TURKISH ELEMENTARY PRE-SERVICE TEACHERS' EPISTEMOLOGICAL BELIEFS[1]

Sevim Sevgi
Dr, Erciyes Üniversitesi, sevimsevgi@erciyes.edu.tr

Fulya Öner Armağan
Assis. Prof. Dr., Erciyes Üniversitesi, onerf@erciyes.edu.tr

Received: 21.04.2017 *Accepted: 17.07.2017*

ABSTRACT

The purposes of the study were to investigate 1rt, 2nd, 3rd and 4rd grade pre-service elementary teachers' epistemological beliefs and how these beliefs change with grade level, gender, and department. The sample of the research included 470 pre-service elementary teachers. Schommer's Epistemological Belief Questionnaire (SEQ) was used to collect data. To evaluate the effect of grade level, gender and department on pre-service teachers' epistemological beliefs, independent t test, and ANOVA were conducted. Results showed that Pre-service teachers' epistemological beliefs of simple knowledge were not statistically significant in terms of gender, department and grade level, pre-service teachers' epistemological beliefs of quick learning were not statistically significant in terms of gender and grade level. Moreover, innate ability was not statistically significant in terms of department. On the other hand, pre-service teachers' epistemological beliefs innate ability has a statistically significant in terms of gender and grade level. Furthermore, pre-service teachers' epistemological beliefs of quick learning have a statistically significant in terms of department. As a result of the research, it may be necessary to investigate and develop more epistemological beliefs of teachers and pre-service teachers. The effects of the research results are discussed.

Key words: Epistemological beliefs, pre-service elementary teachers, gender, department, grade level

TÜRK İLKÖĞRETİM ÖĞRETMEN ADAYLARININ EPİSTEMOLOJİK İNANÇ DÜZEYLERİ

ÖZ

Bu çalışmanın amacı, ilköğretim bölümü 1., 2., 3. ve 4. sınıf öğretmen adaylarının epistemolojik inançlarının ve bu inançlarının sınıf düzeyi, cinsiyet ve öğrenim görülen bölüme göre nasıl değiştiğinin incelenmesidir. Çalışma grubu 470 öğretmen adayından oluşmaktadır. Araştırmada veri toplama aracı olarak, Schommer'ın Epistemolojik İnançlar Ölçeği kullanılmıştır. Öğretmen adaylarının Epistemolojik İnançlarını sınıf düzeyi, cinsiyet ve öğrenim görülen bölüme göre anlamlı farklılık gösterip göstermediğini incelemek amacıyla bağımsız örneklem t testi ve ANOVA testi kullanılmıştır. Bu araştırmanın sonucuna göre, öğretmen adaylarının bilginin basitliğine yönelik epistemolojik inançları cinsiyet, bölüm ve sınıf düzeyi açısından istatistiksel olarak anlamlı bulunmamış, öğretmen adaylarının bilginin kesinliğine yönelik epistemolojik inançları cinsiyet ve sınıf düzeyinde istatistiksel olarak anlamlı olmadığı tespit edilmiştir. Bununla birlikte, öğretmen adaylarının doğuştan gelen epistemolojik inançlarının, öğrenim gördükleri bölüm açısından istatistiksel olarak anlamlı olmadığı sonucuna varılmıştır. Diğer taraftan, öğretmen adaylarının doğuştan gelen epistemolojik inançları, cinsiyet ve sınıf düzeyi bakımından istatistiksel olarak

[1] Bu çalışma 6-8 Nisan 2017'de International Congress Of Eurasian Social Sciences'ta Sözlü Bildiri olarak sunulmuştur.

anlamlı bulunmuştur. Ayrıca, öğretmen adaylarının bilginin kesinliği hakkındaki epistemolojik inançlarının öğrenim gördükleri bölüm bakımından istatistiksel olarak anlamlı olduğu tespit edilmiştir. Araştırmanın sonucunda, öğretmenlerin ve öğretmen adaylarının daha fazla epistemolojik inançlarının araştırılması ve geliştirilmesinin gerekli olabileceğini düşündürmektedir. Araştırma sonuçlarının etkileri tartışılmıştır.

Anahtar Kelimeler: Epistemolojik inanç, öğretmen adayı, cinsiyet, bölüm, sınıf düzeyi.

GENIŞ ÖZET

Giriş

Hofer (2001), "Epistemolojiyi" bilginin doğasını, kökenlerini, sınırlarını, yöntemlerini ve gerekçelerini araştıran bir disiplin olarak tanımlamıştır. Hofer ve Pintrich (1997), epistemolojik kuramların veya inançların yapısının bilgi ile ilgili dört boyuttan oluştuğunu savunmaktadır. Bunlar; (1) bilgi kesindir, (2) bilgi basittir, (3) bilginin kaynağı (4). Bilginin gerekçesi (s.133). Yine de bilgi ve bilme hakkındaki Epistemolojik inançlar aşağıdakilerden bazılarını veya tümünü içerir: Bilginin tanımı, bilginin nasıl oluşturulduğu, bilginin nasıl değerlendirildiği, bilginin bulunduğu yer ve bilimin nasıl oluştuğu hakkındaki inançlar (Hofer, 2001; Hofer, 2004).

Araştırmacılar, öğretmenlerin epistemolojik inançlarının hem öğretmen eğitimi programlarında hem de hizmet içi öğretmen mesleki gelişiminde ele alınması gereken önemli bir alan olduğunu düşünmektedirler (Tatto ve Coupland, 2003; Kagan, 1992; Pajares, 1992; Richardson, 1996). Son yıllardaki araştırmalar, epistemolojik inançların öğretme ve öğrenme ile ilişkili olduğunu göstermiştir (Chai, Khine ve Teo, 2006; Chan ve Elliot, 2004; Cheng et al., 2009). Öğretmenlerin inançları öğrencilerin akademik başarıları üzerinde etkili olduğu öğretmenlerin epistemolojik inançlarını araştırmak ve geliştirmek önem taşımaktadır (Schommer 1993).

Millî Eğitim Bakanlığı (MEB), Türk eğitim sisteminde yapılandırmacı yaklaşıma dayalı olarak değişiklikler yapmıştır (MEB, 2005). Bu değişiklikler ile, Türk Eğitim Sistemi yapılandırmacı yaklaşıma dayalı olarak geliştirmek amaçlanmıştır. Yapılandırmacılık, bilginin şekli ve bu bilginin öğrenme sürecinde nasıl şekillendiği ile ilgilidir. Bu süreç inançlarla bağlantılıdır, bu yüzden epistemolojik inançlar yapılandırmacı öğrenme ortamlarında önemlidir.

Alan yazında, öğretmen adaylarının epistemolojik inançlarına ilişkin bazı çalışmalar bulunmaktadır (Clarebout, Elen, Luyten ve Bamps, 2001; Saylan, Bektaş ve Öner Armağan, 2015). Ayrıca araştırmacılar, epistemolojik inançlar ile diğer değişkenler arasındaki ilişkileri de araştırma eğilimindedir (Aypay, 2011; Saylan, Bektaş ve Öner Armağan, 2015; Saylan, Öner Armağan ve Bektaş 2016; Topçu ve Yılmaz Tüzün, 2009; Topçu, 2011; Yılmaz-Tüzün ve Topçu,2008 Yılmaz Tüzün ve Topçu 2010).

Bu çalışmada, ilköğretim bölümü öğretmen adaylarının epistemolojik inançlarının belirlenmesi amaçlanmıştır. Bu amaç doğrultusunda aşağıdaki alt amaçlar belirlenmiştir:

1. İlköğretim bölümü öğretmen adaylarının epistemolojik inançlarının faktör yapısı nasıldır?
2. İlköğretim bölümü öğretmen adaylarının epistemolojik inançları cinsiyete göre farklılık göstermekte midir?
3. İlköğretim bölümü öğretmen adaylarının epistemolojik inançları öğrenim görülen bölüme göre farklılık göstermekte midir?
4. İlköğretim bölümü öğretmen adaylarının epistemolojik inançları öğrenim görülen sınıf düzeyine göre farklılık göstermekte midir?

Yöntem

Öğretmen adaylarının epistemolojik inanç düzeylerini açıklamayı amaçlayan bu araştırmada betimsel tarama yöntemi kullanılmıştır (Fraenkel & Wallen, 2009). Fraenkel & Wallen'a (2009) göre nicel araştırma yöntemlerinden biri de betimsel araştırmadır. Betimsel araştırmalar olgulara açıklık getiren ve olan bir durumu var olduğu şekli ile betimlemeyi amaç edinen araştırmalar için uygun bir modeldir.

Bulgular

Bu çalışmada, öğretmen adaylarının bilginin kesinliği ve bilginin basit olduğuna dair epistemolojik inançlarında cinsiyete göre anlamlı bir fark bulunmamasına karşın, öğretmen adaylarının doğuştan gelen epistemolojik inançlarında cinsiyet açısından anlamlı farklılık bulunmuştur. Öğretmen adaylarının doğuştan gelen ve basit bilgiye dair epistemolojik inançları ve öğrenim gördükleri bölümler arasında istatistiksel olarak anlamlı bir farklılık bulunmamış, ancak öğretmen adaylarının bilginin kesinliğine dair epistemolojik inançları ve sınıf düzeyleri arasında istatistiksel olarak anlamlı bir farklılık tespit edilmiştir. Öğretmen adaylarının bilginin kesinliği ve bilginin basitliğine yönelik epistemolojik inançları ile sınıf düzeyleri arasında anlamlı bir ilişkili bulunmamıştır; ancak öğretmen adaylarının sınıf düzeyleri açısından bilginin kaynağına ilişkin epistemolojik inançları arasında anlamlı bir farklılık bulunmuştur.

Sonuç

Araştırmanın sonucuna göre, öğretmen adaylarının bilginin basitliğine yönelik epistemolojik inançları cinsiyet, bölüm ve sınıf düzeyi açısından istatistiksel olarak anlamlı bulunmamış, öğretmen adaylarının bilginin kesinliğine yönelik epistemolojik inançları cinsiyet ve sınıf düzeyinde istatistiksel olarak anlamlı olmadığı tespit edilmiştir. Bununla birlikte, öğretmen adaylarının doğuştan gelen epistemolojik inançlarının, öğrenim gördükleri bölüm açısından istatistiksel olarak anlamlı olmadığı sonucuna varılmıştır. Diğer taraftan, öğretmen adaylarının doğuştan gelen epistemolojik inançları, cinsiyet ve sınıf düzeyi bakımından istatistiksel olarak anlamlı bulunmuştur. Ayrıca, öğretmen adaylarının bilginin kesinliği hakkındaki epistemolojik inançlarının öğrenim gördükleri bölüm bakımından istatistiksel olarak anlamlı olduğu tespit edilmiştir.

INTRODUCTION

Hofer (2001) defined the "Epistemology" as a discipline that explores the nature, origins, limits, methods and justification of knowledge. Hofer and Pintrich (1997) proposed that the construct of core epistemological theories or beliefs is composed of four dimensions about knowledge. They are "certainty of knowledge, simplicity of knowledge, source of knowledge, and justification of knowledge" (p. 133). Nevertheless, Epistemological beliefs about knowledge and knowing includes some or all of the followings: beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs (Hofer, 2001).

Researchers consider teachers' epistemological beliefs is an important area that needs to be addressed in both teacher education programs and in-service teacher professional development (Tatto and Coupland, 2003; Kagan, 1992; Pajares, 1992; Richardson, 1996). Recent studies showed that epistemological beliefs were related to teachers' teaching and learning (Chai, Khine and Teo, 2006; Chan & Elliot, 2004; Cheng, Chan, Tang and Cheng, 2009; Schraw & Olafson, 2003; Hofer, 2004; Hofer, 2010). Moreover, it is important to investigate epistemological beliefs of teachers' and improve them because their beliefs have influence on students' academic achievement (Schommer 1993).

Turkish Ministry of National Education (MoNE) made reform on Turkish education system based on constructivism (Ministry of National Education, 2005). Reforms continues to improve Turkish Education with constructivist approaches. Constructivism deals with the shape of the knowledge and how these knowledge shapes during the learning. This process linked with the beliefs so epistemological beliefs are important in constructivist learning environments.

In literature, there are some studies about the epistemological beliefs of pre-service teachers (Clarebout, Elen, Luyten and Bamps, 2001; Saylan, Bektaş and Öner Armağan, 2015). Also, researchers have a tendency for investigation of the relationships between epistemological beliefs and teaching-learning conceptions; the student-teachers preferred constructivist approach over the traditional approach, and student-teacher views differed based on gender and class-level (Aypay, 2011), pre-service science teachers' epistemological beliefs and perceptions of a constructivist learning environment (Saylan, Bektaş and Öner Armağan, 2015), pre-service science teachers' epistemological beliefs and perceptions of a constructivist learning environment (Saylan, Öner Armağan and Bektaş 2016), relationship among science achievement, metacognition, and epistemological beliefs (Topçu and Yılmaz-Tüzün, 2009), relationships among Turkish elementary student teachers' epistemological beliefs and moral reasoning (Topçu, 2011), elementary science teachers' (PSTs) epistemological beliefs and the relationships among their epistemological beliefs, epistemological world views, and self-efficacy beliefs (Yılmaz-Tüzün and Topçu,2008, Schraw & Olafson, 2008), relationships among students' perceived characteristics of constructivist learning environment, metacognition, and epistemological beliefs (Yılmaz-Tüzün and Topçu 2010). Epistemological beliefs indicate that these beliefs employ powerful, subtle and unconscious influence on teaching and learning environment (Hofer, 2004; Hofer, 2010; Schommer-Aikins,

2004). Therefore, the main aim of the study is to determine the epistemological beliefs of pre-service elementary teachers. On this basis, the following research questions were determined:

1. What are the factor structures of epistemological beliefs of pre-service elementary teachers?
2. Epistemological beliefs of pre-service elementary teachers differ is in terms of gender?
3. Epistemological beliefs of pre-service elementary teachers differ is in terms of departments?
4. Epistemological beliefs of pre-service elementary teachers differ is in terms of grade level?

METHODOLOGY

Research design

The main aim of this study was to explore pre-service teachers' epistemological beliefs. In order to achieve this purpose, a survey design was used in this study (Fraenkel and Wallen, 2009). According to Fraenkel and Wallen (2009), one type of quantitative research is classified descriptive research. The aim of descriptive research is to become familiar with phenomena, to gain new insight, and to formulate a more specific research problem.

Sample

Sample of the research is 470 pre-service elementary teachers from 1st, 2nd, 3rd and 4th grade levels who are studying at two different elementary teacher education programs of Education Faculty of Erciyes University. The university is a public university located at the Central Anatolia. The research was conducted during the spring semester of the 2016-2017 academic year. The distribution of the demographic information of pre-service teachers participated to research is given in Table 1.

Table 1. Descriptive Statistics of Sample of the Study

		Grade Level					Gender		
		1	2	3	4	Total	Female	Male	Total
Department	Elementary Teaching	66	71	49	64	250	201	49	250
	Elementary Science Teaching	59	57	51	53	220	191	29	220
Total		125	128	100	117	470	392	78	470

Instruments

The Schommer Epistemological Questionnaire (SEQ) was used to collect data. The SEQ has five hypothetical epistemological belief dimensions: (a) the stability of knowledge ranging from unchanging knowledge to tentative knowledge (certain knowledge); (b) the structure of knowledge ranging from isolated bits and pieces to integrated concepts (simple knowledge); (c) the source of knowledge ranging from omniscient authority to reason and empirical evidence (omniscient authority); (d) the speed of learning ranging from quick or not-at-all to gradual (quick learning); and (e) the ability to learn ranging from fixed at birth to improvable (innate ability). hypothetical epistemological belief dimensions were given at Table 2.

Table 2. Hypothetical Dimensions and Associated Subsets of The Epistemological Questionnaire.

Subset dimension	Hypothetical dimension	Number of statement in questionnaire
Simple knowledge	Seek single answers	11
	Avoid integration	8
Certain knowledge	Avoid ambiguity	5
	Knowledge is certain	6
Omniscient authority	Do not criticize authority	6
	Depend on authority	6
Innate ability	Cannot learn how to learn	5
	Success is unrelated to hard work	4
	Ability to learn is innate	4
Quick learning	Learning is quick	5
	Learn first time	3
	Concentrated effort is a waste of time	2

Adapted from Schommer's (1990) "effects of beliefs about the nature of knowledge on comprehension" (p.500)

The instrument administered to pre-service elementary teachers to evaluate 63 statements about the nature of learning and knowledge using a five-point scale from one (strongly disagree) to five (strongly agree). The SEQ consists of 12 subsets, and for each subset, the number of items changes and item distribution for each sub-category were given at Table 5. The SEQ was translated into Turkish by Topçu and Yılmaz-Tüzün (2006) and the reliability and validity of the instrument have been evaluated in several studies (Topçu and Yılmaz-Tüzün 2006; Yılmaz-Tüzün and Topçu 2008; Yılmaz-Tüzün and Topçu, 2013; Yılmaz-Tüzün and Topçu, 2008). Similar to the studies of Schommer (1990) and Schommer, Crouse Rhodes, (1992) the 12 subsets as presented in Table 2, which should be categorized under hypothetical dimensions, were used in the present study. Depending on Schommer's theoretical approach of epistemology, the researcher tried to scale these 12 subsets into their best defined hypothetical dimensions by exploratory factor analysis. In this study, the Cronbach alpha reliability coefficient was 0.6, this Cronbach alpha reliability coefficient value is bigger than the previous studies which were conducted with Turkish version of SEQ. Similarly, Topçu (2011) found Cronbach alpha reliability coefficient values (0.35 through 0.60) in his study. Moreover, Yılmaz-Tüzün and Topçu (2008) found Cronbach alpha reliability coefficient as 0.25 through 0.60 in their study. These Turkish studies alpha coefficient values still lower than Schommer's (1990) original study (0.51 through 0.78).

RESULTS

The aim of the study was to determine the epistemological beliefs of pre-service elementary teachers with respect to the gender, departments, grade level and academic achievement level.

Factor Analysis of The Schommer Epistemological Questionnaire (SEQ)

Firstly, try to find out the sub-scales of Schommer's Epistemological Questionnaire (omniscient authority, simple knowledge, certain knowledge, innate ability, or quick learning) of Turkish elementary pre-service teachers, exploratory factor analysis(EFA) was run. The results of factor analysis enabled the researchers to find out the number and the character of the factors that represent Turkish pre-service teachers' responses in the SEQ. As a priori analysis for evaluating grade level, gender and department effect on the epistemological beliefs, it is necessary to investigate dimensions of epistemological beliefs with EFA.

Before performing the factor analysis, 12 subset scores were calculated with the mean scores of related subset items. These subset scores were used as variables in the factor analysis. With orthogonal varimax rotation and an eigenvalue that is greater than one (as a cutoff point for factors), 'principal component factoring' generated 4 factors that account for 47.03% of the variance. Performing factor analysis produced four factor structures in the data. Factors were named with the technique that Schommer (1990) used in her study. Schommer named each factor on the basis of high loadings of subsets of items. While naming the factors, she mostly considered the subsets that have factor loadings approximate to or higher than 0,5 loadings.

The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity were examined whether the data collected were suitable for running explanatory factor analysis (EFA). KMO index was 0.722 which is in the range of 0.7 to 0.79 and defined as middling (Kaiser, 1974). The Bartlett's Test of Sphericity was 900.435 ($p= 0.000$, $p< 0.05$) The indexes presented that the data were suitable for running EFA since distribution is multivariate normal and correlation matrix is not and identity matrix (George and Mallery, 2001).

The results of the SEQ concerning the means and standard deviations of dimensions of epistemological beliefs are presented in Table 3. Moreover, Table 3 shows that hypothetical epistemology dimensions (e.g., simple knowledge) did not successfully load into their hypothesized dimension for some of the subsets. On the contrary, most subset dimensions loaded to other dimensions. The dimensionality of the SEQ was studied by Scree test. As seen in Figure 1, SEQ revealed at least 3 factors as based on Kaiser Criterion and the point where the scree plot levels off. Thus, based on the scree test results 3 factors were interpreted.

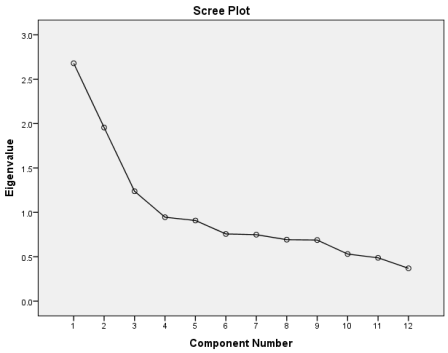

Figure 1. Scree Plot of Factors of SEQ

Factor analysis results intended to give the number and characteristics of factors that account for pre-service teachers' responses. 12 sub-categories were computed based on the description of Schommer's hypothetical dimensions. These 12 computed variables were used as variables in the factor analysis. "Principal Component Analysis" with orthogonal varimax rotation and eigenvalue that is greater than one generated three factors that account for 47.03% of the variance. Variances associated with 3 factors and their eigenvalues are presented in Table 3.

Table 3. Descriptive Statistics of Dimensions and Factor Loadings from Principal Component Factor Analysis of SEQ

					Factor Loadings		
	Mean	SD	Mean	SD	Innate	Quick	Simple
Sub-categories					ability	learning	knowledge
Can't Learn How to Learn	2.05	.64	2.36	.40	.769	-.336	
Avoid Integration	2.49	.47			.741		.115
Don't Criticize Authority	2.32	.53			.729	-.128	
Knowledge is Certain	2.49	.58			.555	.116	-.167
Learn the First Time	2.45	.73			.553	.136	.182
Learning Is Quick	3.21	.54	3.06	.40		.698	
Avoid Ambiguity	3.19	.60				.592	-.232
Concentrated Effort is a Waste of Time	3.12	.90				.589	.102
Depend on Authority	3.14	.53			-.217	.497	.217
Ability to Learn is Innate	2.64	.75			.413	.496	.104
Seek Single Answers	2.92	.34	2.70	.47		.230	.790
Success in Unrelated to Hard Work	2.47	.79			.273	-.124	.734
Eigenvalue					2.59	1.91	1.36
% of variances					21.643	15.919	11.380

Factors were named with the technique that Schommer used in her studies as giving descriptive titles to each factor on the basis of high loadings subsets of items. Schommer only considered the subsets that have factor loadings higher than .50 when giving names to factors. Researcher followed the same procedure in naming three factors. In the analysis, Factor 1 was named "Innate ability" which includes the subset dimensions of "Cannot learn how to learn" Factor 2 was named "Quick learning," which includes the subset dimension of "Learning is quick" and "Concentrated effort is a waste of time" Factor 3 was named "Simple Knowledge," which includes the subset dimension of "Seek single answers.".

In the present study, Schommer's hypothetical dimensions were used but in the above-mentioned analyses, three-factor structure which was different than Schommer's hypothetical dimensions was found. Whereas the present study did not find omniscient authority and certain knowledge as dimensions of epistemological beliefs, these dimensions were determined by previous studies (Yılmaz-Tüzün and Topçu; 2008). The reason of this difference was highlighted by Schommer as factor structures can be changed at different samples.

Using three factor structures, the research question "Epistemological beliefs for pre-service elementary teachers differs is in terms of gender?" was analyzed with independent samples t-test. Descriptive Statistics of the gender across the factors and the independent t-test results was given in Table 4.

Table 4. Descriptive Statistics of Factors and Independent Samples t-test Results Across Gender Groups

Factors	Gender	N	Mean	SD	t value	Eta Square
Innate ability	Female	392	2.33	.39	t (468) = -3.00, p= 0.0**03**	0.02
	Male	78	2.48	.45		
Quick Learning	Female	392	3.05	.39	t (468) = -.83, p= .405	0.0014
	Male	78	3.10	.45		
Simple Knowledge	Female	392	2.70	.48	t (468) = -.20, p= .839	So small
	Male	78	2.71	.43		

According the results which were given at Table 4, there is no statistically significant mean difference in pre-service teachers' quick learning beliefs and simple knowledge beliefs in terms of gender but there is a statistically significant mean difference in pre-service teachers' innate ability beliefs in terms of gender. It can be said that, epistemological beliefs of quick knowledge and simple knowledge can't depend on the gender for pre-service teachers. On the other hand, epistemological beliefs of innate ability depend on the being female or male for pre-service teachers.

Next research question "Epistemological beliefs for pre-service elementary teachers differs is in terms of departments?" was searched with the independent t-test and results of the analysis were given Table 5.

Table 5. Descriptive Statistics of Factors and Independent Samples t-test Results Across Departments Groups

Factor	Department	N	Mean	SD	t value	Eta square
Innate ability	Elementary Teaching	250	2.35	.40	t (468) = -.62, p= .54	0.0008
	Elementary Science Teaching	220	2.37	.40		
Quick Learning	Elementary Teaching	250	3.10	.38	t (468) = 2.38, p= .02	0.012
	Elementary Science Teaching	220	3.01	.41		
Simple Knowledge	Elementary Teaching	250	2.72	.51	t (468) = .89, p= .37	0.0017
	Elementary Science Teaching	220	2.68	.42		

There is no statistically significant mean difference in pre-service teachers' beliefs in innate ability and simple knowledge in terms of department but there is a statistically significant mean difference in pre-service teachers' scores in quick learning in terms of department. It can be said that; epistemological beliefs of innate

ability and simple knowledge cannot depend on the department for pre-service teachers. On the other hand, epistemological beliefs of quick learning depend on the being a pre-service teacher in the elementary teaching program or elementary science teaching program.

The third research question “Epistemological beliefs for pre-service elementary teachers differs is in terms of grade level?" was searched with one-way analysis of variance (ANOVA) and the results were given in below Table 6. Alpha level of 0.05 was used for analyses. Distribution of grade levels across factors were given at Table 6 below.

Table 6. Distribution of Grade Levels Across Factors

Factor	Grade Level	N	Mean	SD	F
Innate ability	1	125	2.39	.46	F (3,466) =6,12, p =.000
	2	128	2.47	.45	
	3	100	2.28	.27	
	4	117	2.28	.35	
Quick Learning	1	125	3.06	.46	
	2	128	3.09	.36	F (3,466) =0.36, p =.785
	3	100	3.04	.36	
	4	117	3.05	.40	
Simple knowledge	1	125	2.67	.45	
	2	128	2.72	.39	F (3,466) =0.45, p =.720
	3	100	2.73	.37	
	4	117	2.68	.64	

According to Table 6, there was no statistically significant difference in mean scores of pre-service teachers’ epistemologies beliefs in quick learning and simple knowledge scores in terms of grade level but there was a statistically significant difference in mean scores of pre-service teachers’ epistemological beliefs in innate ability in terms grade levels.

According to table below, there was no statistically significant difference in mean scores of pre-service teachers’ epistemological beliefs in innate ability between grade level 1^{st} - 2^{nd} and 3^{rd} - 4^{th} grades. On the hand, there is statistically significant difference in mean scores of pre-service teachers’ epistemological beliefs in innate ability between 1^{st} - 3^{rd} grades, 1^{st} - 4^{rd} grades, 2^{nd} - 3^{rd} grades, 2^{nd} -4^{th} grades. Table 7 interpreted the comparisons at innate ability.

Table 7. Comparisons Between Groups In Innate Ability

Dependent Variable	(I) Class	(J) Class	Tukey HSD Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Innate Ability	1	2	-.08	.050	.36	-.21	.04
		3	.12	.053	.20	-.03	.24
		4	.10583	.051	.16	-.02	.23
	2	1	.08152	.050	.36	-.04	.21
		3	.18667*	.053	.003	.04	.32
		4	.18735*	.051	.002	.05	.31
	3	1	-.10515	.053	.20	-.24	.03
		2	-.18667*	.053	.003	-.32	-.04
		4	.00068	.054	1.00	-.13	.14
	4	1	-.10583	.051	.16	-.23	.02
		2	-.18735*	.051	.002	-.31	-.05
		3	-.00068	.054	1.00	-.14	.13

DISCUSSION

In the present study, the results revealed that the pre-service science teachers' scores from highest to lowest with respect to epistemological beliefs were as follows: Quick Learning (M = 3.07), Simple Knowledge (M = 2.71) and Innate ability (M = 2.37). Since the highest score represents relatively naive epistemological beliefs, these results can be interpreted as the pre-service teachers mostly believe learning is quick and knowledge is simple, and learning is innate while they mostly believe that authority is not superior. Therefore, the pre-service teachers had a naive view in terms of quick learning, simple knowledge and innate ability. When, results of the previous studies were investigated, these dimensions were supported by findings of present study. To illustrate, "Quick Learning" dimension, had the highest mean score (Topçu, 2011; Schraw and Olafson, 2003; 2008). Similarly, pre-service teachers had naive beliefs on "Simple Knowledge" dimension and some other studies supporting this finding (Saylan, Bektaş and Öner Armağan, 2015; Saylan, Öner Armağan and Bektaş 2016; Topçu and Yılmaz-Tüzün, 2009; Topçu, 2011; Yılmaz-Tüzün and Topçu, 2008,2010, 2013). The pre-service teachers also had naive beliefs on Innate Ability dimension as supported by some other studies (Saylan, Bektaş and Öner Armağan, 2015; Saylan, Öner Armağan and Bektaş 2016; Ravindran et al., 2005).

Pre-Service Teachers' Epistemological Beliefs in Terms of Gender

According the results of the second research question, there is no statistically significant mean difference in pre-service teachers' quick learning beliefs and simple knowledge beliefs in terms of gender but there is a statistically significant mean difference in pre-service teachers' innate ability beliefs in terms of gender. As, Aypay (2009) found that epistemological beliefs of females developed more sophisticated beliefs in quick learning and innate ability. On the other hand, Clarebout, Elen, Luyten, and Bamps, (2001) revealed a gender difference for "quick learning" and "fixed ability" with girls having more sophisticated beliefs than boys.

Similarly, Schommer-Aikins and Easter (2006) stated a situation where men scored statistically significant higher than females in "separate knowing".

Pre-Service Teachers' Epistemological Beliefs in Terms of Department

This research revealed that pre-service teachers' epistemologies beliefs in in innate ability and simple knowledge were not statistically significant among departments but pre-service teachers' epistemological beliefs quick learning has a statistically significant difference in mean scores in terms of department. Buehl, Alexander and Murphy (2002) explored whether students' epistemological beliefs were general or domain specific with the participants in their sample were undergraduates, primarily juniors and seniors. They found that influence of education on university students' epistemological beliefs, different outcomes may have emerged if they were more varied in their educational backgrounds. Our findings were supported by Buehl et all (2002) as they stated that their findings, directly related to mathematics and history, may actually generalize to other domains of similar structuredness. Therefore, As Chai et al (2006) indicated that subject-matter domains may have exerted an influence on one's epistemological outlooks.

Pre-Service Teachers' Epistemological Beliefs in Terms of Grade Level

This study indicated that pre-service teachers' epistemologies beliefs in quick learning and simple knowledge scores was not related to their grade level but there was a statistically significant difference in mean scores of pre-service teachers' epistemological beliefs in innate ability in terms of grade level. There was no statistically significant difference in mean scores of pre-service teachers' epistemological beliefs in innate ability between grade level 1st – 2nd and 3rd-4th grades. Aypay (2009) found that innate ability changed from 4^{th} and 5^{th} grade students. On the other hand, there is statistically significant difference in mean scores of pre-service teachers' epistemological beliefs in innate ability between 1st and 3rd grades, 1st and 4rd grades, 2nd and 3rd grades, 2nd and 4th grades. Contrary to this finding, Clarebout, Elen, Luyten, and Bamps, (2001) revealed that an effect of grade levels as freshman to senior year was found in "belief in simple knowledge, certain knowledge, and quick learning". Similar to this study, Aypay (2009) found girls developed less sophisticated beliefs in omniscient authority among grade levels 6^{th} through 8^{th} grades.

CONCLUSION

Pre-service teachers' epistemological beliefs of simple knowledge were not statistically significant in terms of gender, department and grade level, pre-service teachers' epistemological beliefs of quick learning were not statistically significant in terms of gender and grade level. Moreover, innate ability was not statistically significant in terms of department. On the other hand, pre-service teachers' epistemological beliefs innate ability has a statistically significant in terms of gender and grade level. Furthermore, pre-service teachers' epistemological beliefs of quick learning have a statistically significant in terms of department.

SUGGESTIONS

Suggestions based on the results of the study were given as:

- In order to investigate pre-service teachers' epistemological beliefs deeper, further survey could be administered.
- A qualitative or mixed method study could be conducted.
- Conducting interviews with pre-service teachers could develop a deeper understanding of how their epistemological beliefs change.
- Further research could be carried out with more detailed way such as obtaining data from more universities, making interviews with pre-service elementary teachers.

LIMITATIONS

The study is limited to data collected form 470 pre-service elementary teachers studying in one university, whereas there are 77 elementary teaching departments in different universities in Turkey. Hence, it cannot be generalized to all elementary teaching programs in Turkey but it might give a different perspective from a specific study to other universities and pre-service teachers. Second limitation is the study was based on the quantitative data collected through a survey which is structured. Therefore, the study was limited to the items on the survey.

REFERENCES

Aypay, A. (2011). The Adaptation of the Teaching-Learning Conceptions Questionnaire and Its Relationships with Epistemological Beliefs. *Educational Sciences: Theory and Practice*, *11*(1), 21-29.

Buehl, M. B., Alexander, P. A. & Murphy, P. K. (2002). Beliefs about schooled knowledge: domain specific or domain general? *Contemporary Educational Psychology, 27*, 415–449.

Chai, C. S., Khine, M. S., & Teo, T. (2006). Epistemological beliefs on teaching and learning: a survey among pre-service teachers in Singapore. *Educational Media International*, *43*(4), 285-298.

Chan, K. W., & Elliott, R. G. (2004). Relational analysis of personal epistemology and conceptions about teaching and learning. *Teaching and Teacher Education*, *20*, 817-831.

Cheng, M. M. H., Chan, K. W., Tang, S. Y. F., & Cheng, A. Y. N. (2009). Pre-service teacher education student' epistemological beliefs and their conceptions of teaching. *Teaching and Teacher Education*, 25, 319-322.

Clarebout, G, Elen, J, Luyten, L & Bamps, H. (2001). Assessing Epistemological Beliefs: Schommer's Questionnaire Revisited. *Educational Research and Evaluation*, 7:1, 53-77

George, D., & Mallery, P., 2001, *SPSS for Windows Step by Step: A Simple Guide and Reference*. Boston: Allyn & Bacon.

Fraenkel, J. R., & Wallen, N. E. (2009). *The Nature of Qualitative Research. How to Design and Evaluate Research in Education*, Seventh Edition. Boston: McGraw-Hill, 420.

Hofer, B. K. (2001). Personal epistemology research: Implications for learning and teaching. *Educational Psychology Review*, *13,*353-383.

Hofer, B. K. (2004). Exploring the Dimensions of Personal Epistemology in Differing Classroom Contexts: Students Interpretations During the First Year of College. *Contemporary Educational Psychology*, *29*(2), 129–163.

Hofer, B. K. (2010). Personal Epistemology in Asia: Burgeoning Research and Future Direction. *The Asia-Pacific Education Researcher*, *19*(1), 179-184.

Hofer, B. K., & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning*. Review of Educational Research*, *67*, 88–140.

Kaiser, H. F., (1974). An index of factorial simplicity. *Psychometrica (*39), 31-36.

Kagan, D. M. (1992). Implications of research on teacher belief. *Educational Psychologist*, *27*(1), 65–90

Pajares, M. F. (1992). Teachers' beliefs and educational research: cleaning up a messy construct. *Review of Educational Research*, *62*(3), 307–332.

Richardson, V. (1996). *The role of attitudes and beliefs in learning to teach*. in: J. Sikula, T. J. Buttery & E. Guyton (Eds) Handbook of research on teacher education (2nd edn) (New York, Macmillan Library Reference USA), 102–119.

Saylan A., Bektaş O., Öner Armağan F., (2015). Investigation of the Relationship between Pre-service Science Teachers' Epistemological Beliefs and Beliefs about Nature of Science. *Mevlana International Journal of Education (MIJE),* 5(2), 96-116.

Saylan A., Öner Armağan F., Bektaş O., (2016). The relationship between pre-service science teachers' epistemological beliefs and preferences for creating a constructivist learning environment. *European Journal of Science and Mathematics Education, 4(*2),251-267.

Schraw, G., & Olafson L. (2003). *Teachers' Epistemological World Views and Educational Practices. Journal of Cognitive Education and Psychology*, *3*(2), 178-235.

Schraw, G., & Olafson, L. (2008). *Assessing Teachers' Epistemological and Ontological Worldviews*. In M. S. Khine (Ed.), Knowing, Knowledge and Beliefs: Epistemological Studies across Diverse Cultures (pp. 25-44). Netherlands: Springer Netherlands.

Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, *82*, 498-508.

Schommer, M. (1993). Epistemological development and academic performance among secondary schools. *Journal of Educational Psychology*, *85*(3), 406-411.

Schommer, M., Crouse, A., & Rhodes, N. (1992). Epistemological beliefs and mathematical text comprehension: Believing it is simple does not make it so*. Journal of Educational Psychology*, 84(4), 435-443

Schommer-Aikins, M., & Easter, M. (2006). Ways of knowing and epistemological beliefs: Combined effect on academic performance. *Educational Psychology*, *26*(3), 411-423.

Schommer-Aikins, M. (2004). Explaining the epistemological belief system: Introducing the embedded systemic model and coordinated research approach. *Educational psychologist*, *39*(1), 19-29.

Tatto, M. T. & Coupland, D. B. (2003). *Teacher education and teachers' beliefs: theoretical and measurement concerns*, in: J. Raths & A. C. McAninch (Eds) Teacher beliefs and classroom performance: the impact of teacher education (Greenwich, CT, Information Age Publishing), 99–122.

Tsai, C.C. (1998). An analysis of scientific epistemological beliefs and learning orientations of Taiwanese eighth-graders. *Science Education*, 82, 473–89.

Topçu, M., S., (2011) Turkish elementary student teachers' epistemological beliefs and moral reasoning, *European Journal of Teacher Education*, *34*(1), 99-125.

Yılmaz-Tüzün, Ö. & Topçu, M. S. (2008). Relationships among pre-service science teachers' epistemological beliefs, epistemological world views, and self-efficacy beliefs. *International Journal of Science Education, 30*(1), 65-85.

Yılmaz-Tüzün, Ö., & Topçu, M. S. (2013). Exploration of pre-service science teachers' epistemological beliefs, world views, and self-efficacy considering gender and achievement. *Elementary Education Online*, *12*(3), 659-673.