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Öğretmen Adayları İçin Epistemolojik İnançlar Ölçeği Uyarlama Çalışması*

The Adaptation Study of the Epistemological Beliefs Scale for Pre-Service Teachers

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Extended Summary

Introduction

Epistemology contains how does scientific knowledge develop, how do scientific studies occur, how do we reach to scientific knowledge and how do scientific knowledge can be evaluate (Driver et al., 2008). Epistemology is the theory of knowledge (Carter and Little, 2007). Also, it is a branch of a philosophy which explains how does individual's build self-knowledge (Schommer, 1990; Tsai, 2000). The first studies of epistemology were done in 1960s on educational psychology field (Schraw, 2001). In 1970s, the investigations of relationship between epistemology and educational issues were started. The first study on epistemological beliefs was William Perry's (1970), which was between Harvard and Radcliffe College students. According to Perry (1970), epistemology is being developed unidimensional and its stages improve constantly. Schommer (1990), defines epistemological beliefs as "To understand what is knowledge and how knowledge and learning come true". According to Schommer (1990), epistemological knowledge has five dimentions. These are "Innate Ability", "Simple Knowledge", "Quick Learning", "Certain Knowledge" and Omniscient knowledge". How knowledge is attained and the beliefs according to knowledge are important in learning process for learning and understanding (Hofer, 2002). Pintrich (2002) points out that epistemological beliefs' effective cognition strategies are related to reading perception talents and academic performance. Personal epistemology has two categories: The Nature of knowledge and The Nature of knowing time (Hofer and Pintrich, 1997). Epistemological beliefs' relations between different areas were studied by some researchers:

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Relations between problem solving skills (Schraw, Dunkle, and Bendixen, 1995), argumentation skills (Anderson, 1993), material usage as meaningful cognitive material (Ravindran, Greene and DeBacker, 2005), academical success (Bendixen and Hartley, 2003), reflective judgment and their information-seeking behavior (Whitmire, 2004), perception of constructivist learning environment (Tsai, 2000). The purpose of this quantitative research is to explore the views of science and social science pre-service teachers' epistemological beliefs respect to gender, grade level and fields of study.

In this study, Epistemological Beliefs Questionnaire which was originally developed for 5th grade students by Conley, Pintrich, Vekir and Harrison (2004) is adapted for preservice teachers. Epistemological Belief Questionnaire has 26-items and four dimensions including "Source of Knowledge", "Certainty of Knowledge", "Development of Knowledge" and "Justification of Knowledge". Items were rated on a 5-point Likert scale (1= strongly disagree; 5= strongly agree).

Conley et al. (2004)'s Epistemological Beliefs Scale was translated intoTurkish by Ozkan (2008) and adapted to 7th grade students. After validity and reliability studies the questionnaire was arranged in three dimensions by Ozkan (2008) and the total reability of the scale was calculated as $\alpha = .76$. Ozkan's (2008) Turkish version of Epistemological Beliefs Scale was adapted for 6th , 8th , and 10th grade students from Kurt (2009); and for 9th and 11th grade students from Aydemir, Aydemir and Boz (2013).

In recent years, researchers have preferred to use adaptation of scale rather than scale development (Bardakçı, 2010; Aksayan ve Gözüm, 2002) because adaptation of scale has many benefits such as saving time and resources, providing cultural comparison among different countries, using same theoretical and methodological background in different samples to support generalization of data. In Turkey, we determined a need for an epistemological beliefs questionnaire designed for preservice teachers.

Purpose

The purpose of this study was to adapt "Epistemological Beliefs Scale" originally developed for 7th grade students by Conley et al. (2004) into Turkish language and culture for preservice teachers.

Method

The sample consists of 424 sophomore and junior preservice teachers who attend science, math, social science computer and elementary education departments at a large State University. Hambleton and Patsula (1999)'s adaptation process was used in the study. The adaptation process includes three parts; (1) translation of the whole scale from original language (English) to target language (Turkish) which were already done by Ozkan (2008) for 7th grade students, (2) linguistic equivalence for preservice teachers based on expert opinions and (3) validity and reliability anal-

yses on examining factor structure of the adapted scale. Exploratory Factor Analysis (EFA) was used to determine the factor structure of the scale while Confirmatory Factor Analysis (CFA) was conducted to test validity of the scale. Also, to determine the reliability of the scale Cronbach's Alpha and item-total correlations were also calculated.

Findings

Research findings showed that after exploratory and confirmatory factor analysis of the scale items decreased from 26 to 19 items under 3 three factors. The factors were named as "Justification of knowledge" includes 7 items, "Source/certainty of knowledge" includes 7 items and "Development of knowledge" includes 5 items. Three factors explain 47.439's of the total variance. Factor loadings of items ranged from .53 to .71 for "Justification of knowledge", from .55 to .73 for "Source/certainty of knowledge", and from .52 to .67 for "Development of knowledge". Confirmatory Factor Analyses results for 19-item scale showed that the goodness of fit index values are as follows: X^2/df=2.538, RMSEA=.060, SRMR=.066, GFI=.91, AGFI=.89, CFI=.96. As to the reliability results, Cronbach's Alpha coefficient calculated as .814 for "Justification of knowledge" dimention, .784 for "Source/certainty of knowledge" dimention, .697 for "Development of knowledge" and .853 for the whole scale.

Conclusion and Discussion

The present study adapted "Epistemological Belief Scale" into Turkish language and culture for preservice teachers. Results indicated that the study produced a valid and reliable scale with 19 items under 3 subscales to measure the epistemological beliefs of preservice teachers.

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Ek 1: Ölçek Formu

FAÖMN	FASMN	Epistemolojik inançlar	SIKLIK DERECESİ				
			1	2	3	4	5
1	1	**Tüm insanlar, bilim insanlarının söylediklerine inanmak zorundadır.**					
		Everybody has to believe what scientists say					
2	2	**Bilimde, bütün soruların tek bir doğru yanıtı vardır.**					
		All questions in science have one right answer.					
3	Çıkarılmış madde	**Bilimsel deneylerdeki fikirler, olayların nasıl meydana geldiğini merak edip düşünerek ortaya çıkar.**					
		Ideas about science experiments come from being curious and thinking about how things work.					
4	3	**Günümüzde bazı bilimsel düşünceler, bilim insanlarının daha önce düşündüklerinden farklıdır.**					
		Some ideas in science today are different than what scientists used to think.					
5	4	**Bir deneye başlamadan önce, deneyle ilgili bir fikrinizin olmasında yarar vardır.**					
		It is good to have an idea before you start an experiment.					
6	5	**Bilimsel kitaplarda yazanlara inanmak zorundasınız.**					
		In science, you have to believe what the science books say about stuff.					
7	Çıkarılmış madde	**Bilimsel çalışma yapmanın en önemli kısmı, doğru yanıta ulaşmaktır.**					
		The most important part of doing science is coming up with the right answer					
8	6	**Bilimsel kitaplardaki bilgiler bazen değişir.**					
		The ideas in science books sometimes change.					
9	7	**Bilimsel çalışmalarda düşüncelerin test edilebilmesi için birden fazla yol olabilir.**					
		In science, there can be more than one way for scientists to test their ideas.					
10	8	**Fen bilgisi dersinde, öğretmenin söylediği her şey doğrudur.**					
		Whatever the teacher says in science class is true.					
11	9	**Bilimdeki düşünceler, konu ile ilgili kendi kendinize sorduğunuz sorulardan ve deneysel çalışmalarınızdan ortaya çıkabilir.**					
		Ideas in science can come from your own questions and experiments.					
12	Çıkarılmış madde	**Bilim insanları bilim hakkında hemen her şeyi bilir, yani bilinecek daha fazla bir şey kalmamıştır.**					
		Scientists pretty much know everything about science; there is not much more to know.					
13	10	**Bilim insanlarının bile yanıtlayamayacağı bazı sorular**					

		vardır.					
		There are some questions that even scientists cannot answer.					
14	**11**	**Olayların nasıl meydana geldiği hakkında yeni fikirler bulmak için deneyler yapmak, bilimsel çalışmanın önemli bir parçasıdır.**					
		One important part of science is doing experiments to come up with new ideas about how things work.					
15	**12**	**Bilimsel kitaplardan okuduklarınızın doğru olduğundan emin olabilirsiniz.**					
		If you read something in a science book, you can be sure its true.					
16	**13**	**Bilimsel bilgi her zaman doğrudur.**					
		Scientific knowledge is always true.					
17	**14**	**Bilimsel düşünceler bazen değişebilir.**					
		Ideas in science sometimes change.					
18	**15**	**Sonuçlardan emin olmak için, deneylerin birden fazla tekrarlanmasında fayda vardır.**					
		It is good to try experiments more than once to make sure of your findings.					
19	Çıkarılmış madde	**Sadece bilim insanları, bilimde neyin doğru olduğunu kesin olarak bilirler**					
		Only scientists know for sure what is true in science.					
20	**16**	**Bilim insanının bir deneyden aldığı sonuç, o deneyin tek yanıtıdır.**					
		Once scientists have a result from an experiment, that is the only answer.					
21	**17**	**Yeni buluşlar, bilim insanlarının doğru olarak düşündüklerini değiştirir.**					
		New discoveries can change what scientists think is true.					
22	Çıkarılmış madde	**Bilimdeki parlak fikirler sadece bilim insanlarından değil, herhangi birinden de gelebilir.**					
		Good ideas in science can come from anybody, not just from scientists.					
23	Çıkarılmış madde	**Bilim insanları bilimde neyin doğru olduğu konusunda her zaman hemfikirdirler.**					
		Scientists always agree about what is true in science.					
24	**18**	**İyi çıkarımlar, birçok farklı deneyin sonucundan elde edilen kanıtlara dayanır.**					
		Good answers are based on evidence from many different experiments.					
25	Çıkarılmış madde	**Bilim insanları, bilimde neyin doğru olduğu ile ilgili düşüncelerini bazen değiştirirler.**					
		Sometimes scientists change their minds about what is true in science.					
26	**19**	**Bir şeyin doğru olup olmadığını anlamak için deney yapmak iyi yoldur.**					
		A good way to know if something is true is to do an experiment.					

FAÖMN: Faktör Analizi Öncesi Madde Numarası FASMN: Faktör Analizi Sonrası Madde Numarası
1:Kesinlikle Katılmıyorum, 2:Katılmıyorum, 3:Kararsızım, 4:Katılıyorum, 5:Kesinlikle Katılıyorum