# Turkish Adaptation Study of UF/EMI Critical Thinking Disposition Instrument [*]

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## Abstract

Critical thinking is an active and organized cognitive process which intends to understand the individual himself/herself, the events, situations and thoughts around him/ her by taking into consideration the individual and the thoughts of others that he/she interacts with. For this cognitive process, it is vitally important to be willing. Because of the need for a valid and reliable scale to measure critical thinking disposition especially in secondary education, the present study conducted aims to determine the validity and reliability of UF/EMI (University of Florida Engagement, Maturity and Innovativeness) Critical Thinking Disposition Instrument in Turkey conditions. The five-point Likert Scale composed of 26 items was applied to 342 Grade 9 and Grade 10 students. In order to analyse the triple factorial structure of the scale, confirmatory factor analysis (CFA) was carried out. As a result of analysis, one item was excluded from the scale. The obtained results indicated that 25-item scale resulting in three factors is consistent and compatible with the data. For the reliability of the scale, internal consistency coefficients of the entire scale and its sub-dimensions were checked out. The obtained Cronbach's Alpha internal consistency coefficient is 0,91 for the entire scale, 0,88 for engagement sub-dimension, 0,70 for cognitive maturity sub-dimension and 0,73 for innovativeness sub-dimension.

## Introduction

Daily thinking tends to be effortless and ordinary so long as it involves common problems. On the contrary, unlike ordinary thinking, uncommon problems require more effort. Thinking involves processing information at the same time and different problems demand different thinking types (Robertson, 1999). If we define thinking as a planned exploration of experience for a particular purpose, this purpose might include understanding, decision making, planning, problem solving, reaching to a conclusion and action (De Bono, 1978). Thinking is a research and reaching to meaning for the answers and countless of cognitive activity takes part in thinking process. These cognitive activities are careful investigation, recall, wondering, imagining, questioning, interpretation, evaluation and reasoning and generally few of them work together during problem solving and deciding (Ruggiero, 2007). According

to Chaffee (1988) thinking is active, purposeful and organized effort of human being to make sense of the world. Critical thinking, one of the types of thought, is the effort of individual to make sense of the world by questioning thinking process of himself and others' in order to develop and explain his/her understanding.

Unlike ordinary thinking, critical thinking which involves many qualities is closely related with higher order thinking skills such as problem solving, decision making and creative thinking. Although these higher order thinking skills overlaps conceptually, they involve certain significant details distinctively. One of the most crucial points about critical thinking agreed by the researchers participating in Delphi Project ,a two-year project supported by American Philosophy Association, is each beneficial cognitive process cannot be thought as critical thinking. (Facione, 1990).

In the study conducted by Lipman (1988) which he presented the differences between ordinary thinking and critical thinking, Lipman remarked that unlike ordinary thinking, critical thinking is a type of thought that some criteria are used and evaluated on the basis of them. He presents the differences between critical and ordinary thinking comparatively as shown in Table 1.

**Table 1.** Comparing of Ordinary Thinking and Critical Thinking

| Ordinary Thinking | Critical Thinking/Reasoning |
| --- | --- |
| Guessing | Estimating |
| Preferring | Evaluating |
| Grouping | Classifying |
| Believing | Assuming |
| Inferring | Inferring logically |
| Associating concepts | Grasping principles |
| Noting relationships | Noting relationships among other relationships |
| Supposing | Hypothesizing |
| Offering opinions without reasons | Offering opinions with reasons |
| Making judgments without criteria | Making judgments with criteria |

A reasonable relationship exists between critical thinking, standards, and decision-making. Decision-making is a skill. Similarly, critical thinking is a type of thought which requires skill. Skills cannot be explained without standards. Therefore, critical thinking is a type of thought that the standard is used and determined through the standards applied. Different from featureless, random and unstructured thought, critical thinking could be defined as a type of thought which is well based, structured and based on a standard determining assisted thought (Lipman, 1988).

Critical thinking involves, at least, six distinctive features. These are tendencies, standards, proof, reasoning, perspective, the application of the standards and the methods used to reach conclusion. Critical thinking involves combined and simultaneous interaction of these six features for the purpose of researching to understand an item, a situation, an event and an action in the best way (Beyer, 1995).

As a result of the Delphi Project, the definition concerning critical thinking made by the researchers participating in the study is the ability of decision making by thinking correctly which enables an individual to make interpretation, analysis, evaluation and inference under his/ control for a particular purpose. Critical thinking is the evidence-based explanation of conceptual, procedural, logical and contextual thoughts which underlie the capacity of this decision making process. A good critical thinker is someone who is curious, has a good command of the subject, is open-minded, flexible, objective in his evaluations and honest in facing with personal prejudices. Apart from comprehending the problems easily, he can give reasonable decisions and is willing to review these decisions. Another result obtained from the Delphi Project is that, conceptually, critical thinking is composed of two dimensions, namely cognitive skill dimension and affective skill dimension (Facione, 1990). Similarly,

Paul, Weil, & Binker (1990) classifies critical thinking strategies in a detailed way and divides these strategies into two categories as cognitive and affective.

When conceptual considerations made for critical thinking are taken into account, it has been emphasized by the researchers that critical thinking is a process. At the same time, it could also be stated that critical thinking is made up of some skill based and affective dispositions. Critical thinking is an active and organized cognitive process which aims to understand the individual, the events, situations and thoughts around him by considering the individual's thoughts and the thoughts of others that he/she interacts.

Critical thinking skill is the ability to think critically in an easy and skilful way by giving cognitive effort. On the other hand, disposition is someone's desire to think critically (Zhang, 2003). Dispositions are attitudinal in nature and develop over time. Also, they are influenced by adults, peers and environmental conditions specifically. Dispositions are significant markers of critical thinking and in addition to their changing nature, this change happens slowly over time. The individuals with low-level dispositions do not concern about complex questions a lot, look for different solutions for the problems, question decisions and struggle to solve problems. Dispositions could be defined as the gateways individuals used to reach critical thinking activities (Irani et al., 2007).

The approach of an ideal critical thinker towards life and the critical thinking dispositions he/she presents generally in daily life are: curiosity about relevant topics, concern about being well-informed and sustaining it, awareness to make use of opportunities in critical thinking, trust to reasonable questioning process, confidence to one's own reasoning process, open-mindedness towards different opinions, flexibility in taking alternatives and thoughts into consideration, fair-mindedness in understanding different opinions and evaluated thoughts, prudence in deciding or changing decisions during postponement process, honesty in facing with personal biases and stereotyped, ego-centric or socio-centric dispositions, willingness to change or reconsider opinion when an authentic proposal is offered to change it (Facione, 1990).

As for an ideal critical thinker when approaching to a specific topic, question or problem, the critical thinking dispositions he/she presents are: clarity in specified question or connection, orderliness in complex matters, diligence in seeking relevant information, reasonableness in selection of criteria or applying according to specific criteria, being rigorous in concentrating on a specific topic, determination when faced with challenges and persistence as long as the subject and circumstances permit (Facione, 1990).

As a result of Delphi Project, seven dispositions of critical thinking were described which are analyticity, self-confidence, inquisitiveness, maturity, open-mindedness, systematicity, and truth seeking (Facione, 1990). *Analyticity* expresses dispositions of concentration on potentially problematic situations, constitution of assumptions for possible results or consequences and the use of evidence even if it makes the problem challenging. The analytically inclined individual is alert against potential difficulties both conceptually and behaviourally and generally while solving problems he/she constantly tries to apply anticipatory intervention, reason giving and fact-finding as ways to solve problems. *Self Confidence* refers to the level of trust towards one's own reasoning process. The individuals thinking critically and having self-confidence trust themselves in terms of giving reasonable decisions and believe that the others believe them as well, because they believe that they can decide what to do and conclude the inquiry in an appropriate way when people apply them to solve problems. The *Inquisitive* person is someone who knows the value of being well-informed, wants to learn how things work, appreciates the value of learning even it doesn't produce result at once. *Maturity* means cognitive maturity and epistemic development. Mature thinkers tend to approach to problems, inquiry and decision making with an understanding that some statements have more than one convincing option. They are also aware that the judgments based on standards, contexts and evidence generally are not given without having all the information about situation. *Open-mindedness* is a construct that describes the tendency of being tolerant with sensitivity to different opinions. Open-minded individual

is someone who respects others' different ways of thinking. *Systematicity* refers to the tendency of being organized, neat, focused and diligent in inquiry. A specific kind of organization (i.e. linear or non-linear) is not prioritised. A systematic individual struggles to approach particular issues, inquiries and problems in a neat and focused way. *Truth seeking* are individuals who are desirous of seeking truth, courageous about asking questions and honest and objective during inquiry even when the findings do not support his/her interests or preconceived notions. Truth-seeking person prefers to follow the truth and discuss rather than win.

An individual's having thinking skills does not mean that s/he will use it. Students generally fail using the skills they are taught and this might result from lack of thinking disposition (Tishman, Jay and Perkins, 1993). Individuals who have critical thinking ability may not use it when they lack critical thinking disposition. Individuals with this disposition are more willing to think critically so developing these dispositions which are the way for critical thinking is one of the fundamental requirements for an individual's thinking critically.

Curricula have been gradually renewed in terms of reconstruction of secondary education in Turkey since 2013. When they are examined, it is seen that expressions about developing students' critical thinking exist in many places and terms and approaches that adopt critical thinking and student centered learning theories are adopted (TTKB, 2014). Besides, Thinking Education course has been offered as a selective course since 2006-2007 academic year (Ülger, 2012). It can be said that teaching theories and approaches based on thinking education and critical thinking gain importance day by day. Determining the level of critical thinking tendency –especially in secondary education- might be instructive to increase students' willingness to be critical thinkers and to develop their critical thinking ability. California Critical Thinking Disposition Inventory (CCTDI) that was translated into Turkish in bachelor's degree by Kökdemir (2003) stands out as a frequently used tool in determining the level of critical thinking tendencies by studies in Turkey (Çetinkaya, 2011; Dutoğlu & Tuncel, 2008; Emir, 2013; Gürol-Arslan, Demir, Eşer, & Khorshid, 2009; Hamurcu, Günay, & Akamca, 2005; Kartal, 2012; Korkmaz, 2009; Kurt & Kürüm, 2010; Şengül & Üstündağ, 2009; Tümkaya, 2011; Türnüklü & Yeşilkaya, 2005). In his study that included university students, Azar (2010) used the critical thinking tendency inventory developed by Akbıyık (2002) to determine the level of critical thinking tendency. The lack of a valid and reliable inventory on determining the critical thinking tendency of especially secondary education level students is notable. The aim is to test the validity and reliability of University of Florida Engagement, Maturity and Innovativeness (UF/EMI) Critical Thinking Disposition Instrument in Turkish context as it might be a solution to the mentioned lack.

# Method

## Participants

This study, which intends to carry out validity and reliability analysis of UF/EMI Critical Thinking Disposition Instrument by adapting it into Turkish, was practised in 2009-2010 education year fall semester in Ankara. It was conducted with 342 Grade 9 and Grade 10 students using convenient sampling method.

## UF/EMI Critical Thinking Disposition Instrument

UF/EMI Critical Thinking Disposition Instrument is an instrumentation tool developed by Florida University researchers to measure critical thinking disposition because of the need for measuring critical thinking disposition in an effective way and having an instrumentation tool which includes fewer factors than existing ones. Facione (1990) described seven dispositions of critical thinking in CCDI deriving from the results obtained from Delphi Project. These dispositions are analyticity, self-confidence, inquisitiveness, maturity, open-mindedness, systematicity, and truth seeking.

Ruud, Moore and Penfield applied factor analysis to CCTDI in 2002 and determined that the constructs in Facione's study were not explained in the analysis. In another study conducted with the participation of over 800 participants, the constructs proposed by Facione (1990) were not determined again and the researchers needed to develop an instrument that measures critical thinking more accurately. The resulting instrument which takes its name from the university the researchers worked and the English initials of the sub dimensions of the instrument UF/EMI (University of Florida Engagement, Maturity and Innovativeness) developed and pilot-tested in 2003. The instrument is a five-point Likert Scale. UF/EMI represents three constructs of critical thinking disposition. These constructs were derived from Facione's (1990) study. For the development of new instrument representing three constructs, it was benefited from factor analysis data obtained from CCTDI study (Irani et al., 2007).

These constructs were translated into Turkish as "Katılım (Engagement), Bilişsel Olgunluk (Cognitive Maturity) and Yenilikçilik (Innovativeness)" by taking the experts' opinions into consideration. When the explanations under analyticity and self confidence dimension present in CCTDI were taken into consideration, it is possible to say that the engagement construct in EMI is related with these dimensions. Similarly, the dimensions of maturity and open-mindedness are in relation with cognitive maturity construct and the dimensions of inquisitiveness and truth seeking are in correlation with innovativeness construct.

Engagement Construct: The individuals with a high disposition in engagement expect situations where a decent reasoning is essential. They also watch for an opportunity for the purpose of using their reasoning skills, solving problems and reaching to conclusions. Such an individual is also a confident communicator and is able to explain the reasoning process while trying to reach conclusion or solve a problem. Totally, 11 items in the instrument have been used to measure engagement construct.

Cognitive Maturity Construct: The individuals with a high disposition in cognitive maturity are aware of their own tendencies and prejudices during decision-making process. Such an individual is aware that the opinions he/she holds are influenced by his own identity, environment and experiences. He/she is also aware that the others may not agree with his/her decisions. Cognitively mature people are open-minded, they search for different viewpoints and consider them objectively while deciding or reaching to a solution. The people with high level of cognitive maturity know that most problems are complex and they are also aware that they will meet with one-right answer questions occasionally. Totally, eight items in the instrumentation have been used to measure cognitive maturity construct.

Innovativeness Construct: The individuals with a high innovativeness disposition could also be defined as "hungry learners". These people consistently seek for new knowledge. They tend to be innovative concerning their occupation, position, life and world. Innovative person has an intellectual curiosity and impulse and endeavours to learn new things by researching, reading and questioning.

Such an individual is also characterized by his desire for finding the truth even if the truth conflicts with his existing belief and opinions. Totally, seven items in the instrumentation have been used to measure innovativeness construct.

When the literature on critical thinking is examined, it is seen that the reliability coefficients of UF/EMI Critical Thinking Disposition Instrument are generally at an acceptable level. In their study in which they used critical thinking as a teaching method, Friedel et al. (2008) compared learning based on questioning and critical thinking and used UF/EMI in order to determine students' critical thinking dispositions. In the study, the reliability coefficient of participation dimension is 0.91 while it is 0.79 in cognitive maturity dimension and 0.80 in innovativeness dimension. Friedel, Irani, Rhoades, Fuhrman and Gallo (2008) used UF/EMI in their study in which they searched for the relation between critical thinking and problem solving skills; the reliability coefficient for the whole inventory was 0.84; it was 0.84 in participation sub-dimension, 0.39 in cognitive maturity sub-dimension and 0.63 in innovativeness sub-dimension. Lamm et al. (2011) used UF/EMI in their study in which they searched for the relation of three structures of cognitive function –namely, critical thinking disposition, problem solving styles and learning styles. Lewis (2012), Stedman (2009) and Towns (2012) also used UF/EMI in their studies to determine the level of critical thinking disposition.

### UF/EMI the translation of critical thinking instrument into Turkish

In first step of the adapting process, it was contacted with Tracy Irani by email in order to ask her positive permission about adapting the assessment into Turkish, according to the assessment manual. The instrument that original language is English was translated into Turkish by three independent translators, whose first language was Turkish and working in different departments at a Turkish university for the purpose of using it with Turkish participants. The translators produced three different versions of the instrument. Translators were personnel of a Turkish university, one was professor in department of physics education, second one was an assistant professor in department of elementary mathematics education, and other one was an assistant professor in elementary science education. In the next step of adapting process, Turkish version of the instrument was re-translated into English by four translators work in department of foreign languages school at a Turkish university. The items of instrument compared by translating from Turkish to English and English to Turkish. After comparisons, the instrument was prepared for intelligibility test. In order to test the intelligibility of the instrument was applied to 80 Grade 9 and Grade 10 students. On the basis of the obtained results, the items were reorganized and the instrument was made ready for validity and reliability analysis.

### Analysis of Data: Validity and reliability analysis of UF/EMI critical thinking disposition instrument

The instrument was applied to 342 Grade 9 and Grade 10 secondary education students in 2009-2010 school year fall term to conduct validity and reliability analysis. Construct validity and content validity were analysed for validity analysis. CFA was carried out to test construct validity. In cross cultural adaptation of research instrument studies, it could be suggested to start with confirmatory factor analysis straightforwardly for the factor pattern of the tool in target culture because the factor pattern of the existing instrument was revealed in many qualitative and quantitative studies in the source culture and the experimental proofs related to construct validity were determined. In such a case, whether the factor pattern of the existing tool is preserved in the target culture or not can be tested by CFA. If the model concerning original factor pattern is not confirmed or it does not reveal high goodness of fit index in the confirmatory factor analysis, then it could be preferred to explore factor pattern in the target culture with CFA (Çokluk, Şekercioğlu, & Büyüköztürk, 2010).

One of the ways to analyse content validity is to apply for expert opinion (Büyüköztürk, et al., 2010). For the content validity of the assessment, three academicians who are expert on critical thinking and in department of psychology of a Turkish university, were asked for their opinions, whether the items in the instrument involve critical thinking dispositions and appropriate for the level of students or not. For reliability analysis, internal consistency coefficient of the whole instrument and its sub dimensions was examined.

# Results

## *Validity*

For the construct validity of UF/EMI Critical Thinking Instrument, confirmatory factor analysis was performed for the purpose of confirming the factors present in the original. Before conducting the analysis, the data set was checked by examining the missing data, outliers and normality. LISREL was used in data analysis.

After the analysis, for item 11 (I am likely to change my opinion when I am given new information that conflicts with my current opinion) a meaningful t value was not obtained and it was observed that error variance of the item was high (0,99). In this respect, it was decided to exclude 11th item from the instrument. After performing the confirmatory factor analysis, measures, criterion, acceptable thresholds and the obtained values (CFA I and CFA II - before and after item 11 excluded from the instrument), which are Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA), Root Mean Square Residuals (RMR), Standardized Root Mean Square Residuals (SRMR), Comparative Fit Index (CFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), Parsimony Goodness of Fit Index (PGFI), Parsimony Normed Fit Index (PNFI), have been given in Table 2.

**Table 2.** Confirmatory Factor Analysis Results

| Measure | Criterion | Acceptable thresholds | CFA I | CFA II |
|---|---|---|---|---|
| $\chi^2$ | p>0,05 | - | 844,74 (df=296, p=0,00) | 813,66 (df=272, p=0,00) |
| $\chi^2$/ df | - | ≤3= perfect fit | 2,85 | 2,99 |
| RMSEA | 0 (perfect fit) 1 (no fit) | ≤0,05= great fit ≤0,08= good fit | 0,07 | 0,08 |
| RMR | 0 (perfect fit) 1 (no fit) | ≤0,05= great fit ≤0,08= good fit | 0,06 | 0,06 |
| SRMR | 0 (perfect fit) 1 (no fit) | ≤0,08= good fit | 0,06 | 0,06 |
| GFI | 0 (no fit) 1 (perfect fit) | ≥0,90= good fit | 0,84 | 0,84 |
| AGFI | 0 (no fit) 1 (perfect fit) | ≥0,90= good fit | 0,81 | 0,81 |
| NFI | 0 (no fit) 1 (perfect fit) | ≥0,90= good fit | 0,91 | 0,91 |
| NNFI | 0 (no fit) 1 (perfect fit) | ≥0,90= good fit | 0,94 | 0,94 |
| CFI | 0 (no fit) 1 (perfect fit) | ≥0,90= good fit | 0,94 | 0,94 |
| PGFI | 0 (no fit) 1 (perfect fit) | - | 0,71 | 0,70 |
| PNFI | 0 (no fit) 1 (perfect fit) | - | 0,83 | 0,83 |

*Note:* Criterion and acceptable thresholds were taken from Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2010). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları.* Ankara: Pegem Akademi, p. 271-272.

It was observed that Chi-Square value is $\chi^2$ = 844,74 (N=342, sd=296, p=0,00) before item 11 excluded from the instrument. P value is meaningful at a level of 0,01 in the obtained results. It is typical for p to be meaningful in many CFA because of the large number of sampling and it is tolerated in many studies (Çokluk et al., 2010). $\chi^2$/df rate is 2,85 (844,74/296=2,85). In large number of samplings if $\chi^2$/df rate is under 3, it corresponds to perfect fit; if it is under 5, it corresponds to moderate level of fit (Kline, 2005). Within this framework, It could be stated that $\chi^2$/df rate reveals perfect fit. When goodness of fit index values were examined it was observed that it was at the level of RMSEA = 0,07 and RMR = 0,06.

It could be expressed that there is not much differences between the values before and after, which obtained item 11 excluded from the instrument. It was observed that Chi-Square value is, lower than calculated in first CFA, $\chi^2$ = 844,74 (N=342, df=296, p=0,00) after item 11 excluded from the instrument. It was calculated that the new $\chi^2$/df rate is 2,99 (813,66/272) and RMSEA=0,08. A parsimony index can provide useful information in evaluating competing models, but that it should not be relied upon alone. PNFI is the most widely applied parsimony fit index (Hair, Black, Babin, & Anderson, 2010). After the CFA, it was observed that PGFI value decreased from 0,71 to 0,70 and PNFI value had no change.

When all these goodness of fit values are taken into account, it might be claimed that the Turkish version of the instrument does not reveal a perfect level of fit, but reveals an acceptable level of fit. When factor loadings concerning model are checked, it could be stated that variables on each factor have high loadings in general. Therefore, it could be claimed that convergent validity of the instrument is confirmed. It could be expressed that discriminant validity of the instrument is ensured, because correlations among measures are not so high. Factor loadings concerning model has been represented in the appendix.

### Reliability

In Likert Scale, the existing options are; strongly disagree (1 point), disagree (2 points), neutral (3 points), agree (4 points) and strongly agree (5 points). The sub-dimensions of UF/EMI Critical Thinking Disposition Instrument are, "Engagement, Cognitive Maturity and Innovativeness Constructs".

There are 11 items under "Engagement" sub-dimension. Internal consistency coefficient of engagement subscale in the original instrument is (alpha) 0,91. The coefficient obtained in the present study is 0,88. There are eight items in "cognitive maturity" subscale of UF/EMI Critical Thinking Disposition Instrument.

As a result of confirmatory factor analysis item 11 which belongs to "Cognitive Maturity" subscale was excluded from the instrument. The Internal consistency coefficient of cognitive maturity subscale in the original instrument is 0,79. The coefficient obtained in the present study is 0,67. After item 11 was excluded from the instrument, the obtained internal consistency coefficient is 0,70. Seven items remain in cognitive maturity subscale after item 11 is removed from the instrument.

Seven items exist in Innovativeness sub-dimension of UF/EMI Critical Thinking Disposition Instrument. The internal consistency coefficient of Innovativeness sub-dimension which belongs to original scale is 0,80. The obtained coefficient in the present study is 0,73.

The internal consistency coefficient of the whole scale for the original instrument is 0,94. As a result of the present study, the internal consistency coefficient of the scale composed of 26 items is 0,91. The coefficient was found to be 0,91 when item 11 was excluded from the instrument.

## Discussion, Conclusion and Suggestions

The aim of the present study is to adapt UF/EMI Critical Thinking Disposition Instrument into Turkish and carry out validity and reliability analysis for the adapted instrument. Content and construct validity of the scale were analysed for validity and internal consistency coefficient was calculated for reliability. The construct validity of the scale was tested with CFA. After the analysis, for item 11 (I am likely to change my opinion when I am given new information that conflicts with my current opinion) a meaningful t value was not obtained and observed that error variance of the item was high (0,99). So, the item 11 was removed from the instrument and it is decided to reanalyse CFA without item 11.

With respect to the results obtained from analysis, it could be said that there are not much differences between the fit statistics and it has been observed that the 25 item-scale resulting in three factors is consistent and coherent with the existing data. When parsimony indices are compared, it could be stated that there are not considerable differences between PGFI and PNFI values. When all these goodness of fit statistics are taken into account, it might be claimed that the relations, among data obtained from Turkish version of the instrument, comply with theoretical construction. For reliability, internal consistency coefficient of the whole scale and its sub-dimensions were examined. Cronbach's Alpha internal consistency coefficient of the whole scale is 0,91; 0,88 for "Engagement" sub-dimension; 0,70 for "Cognitive Maturity", and 0,73 for "Innovativeness" sub-dimension. The obtained coefficient of internal consistency is parallel with the ones found in the development of original scale and the other studies. The internal consistency coefficient of cognitive maturity dimension, similar to these studies, presents lower results compared to the other dimensions (Fridel et al, 2008; Irani et al, 2007; Lamm et al, 2011).

The implementation of the study with 342 participants educating in Grade 9 and Grade 10 constitutes the one of the limitations of the study. The construct and content validity were observed and internal consistency coefficient was investigated in the study. However, no calculation was carried out for convergent and discriminant validity. The results of studies carried out with larger number of sampling with the participation of Grade 11 and Grade 12 students are thought to contribute to validity and reliability by comparing the results obtained in this study. It is believed that the results of the studies, which make use of the adapted scale, will contribute to the support of the proof in terms of validity and reliability. For the following studies, an adaptation study of UF/EMI for different level of learning could be executed.

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**Appendix 1.** Factor Loadings Concerning Model
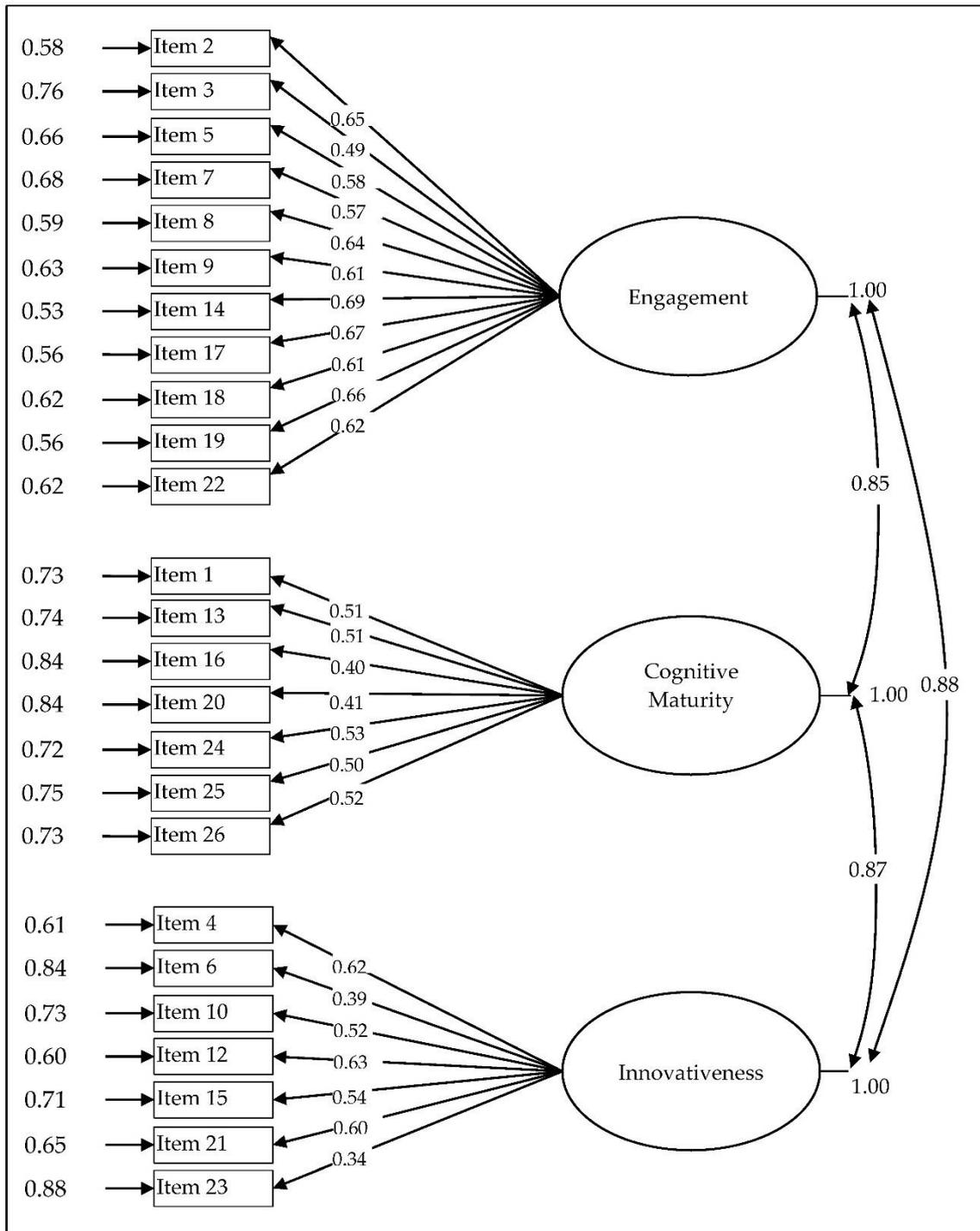


$\chi^2$ = 813,66, df = 272, P = 0,0000, RMSEA = 0,076