



Adapting Classroom Engagement Inventory into Turkish Culture

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Abstract

The purpose of this study is to adapt Classroom Engagement Inventory, developed by Wang, Bergin and Bergin (2014) into Turkish language. Inventory's original language is English and it consists of 24 items in the original form. Appropriateness of the translation with Turkish is checked with the help of 10 qualified experts who have a good command of English and studying in educational sciences fields. In accordance with the experts' opinions, corrections were made and final form was created. In order to determine the consistency between Turkish and English forms of the inventory, it was administered to 38 students who have a good command of both languages. It was found that correlation values for the language equivalency and consistency between Turkish and English forms oscillates between $r=0.969$ and 0.699 ($p<.05$). Inventory, administered to 300 high school students attending 9th, 10th. and 11th., grades in Ankara and 5 factor structure of the original form was tested. It was found that after an item removed from the form, item factor loading values are between 0.561 and 0.781; item-total correlation values are between 0.304 and 0.687; anti-image correlation values are 0.692 and 0.952. The variance explained by these items was %65.326 and Cronbach-Alpha internal consistency coefficient is found 0.930. After exploratory factor analysis, the structure appeared was tested through confirmatory factor analysis by applying to 201 high school students and structure was confirmed by the analysis. (RMSEA, 0,068; AGFI, 0,81; SRMR, 0.096; RMR, 0,062; NNFI, 0.97; CFI, 0.97; NFI, 0.95; IFI, 0.97).

Keywords

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Introduction

There is a tendency across educational scholars that poor engagement with the classroom practices translates into reduced learning and performance (Wang, Bergin & Bergin, 2014; Skinner, Kindermann & Furrer, 2009). On the other side, how class engagement affects student learning and other educational outcomes requires multi-dimensional analysis. This study sets out from this point and attempts to contribute our understanding regarding how and to what extent class engagement happens in our country. Towards this end, the inventory developed by Wang, Bergin and Bergin (2014), "High-school students Classroom Engagement" was adapted into Turkish Culture and its validation was made through this study.

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Class engagement refers to active involvement of students to the learning processes (Christenson, Reschly & Wylie, 2012). Studies concerning classroom engagement carry on the discussion over three major axes. Those are affective engagement, cognitive engagement and behavioral engagement. (Wang, Bergin & Bergin, 2014). Sometimes, the fourth dimensions could be added to these major three, that is, agency (Reeve, 2013; Fredricks, Blumenfeld & Paris, 2004). In the classroom, emotional or affective engagement corresponds to the positive feelings of students such as interest, excitement and amusement. Cognitive engagement refers to the accompanying processes such as meaningful-processing, strategy use, concentration and metacognition. Behavioral engagement refers to the observable behaviors such as asking questions, being active in team-works and completing tasks on time (Skinner, Kindermann & Furrer, 2009). The relatively new dimension discussed in the literature is agency. The notion agency in class engagement corresponds to the students' active contribution to the classroom processes through asking questions and communicating his/her wishes to teachers. Consistent with motivational theories, children who experience support from teachers and peers feel more comfortable in school, like school more, and participate more actively in classroom activities (Reeve, 2013).

Studies concerning classroom engagement claim that support from teachers and friends affect their engagement to the class processes (Furrer & Skinner, 2003; Stipek, 2002). Similarly, engaging class enhances motivation and influence learning positively (Furrer & Skinner, 2003; Skinner & Belmont, 1993). And yet, studies tend to focus on school level rather than classroom in general.

Eryılmaz (2004) developed a scale of class engagement in order to determine the level of the undergraduate students' class engagements. He included 209 undergraduate students in the study. His findings allowed him to develop two scales named general and specific class engagement. These two scales anchored into three subscales: emotional engagement, cognitive engagement and behavioral engagement.

Nazlıççek and Akarsu (2003) carried out a study in order to probe the ways of which Math, Physics and Chemistry teachers' approaches and practices to the evaluation instruments. They found out that class engagement and effort are the most important elements for the teachers' evaluation. Aypay and Eryılmaz (2011) investigated the relationship between high school students' burnout and their motivation to class engagement. On the grounds of their findings, they assert that when the students lost their interest to school and their burnout out from homework increases, their motivation to class engagement goes down. On the same isle, when the need for relaxation and having fun increased, their motivation to class engagement also tends to increase.

The notion class engagement is involved as a dependent variable in many studies. In these studies; scholars investigated the effects of the usage of the learning objects, the methods, techniques and activities applied by teachers, the level of the students' trust in their teachers, learning environment, students' features like their motivation, anxiety, self-confidence, extraversion and introversion and the formative evaluation involved in curriculum to students' class engagement (Kaya,1995; Adıyaman, 2008; Çevik, 2008; Özcan, 2010; Menteş 2011; Sarıtepeci, 2012; Gürer, 2013; Günel 2014). Scales used in these studies are developed to determine the level of classroom engagement of primary school students (Adıyaman, 2008; Menteş 2011; Sarıtepeci, 2012; Gürer, 2014) and university students (Kaya, 1999). However, we did not find any scale in the literature that aims to measure high school students' classroom engagement. Thus, this study aims to contribute to the literature through adapting "High School Students' Classroom Engagement Inventory" into Turkish culture.

Method

Research Design

This research is designed as a descriptive research. Its major aim is to adapt the Classroom Engagement Inventory, developed by Wang, Bergin and Bergin (2014) into Turkish culture by doing its validity and reliability study.

Inventory Adaptation Process

Assessment tools developed for measuring the psychological features of a certain culture are adapted into different cultures and languages. Inventory adaptation is being done because of growing demand for setting the differences among national, ethnical and cultural groups by comparing them. Additionally, there is a growing interest internationally about taking common educational and psychological precautions by determining the abilities, skills and attitudes of the students belonging to different cultures and countries (Rapp & Allalouf, 2003). An assessment tool developed in a specific culture carries the features of the culture. The systematic preparation process conducted for applying to different culture and languages is called inventory adaptation (Öner, 1987). The aim of the adaptation is to make available the measurement tools of specific culture for a different culture by way of translation, adaptation and standardization.

Hambleton and Patsula (1999) state the importance of knowing and following some steps to make an adaptation accurately. Below are the brief steps of adaptation:

1. **Step:** Structural equality/equivalency must be achieved in terms of language and culture
2. **Step:** It must be decided whether to develop a new inventory or adapt an existing one.
3. **Step:** Well-qualified translators must be identified.
4. **Step:** An assessment tool must be translated and adapted to the target language.
5. **Step:** Revision of the adapted tool must be done and if necessary correction also must be done.
6. **Step:** The tool must be tried on a small group.
7. **Step:** After the calculation of validity and reliability of the tool and item analysis are done with the output of the pretest, real test must be applied to bigger group that resembles to the real group, and studies must be done like factor analysis to test the construct validity.
8. **Step:** Statistical model must be decided in an attempt to see if there is a relation between output of the original and the target language forms.
9. **Step:** Language equality must be provided in the different forms of the tool if comparison of the cultures is demanded.
10. **Step:** Appropriate validity studies must be conducted.
11. **Step:** Process of the adaptation must be reported in detail and a handbook must be prepared for the users.
12. **Step:** Users must be educated.
13. **Step:** The tool must be revised with the help of the new studies.

The steps taken in this study while the inventory was adapted into Turkish are summarized below:

- Permission was gotten from the developers of the original inventory.
- Inventory was translated into Turkish.
- Appropriateness of the translation with Turkish is checked with the help of 10 qualified experts who have a good command of English and studying in educational sciences. Opinions were taken from the experts for the appropriateness of the translation.
- In accordance with the experts' opinions, corrections were made and final form was created.

- Inventory was administered to the small group of students who are attending to high school and have a good command of both languages with an aim to assess equivalence and understandability of the language. Correlation between the outputs of the forms was calculated accordingly. Also it was asked to this group whether there was consistency between the items of the forms.
- Inventory was revised with the help of feedback taken from the group.
- Inventory was administered to 300 high school students. Exploratory factor analysis was made according to the output of the applications to identify the reliability and factor structure of the inventory.
- After technical features identified, the inventory was administered to 209 high school students. In an attempt to determine whether the data collected from this group confirm both the original and adapted version's factor structure of the inventory Confirmatory Factor Analysis was conducted.
- Final form was created in accordance with all the findings.

Inventory adaptation group

Study group of this research was constituted of 9th, 10th, 11th and 12th grade students attending religion, general, Anatolian and vocational schools in Ankara. Three groups were used in the adaptation process of the inventory:

1. First group was language equivalency group included to identify the equivalence of the both languages. It consists of 38 students (18 female and 20 male) who have a good command of both languages and are attending to Anatolian high schools in Ankara.
2. The group used for identifying the factor structure and level of reliability of the inventory in accordance with the output of the inventory administered to people from Turkish culture. This group consists of 300 high school students (120 female, 180 male) from the state schools.
3. The group used for verifying the factors from the exploratory factor analysis. This group consists of 201 high school students (89 female, 112 male) from the state schools.

Features of the Adapted Inventory

Original study of Classroom Engagement Inventory was conducted through two levels of study. In the first study, inventory was consisted of 21 items and 4 factors. They are affective, behavioral, cognitive engagement and disengagement factors. In the second study, items of the inventory were increased to 24 from 21, as well as increasing 4 factors to 5. They are affective engagement, behavioral engagement - compliance, behavioral engagement -effortful classroom participation, cognitive engagement and disengagement factors (Wang, Bergin and Bergin, 2014, 5-10).

Data Analysis

Data collected from the study were analyzed through IBM-SPSS 22 and Lisrel packet programs. Techniques used to determine validity and reliability were Kaiser-Meyer-Olkin (KMO) test, Bartlett Sphericity test, varimax rotation, anti-image correlation, Cronbach Alpha reliability coefficient and confirmatory factor analysis (Büyüköztürk, 2003; Özdamar, 2013). Details of the analysis were given in 'findings' section.

Results

Language equivalency

In order to determine the consistency between Turkish and English forms of the inventory, it was administered to 38 students who have a good command of both languages. The data obtained as a result of application were translated into total scores both in terms of the entire inventory and its subscales. Total scores obtained from subscales and entire inventory were examined by means of Pearson's Product Moment Correlation Coefficient between Turkish and English forms. Analyzing the correlation with this technique requires normal distribution of the data. Normal distribution test was conducted with the "Kolmogorov-Smirnov Test". According to test results, total score of the entire inventory; as well as affective, behavioral-compliance, behavioral-effortful classroom participation and disengagement subscales' scores show normal distribution ($p > .05$), while cognitive subscale does not show normal distribution ($p < .05$). The subscales showing normal distribution were examined with "Pearson Product Moment Correlation Coefficient", while the cognitive subscale which does not show normal distribution was examined with "Differences Spearman Rank Correlation Coefficient Brown". Results are given in table 1.

Table 1. Correlation Values

Variables	N	r	p
Turkish Form* English Form Total Scores	38	0.916	0.000
Turkish Affective*English Affective Subscale	38	0.969	0.000
Turkish Behavioral Compliance* English Behavioral Compliance Subscale	38	0.877	0.000
Turkish Behavioral-Class Participation *English Behavioral Class Participation Subscale	38	0.721	0.000
Turkish Cognitive* English Cognitive Subscale	38	0.827	0.000
Turkish Disengagement * English Disengagement subscale	38	0.699	0.000

Table 1 shows that there is a positive, high level and significant correlation between total scores of Turkish and English forms, as well as scores of affective, behavioral-compliance, behavioral-effortful classroom participation and disengagement subscales ($r=0.916, 0.969, 0.877, 0.721, 0.827$ and $0.699, p<.05$). Thus, it can be said that there is a language equivalency and consistency between Turkish and English forms.

Construct Validity (Factor Analysis) and Reliability

In an attempt to determine the construct validity of the inventory, exploratory factor analysis was conducted for the data obtained from 300 high school students. KMO value was examined in order to understand whether the data set was appropriate for the analysis and the result was 0.926. According to the related literature, this value needs to be over 0.50, a threshold value to determine whether the data set is appropriate for the factor analysis (Büyüköztürk, 2003; Özdamar, 2013). The result yielded from Bartlett Test serving to the same purpose was found as [$\chi^2 = 3692.247; p<0.01$]. As both values were significant, they point out that factor analysis could be conducted for the data set.

Exploratory factor analysis indicated that item number 14 shows high correlation with more than one factor. Therefore, this item was removed from the inventory. The remaining items' factor loading values were between 0.561 and 0.782. Total-item correlations oscillated between 0.304 and 0.687. The remaining items gathered around 4 factors. The variance explained by these items was %65.326. When the inventory was taken into account as one dimension, The Cronbach-Alpha Internal Consistency value was found 0.930. Item-factor loading values and total-item correlations were given in Table 2; anti-image correlation values of the items were displayed in Table 3.

Table 2. Factor Analysis Primary Factor Loading Values and Item Total Correlation Results

Item No	Primary Factor Loading Value	Total-item Correlation	Item No	Primary Factor Loading Value	Total-item Correlation
1	0.603	0.677	13	0.565	0.579
2	0.611	0.497	15	0.564	0.606
3	0.683	0.655	16	0.645	0.693
4	0.782	0.687	17	0.628	0.676
5	0.738	0.627	18	0.708	0.647
6	0.688	0.657	19	0.643	0.655
7	0.726	0.666	20	0.612	0.568
8	0.708	0.539	21	0.608	0.605
9	0.695	0.628	22	0.561	0.304
10	0.688	0.665	23	0.735	0.449
11	0.586	0.570	24	0.662	0.385
12	0.591	0.568			

Variance explained by the five factors = % 65.326

Cronbach Alpha = 0.930

Table 2 indicates that after exploratory factor analysis, primary factor loadings of the items remained in the inventory do not go below 0.561, whereas total-item correlations do not go below 0.304. While conducting Cronbach-Alpha reliability test, in the section of "Cronbach Alpha Item Deleted", it was determined that when any item displayed in the Table 1 removed from the inventory, Cronbach Alpha reliability coefficient goes below 0.930. Therefore, it can be said that contribution of all item to the reliability are very high (Özdamar, 2013).

Table 3. Anti-Image Correlation Values

Item No	Anti-Image Correlation	Item No	Anti-Image Correlation
1	0.950	13	0.938
2	0.931	15	0.932
3	0.932	16	0.933
4	0.919	17	0.952
5	0.924	18	0.933
6	0.944	19	0.939
7	0.928	20	0.940
8	0.915	21	0.938
9	0.929	22	0.692
10	0.937	23	0.810
11	0.930	24	0.823
12	0.928		

Table 3 displays that the anti-image correlation values of the items oscillate between 0.692 and 0.952. It was determined that the remaining items in the inventory do not go below the value of 0.50. According to Özdamar (2013) this result points out that loadings of items contribute highly to the factor structure.

Scree Plot graphic acquired through exploratory factor analysis gives the impression that there are five factors. It could be seen in Figure 1.

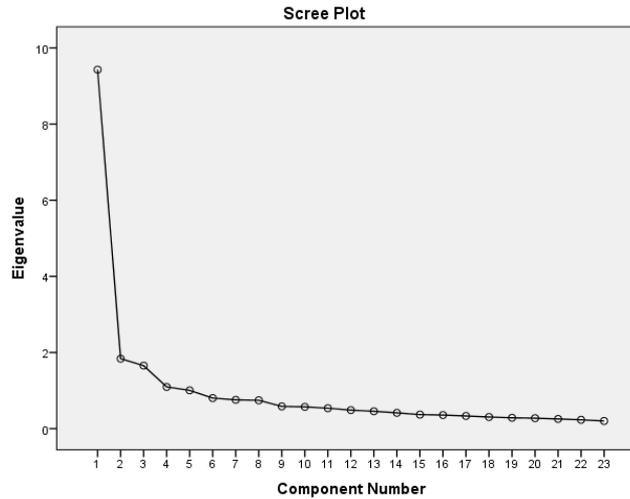


Figure 1. Scree Plot graphic displaying the factor number of classroom engagement inventory.

It could be seen from the Figure 1 that after factor 5 the line tends to be straightened. After then, there is a small inclination and straightness again. When reading scree plot graphic, whenever the line becomes straight, it is believed that there is no other factor involved (Büyüköztürk, 2003). To this end, graphic gives the idea that there are five factors.

When conducting exploratory factor analysis, in order to decide whether there is any subscale and if there is one, which subscales are aggregated under which items, Varimax rotation technique was applied (Büyüköztürk, 2003; Özdamar, 2013). Varimax rotation results were given in Table 4.

Table 4. Varimax Rotation Results

	Factors				
	1	2	3	4	5
20	,750				
18	,726				
21	,708				
19	,703				
16	,684				
17	,634				
15	,622				
5		,801			
4		,799			
2		,724			
3		,719			
11		,583			
1		,537			
8			,787		
6			,664		
7			,635		
9			,607		
12				,662	
10				,655	
13				,604	
23					,800
24					,761
22					,716

Table 4 indicates that;

- Item 1, 2, 3, 4, 5 and 11 creates a subscale (First subscale)
- Item 6, 7, 8 and 9 creates a subscale (Second subscale),
- Item 10, 12 and 13 creates a subscale (Third subscale),
- Item 15, 16, 17, 18, 19, 20 and 21 creates a subscale (Fourth subscale),
- Item 22, 23 and 24 creates a subscale (Fifth subscale).

The reliability coefficients of the subscales are respectively, 0.877, 0.827, 0.746, 0.890 and 0.697. These values are within the range of acceptable reliability values in social sciences (Büyüköztürk, 2003; Özdamar, 2013).

The final form of the inventory was given after exploratory factor analysis and reliability analysis. According to this:

- Items 1, 2, 3, 4, 5 and 11, *renumbered as 1, 2, 3, 4, 5 and 6*. Subscale that these items constitute is "Affective Engagement".
- Items 6, 7, 8 and 9, *renumbered as 7, 8, 9 and 10*. Subscale that these items constitute is "Behavioral Engagement-Compliance".
- Items 10, 12 and 13, *renumbered as 11, 12 and 13*. Subscale that these items constitute is "Behavioral Engagement-Effortful Classroom Participation".
- Items 15, 16, 17, 18, 19, 20 and 21, *renumbered as 14, 15, 16, 17, 18, 19 and 20*. Subscale that these items constitute is "Cognitive Engagement".
- Item 22, 23 and 24, *renumbered as 21, 22 and 23*. Subscale that these items constitute is "Disengagement".

Whether the structure appeared after exploratory factor analysis is correct was tested through confirmatory factor analysis. Figure 2 shows the model produced by CFA.

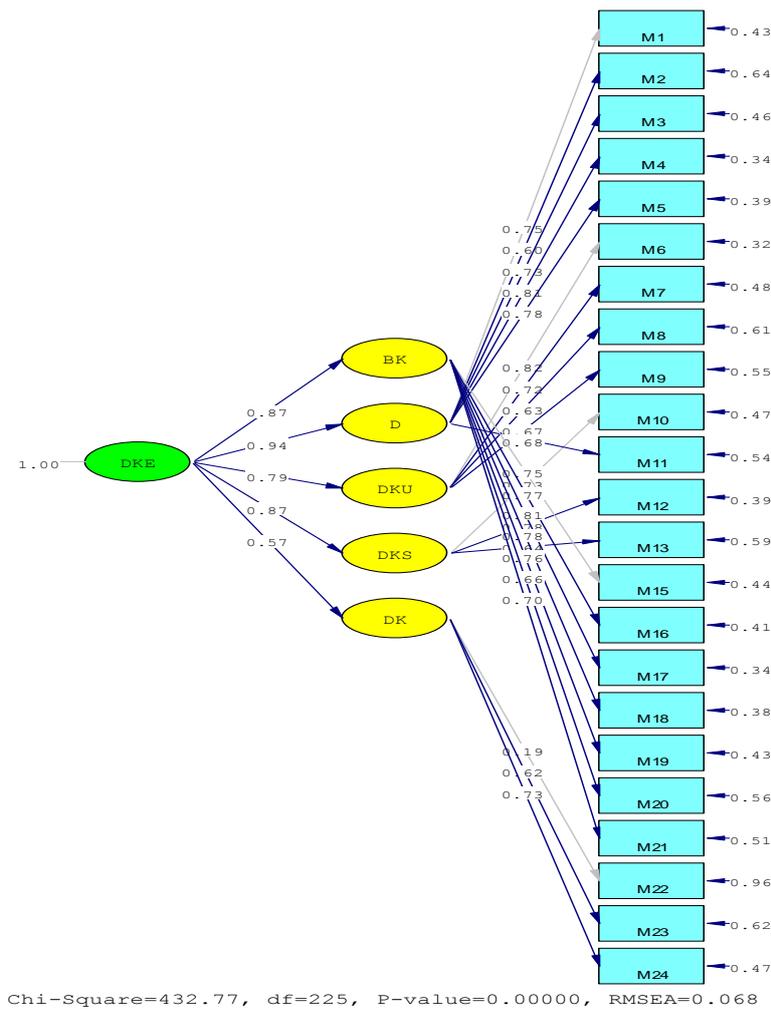


Figure-2. Confirmatory Factor Analysis Model Regarding Classroom Engagement Inventory

Figure 2 shows that freedom degree chi-square acquired through confirmatory factor analysis values are $\chi^2=432.77$, ($sd=225$, $p<.01$) and $\chi^2/sd=1.92$. This ratio calculated from the selected sample, points out perfect fit as it is below 3. (Jöreskog & Sörbom, 1993; Sümer, 2000; Kline, 2005). In this study, it can be said that the fit between the model created after CFA and the data is perfect.

One of the most common indexes used in CFA is RMSEA (root meansquare error of approximation). In CFA, it is the sign of good fit of model and the data when RMSEA index is below 0.05 or lower. However, it was stated that the value is acceptable up to 0.08. (Browne & Cudeck, 1993; Hu & Bentler, 1999; Şimşek, 2007; Vieira, 2011). In this study, it could be said that RMSEA value, that is, 0.068, is within the range of acceptability.

In CFA, the value of AGFI (Adjusted goodness of fit index) above "0.80"; RMR (Root-mean-square residual) value above "0.10" (Anderson & Gerbing, 1984; Marsh, Balla & McDonald, 1988); and SRMR (Standardized RMR) value below "0.08" (Şimşek, 2007) could be acceptable for the fit of model with the real data. In this study, CFA found out that compatibility values are AGFI=0,81, RMR=0,096 and SRMR=0.062. According to these results, it can be said that compatibility level is within acceptable range.

Similarly, in CFA, if NNFI (Non-Normed Fit Index), CFI (Comparative Fit Index), NFI (Normed Fit Index) and IFI (Incremental Fit Index) values are higher than 0.95, this means that model data fit is perfect (Bentler, 1990; Hu & Bentler, 1999; Sümer, 2000; Şimşek, 2007; Çokluk, Güçlü & Büyüköztürk, 2008). In this study those values are NNFI=0.97, CFI=0.97 and NFI=0.95 and IFI= 0.97. By leaning on these results, it can be said that model data fit is perfect.

Table 5 summarizes fit index values acquired through CFA.

Tablo 5. Fit indexes

χ^2	sd	χ^2/sd	RMSEA	AGFI	SRMR	RMR	NNFI	CFI	NFI	IFI
432.77	225	1.92	0,068	0,81	0.096	0,062	0.97	0.97	0.95	0.97

The main purpose of CFA is to determine harmony between the data obtained and the model. Thus, it could be said that Classroom Engagement Inventory with its 5 factor structure is confirmed by the CFA (Sümbüloğlu & Akdağ, 2009).

Discussion, Conclusion and Suggestions

In this research, Classroom Engagement Inventory developed by Wang, Bergin & Bergin, (2014) is adapted into Turkish language. In the original form of the inventory, there are five dimensions: affective engagement (1, 2, 3, 4 and 5. items), behavioral engagement–compliance (6, 7 and 8. items), behavioral engagement- effortful classroom participation (9, 10, 11, 12 and 13. items), cognitive engagement (14, 15, 16, 17, 18, 19, 20 and 21. items) and disengagement (22, 23 and 24. items).

Some differences between Turkish and original form appeared during adaptation process. They are;

- In the original inventory, items between 14-21 are grouped as seven point likert scale. Although, in English, there are enough and meaningful words to name the answers in septet format but it is not the same for Turkish. For instance, it does not make much sense when we say I am 'partially agree' or 'neither less nor more agree'. So, in the original form items grouped in seven points likert scale but in Turkish form they are grouped in five points scale.
- In the process of identifying technical features of the inventory (validity-reliability), it was appeared that item number 14 (I go back over things I don't understand) did not work out for Turkish context. In factor analysis this item shows high value under more than one factor. So this item is removed from Turkish form.
- While item number 11 (I do not want to stop working at the end of class) is under behavioral engagement–effortful classroom participation subscale in the original form of the inventory, it is located under affective engagement subscale Turkish culture.

Confirmatory factor analysis is conducted in order to identify whether the structure obtained through exploratory factor analysis is confirmed. It shows that exploratory factor analysis is confirmed. It can be said that the original form of Classroom Engagement Inventory is confirmed in Turkish language.

It could be probed by other studies whether the structure appeared in this study is confirmed by other studies. By means of determining other factors, which would be in relation to classroom engagement, new findings could be obtained. Using reliability determination techniques such as test-retest, new studies could be conducted for the further testing of the inventory's reliability. Besides, studies could be made in an attempt to understand whether the inventory could be adapted to other educational levels.

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