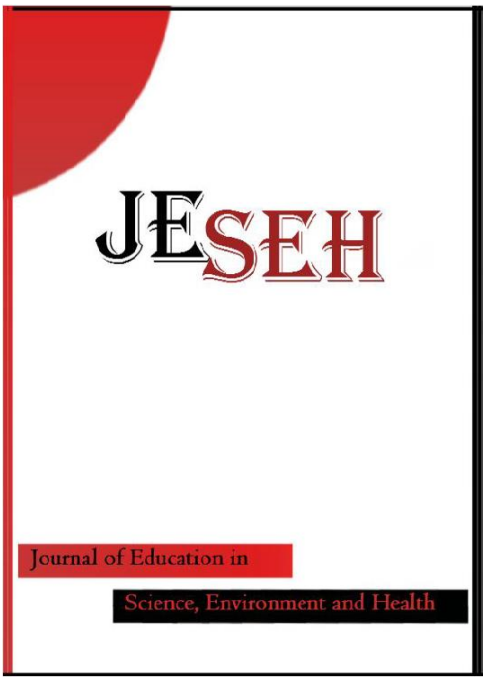

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Science Amotivation Scale: Validity and Reliability Study

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Science Amotivation Scale: Validity and Reliability Study

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Abstract

The aim of the present study was to develop the Science Amotivation Scale (SAS) in order to determine amotivation levels among demotivated students in science classes as well as examine the reasons causing amotivation. The participants were 533 students (6th, 7th, and 8th grade) studying across secondary schools located in Kars city centre in Turkey. The development of the scale included; *1)* a review of related literature to develop an item pool, *2)* interviews with students in a secondary school who were highly demotivated in science classes, *3)* consultation with subject matter experts for the draft scale, and *4)* exploratory and confirmatory factor analyses. The results suggested that the final scaled included 22 items on a 5-point Likert scale. In addition, the scale had three sub-dimensions: Psychological-Personal Reasons, Family-Environment Related Reasons, and Fear-Anxiety Related Reasons. Exploratory Factor Analysis results showed that factor loadings of items within the scale ranged between .602 and .764. In addition, Confirmatory Factor Analysis results supported the structure of the scale. The reliability coefficient of the scale was calculated as .91. The results also indicated that validity and reliability levels of the scale were high and that the scale, in its current form, can be used to identify the reasons behind students' amotivation in secondary school science classes.

Introduction

Science courses have an abstract and equally complex structure. Therefore, students may experience difficulties in science subjects from time to time. Motivating students becomes an important point of consideration in order to be able to overcome the difficulties that can be faced during science education. Research has shown that motivation affects students' academic success in the classroom (Alvord & Glass, 1974; Bart, 1978, Pintrich & De Groot, 1990; Trumper, 1995). Atay (2014) has found that individuals' purposeful participation in the learning process positively affects learning and students become more successful in learning scientific knowledge. Being motivated will positively affect an individual's learning and allow the learning process to be more effective. In this sense, identifying factor that can affect students' motivation becomes an important point of consideration to increase their motivation. Undoubtedly, the learning outcomes for a motivated student would be different from the learning outcomes for a demotivated student.

Amotivation results from not caring about an activity, feeling the self to be incompetent, or not believing that the self will be able to reach the desired outcome (Deci & Ryan, 2000). An individual's imperceptions or disbelief in his/her skills and efforts are one of the main sources of amotivation (Legault, Green-Demers, & Pelletier, 2006). Amotivation, which is a big problem not only for teachers but also for students, is one of the most frequently experienced sources of failure (Green-Demers, Legault, Pelletier & Pelletier, 2008). More specifically, high levels of student amotivation, in most cases, can put the teacher in a tight spot and cause them to make wrong decisions (Dicke, Lüdtke, Trautwein, Nagy & Nagy, 2012).

Research studies revealed that individuals with high levels of motivation are able to achieve better results compared to those who are less motivated (Green, Nelson, Martin ve Marsh, 2006; Linnenbrink ve Pintrich, 2002; Pintrich ve Schunk, 1996). Motivation is a prequisite for classroom success and school satisfaction (Vallerand et al., 1991). According to self-determination theory, amotivation is the most worrisome state of academic motivation. While motivated students' actions are supported by feelings such as competition and effort, amotivated students have the tendency to not participate in activities, not taking any taks, not comleting a given task, and absenteeism (Vallerand et al., 1991). Demotivated students can experience negative feelings such as anxiety, fear, disappointment, anger, hopelessness, and unhappiness. Therefore, an individual's amotivation can increase incrementally and result in unproductivity at classroom as well as societal levels. In this sense, student amotivation becomes a significant problem that needs to be solved not only in the context of an individual students' academic success but also in the context of the whole class as well as the school

(Legault, Green-Demers & Pelletier, 2006). Therefore, it is considered that the reasons which negatively affect student motivation should be determined. More specifically, if teachers become aware of the factors that cause their students to become amotivated in the classroom then they can shape teaching and learning processes and their behaviour in a way that contributes towards the solution of those problems.

Table 1. Factors that were found to be related to student amotivation

Category
Family
Financial situation (Atay,2014)
Monthly income (Demir, Öztürk & Dökme, 2012; Dembo, 2004)
Education level (Demir, Öztürk & Dökme, 2012; Uzun & Keleş, 2010; Atay, 2014; Yerlikaya, 2014)
Study environment (Demir, Öztürk & Dökme, 2012)
Having a computer and internet connection available for use at home (Atay, 2014)
Family support (Khamis, Dukmak & Elhoweris, 2008)
Family expectations (Dembo, 2004)
School and environment
School's physical appearance (Vatansever-Bayraktar, 2015)
Classroom seating arrangement (Ceylan, 2003)
A classroom environment that supports student autonomy (Orsini, Binnie & Wilson, 2016)
Friends
Friends' attitudes towards learning (Khamis, Dukmak & Elhoweris, 2008)
Collaboration (Uzun & Keleş, 2010)
Personal reasons
Weekly study time (Yenice, Saydam & Telli ,2012)
Individual differences (Arıkıl & Yorgancı, 2012)
Teacher
Teacher guidance (Ceylan, 2003)
Teacher appearance (Uzgören-Gültan, 1999; Vatansever-Bayraktar, 2015)
Teacher behaviour (Akbaba & Aktaş, 2005; Ceylan, 2003; Vatansever-Bayraktar, 2015; Mccombs, 1991; Dembo, 2004)
Teacher-Student interaction (Arıkıl & Yorgancı, 2012; Khamis, Dukmak & Elhoweris, 2008; Mccombs, 1991)
Teacher's Teaching style (Ceylan, 2003; Vatansever-Bayraktar, 2015; Mccombs, 1991; Dembo, 2004)
Teaching materials (Arıkıl & Yorgancı, 2012; Ceylan, 2003)
Teacher's psychological support (Kashef, Mazyari & Ameri, 2012)
Psychological
Passion-enthusiasm (Arıkıl & Yorgancı, 2012; Ceylan, 2003)
Student beliefs (Khamis, Dukmak & Elhoweris, 2008)
Being goal oriented (Gömleksiz & Serhatlıoğlu, 2014; Dembo, 2004; Martin & Tracey, 2002)
Self-confidence (Akbaba & Aktaş, 2005; Vatansever-Bayraktar, 2015
Reward-punishment (Vatansever-Bayraktar, 2015; Khamis, Dukmak & Elhoweris, 2008)
Attitudes towards the course (Yaman & Dede, 2007; Yetim, Demir & Erturan İlker, 2016; Dembo, 2004)
Interest in the subject (Arıkıl & Yorgancı, 2012; Gömleksiz & Serhatlıoğlu, 2014)
Positive thinking (Arıkıl & Yorgancı,2012; Akbaba & Aktaş, 2005)
Students' fear and concerns (Martin & Tracey, 2002)

The review of literature on this subject suggests that most studies have been conducted to measure students' motivation levels and scales have been developed to realize this aim (Aydın, Yerdelen, Gürbüzoğlu-Yalmancı & Göksu, 2014; Azizoğlu & Çetin 2009; Dede & Yaman, 2007; Uzun & Keleş, 2010; Yenice, Saydam & Telli, 2012).. It has been found that various international studies have been conducted on amotivation (i.e. Legault, Green-Demers & Pelletier, 2006; Pelletier, Dion, Tuson & Green-Demers, 1999; Vlachopoulos & Gigoudi, 2008). Nevertheless, there has not been enough research on this subject in the context of Turkey. The only study

that has been conducted in the context of Turkey is İlter's (2019) study which aimed to adapt the "Academic Amotivation Scale" developed by Legault, Green-Demers and Pelletier (2006) into the Turkish culture. No amotivation scale was found that was specifically oriented towards science classes. The aim of the present study is to contribute to the literature by developing a valid and reliable scale which can be used to measure students' amotivation levels and understand the reasons for their amotivation.

Method

The aim of the present study is to develop the Science Amotivation Scale (SAS). Survey research design, a quantitative research approach, was followed to achieve this aim and collect data. The development of the scale included; 1) a review of related literature to develop an item pool, 2) interviews with students in a secondary school who were highly demotivated in science classes, 3) consultation with subject matter experts for the draft scale, and 4) exploratory and confirmatory factor analyses. The universe of the study consisted of 6th, 7th, and 8th grade students studying in secondary schools in Kars city centre in Turkey. A different group of participants (sample) was selected for each phase of the study and analyses were conducted using the collected data. The size of each sample is specified under related sub-headings.

Table 2. Student responses received following the interviews

Reasons affecting amotivation	Number of students mentioning a reason (5 students)
Study environment	2
Use of internet	3
Family support	4
Family expectations	5
School's physical appearance	1
Classroom seating arrangement	3
An environment supporting student autonomy	3
Friends' attitudes towards learning	2
Collaboration	3
Teacher guidance	3
Teacher behaviours	1
Student-Teacher interaction	5
Teacher's teaching style	2
Teacher's teaching materials	3
Teacher's psychological support	5
Being passionate and enthusiastic	3
Student beliefs	1
Students being goal-oriented	3
Student self-confidence	2
Reward and punishment	2
Attitudes towards the course	1
Interest in the subject	5
Positive thinking	4
Students' fears and concerns	3
Weekly study time	2
Individual differences	3

Creation of item pool

In the initial phase, a review of related literature was conducted in order to create the item pool. This review focused on identifying the factors that cause amotivation among students. Those factors are summarized in Table 1. Those factors were transformed into items and included in the item pool. Furthermore, interviews were arranged to be held with demotivated students in order to write further items. Therefore, the Academic Motivation Scale for Learning Science (AMSLS) was administered to 6^{th}, 7^{th}, and 8^{th} grade students in a

secondary school that was not part of the study sample for the main study. The reason for administering this scale was to identify students who were demotivated in science classes.

AMSLS is a scale developed by Aydın, Yerdelen, Gürbüzoğlu-Yalmancı and Göksu (2014) and adapted for science classes by Çekim (2016). It is used to measure students' academic motivation in science classes and consists of 19 items and four sub-dimensions. Those sub-dimensions are; intrinsic motivation, extrinsic motivation-career, extrinsic motivation-social, and amotivation. Due to the focus of the present study, only the results of the *amotivation* sub-dimension were taken into consideration. Five students among those who scored highest in this sub-dimension (indicating highest levels of amotivation) were invited to semi-structured interviews. Students were asked questions linked to the factors identified in the review of literature for amotivation. Those questions were:

- Do you think your family affects your motivation in science classes?
- Do you think that your school's physical appearance affects your motivation in science classes?
- Do you think your friends affect your motivation in science classes?
- Do you think your teacher affects your motivation in science classes?
- Do you think that your psychological mood affects your motivation in science classes?
- Are there any other reasons that you think affect your motivation in science classes?

The content analysis of the responses received from students, the reasons mentioned to affect amotivation are summarized in Table 2. The item pool developed following the above steps were examined by three subject matter experts and the item pool was finalized following the revisions suggested by the experts. The scale consisted of 42 items to be administered on a 5-point Likert scale where "1" represented "Strongly disagree" and "5" represented "Strongly agree".

Results and Discussion

Exploratory Factor Analysis

Initially the scale was administered to 261 secondary school students (6^{th}, 7^{th}, and 8^{th} grade) using simple random sampling procedures and the 42-item scale was factor analysed. Exploratory Factor Analysis (EFA) results indicated that 22 items had a loading value of .518 and over. Next, the factor analysis was run again with those 22 items and the KMO value was calculated as .93. This suggested that the dataset was fit for factor analysis. Moreover, the Bartlett Sphericity test indicated that there was a considerably large relationship among variables to conduct the factor analysis ($\chi 2 = 3027$, p<, 001). The EFA results indicated that there were 3 factors with an eigenvalue higher than 1. Similarly, the analysis of the scree plot suggested that there were three areas above the curve point (Figure 1).

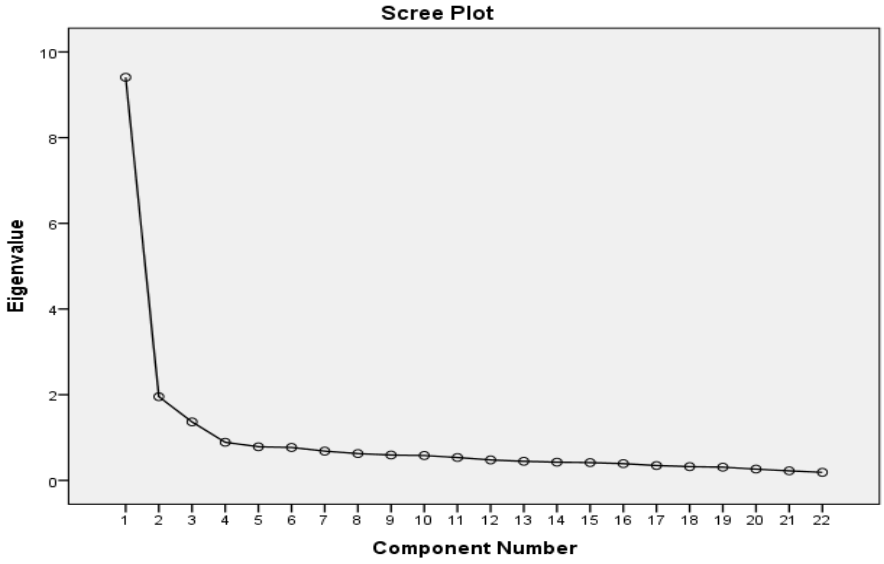

Figure 1. Eigenvalues' distribution graph

Following these results, the dataset was rotated using the Varimax method and it was decided that the scale had a 3-factor structure. The factors were named based on the items that loaded onto them; Psychological-Personal

(PP), Family-Environment (FE), and Fear-Anxiety (FA). The total variance that those three factors explained was 57.85 % (see Table 3).

Table 3. Total variance explained by the factors

Factors	Eigenvalue	Explained variance (%)	Total variance (%)
PP	9,408	32,572	32,572
FE	1,954	13,417	45,988
FA	1,366	11,864	57,852

Each item's factor loadings are summarized in Table 4. According to the Varimax rotation technique in Table 4, the first factor (Family-Environment) consists of items 1, 2, 3, 9 and 26; the second factor (Fear-Anxiety) consist of items 21, 32 and 36; and items 22, 24, 33, 35, 37, 38, 39, 40, 41, 7, 13, 16, 18 and 19 constitute the third factor (Psychological-Personal).

Table 4. SAS factor loadings based on the 3-factor solution using varimax method

Items	Factors		
	FE	FA	PP
1. Because my family's financial situation prevents me from buying materials necessary for science classes	.790		
2. Because I do not have Internet at home to do my science homework	.775		
3. Because my parent's education level is not high enough to support me in science classes.	.764		
9. Because I do not have an opportunity to study for science classes with my friends.	.719		
26. Because I do not have a computer to do my science homework.	.603		
21. Because I fear that I will not be successful in science classes.		.658	
32. Because I abstain from asking questions to my teacher when I do not understand the subject in science classes.		.518	
36. Because the subjects in science classes are difficult for me.		.638	
22. Because I do not like science classes.			.652
24. Because I do not have a goal to learn science.			.648
33. Because I do not like my science teacher.			.798
35. Because my teacher does not believe that I can be successful in science.			.716
37. Because I do not know why I should learn science.			.627
38. Because I do not learn new information in science classes.			.602
39. Because science classes are not important for me.			.763
40. Because my family does not believe that I can be successful in science.			.722
41. Because learning science will not be useful.			.671
7. Because I do not like my school.			.754
13. Because our teacher does not interact with us when teaching science lessons.			.711
16. Because I do not think science classes are necessary.			.708
18. Because I do not want to learn science.			.686
19. Because I do not believe that I can be successful in science.			.684

Note: FE: Family-Environment, FA: Fear-Anxiety, PP: Psychological-Personal

Confirmatory Factor Analysis (3 Factors)

Confirmatory Factor Analysis (CFA) was conducted to establish the construct validity of the Science Amotivation Scale (SAS). The 22-item version of SAS was administered to a new cohort of participants. 272 students (6^{th}, 7^{th}, and 8^{th} grade) from three secondary schools were selected using simple random sampling strategy. Model indices that were achieved following CFA and using the Maximum Likelihood method indicated that the model has a good fit (x^2=531,27; p<,05; x^2/sd= 2,617; RMSEA= ,077; NFI= ,93; CFI= ,96; IFI= ,96; NNFI= ,95). Factor correlations, mean, standard deviation, and reliability coefficients were calculated for the 22-item final version of the scale and the results supported SAS's construct validity. Parameter (λ) estimates for the 22 items are presented in Table 5.

Table 5. Parameter values (λ)

Items	Factors		
	FE (λ)	FA (λ)	PP (λ)
1 Because my family's financial situation prevents me from buying materials necessary for science classes	.58		
2 Because I do not have Internet at home to do my science homework	.69		
3 Because my parent's education level is not high enough to support me in science classes.	.55		
5 Because I do not have an opportunity to study for science classes with my friends.	.61		
13 Because I do not have a computer to do my science homework.	.65		
10 Because I fear that I will not be successful in science classes.		.69	
14 Because I abstain from asking questions to my teacher when I do not understand the subject in science classes.		.72	
17 Because the subjects in science classes are difficult for me.		.68	
11 Because I do not like science classes.			,66
12 Because I do not have a goal to learn science.			.56
15 Because I do not like my science teacher.			.59
16 Because my teacher does not believe that I can be successful in science.			.73
18 Because I do not know why I should learn science.			.72
19 Because I do not learn new information in science classes.			.71
20 Because science classes are not important for me.			.77
21 Because my family does not believe that I can be successful in science.			.65
22 Because learning science will not be useful.			.71
4 Because I do not like my school.			.49
6 Because our teacher does not interact with us when teaching science lessons.			.53
7 Because I do not think science classes are necessary.			.68
8 Because I do not want to learn science.			.72
9 Because I do not believe that I can be successful in science.			.51

Factor correlations of the scale ranged between .55 and .76. All factor correlations were significant at p<.01 level. There were medium-level, positive relationships among factors (Table 6). Mean, standard deviation, and reliability coefficients for each factor are presented in Table 7.

Table 6. Factor correlations coefficient

Factors	FE	FA	PP
FE	1	.76*	.60*
FA		1	.55*
PP			1

Table 7. Mean and standard deviation for SAS's sub-dimensions

Factors	N	Mean	Sd
FE	272	1.81	.91
FA	272	2.19	1.09
PP	272	1.61	0.75

In addition the results of the reliability analysis show that the reliability coefficient of the Family-Environment sub-dimension was .76, reliability coefficient for the Fear-Anxiety sub-dimension was .66, and reliability coefficient for the Psychological-Personal sub-dimension was .90. Moreover, Cronbach's alpha value for the whole scale was calculated as .91.

Confirmatory Factor Analysis (Single Factor)

Another round of CFA for one factor structure was conducted using the data collected from 406 secondary schools in order to decide whether SAS can be used to measure students' amotivation levels in science classes. The fit indices achieved suggested that the scale can also be used in its single factor structure (x^2=698,98; p<,05; x^2/sd= 3,530; RMSEA= ,079; SRMR= ,040; NFI= ,98; CFI= ,99; IFI= ,99; RFI= ,98; GFI= ,86; NNFI= ,99). Those results supported the idea that SAS can measure the factors which it is intended to measure and can be used to identify students' amotivation levels as well as the reasons of amotivation.

Conclusion

The present study aimed to develop the Science Amotivation Scale (SAS) which can be used to measure students' levels of amotivation and reasons behind their amotivation in science classes. Initially, a review of literature was conducted to create an item pool and interviews were held with students who had high levels of amotivation in science classes. The item pool included a number of dimensions such as family, friends, teacher, personal and psychological reasons, school, and environment. The initial item pool included 42 items which decreased to 22 items with a 3-factor structure following Exploratory Factor Analysis (EFA). After analysing the items that loaded onto each factor, the three factors were named as; Family-Environment (FE), Fear-Anxiety (FA), and Psychological-Personal (PP).

Within the Family-Environment factor, it is understood that various factors such as families' financial situation, monthly income, parents' level of education, availability of the Internet at home, having a computer for use, family support, family expectations, and opportunities for students to collaborate with their friends affect students' motivation (Atay, 2014; Demir, Öztürk & Dökme, 2012; Uzun & Keleş, 2010; Yerlikaya, 2014; Khamis, Dukmak & Elhoweris, 2008; Dembo, 2004). Deci and Ryan (1985) noted that social factors such as teachers, family, and friends affect motivation. Similarly, Legault, Green-Demers and Pelletier (2006) underlined that teachers, family, and friends are important social support factors which have effects on students' amotivation.

In addition, investigation of factors related to fear and anxiety which cause amotivation among students indicates that not believing that they could succeed in science classes, abstaining from asking questions to the teacher, and finding the topic to be difficult cause fear and anxiety. Martin and Tracey (2002) highlighted that fear and anxiety affected students' motivation. In their research, Green-Demers, Legault, Pelletier and Pelletier (2008) studied amotivation under four sub-dimensions. Those sub-dimensions are; (a) deficient ability beliefs, (b) deficient effort beliefs, (c) insufficient academic values, and (d) unappealing characteristics of school tasks. Thus, students' fears and anxiety might result from their lack of confidence in their abilities and unappealing school tasks.

The analysis of studies conducted on factors affecting students' motivation suggested that psychological and personal reasons affect students' motivation. These factors included various sub-dimensions such as students being passionate and enthusiastic, their beliefs, their goal orientations, self-confidence, reward and punishment, attitudes towards the course, being interested in the subject, positive thinking, weekly study time and individual differences (Arıkıl & Yorgancı, 2012; Ceylan, 2003; Khamis, Dukmak & Elhoweris, 2008; Gömleksiz & Serhatlıoğlu, 2014; Dembo, 2004;; Akbaba & Aktaş, 2005; Vatansever-Bayraktar, 2015; Yaman & Dede, 2007; Yenice, Saydam & Telli, 2012; Yetim, Demir & İlker, 2016). Zimmerman, Bandura and Martinez-Pons (1992) stated that motivation depends on self-regulation and personal goals. Raffini (1993), on the other hand, underlined that students do not perceive school as an important activity if their basic psychological and academic needs are not met in the school environment. Therefore, it is important for student motivation that teachers create an educational environment in which students feel psychologically safe.

Lastly, the scale's three-factor structure was confirmed using Confirmatory Factor Analysis (CFA) and the scale's construct validity was established. Furthermore, an extra layer of analysis (one-factor CFA) was conducted to test whether the scale can be used as a whole to measure students' amotivation levels and CFA

results indicated that the scale can be used for this purpose. Cronbach Alpha reliability coefficients were calculated as .76 for the Family-Environment factor, .90 for the Psychological-Personal factor, .66 for the Fear-Anxiety factor, .91 for the whole scale. These analyses suggested that the Science Amotivation Scale (SAS) is a valid and reliable scale that can be used to measure secondary school science students' amotivation levels and the reasons behind their amotivation.

Scientific Ethics Declaration

The author(s) declare that the scientific ethical and legal responsibility of this article published in JESEH journal belongs to the author(s).

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Appendix 1: Fen Bilimlerinde Motivasyonsuzluk Ölçeği (Turkish Version)

Sevgili öğrenciler;

Bu ölçek Fen Bilimleri dersini öğrenmeyi istememenizin sebeplerini belirlemek amacıyla hazırlanmıştır. Her bir maddeyi dikkatlice okuyarak size uygun gelen ifadeyi 1'den 5'e kadar puanlayınız. Katkılarınızdan dolayı teşekkür ederiz.

Neden fen öğrenmek istemiyorsunuz?	**Kesinlikle katılmıyorum**	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Kesinlikle katılıyorum**
Çünkü ailemin maddi durumu fen dersindeki gerekli malzemeleri almaya yetmiyor.	①	②	③	④	⑤
Çünkü evde fen ödevlerimi yapabilmek için internetim yok.	①	②	③	④	⑤
Çünkü ailemin eğitim durumu fen dersime yardım etmek için yeterli değil.	①	②	③	④	⑤
Çünkü okulumu sevmiyorum.	①	②	③	④	⑤
Çünkü arkadaşlarımla birlikte fen dersini çalışma imkanım olmuyor.	①	②	③	④	⑤
Çünkü öğretmenimiz fen dersini anlatırken bizimle hiç iletişim kurmuyor.	①	②	③	④	⑤
Çünkü fen dersinin gerekli olduğunu düşünmüyorum.	①	②	③	④	⑤
Çünkü fen dersini öğrenmek istemiyorum.	①	②	③	④	⑤
Çünkü fen dersini başarabileceğime inanmıyorum.	①	②	③	④	⑤
Çünkü fen dersini yapamayacağımdan korkuyorum.	①	②	③	④	⑤
Çünkü fen dersini sevmiyorum.	①	②	③	④	⑤
Çünkü fen dersini öğrenmek için bir hedefim yok.	①	②	③	④	⑤
Çünkü fen ödevlerimi yapabilmek için bilgisayarım(tablet-telefon vb.) yok.	①	②	③	④	⑤
Çünkü fen dersinde konuyu anlamadığım zaman öğretmenime soru sormaktan çekiniyorum.	①	②	③	④	⑤
Çünkü fen öğretmenimi sevmiyorum.	①	②	③	④	⑤
Çünkü öğretmenim fen dersini yapabileceğime inanmıyor.	①	②	③	④	⑤
Çünkü fen dersindeki konular bana zor geliyor.	①	②	③	④	⑤
Çünkü neden fen öğrenmem gerektiğini bilmiyorum.	①	②	③	④	⑤
Çünkü fen dersinde yeni bilgiler öğrenmiyorum.	①	②	③	④	⑤
Çünkü fen dersi benim için önemli bir ders değil.	①	②	③	④	⑤
Çünkü ailem fen dersini yapabileceğime inanmıyor.	①	②	③	④	⑤
Çünkü fen dersini öğrenmek işime yaramayacak.	①	②	③	④	⑤

Appendix 2: Science Amotivation Scale

Dear students;
This scale has been prepared in order to determine the reasons for not wanting to learn Science course. Read each item carefully and score the expression that suits you from 1 to 5. Thank you for your contribution.

Why don't you learn science?	**Strongly Disagree**	**Disagree**	**Not sure**	**Agree**	**Strongly Agree**
Because my family's financial situation prevents me from buying materials necessary for science classes.	①	②	③	④	⑤
Because I do not have Internet at home to do my science homework.	①	②	③	④	⑤
Because my parent's education level is not high enough to support me in science classes.	①	②	③	④	⑤
Because I do not like my school.	①	②	③	④	⑤
Because I do not have an opportunity to study for science classes with my friends.	①	②	③	④	⑤
Because our teacher does not interact with us when teaching science lessons.	①	②	③	④	⑤
Because I do not think science classes are necessary.	①	②	③	④	⑤
Because I do not want to learn science.	①	②	③	④	⑤
Because I do not believe that I can be successful in science.	①	②	③	④	⑤
Because I fear that I will not be successful in science classes.	①	②	③	④	⑤
Because I do not like science classes.	①	②	③	④	⑤
Because I do not have a goal to learn science.	①	②	③	④	⑤
Because I do not have a computer to do my science homework.	①	②	③	④	⑤
Because I abstain from asking questions to my teacher when I do not understand the subject in science classes.	①	②	③	④	⑤
Because I do not like my science teacher.	①	②	③	④	⑤
Because my teacher does not believe that I can be successful in science.	①	②	③	④	⑤
Because the subjects in science classes are difficult for me.	①	②	③	④	⑤
Because I do not know why I should learn science.	①	②	③	④	⑤
Because I do not learn new information in science classes.	①	②	③	④	⑤
Because science classes are not important for me.	①	②	③	④	⑤
Because my family does not believe that I can be successful in science.	①	②	③	④	⑤
Because learning science will not be useful.	①	②	③	④	⑤