlik ile öz-düzenleme değişkenleri birlikte, öğrenci başarısı ile anlamlı bir ilişki içinde olduğu tespit edilmiştir. Ayrıca fen bilimleri dersine karşı motivasyon düzeylerinin öz-düzenleme becerilerini yordama gücünü belirlemek için yapılan çoklu doğrusal regresyon analiz sonuçları incelendiğinde ise motivasyonun alt boyutları olan öğrenme amaçları, görev değeri ve öz-yeterlikle birlikte, öz-düzenleme başarısı ile anlamlı bir ilişki ($R=.708$; $R^2 = .501$) içinde olduğu ortaya çıkmıştır. Pintrich ve De Groot (1990) tarafından yapılan çalışmada öz-düzenleme becerisi ve motivasyon ile akademik performans arasındaki ilişkiyi araştırmışlardır. Araştırma sonucunda yüksek seviyede öz-yeterlik ve görev değerinin yüksek seviyede bilişsel strateji kullanımıyla; yüksek seviyedeki öz-yeterlik ve yüksek seviyede görev değerinin daha yüksek seviyede öz-düzenlemeyle ilgili olduğu belirlenmiştir. Yapılan çalışma ile bu sonuç örtüşmektedir.

Sonuç olarak Velayutham, Aldridge ve Fraser (2011) tarafından 32 madde olarak geliştirilen "Motivasyon ve Öz-Düzenleme Ölçeği"nin Türkçeye uyarlanan formunun geçerlik ve güvenirlik çalışması sonucu elde edilen bulgular, ölçeğin 25 maddelik halinin kültürel açıdan Türkiyede kullanılabilecek geçerli ve güvenilir bir ölçek olduğunu göstermiştir. Söz konusu ölçek ortaokul sekizinci sınıf öğrencilerinin fen bilimlerine karşı motivasyon ve öz-düzenleme beceri düzeylerinin tespiti için kullanılabilir.

Ek-1

No	Motivasyon ve Öz-Düzenleme Ölçeği	Tamamen Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum
	Bu fen dersinde;					
1	Amaçlarımdan biri öğrenebildiğim kadar fen öğrenmektir.	①	②	③	④	⑤
2	Amaçlarımdan biri fene ilişkin yeni konuları öğrenmektir.	①	②	③	④	⑤
3	Amaçlarımdan biri fene ilişkin yeni becerilere sahip olmaktır.	①	②	③	④	⑤
4	Çalışmalarımı anlayarak yapmam benim için önemlidir.	①	②	③	④	⑤
5	Öğretilen fen konularını öğrenmek benim için önemlidir.	①	②	③	④	⑤
6	Fen becerilerimi geliştirmek benim için önemlidir.	①	②	③	④	⑤
7	Bilimsel düşünceleri anlamak benim için önemlidir.	①	②	③	④	⑤
8	Öğrendiklerim günlük yaşantımda kullanılabilir.	①	②	③	④	⑤
9	Öğrendiklerim ilgi çekicidir.	①	②	③	④	⑤
10	Öğrendiklerim bir şeyleri tanımam için yararlıdır.	①	②	③	④	⑤
11	Öğrendiklerim benim için yararlıdır.	①	②	③	④	⑤
12	Öğrendiklerimin uygulanabilir değeri vardır.	①	②	③	④	⑤
13	Öğrendiklerim merakımı giderir.	①	②	③	④	⑤
14	Öğrendiklerim beni düşünmeye teşvik eder.	①	②	③	④	⑤
15	Fen konuları zor olsa bile onları öğrenebilirim.	①	②	③	④	⑤
16	Uğraşırsam zor konuların üstesinden gelebilirim.	①	②	③	④	⑤
17	İyi notlar alacağım.	①	②	③	④	⑤
18	Yaptığımız çalışmaları öğrenebilirim.	①	②	③	④	⑤
19	Öğretilen konuları anlayabilirim.	①	②	③	④	⑤
20	Konularda iyiyimdir.	①	②	③	④	⑤
21	Ödevler ilgimi çekmese bile çalışmaya devam ederim.	①	②	③	④	⑤
22	Yaptığım işi sevmesem bile çok çalışırım.	①	②	③	④	⑤
23	Yapılacak daha iyi işler olsa bile mevcut çalışmama devam ederim.	①	②	③	④	⑤
24	Çalışma zor olsa bile çalışmaktan vazgeçmem.	①	②	③	④	⑤
25	Sınıf içinde dikkatimi toplarım.	①	②	③	④	⑤

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