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Classroom Emotions Scale For Elementary School Students (Ces-Ess)

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Recently, there has been growing interest in emotions ignored in learning settings by many scholars. To date, research on emotions has been limited to anxiety studies but many emotions beyond anxiety are experienced in educational settings. Although there are some studies regarding the relationships between emotions and cognition, motivation and achievement, more research is clearly needed to produce cumulative and refined information on these relationships. The first aim of the current study was to construct an instrument that measures students' enjoyment, anxiety, and boredom in a Turkish elementary school context. The second aim of current study was examine students' emotions in terms of gender and class level. This first version of the scale was administered to 391 elementary school students (201 fourth and 190 fifth graders) for exploratory factor analysis and reliability analysis. The second version of the scale was administered to 274 elementary students for confirmatory factor analysis. The principal component analysis of the CES-ES yielded a three-factor structure (enjoyment, boredom and anxiety). The internal consistency ranged from .78 to .85. The CFA supported the item selection of the EFA. Moreover, students' classroom emotions differed in terms of gender and class level.The findings provide some evidence for the validity and reliability of the CES-ES.

Introduction

Recently, there has been growing interest in emotions ignored in learning settings by many scholars (Frenzel, Thrash, Pekrun, & Goetz, 2007; Goetz, Frenzel, Pekrun, & Hall, 2006; Govaerts & Gr´egoire, 2008; Lichtenfeld, Pekrun, Stupnisky, Reiss, & Murayama, 2012; Pekrun, Goetz, Titz, & Perry, 2002a; Pekrun, Goetz, Perry, Kramer, Hochstadt, & Molfenter, 2004; Pekrun, 2006; Schutz & Pekrun, 2007; Villavicencio, 2011). To date, research on emotions has been limited to research on anxiety (Zeidner, 1998) but many emotions beyond anxiety are experienced in educational settings (Govaerts & Gr´egoire, 2008; Pekrun et al., 2002a; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). In the past 10 years, research has focused on the relationships between emotions and achivement, motivation, cognition, learning, and the learning environment (Auano, 2011; Aultman, & Schutz, 2009; Bush, 2006; Decuir-Gunby, Goetz, Preckel, Pekrun, & Hall, 2007; Frenzel, Pekrun & Goetz, 2007; Goetz, Frenzel, Hall & Pekrun, 2008; Pekrun, Elliot & Maier, 2009; Schutz, Benson, & Decuir-Gunby, 2008; Stephanou, 2011; Stephanou, Kariotoglou, & Dinas, 2011; Trigwell, Ellis, & Han, 2012).

Research on academic emotions have two important issues. Academic emotions don't have the operational definition and there is a need the reliable and valid scales for measuring.

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(Govaerts & Gr´egoire, 2008). The control-value theory of achievement emotions provide a framework for defining emotions and developing scales (Pekrun, 2006). The control-value theory of achievement emotions provides an integrative framework for analyzing the roots and effects of emotions experienced in achievement and academic settings (Pekrun, 2006; Pekrun et al, 2011). Pekrun's control-value theory (2006) describes emotions through taxonomy with three dimensions: valence (positive-negative), the level of activation (activating-deactivating), and object focus (achievement activities-achievement outcomes). For example, enjoyment, hope, and pride are positive-activating, while hopelessness and boredom are negative-deactivating. Additionally, enjoyment experienced during a class is a positive, activating and activity-related emotion, while anxiety when facing a test is a negative, activating outcome-related emotion.

The control value theory asserts that emotions consist of four elements: affective, cognitive, motivational, and physiological. For example, negative feeling (affective), worrying (cognitive), avoiding (motivational), and sweating (physiological) can be the symptoms of anxiety (Pekrun et Al., 2011)

Table 1. A Three-Dimensional Taxonomy of Achievement Emotions (Pekrun, Frenzel, Goetz, & Perry, 2007)

	Positive		Negative	
	Activating	Deactivating	Activating	Deactivating
Activity focus	Enjoyment	Relaxation	Anger Frustration	Boredom
Outcome focus	Joy Hope Pride Gratitude	Contentment Relief	Anxiety Shame Anger	Sadness Disappointment Hopelessness

In line with this model, ''achievement emotions are defined as emotions that are directly linked to achievement activities or achievement outcomes'' (Pekrun, Goetz, &Perry, 2005, p. 4). Emotions are important for students' motivation, learning, performance, identity development, and health (Schutz & Pekrun, 2007; Pekrun, 2006). Pekrun et al. (2011) asserts that emotions are expected to influence students' intrinsic and extrinsic motivation. Furthermore, emotions may facilitate students' use of learning strategies as well as promote self-regulation. Pekrun, Goetz, Titz, & Perry (2002b) propose that

> positive emotions are essential for human behavior and adaption because they help to envision goals and challenges, open the mind to thoughts and problem-solving, protect health by fostering resiliency, create attachments to significant others, lay the groundwork for individual self-regulation, and guide the behavior of groups, social systems, and nations (pp. 149).

There are some instruments developed for the assessment of academic emotions in different cultures and contexts. One of these instruments is The Academic Emotions Questionnaire (AEQ) developed by Pekrun et al. (2011) AEQ is a multidimensional self-report instrument designed to assess college students' achievement emotions. The AEQ measures a number of different emotions in three achievement situations, which is attending class, studying, and writing tests and exams. This instrument was first developed in German. There are also English and Chinese versions of the scale. The Achievement Emotions Questionnaire-Elementary School (AEQ-ES) is an instrument assessing elementary students' achievement emotions (Lichtenfeld, et al., 2012). The AEQ-ES assesses students' enjoyment, anxiety, and

boredom pertaining to three types of academic settings (i.e., attending class, doing homework, and taking tests and exams). The reliability and validity of the scale were tested on German and American elementary school students. The Academic Emotions Scale (AES) is a French self-report questionnaire assessing six emotions (enjoyment, hope, pride, anxiety, shame and frustration) in the context of school learning (Govaerts & Gr´egoire, 2008). The structure of the scale was examined in a sample of secondary school students. The AES measures secondary students' emotions in the situation of math exam preparation. In another study, Chiang ve Liu (2013) developed a scale about university students' emotions related to science education. Their scale included three settings: attending science class, learning scientific subjects, and problem solving.

Considering research on academic emotions, some studies have addressed the relationships between students' emotions and academic achievement (Frenzel et al., 2007; Pekrun, Elliot & Maier, 2009; Pekrun et al., 2002a; Pekrun, Goetz, Daniels, Stupnisky & Perry, 2010; Pekrun, Goetz, Perry, Kramer, Hochstadt & Molfenter, 2004). Some studies have found relationships between achievement goals and emotions (Elliot & McGregor, 1999; Pekrun, Elliot & Maier, 2006-2009; Tanaka, Takhara & Yamauchi, 2006). Furthmore, students' emotions have been shown to be related to the classroom environment (Frenzel, Pekrun & Goetz, 2007; Goetz et al., 2006; Stephanou, 2011).

Althought there are studies that develop and translate scales on academic emotions in different cultures and contexts, given the elements of the classroom setting, such as the perspective of teacher, the number of students in class, classroom management, teaching methods, curriculum and lesson time can differ from culture to culture**,** the causes and outcomes of emotions that students experience in classroom settings may vary. Thus, culture-spesific conditions can emerge. For this reason, the development of a scale in Turkish context has been decided.

In conclusion, although there are some studies regarding the relationships between emotions and cognition, motivation and achievement, more research is clearly needed to produce information on these relationships. Additionally, the research on elementary students' emotions is restricted because the number of measurement instruments is less. It is important to have valid and reliable instruments for measuring emotions. Linnenbrink-Garcia and Pekrun (2011) assert that more research is needed to understand how different contexts and cultures shape emotion. Accordingly, the first aim of the current study was to construct an instrument that measures students' enjoyment, anxiety, and boredom in a Turkish elementary school context. The second aim of current study was examine the students' emotions in terms of gender and class level.

Method

Sample

This first version of the scale was administered to 391 elementary school students (201 fourth and 190 fifth graders) for exploratory factor analysis and reliability analysis. The students mean age was 10.3, and the sample was 46.3% boys and 53.7% girls. The second version of the scale was administered to 274 elementary students for confirmatory factor analysis. The students mean age was 10.4, and the sample was 53.3% boys and 46.7% girls in this second sample (96 fourth graders and 178 fifth graders).

Instrumentation Development

The item pool of the scale consisted of 64 items, evaluating three emotions (enjoyment, boredom, and anxiety) experienced in classroom settings. The items were chosen based on Pekruns' control-value theory in which each emotion has affective, cognitive, motivational, and physiological elements. In addition, the items of the scale were generated based on 30 elementary school students' written opinions, and existing academic emotions scales such as The AEQ (Pekrun et al., 2011), The AES (Govaerts & Gr´egoire, 2008), and The AEQ-ES (Lichtenfeld, et al., 2012).
To investigate students' emotions in classroom setting students were asked to answer eight open-ended questions in written form . Some of the questions about classroom emotions were as following:

Could you tell about enjoyable conditions in classroom setting?
What do you do when you are bored in lesson?
Could you tell about conditions that you are nervous and afraid ?

Descriptive analysis was used in analyzing the data obtained from students and some items of the scale was generated based on this data. Some of students' views about emotions were as following:

....i am really bored when my teacher talks and I sit listening for long periods of time…
....when I don't know the answer, I am worried if my teacher asks a question about problem…

The first scale with 64 items was sent to four experts. Experts reviewed the items for ease of understanding, item content, and comprehensiveness of item coverage. Following the experts' opinions, a scale with 48 items was created. These items were classified as follows: 16 items measured enjoyment (*I am motivated to learn new topics because I am prepared for lessons*), 15 items measured boredom (*I participate reluctantly in lessons*), and 17 items measured anxiety (*I feel tension my stomach when a question is asked to me*).

Procedure

The students were asked to rate each of the items on a 5-point Likert-type scale ranging from 1 ("*I don't* agree *at all*") to 5 ("*I totally agree*"). Students completed the study scale during regular classroom hours. Before administering the scale, students were informed of the confidentiality of their responses. Most students finished the scale in about 15 minutes.

Analysis

To examine the validity of the scale, exploratory and confirmatory factor analysis were used . Cronbach Alpha value was computed for reliability analysis. Furthmore, item-total correlation was computed to evaluate the discrimination of items. Finally, independent samples t-test was used to examine if classroom emotions differ in terms of gender and grade level.

Results

Exploratory Factor Analysis and Reliability Analysis

To examine construct validity of CES-ES, all 48 items were submitted to principal components analyses with varimax rotation. Based on both a minimum Eigen value and scree criteria, a three-factor solution was created.

The resulting three factors accounted for 40% approximately of the total variance. The items with factor loadings below .40 were removed. The eigenvalues of the three factors were 9.245, 2.636, and 1.712, respectively. This solution showed a very good Kaiser- Meyer-Olkin measure of sampling adequacy (.91). Factor I (boredom) consisted of 12 items with factor loadings ranging from .66 to .47 and accounted for 27% of the variance in the total scale. Factor II (enjoyment) consisted of 13 items with loadings ranging from .68 to .44 and accounted for 7.8 % of the variance in the total scale. Factor III (anxiety) consisted of 9 items with loadings ranging from .64 to .40 and accounted for 5% of the variance in the total scale.

In addition, a Cronbach Alpha and a 95% confidence interval for reliability coefficients were calculated to determine the internal consistency of the scores obtained from the scale. The three retained subscales showed a good internal consistency. The standardized Cronbach's alpha coefficients were .85 for the boredom subscale, .85 for the enjoyment subscale, and .78 for the anxiety subscale. In order to find out the item discrimination of the CES-ES items, the item-total correlation was calculated. According to Buyukozturk (2009), a positive and high item-total correlation demonstrates that the internal consistency of the scale is higher. .30 or greater values for item-total correlation indicate good distinctiveness. The corrected item-total correlations ranged from .46 to .64 for boredom, .41 to .67 for enjoyment, and .40 to .58 for anxiety.

Table 2. Factor Loadings for Classroom Emotions Scale-Elementary Students

	Boredom (Factor 1)	*Enjoyment (Factor II)*	*Anxiety (Factor III)*	*Item-total Correlations*
Item 20	**,661**	-,160	,152	,59
Item 44	**,658**	-,252	,070	,60
Item 17	**,627**	-,184	,335	,64
Item 41	**,603**	-,106	,155	,53
Item 29	**,601**	-,123	,177	,54
Item 32	**,561**	-,045	,158	,47
Item38	**,558**	-,125	,121	,57
Item35	**,547**	-,241	,216	,47
Item14	**,535**	-,311	,258	,58
Item8	**,514**	-,117	,143	,46
Item26	**,502**	-,224	,198	,46
Item2	**,478**	-,212	,189	,50
Item16	-,088	**,682**	-,075	,58
Item34	-,327	**,659**	-,127	,67
Item25	-,233	**,654**	-,038	,60
Item31	-,337	**,648**	-,006	,62

Item19	-,243	**,614**	-,033	,56
Item28	,041	**,600**	-,201	,47
Item13	-,130	**,593**	-,090	,51
Item22	,044	**,590**	-,213	,48
Item40	-,153	**,544**	,005	,47
Item43	-,332	**,478**	-,006	,48
Item10	-,020	**,460**	-,373	,41
Item7	-,269	**,450**	-,168	,45
Item4	-,275	**,449**	,016	,42
Item21	,074	,007	**,649**	,46
Item33	,202	-,129	**,643**	,54
Item6	,165	-,080	**,630**	,51
Item30	,131	-,179	**,604**	,49
Item39	,341	-,226	**,570**	,58
Item48	,192	,058	**,527**	,41
Item12	,366	,019	**,468**	,44
Item18	,310	-,187	**,422**	,42
Item47	,248	-,280	**,404**	,40
Eigen values	9.245	2.636	1.712	
Percent of variance	27,2%	7,8%	5%	
Coefficient alpha	,85	,85	,78	

Table 3 presents intercorrelations among the three factors. Positive correlations between unpleasant emotion (boredom) and unpleasant emotion (anxiety), and negative correlations between pleasant emotion (enjoyment) and unpleasant emotions (anxiety and boredom) were observed. Correlation coefficients were significant for all relationships. According to Kline (2005), estimated correlations should not exceed .85 for discriminant validity. These correlations ranged from -.41 to .61.

Table 3.Intercorrelations Among Factors

Factors	1	2	3
1. Boredom	1		
2. Enjoyment	-.55**	1	
3. Anxiety	.61**	-.41**	1

Confirmatory Factor Analysis

The three factors of the CES-ES were confirmed in another sample (n=274) with similar characteristics as the first sample. The confirmatory factor analysis (CFA) was conducted using LISREL 8.70 for Windows in order to test whether to test the initial model suggested by the EFA (Jöroskop & Sörbom, 1996). ‘‘EFA is considered to be more of a theory-generating than a theory-testing procedure. In contrast, CFA is generally based on a strong theoretical or empirical foundation that allows the researcher to specify an exact factor model in advance’’ (Stevens, 2009, pp.345). The three-factor solution was tested and each item on the scale was assigned to the specified factor. Several different indexes were used to

evaluate the model fit including the chi-square fit, the standardized root mean squared residual (SRMR), the comparative fit index (CFI), and the root-mean square error of approximation (RMSEA), Normed fit index (NFI).

Hu and Bentler (1999) suggest that values of .08 or below for SRMR, values of.06 or below for RMSEA and values of .95 or greater for CFI indicate good fit. According to Schumacker & Lomax (2004), values of .05 or below for RMSEA and values close to .95 indicate good fit. For RMSEA, values less than .07 indicate a good model fit (Stieger, 2007). According to Kline (2005), values of the SRMR less than .10 are considered favorable.

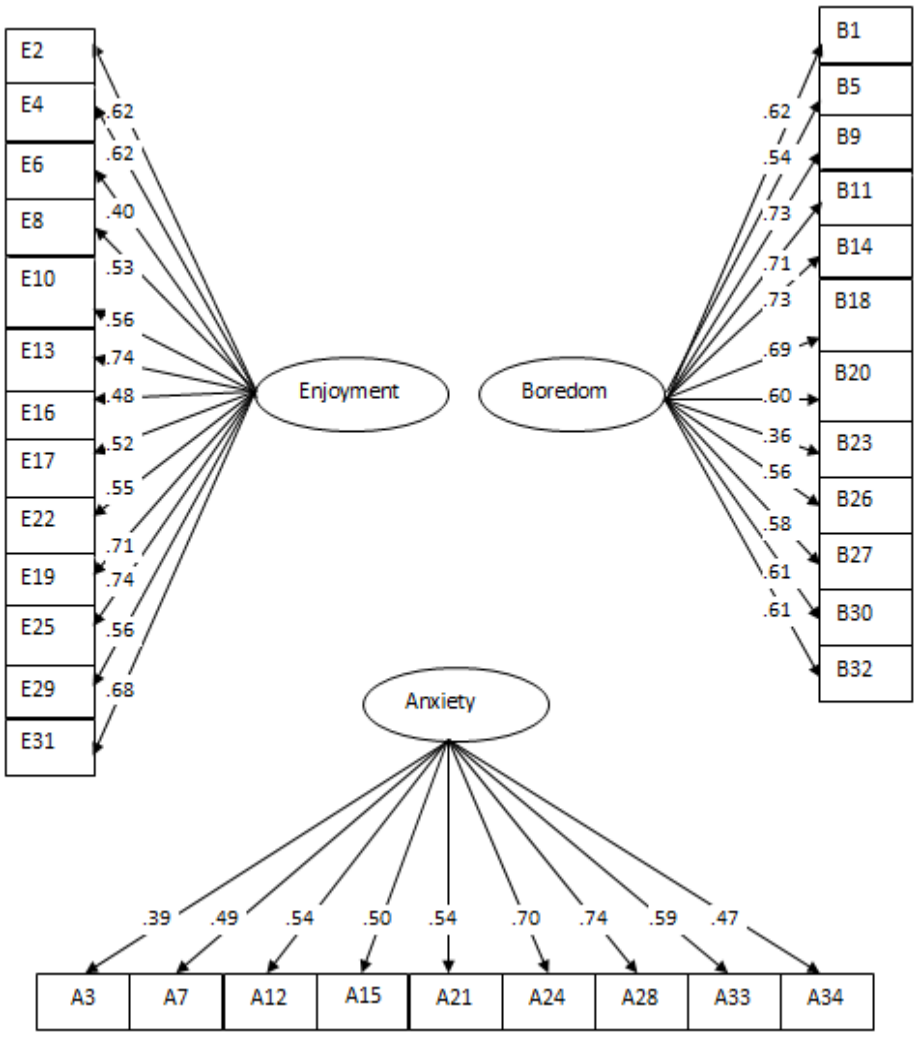


Figure 1. Confirmatory factor analysis model for Ces-Es

The results of CFA showed that the model attained adequate fit shown by the chi-square (X^2=777.1, $p<.05$), Standardized Root Mean Square Residuals (SRMR=.055), Root Mean Square Error Approximation (RMSEA=.040) Comparative Fit Index (CFI=.98), Normed Fit Index (NFI=.94).

Gender Differences

To determine whether students' classroom emotions differ in terms of gender, independent t-test was used. T-test results were presented Table 4.

Table 4. Differences in Students' Emotions According to Gender

	Male		Female				
	M	SD	M	SD	t	p	Cohen's *d*
Boredom	1.79	.71	1.59	.70	2.66	.00	.27
Enjoyment	4.36	.64	4.51	.52	-2.43	.01	-.25
Anxiety	2.18	.89	2.15	.80	0.34	.73	.03

The results indicated that means was significantly different for two emotions. As compared with male students, female reported more enjoyment. Male students reported more boredom than female students. However, there was no significant mean difference for anxiety.

Class Level Differences

To determine whether students' classroom emotions differ in terms of class level, independent t-test was used. T-test results were presented Table 5.

Table 5. Differences in Students' Emotions According to Class Level

	Fourth Grade		Fifth Grade				
	M	SD	M	SD	t	p	Cohen's *d*
Boredom	1.57	.63	1.80	.77	-3.21	.00	.32
Enjoyment	4.50	.54	4.38	.62	1.96	.05	-.20
Anxiety	2.00	.76	2.33	.89	3.95	.00	.40

The results indicated that means was significantly different for boredom and anxiety. As compared with fourth grade students, fifth grade students reported more anxiety. Furthermore, fifth grade students reported more boredom than fourth grade students. However, there was no significant mean difference for enjoyment.

Discussion

The aim of this study was to develop an instrument that would examine students' emotions in classroom settings. Students' emotions are often ignored by educators in educational settings. Linnenbrink-Garcia and Pekrun (2011) argue that research on students' emotions is in the initial stage. However, emotions are essential for social interaction, cognitive functions, and engagement.

The CES-ES is a scale assessing elementary school students' classrooms emotions. The reliability and validity of the scale have been established by exploratory and confirmatory factor analysis, alpha coefficients and item-total correlations. The study was conducted with two different samples. The first sample was used for exploratory factor analysis and reliability analysis. The second sample was used for confirmatory factor analysis. The results of this study provide initial evidence for the reliability and validity of the CES-ES.

This final solution confirmed the three factor structure that we postulated. The final version of the CES-ES includes 34 items in three factors. The EFA showed that the scale has three factors: enjoyment (12 items), boredom (13 items), and anxiety (9 items). This structure is consistent with other studies (Linchtenfeld et al., 2012; Pekrun et al., 2002a; Pekrun et al., 2011). However, Govaerts and Gr´egoire (2008) found that the items of the anger and boredom subscales did not appear as separate factors and the boredom and anger subscales loaded on the same factor. They labeled as this factor ‘‘frustration’’.

The reliability of each factor was shown to be satisfactory by the use of the Cronbach alpha coefficient. Cronbach coefficients were .85 for enjoyment and boredom and were .78 for anxiety. The item-total correlation of the scale was calculated for internal consistency. These results show that the internal consistency of the scale is high. The study findings demonstrate that elementary school students' achievement emotions are significantly related. Specifically, enjoyment correlated negatively with anxiety and boredom. In contrast, boredom correlated positively with anxiety. Previous studies have produced similar findings (Govaerts & Gr´egoire, 2008; Linchtenfeld et al., 2012; Pekrun et al., 2011). The result of the CFA demonstrated that a significant fit was obtained (X^2=777.1, $p<.05$; SRMR=.055; RMSEA=.040; CFI=.98; NFI=.94).

Finally, the results indicated that students' classroom emotions differed in terms of gender and class level. Female students reported more enjoyment, while male students reported more boredom. In Pekrun et al.'s study (2011) on classroom emotions, although female university students reported more enjoyment, students' boredom did not differ in terms of gender. Furthermore, female university students reported more learning-related anxiety and more test-related anxiety. In Lichtenfeld et al.'s study (2012) on the elementary school students' emotions in mathematics, for second grade students, male students reported more class-related enjoyment, less class-related anxiety, and less learning-related boredom than female students. For third grade students, female students reported less enjoyment and more anxiety across the three achievement settings. Female students reported more class-related boredom. Moreover, students' classroom emotions differed in terms of class level. Fifth grade students reported more class-related boredom and anxiety than fourth grade students. In Turkish settings, subject teachers teach students upwards fifth grade, while classroom teachers teach students between first and fourth grades. The reason why fifth grade students reported more anxiety and boredom can be this diversity.

The current study has some implications for further studies. Firstly, the context of development of the CES-ES was a classroom setting. There is a need for more studies to measure other academic settings in Turkish culture. Secondly, the current study was conducted with elementary school students. The findings can be tested at different grade levels. Thirdly, the CES-ES can be used to assess classroom emotions in academic domains such as mathematics, language arts, and social studies by adapting the items accordingly. Finally, the CES-ES can be used to study the relationships between emotions and cognitive and motivational variables.

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APPENDIX

Classroom Emotions Scale For Elementary Students (Ces-Es): Sample Items for Turkish Version.

Eğlence

Derslerde enerji doluyum.

Derslerde yeni bilgiler öğrenmekten zevk alırım.

Derslerde bulunmaktan keyif aldığım için gerekenden daha fazla çalışırım.

Sıkılma

Derslerde hayallere dalmaya başlarım.

Saati öğrenmeye çalışırım.

Derslere isteksiz bir şekilde girerim.

Kaygı

Bana sorulan bir soruyu cevaplıyorken kalbim küt küt atmaya başlar.

Bana bir soru sorulduğunda karnımda gerilme hissederim.

Anlatılan konuyu öğrenip öğrenemeyeceğim hakkında endişelenirim.

Classroom Emotions Scale For Elementary Students (Ces-Es): Sample Items for English Version.

Enjoyment

I am full of energy in class.

I enjoy learning new knowledge in class.

I study more than required because I enjoy occupying in class

Boredom

I start daydreaming in class.

I try to learn what time it is.

I reluctantly go to class.

Anxiety

My heart starts pounding while answering a question asked me.

When asked me a question, I feel tension in my stomach.

I worry whether I will be able to learn the subject.