



THE DEVELOPMENT OF CRITICAL THINKING ATTITUDES SCALEⁱ

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Abstract:

This research aims to develop an independent scale that measures the critical thinking attitudes of classroom teacher candidates. The research was designed in a screening model. The universe of the research was composed of 384 prospective teachers who are studying in the education faculty of a university in the western part of Turkey. In the sample of the research was composed; classroom teacher and preschool teacher departments. Explanatory and confirmatory factor analysis was performed on the obtained data. The validity of the construct obtained by confirmatory factor analysis with the data was tested. According to research findings, "Critical Thinking Attitude Scale (CTAS)" is a valid and reliable measurement tool consisting of 19 items and 5 sub-dimensions (Information Acquisition Willingness, Reasoning, Discovery, Evidence-Based Decision Making, Self-Regulation). The maximum score that can be obtained from the scale is 95 and the minimum score is 19. The scale is suitable for use in the 17-25 age groups.

Keywords: critical thinking attitude, teacher candidate, scale development, primary education

1. Introduction

It is thought that globalization, which now feels its influence intensively, will further increase its influence in the coming years. So human type which we need in the future;

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will be changed. Discussing presented data as the most accurate service for their purpose, use it in productive measures, establish causality relationships, develop assumptions and strive to test it. These are the qualifications of the future human. In the other hand the changing human type has also influenced the perception of work and profession, and many potency have left their place in the brain power. The role of the educational institutions that are obliged to train the individuals with the mentioned qualifications and the teachers who work in these institutions also varies in this context. According to Kazancı (1989), teachers' inadequacies in reasoning are why students cannot learn to think critically.

For every student in elementary school, the teacher's attitudes and behaviors are carefully examined by the students when every message that the teacher gives openly or implicitly is important. According to Tokyürek (2001), students' critical thinking skills are influenced by teacher attitudes. From the beginning of childhood until the end of adolescence, students are influenced by teacher attitudes. Therefore it is important to determine the critical thinking attitudes of classroom teacher candidates who will serve as classroom teachers and to determine the factors affecting these attitudes. Attitudes can change with learning and life (İnceoğlu, 2000; Kağıtçıbaşı, 1999). In this context, this research is crucial in determining the attitudes of prospective teachers towards critical thinking and enabling the possibility of organizing alternative educational situations to develop positive attitudes in prospective teachers' programs.

2. Literature Review

A number of different measuring instruments have been developed and used in different studies that treat critical thinking as attitude, tendency, or skill and aim to measure it in this context. In addition to the scales where adaptation works have been done in different cultures translated into different languages in the field, there are also scales prepared for limited applications. In general, the Watson-Glasser Critical Reasoning Test, the California Critical Thinking Skills Test, and the California Critical Thinking Tendency Test are among the most commonly used measurement tools. Attitude scales developed by researchers in Turkey are also used by content-based skill tests or checklists by researchers, teacher or student questionnaires with the aim of measuring critical thinking. However, the means of measurement aimed at measuring the "attitude" of critical thinking are very limited. There are 3 attitude scale developed for this purpose in Turkey. But, the target mass of all scales is different. Critical thinking attitude scale developed by Öner (1999) is directed to primary school students and attitude scale developed by Akar (2005) is directed to secondary school students. The attitude scale developed by Özdemir (2005) is designed to be based on "critical thinking

skills" with being suitable for teacher candidates. For this reason, it was aimed to develop a critical thinking attitude scale focusing on "field independence" and "attitude" within the scope of this research. The scale developed according to the basic elements of critical thinking and the characteristics of critical thinking individuals. Scale based on sources of critical thinking, developed scales by other researchers, definitions made in the context of philosophy and dialectical thinking sources and American Psychologists' Report (1990). In this context, it is a valid and reliable scale.

3. Material and Methods

3.1. Research Model

This research is a scale development study to measure the critical thinking attitudes of classroom teacher candidates. For this purpose, the research was designed in a screening model.

3.2. Universe and Sample

The universe of the research is composed of prospective teachers who are studying at Adnan Menderes University Faculty of Education in 2009-2010 academic year. The sample consisted of 392 prospective teachers in the classroom teacher and preschool teacher departments. An explanatory and confirmatory factor analysis was performed on the data, in which 384 data are considered valid.

3.3. Scale Development Steps

The Critical Thinking Attitude Scale is a Likert type scale. Likert type scales are based on the principle that the individual gives information about himself / herself. The individual reports his observations about himself by observing himself in terms of various characteristics. Likert-type scales are also called summing the scales (Tavşancıl, 2005: 138, Tezbaşaran, 1996: 7). Scale development studies started in spring semester 2007-2008 academic year. 3 practices were carried out respectively. Measurement tool was finalized at the fourth one. Below is a description of the 4th practice.

3.3.1. Theoretical Basis

Different researchers are following different ways in defining and measuring critical thinking. When the researches made from the past to today be examined, it is seen that the scales for measuring the dimensions considered in the definition of critical thinking have been developed. In this research, it is aimed that critical thinking can be separated from others and measured independently of the content. For this purpose, the philosophical and theoretical foundations of critical thinking were discussed. From the

basic principles of dialectics and from the critical rationality of Karl Popper, we tried to prepare items of scale. In addition, the dimensions of the critical thinking discussed in Beyer (1985), the Delphi project (1990) report by Paul and Elder (2005; Until the writing of the scale had begun to be written, the critical thinking dimensions revealed by Watson-Glasser (1964) and Facione (1990) were utilized.

3.3.2. Criterion of an Item Pool

During the spring semester of 2009-2010 academic year, interviewed on "critical thinking" with 16 class teacher candidates were. In this form prepared by taking the opinions of 3 lecturers who are working in Curriculum and Instruction department there are 6 main questions and explanatory questions. Each interview with the prospective teachers lasted about 40 minutes on average. Obtained 42 pages of raw data were analyzed and attitude items were written (62 items and 6 sub-dimensions). Some of these materials were obtained from the previous practices, and a draft form was obtained from the item pool.

3.3.3. Study of Content Validity

For determining the level of comprehension of the draft scale and for the appropriateness of the statements was applied to the 30 teacher candidate. Changes in some expressions have been made in the direction of feedbacks from teacher candidates. Careful attention has been paid to the fact that positive and negative cues are about the same number, and care has been taken to ensure that items of the same subscale do not come to the bottom. Thus, the test items were adapted to the test practice phase, and the draft form was prepared. Then draft form was presented to the field expert. It has been sent with the aim of getting "expert opinion" to 15 faculty members who are working at different faculties of education in different universities. Six feedbacks received. The opinions and suggestions from each lecturer were reviewed one by one and final form was given. At the end, form consists of 64 items and 6 sub-dimensions.

3.3.4. Practice

Form applied in a single session to 392 prospective teachers who are studying at Adnan Menderes University Faculty in the classroom teacher and preschool teacher departments. An explanatory and confirmatory factor analysis was performed on the data obtained in this application, in which 384 data are considered valid.

4. Results and Discussion

4.1. Results Related to Explanatory Factor Analysis

The necessary arrangements were made on 384 raw data (the reverse substances were re-coded). The Kaiser-Meyer-Olkin (KMO) value for the data set was .779, and the Barlett's test result was significant (1175,962) .001. Varimax rotation was made. Five dimensions with an eigenvalue greater than 1 were found in the result of the rotation. The total variance explained by the five factors on the scale was found to be 50,27%. The variance explained by the factors and the self-value for each factor are given in Table 1. 19 items were collected in 5 factors. The factor loadings and item analysis results of the items in each factor are given in Table 2.

Following the factor analysis, each subscale was named after considering the theoretical basis and the meaning. 1. Information Collectability, 2. Self-regulation, 3. Inference, 4. Evidence Based Decision Making, 5. Reason-seeking

4.2. Results Related to Confirmatory Factor Analysis

The Verified Factor Analysis (DFA) results confirm the five-factor structure of the scale. The obtained values of $\chi^2 = 235.19$, $df / \chi^2 = 0.60$, $RMSEA = 0.041$, $NNFI = 0.80$, $CFI = 0.91$ and $AGFI = 0.92$ show the data suitability of the model. The Path diagram for the model is presented below.

4.3. Results related to validity studies

Correlations calculated with the aim of testing the consistency of each factor included in the scale with each factor and with the scale. It is expected that the correlations of the items in the same factors (subscales) with each other are high in the scales. When Table 2 is examined, it is seen that the factors of the factors in a factor show a positive relation with the positive in the positive. In order to determine the power of the items in the scale and the separation power of the individuals with negative and positive attitudes, the t-scores of the upper and lower groups related to each item were calculated. Independent groups when the T-test results are examined, the significance of the t values indicates that the scale has a positive and negative attitude.

4.4. Studies on Critical Thinking Attitude Scale on Similar Scales (Critical Thinking Attitude Scale)

The correlation coefficient with the Central Epistemological Beliefs Scale (Oksal, Şensekerici, Bilgin, 2006) and the Need for Cognition Scale (Gülgöz and Sadowski, 1995) were calculated for the purpose of testing the validity of the similar scales of the critical thinking attitude scale.

The Central Epistemological Beliefs Scale (2006) was developed by Oksal, Şekerci and Bilgin, aim of determining the central epistemological beliefs that constitute the basis for the beliefs of prospective learners about learning-teaching processes. The scale prepared in Likert type consists of 23 items and four sub-dimensions. It was decided that the sub-dimensions (belief in knowledge, rational collective belief, belief in superstitious rituals, belief in supernatural powers), and items of measurement were related to the critical thinking attitude, while showing a difference with the attitude of critical thinking. The cronbach alpha internal consistency coefficients for each subscale of the scale, which explains 52% of the total variance, are .85, .77, .75, .66 respectively.

Need for Cognition Scale consists of 34 items originally. The scale developed by Cacioppo and Petty (1982, 1984) in 1982 aims to determine the situation of individuals in terms of their need for thinking. In 1984, a short 18-item form was created on the scale. This short 18-item form was adapted to Turkish by Gülgöz and Sadowski in 1995. The researchers (Gülgöz and Sadowski, 1995; Demirci, 2002; Hatay Polat, 2008) gathered in the single factor of scale, and the distinction between the two items is low, regarding the scale used and analyzed by different researchers. When the scale items were examined, it was observed that the need for thinking was related to the critical thinking attitude.

In the research, 4 sub-dimensions, thinking need scale and five sub-dimensions of critical thinking attitude scale in the central epistemological belief scale were correlated with each other. Findings related to this practice, which was realized with the participation of 88 students studying at Pamukkale University, are given in Table 3. When Table 3 was examined, it was found that the total point average obtained from the Critical Thinking Attitude Scale was significantly correlated with the total point average obtained from the thinking need scale and the central epistemological belief scale as the information source with the mean scores from the knowledge beliefs, rational social beliefs and supernatural strengths belief subscales. It is seen that there is a significant correlation with all other scales and subscales in the direction of the absence. (R: .38, $p < 0.01$), self-regulation ($r: .28$, $p < 0.01$), and the mean scores obtained from the Central Epistemological Beliefs Questionnaire), and inference ($r: .25$, $p < 0.05$) subscales.

4.5. Results about Reliability Studies

The cronbach-alpha values for each factor included in the scale were calculated. The reliability coefficients of the scale vary between .52 and .70 as shown in Table 4. The Guttman Split Half value, which was calculated as the test hemisphere technique to get an idea of the consistency of the scale or the consistency between the two halves, was .66 for the BTTI subscale, .57 for the OSS subscale, .46 for the SD subscale, And for NAA

subscale, it was calculated as .51, .46 for the whole scale, .74 for the first part, and .57 for the second part.

5. Conclusion and Recommendations

The main purpose of the research is to develop an area-independent attitude scale for prospective teachers. According to research findings, "Critical Thinking Attitude Scale (CTAS)" is a valid and reliable measurement tool consisting of 19 items and 5 sub-dimensions (Information Collectability, Self-regulation, Inference, Evidence Based Decision Making, Reason seeking). The maximum score that can be obtained from the scale is 95 and the minimum score is 19. The high score is accepted as a positive attitude indicative of critical thinking. The scale is suitable for use in the 17-25 age groups.

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B. ELEMENTS

a. Figures and Tables

Table 1: Eigenvalues and Variance Values

S/n	Eigenvalues	Variance (%)
1	3.66	11.62
2	1.98	10.79
3	1.49	9.80
4	1.25	9.41
5	1.17	8.65

Table 2: Factor Analysis and Item Analysis Results for the Fourth Practice

Factors	Factor load	Anti-ıııaj c- coefficient	Mean	Sd	Item / subscales correlation
BİLGİ TOPLAMAYA İSTEKLİLİK					
60. Bir konu hakkında karar verirken. sahip olduđum görüőün tersi görüőler hakkında da bilgi toplamaya çalıőırım.	.807	.759	2.26	.901	.76
61. Ulaőtıđım bilgilerin ne derece güvenilir olduđunu sorgularım	.680	.828	1.99	.806	.73
33. Daha fazlasını öđrenmek için soru sorarım.	.625	.869	1.87	.730	.70
58. Konu ne olursa olsun araőtırma yapmak keyifli bir iőtir.	.526	.861	2.10	.920	.71
ÖZDÜZENLEME					
20. Baőladıđım iőin tamamlanmasını bekleyebilecek kadar sabırlı deđilim.	.702	.715	2.36	.994	.64
50. Kendime ulaőabilecekim hedefler (gerçekçi) koyarım.	.638	.806	2.10	.868	.63
14. Baőladıđım iőı yarım bırakmam.	.610	.830	2.05	.953	.65
24. Düşünmeden konuőmam.	.573	.801	2.04	.917	.64
55. İhtiyacım olan bir bilgiye hangi yolla ulaőacađımı bilirim.	.522	.814	2.27	.757	.61
ÇIKARIMDA BULUNMA					
31. Geçmiőini bilmek geleceđini anlamayı kolaylaőtırır.	.717	.803	1.69	.685	.68
12. Farklılık zenginliktir.	.711	.815	1.81	1.029	.76
21. Geçmiőte olanları merak ederim.	.593	.776	1.74	.805	.70
KANITA DAYALI KARAR VERME					
56. Tam inandıklarımın dođruluđunu sorgulamam.	.788	.634	3.03	1.145	.78
7. Dođruluđuna inandıđım bir konuda kanıt aramam.	.650	.687	2.76	1.069	.69
41. Bildiđimden őaőmam.	.636	.618	2.69	1.061	.67
NEDEN ARAMAYA AÇIKLIK					
59. Her őey göründüđü gibidir.	.728	.688	1.85	.894	.68
37. Bir görüőün dođruluđu o görüőe katılan kiői sayısına bađlıdır.	.649	.674	1.91	.933	.65
17. Karőit görüőleri anlamaya çalıőmak zaman kaybıdır.	.645	.776	1.68	.787	.64
30. İnsan ne yaparsa yapsın baőına gelecekleri deđiőtiremez.	.527	.771	2.58	1.105	.66

* All t values are significant at .001 level.

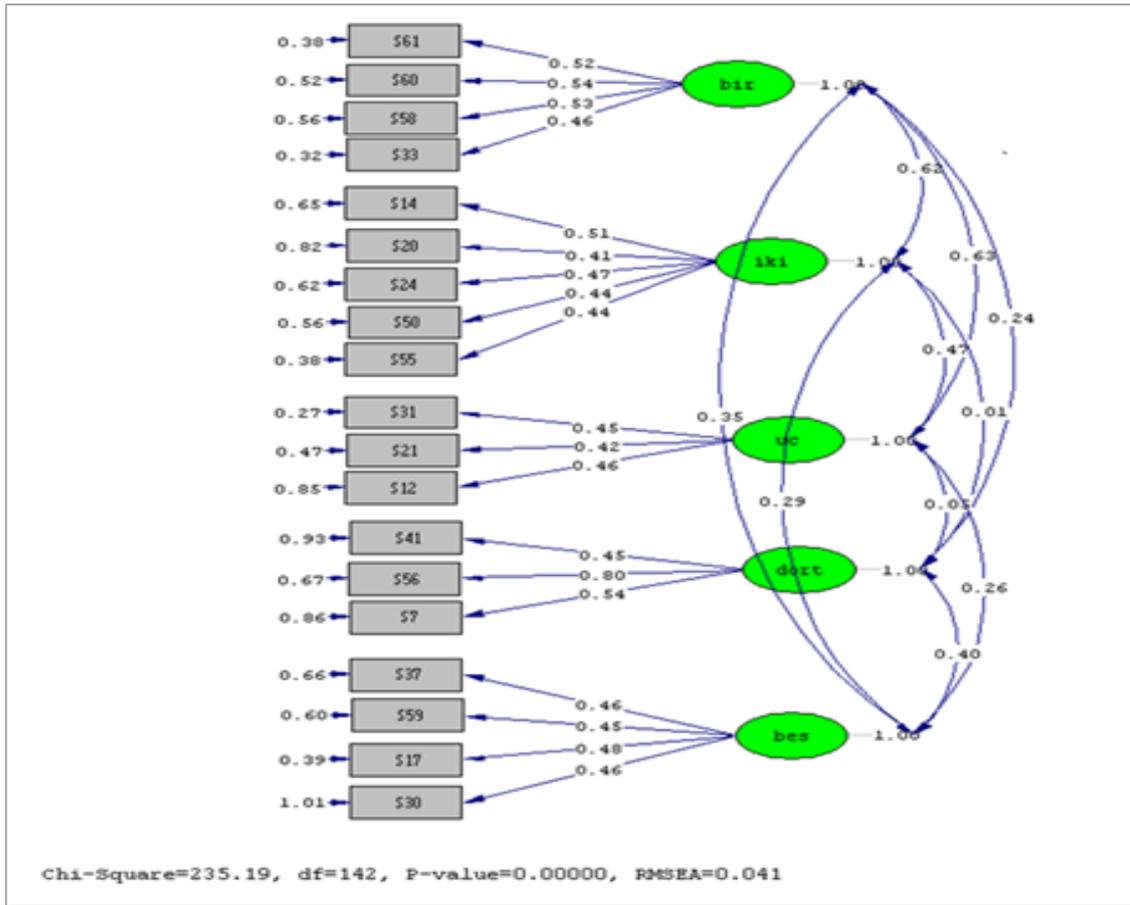


Table 3: Correlation Coefficients Between Scales

Scales	EDTÖ	BTİ	ÖzD	ÇB	KDKV	NAA	DGÖ	MEİÖ	BKOBİ	RTİ	BRİ	DGİ
CTAS	1											
BTİ	.476**	1										
ÖzD	.532**	.400**	1									
ÇB	.639**	.261*	.156	1								
KDKV	.384**	.303**	.053	.080	1							
NAA	.457**	.117	.026	.054	.241*	1						
DGÖ	.062	.029	.091	.086	.049	.034	1					
MEİÖ	.276**	.386**	.280**	.253*	.184	.034	.235*	1				
BKOBİ	.140	.370**	.271*	.075	.214*	.100	.262*	.768**	1			
RTİ	.087	.437**	.255*	.083	.261*	.242*	.156	.773**	.779**	1		
BRİ	.241*	.025	.120	.214*	.020	.191	.075	.538**	.014	.059	1	
DGİ	.192	.035	.085	.279**	.109	.131	.029	.084	.395**	.310**	.290**	1

** p <0.01, * p <0.05 (BTİ: willingness to collect information, ÖzD: self-regulation, PB: inference, KDKV: decision based on decision, NAA

Table 4: Cronbach-alpha Values Related to Factors

	BTİ	ÖzD	ÇB	KDKV	NAA
Cronbach- Alpha	.70	.64	.52	.54	.56

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