

A Study of the Epistemological Beliefs of Teacher Candidates in Terms of Various Variables

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Abstract

Problem Statement: Epistemological beliefs have a significant impact on both learning and the learning process. The levels of epistemological beliefs of teachers and students closely affect their ways of teaching and learning, their perceptions, efforts and acquisition. Thanks to the recent studies, the epistemological belief levels of students in different grades are researched in terms of different variables. It is important that the epistemological belief levels of the teacher candidates at teacher training institutions are defined continuously and regularly and that their beliefs are taken into account in teacher training programs.

Purpose of Study: The purpose of this study is to explore the epistemological beliefs of teacher candidates in terms of various variables.

Method: The study made use of a survey technique in which teacher candidates were asked to respond to an Epistemological Beliefs Inventory (EBI). The study group consisted of students at Balıkesir University Necatibey Faculty of Education (NFE) and Faculty of Science and Literature (FSL). Of the 533 students participating in the study, 216 were from the Necatibey Faculty of Education and 317 from the Faculty of Science and Literature. Of the total students, 341 were female while 192 were male. For data analysis, t test and ANOVA were used. In situations where the analysis of variance proved to be significant, Scheffe's test was applied to determine the direction of the variation.

Findings and Results: The findings of the study led to the conclusion that epistemological beliefs of teacher candidates were moderately developed. Teacher candidates believed that learning is more dependent on ability rather than effort. The students in the Faculty of Science and Literature

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had a stronger belief that learning is dependent upon effort rather than ability, while the students in the Necatibey Faculty of Education, however, had more of a belief that learning is dependent upon ability and that there is only one unchangeable truth. The research revealed that epistemological belief levels exhibited significant differences in terms of departments and teaching types. Epistemological belief levels also differed significantly in terms of genders. It was found that male students, more than females, believed that learning is more dependent on effort rather than ability. It was found that there wasn't any difference between the epistemological beliefs of teacher candidates in terms of the educational levels of their parents.

Conclusions and Recommendations: It was concluded that the epistemological beliefs of teacher candidates had matured moderately and they believed that learning was more related with ability rather than effort. Determining the levels of epistemological beliefs of teacher candidates at the faculties of education is important in terms of improving their beliefs positively and getting to know these students better. Moreover, it is thought-provoking to discover the high level of maturation of teacher candidates' beliefs that learning is dependent upon ability and that there is only a single truth. Qualitative research should be carried out especially to understand why the level of belief in a single truth is so high.

Keywords: teacher education, teacher candidates, epistemology, epistemological beliefs

Epistemology, one of the fundamental areas of philosophy, essentially analyzes the nature, sources, boundaries, conceptual components of knowledge, and even whether the existence of that knowledge is possible (Baç, 2007). Related literature reveals that the first studies related to epistemological beliefs were conducted by Perry. In the studies mentioned, epistemological beliefs were interpreted as what information means and how it is acquired (Güven, 2009; Brownlee, Purdie & Boulton-Levis, 2001). Moreover, the term epistemology can be defined as "the resource, the nature, the limitations and the accuracy of the human knowledge" (Hofer & Pintrich, 2002). Kaya (2003) defines epistemology as "a theory of knowledge that is related to the knowledge of entity and how this knowledge is acquired, in other words, the science of knowledge related to the knowledge of the outside world" (p.35). Epistemological beliefs are the ideas of individuals about what knowledge is and the subjective beliefs of individuals are how knowledge and learning come to exist (Erdem, Yılmaz & Akkoyunlu, 2008).

Kitchener and King (1981), Ryan (1984), and Songer and Linn (1991) pointed that individuals' beliefs about the nature of knowledge and learning, or epistemological beliefs, have been directly linked to their comprehension, meta-comprehension, persistence, and interpretation of information (Schommer, 1998). In addition, Schommer (1998) stated that there is a growing body of evidence indicating that in

regards to beliefs individuals have about the nature of knowledge and learning, epistemological beliefs affect their academic performance. Epistemological beliefs have a determining effect on variables such as the ways individuals process and interpret new information, their levels of understanding, their criteria of controlling their levels of understanding, the strategies they use to study, higher-order thinking and problem solving approaches and the time and effort they spend on learning (Deryakulu & Büyüköztürk, 2002, p.6). Epistemological beliefs also have a significant impact both on learning and teaching. Hofer (2001, cited in Walter, 2009) states that in order to develop students' skills in critical thinking and discovering the nature of knowledge, teachers should create the right learning environments and students' epistemological beliefs should be developed. Students' epistemological beliefs should be reviewed and considered while developing instructional curricula. It may be thought that this is a long and difficult process. Roth and Roychoudhury (1994, cited in Brownlee, Purdie & Lewis, 2001), for example, have asserted that changing epistemological beliefs of the students is difficult, even in environments that support a constructivist perspective. On the other hand, if teaching programs, and particularly teacher training programs, could include different activities that show students different ways of reaching knowledge and learning how to learn, it may be possible to develop students' epistemological beliefs with time.

The levels and development of the epistemological beliefs of university students, teacher candidates, and students have been the frequent subject of studies conducted by many educators in Turkey (Aypay, 2011; Meral & Çolak, 2009; Terzi, 2005). It is thought that recent research abroad showing the fact that epistemological beliefs constitute a determining factor in learning, may have contributed to this growing interest (Deryakulu & Büyüköztürk, 2005). The Turkish literature starts with Deryakulu and Büyüköztürk's validity and reliability testing and adaptation (2002) for Turkish university students of the Epistemological Beliefs Inventory developed by Schommer. This is followed by another study by Deryakulu and Büyüköztürk (2005) in which the researchers review the factor structure of the epistemological beliefs inventory and make a comparison of epistemological beliefs according to gender and type of the training program. Deryakulu and Büyüköztürk's studies are followed by other researches that have examined epistemological beliefs in terms of other variables. The following can be cited in this context: Gürol, Altunbaş and Karaaslan (2010) on the self-efficacy and epistemological beliefs of teacher candidates; Öngen (2003), Aksan and Sözer (2007), on the relation between university students' epistemological beliefs and problem-solving skills; Yılmaz (2007) on the relation between the epistemological beliefs of nursing students and locus of control; Başçiftçi, Güleç, Akdoğan and Koç (2011) on the value choices and epistemological beliefs of teacher candidates; Güven and Belet (2010) on the views of classroom teacher candidates concerning their epistemological beliefs and cognitive knowledge; Topçu and Tüzün (2009) on the metacognitive and epistemological beliefs of primary students and their success in science, their gender and socio-economic status; Erdem, Yılmaz and Akkoyunlu (2008) on the knowledge literacy, self-efficacy beliefs and epistemological beliefs of teacher candidates; Demir (2007) on the epistemological beliefs and authoritarian tendencies of teacher candidates; Uysal (2010) on the

epistemological beliefs of primary students, their perception of their learning environments, their approaches to learning and the relation of these to their achievement in science. All of these studies have established significant differences between epistemological beliefs in terms of the various variables researched.

Silverman (2007) has set forth that the attitudes and beliefs of teachers have a direct impact on their relationships with their students and also in fact, on the classroom climate and what students gain from the class. Chan (2003) has stated that the values and epistemological beliefs of teachers affect their perceptions of learning and teaching. Nespor (1987, cited in Brownlee, Purdie & Lewis, 2001) has pointed out that teacher candidates' epistemological beliefs are generally overlooked in teacher training programs. Brownlee, Purdie and Lewis (2001) assert that students should be encouraged to reflect their epistemological beliefs openly if their beliefs about learning are to be changed or facilitated. Pajares (1993) has pointed out that students do not always share their beliefs with teachers and it is for this reason that identifying with and understanding students is such a difficult task.

In the knowledge that epistemological beliefs have a determining effect on learning, these beliefs must be taken into consideration in teachers' education and it is important that epistemological beliefs are identified in addition to students' demographic characteristics. In other words, research shows that various variables (such as gender, department of study, and faculty) are interrelated to epistemological beliefs. For example, Schommer (1993) studied the difference between the technology sciences and social sciences university students' epistemological beliefs, and tried to determine the dimensions of differences. In the study, it was found that there was a significant difference regarding the epistemological beliefs of the technology sciences university students and social sciences students. Furthermore, Deryakulu and Büyüköztürk (2005) noted that the epistemological beliefs of the students from the field of social sciences and related areas were more developed/mature than of the ones from the field of basic and applied sciences and related areas. In addition, Banks (2005, cited in Ertekin et al. 2010) stated that studies in different disciplines, especially in the domains of mathematics and science, show that epistemological beliefs can change from one domain to another. As an example, in a study carried out by Ertekin et al. (2009) on teacher candidates in the domains of mathematics and social sciences, it was determined that the candidates' beliefs in the subscale of "belief that learning requires talent" in the epistemological belief scale were quite different. Chai, Khine and Teo (2006, cited in Güven, 2009) also studied the epistemological beliefs of Singaporean pre-service teachers and their learning levels. As a result of the study, they concluded that their epistemological beliefs differed; particularly there was a considerable difference in terms of gender, for the benefit of females. However it was found that there was no difference in terms of the participants' learning levels.

Scheurman (1995, cited in Silverman, 2007) has in fact set forth that epistemological belief levels of teacher candidates should be identified at the very beginning of their training and the results must be taken into account of the teachers' training programs. Pajares (1993) says that the beliefs of students at the faculties of

education should be explored logically and legally, also underlining that this might be more difficult in environments where instructors may be keen on encouraging the beliefs of students with whom they share a common perspective while challenging those students whose beliefs are inconsistent with their own. It was because of these different needs that the epistemological beliefs of students at Balıkesir University Necatibey Faculty of Education and Faculty of Science and Literature were chosen as subjects for this research.

The general purpose of this study was to explore the epistemological beliefs of teacher candidates in terms of various variables. In order to reach this purpose, answers to the following questions were sought:

1. What are the levels of the epistemological beliefs of teacher candidates?
2. Do teacher candidates' epistemological beliefs differ according to the faculty in which they are studying?
3. Do teacher candidates' epistemological beliefs differ according to the department in which they are studying?
4. Do teacher candidates' epistemological beliefs differ according to gender?
5. Do teacher candidates' epistemological beliefs differ according to the kind of teaching types?
6. Do teacher candidates' epistemological beliefs differ according to the educational level of their parents?

Method

The Model and the Study Group

This research is a descriptive study that aims to determine the epistemological beliefs of teacher candidates in terms of various variables. Using survey method, the teacher candidates were queried with the help of an Epistemological Beliefs Inventory (EBI). The students of Necatibey Faculty of Education at Balıkesir University, as well as students from the university's Faculty of Science and Literature studying in the "Pedagogical Formation" teacher eligibility program initiated by permission of the Board of Higher Education, constituted the study group of the research. Of the 533 students responding in the study, 216 were from Necatibey Faculty of Education (NFE) and 317 were students at the Faculty of Science and Literature (FSL). Female students accounted for 341 of the students while 192 were males.

The students who were recruited into the study group from Necatibey Faculty of Education, Department of Science and Mathematics for High Schools and Department of Social Fields of Education for High Schools were fourth- and fifth-year students studying in the Department of Physics Education (n=32), the Department of Chemistry Education (n=47), the Department of Biology Education

(n=39), the Department of Mathematics Education (n=60) and the Department of Turkish Language and Literature Education (n=36). Students taken into the study from Faculty of Science and Literature were fourth-year students from the Department of Physics (n=48), the Department of Chemistry (n=81), the Department of Biology (n=94), the Department of Mathematics (n=40) and the Department of Turkish Language and Literature (n=56). The reason fourth- and fifth-year students were recruited from Necatibey Faculty of Education and only fourth-year students were taken in from the Faculty of Science and Literature was because the student population in the Faculty of Science and Literature was larger than in the Necatibey Faculty of Education. More students from their fourth and fifth years of Necatibey Faculty of Education were recruited into the study group to make up for this difference. The teaching programs of the departments in the Faculty of Science and Literature are four-year programs, while the Necatibey Faculty of Education is a five-year program. The field courses in the fourth- and fifth-year sections of the Necatibey Faculty of Education that were included in the study group are equivalent to the courses taken by final-year students at the Faculty of Science and Literature.

Data Collection Tool

This study, which is based on a quantitative research approach, used an Epistemological Beliefs Inventory (EBI) that was originally developed by Schommer (1990) and then tested for validity and reliability for use with Turkish university students by Deryakulu and Büyüköztürk (2005) and questions exploring the participants' demographic characteristics such as academic department, age, gender, and parents' educational levels.

Epistemological Belief Inventory (EBI)

The inventory was developed by Schommer (1990) on the basis of a four-factor format of 63 items. Deryakulu and Büyüköztürk (2002) implemented the inventory, testing for validity and reliability, with Turkish students. The analysis resulted in an inventory that differed from the original in that it was finalized as three-factor and composed of 35 items, constituting the final form adapted for use with Turkish students. Deryakulu and Büyüköztürk reviewed the Epistemological Belief Inventory structure later in 2005 and their factor analysis resulted in one question being removed from the inventory altogether and one being transferred to another factor (the tenth item in the first factor was transferred to the second factor). The inventory has maintained its three-factor format.

The Epistemological Belief Inventory is a five-item Likert-type scale with responses that range as follows: (1) I absolutely disagree; (2) I disagree; (3) I have no idea; (4) I agree; and (5) I absolutely agree. The first factor in the scale, "**The Belief that Learning Depends on Effort**" comprises 17 items; its Cronbach Alpha internal consistency coefficient is .84. The second factor is "**The Belief that Learning Depends on Ability**" and contains nine items; the Cronbach Alpha internal consistency coefficient is .69. The third factor, composed of eight questions, is "**The**

Belief that there is Only One Truth” and the Cronbach Alpha internal consistency coefficient for this factor is .64. The Cronbach Alpha internal consistency coefficient for the scale as a whole is .81.

Scores on the Epistemological Beliefs Inventory are evaluated on a factor basis; all of the scores taken from the scale are generally not considered. This is because each factor on the scale is an independent dimension of belief and it has been found that each dimension has a different impact on learning. Higher scores in any of the factors indicate that the individual’s beliefs in that particular factor have not developed/matured; lower scores show that the individual’s beliefs have developed/matured (Schommer, 1990, cited in Deryakulu & Büyüköztürk, 2005).

Personal Data Form: To collect information on demographic variables, the participants were asked short questions about their faculty, department, age, gender, parents’ education and other similar personal information.

Data Analysis

Analysis of research data, descriptive statistics and for independent samples the t-test and one-way Analysis of Variance (ANOVA) were used. In cases where the analysis of variance pointed to significant differences, the Scheffe test was used to determine the direction of the difference.

Findings and Results

The findings obtained from the data collection tools that were implemented are presented below.

Findings and interpretation of the epistemological beliefs of teacher candidates

An examination of Table 1 shows that the mean scores of the teacher candidates were 65.74 in “The Belief that Learning Depends on Effort” (Factor 1), 18.74 in “The Belief that Learning Depends on Ability” (Factor 2), and 26.74 in “The Belief that there is Only One Truth” (Factor 3). When it is considered that low scores on the inventory indicate that the individual’s beliefs have matured and developed, it can be said that teacher candidates showed the greatest maturation in “The Belief that Learning Depends on Ability” and the least maturation in “The Belief that Learning Depends on Effort.” In other words, teacher candidates had a stronger belief that learning depends on ability rather than on effort.

Table 1***Some Values Regarding the Epistemological Beliefs of Teacher Candidates***

Sub-Factors	M	SD	N
The Belief that Learning Depends on Effort	65.74	9.39	
The Belief that Learning Depends on Ability	18.74	5.42	533
The Belief that there is Only One Truth	26.75	5.31	

Findings and interpretation of the relationship between teacher candidates' faculty and their epistemological beliefs

An unrelated t-test was used to determine whether there was a difference in the attitudes toward epistemological beliefs of teacher candidates according to the faculty they are attending. All of the scores taken from scale were not used in the analysis; scores were evaluated on the basis of factor.

Table 2***T-Test Results on the Epistemological Beliefs of Teacher Candidates by Faculty******Factor 1: The Belief that Learning Depends on Effort***

Faculty	N	SD	F	t	p	
NFE	216	67.03	9.26	531	2.64	.009*
FSL	317	64.86	9.39			

Factor 2: The Belief that Learning Depends on Ability

Faculty	N	SD	F	t	p	
NFE	216	17.84	4.98	531	3.18	.002*
FSL	317	19.35	5.61			

Factor 3: The Belief that there is Only One Truth

Faculty	N	SD	F	t	p	
NFE	216	25.06	5.04	531	6.26	.000*
FSL	317	27.89	5.19			

p<0.05

A review of Table 2 shows that the epistemological beliefs of teacher candidates displayed significant differences in all three sub-dimensions according to the faculty they were attending. Table 2 indicates that the beliefs of the students in the Faculty of Science and Literature in regards to the sub-dimension of "The Belief that Learning Depends on Effort" (Factor 1) ($t_{(531)}= 2.64, p<.009$) are at a higher level of maturity/development than the beliefs of the students in Necatibey Faculty of Education. In other words, the students in Faculty of Science and Literature have a stronger belief that learning depends on effort rather than ability, compared to the students in the Necatibey Faculty of Education.

According to Table 2, in the sub-dimensions of "The Belief that Learning Depends on Ability" (Factor 2) ($t_{(531)}= 3.18, p<.002$) and "The Belief that there is Only One Truth" (Factor 3) ($t_{(531)}= 6.26, p<.000$), the beliefs of the students in Necatibey Faculty of Education were more developed than those of the students in the Faculty of Science and Literature. In other words, the students in Necatibey Faculty of Education had a stronger belief that learning depends on ability and that there is a single unchangeable truth.

Findings and interpretation of the relationship between teacher candidates' departments and their epistemological beliefs

Another comparison of the epistemological beliefs of teacher candidates was carried out in terms of the departments the students were enrolled in. For this, instead of analyzing total scores, the three different factors were examined separately in order to understand whether there were significant differences in attitude using the scores of the students from the 10 different departments.

When the mean scores for Factor 1 are examined in terms of the departments, it is observed that the students of Departments of Mathematics ($\bar{x}=64.43$), Turkish Language and Literature ($\bar{x}=66.94$), Chemistry ($\bar{x}=64.01$), Physics ($\bar{x}=64.43$) and Biology ($\bar{x}=65.74$) in Faculty of Science and Literature had more developed beliefs in the sub-dimension of "The Belief that Learning Depends on Effort" (Factor 1), compared to the students of the Departments of Mathematics Education ($\bar{x}=65.16$), Turkish Language and Literature Education ($\bar{x}=68.07$), Chemistry Education ($\bar{x}=67.40$), Physics Education ($\bar{x}=68.40$) and Biology Education ($\bar{x}=67.20$) in Necatibey Faculty of Education.

An analysis of the mean scores by departments, it is observed that the epistemological beliefs of students in Departments of Mathematics Education ($\bar{x}=17.90$), Turkish Language and Literature Education ($\bar{x}=17.93$), Chemistry Education ($\bar{x}=16.08$), Physics Education ($\bar{x}=18.93$) and Biology Education ($\bar{x}=19.07$) in the Necatibey Faculty of Education in the sub-dimension of "The Belief that Learning Depends on Ability" were more developed compared to the beliefs of the students in the Departments of Mathematics ($\bar{x}=19.86$), Turkish Language and Literature ($\bar{x}=18.48$), Chemistry ($\bar{x}=19.90$), Physics ($\bar{x}=18.60$) and Biology ($\bar{x}=19.45$) in the Faculty of Science and Literature.

An analysis of the mean scores for the third factor, it is observed that the epistemological beliefs of the students in the Departments of Mathematics Education

(\bar{x} =24.58), Turkish Language and Literature Education (\bar{x} =24.87), Chemistry Education (\bar{x} =23.85), Physics Education (\bar{x} = 26.12) and Biology Education (\bar{x} =26.48) in the Necatibey Faculty of Education were more mature in the sub-dimension of “The Belief that there is Only One Truth” compared to the students in the Departments of Mathematics (\bar{x} =27.22%), Turkish Language and Literature (\bar{x} =27.41), Chemistry (\bar{x} =28.09), Physics (\bar{x} = 27.39) and Biology (\bar{x} =28.52) in Faculty of Science and Literature.

Table 3

Anova Results for the Epistemological Belief Scores of Teacher Candidates by Department

Factor 1: The Belief that Learning Depends on Effort

Source of Variance	SD	Total Sum of Squares	Mean Square	F	p
Between groups	9	1512.42	168.04		
Within Groups	523	45417.32	86.84	1.93	.045
Total	532	46929.75			

Factor 2: The Belief that Learning Depends on Ability

Source of Variance	SD	Total Sum of Squares	Mean Square	F	p
Between groups	9	615.79	68.42		
Within Groups	523	14989.81	28.66	2.38	.012
Total	532	15605.61			

Factor 3: The Belief that there is Only One Truth

Source of Variance	SD	Total Sum of Squares	Mean Square	F	p
Between groups	9	1316.19	146.24		
Within Groups	523	13684.81	26.16	5.58	.000
Total	532	15001.01			

p<0,05

An analysis of Table 3 shows that the epistemological beliefs of teacher candidates displayed significant differences in all three factors by department. However, it was determined from the Levene F-test that the variance in the first factor was not equal or homogeneous. Büyükoztürk (2007) stated that one of the main assumptions of the Anova is that the variances of the dependent variable should be equal for each sample. The variances related to the independent variable were found equal in the second and third factors.

The Scheffe test was used to find out in which departments the difference is in the second and third factors between the departments. Concerning "The Belief that Learning Depends on Ability" (Factor 2), a comparison of the Department of Chemistry Education with the Department of Biology, the Department of Chemistry and the Department of Mathematics revealed a significant difference in favor of the Department of Chemistry Education. In the analysis for Factor 3, the Department of Mathematics Education was compared with the Department of Biology and in the Department of Chemistry the difference was significant in favor of the Department of Mathematics Education; the analysis between the Department of Turkish Language and Literature Education and the Department of Biology showed a significant difference in favor of the Department of Turkish Language and Literature Education. The Department of Chemistry Education was compared with the Department of Biology, the Department of Turkish Language and Literature was compared with the Department of Chemistry and the Department of Physics the difference was significant in favor of the Department of Chemistry Education.

Findings and interpretation of the relationship between teacher candidates' gender and their epistemological beliefs

An unrelated t-test was used to determine whether there was a difference in the attitudes toward epistemological beliefs of teacher candidates in terms of gender factor (Table 4). Total scores were not used in the analysis; the scores were evaluated on the basis of factor.

Table 4

T-Test Results for the Epistemological Beliefs of Teacher Candidates' in terms of Gender

Factor 1: The Belief that Learning Depends on Effort

Gender	N	Mean	SD	F	t	p
Women	341	66.96	7.89	531	4.07	.000*
Men	192	63.56	11.28			

Factor 2: Belief that Learning Depends on Ability

Gender	N	Mean	SD	F	t	p
Women	341	18.26	5.16	531	2.72	.008*
Men	192	19.58	5.75			

Factor 3: The Belief that there is Only One Truth

Gender	N	Mean	SD	F	t	p
Women	341	26.71	5.16	531	.206	.572
Men	192	26.81	5.58			

p<0,05

When Table 4 is examined, it could be seen that there are significant differences in terms of gender in the epistemological beliefs of teacher candidates for Factors 1 and 2. In the sub-dimension in Table 4 on “The Belief that Learning Depends on Effort” (Factor 1) ($t_{(531)} = 4.07$ $p < .000$), it is observed that the beliefs of male students are more developed compared to those of female students. This finding could be interpreted to mean that male students have a stronger belief that learning depends on effort rather than ability compared to female students. Table 4 shows that in the sub-dimension of “The Belief that Learning Depends on Ability” (Factor 2) ($t_{(531)} = 2.72$ $p < .086$), female students were more developed in their beliefs than male students. Expressed differently, it could be said that female students are more of a belief that learning depends on ability compared to male students.

Findings and interpretation of the relationship between the teaching types and their epistemological beliefs

An unrelated t-test was used to determine whether there was a difference in attitudes toward the epistemological beliefs of teacher candidates according to the kind of teaching program they were attending (Table 5). Total scores were not used in the analysis; the scores were evaluated on the basis of factor.

Table 5

Epistemological Belief T-Test Scores of Teacher Candidates in terms of the Kind of Teaching Program

Factor 1: The Belief that Learning Depends on Effort

Teaching Program	N	Mean	SD	F	t	p
Teaching Prog.I	426	66.12	9.09	531	1.86	.036*
Teaching Prog.II	107	64.23	10.41			

Factor 2: The Belief that Learning Depends on Ability

Teaching Program	N	Mean	SD	F	t	p
Teaching Prog.I	426	18.51	5.17	531	1.94	.003*
Teaching Prog.II	107	19.64	6.23			

Factor 3: The Belief that there is Only One Truth

Teaching Program	N	Mean	SD	F	t	p
Teaching Prog.I	426	26.33	5.19	531	3.60	.557
Teaching Prog.II	107	28.38	5.47			

p<0.05

A review of Table 5 shows that there are significant differences in the epistemological beliefs of teacher candidates for Factors 1 and 2 in terms of the kind of teaching program. In the sub-dimension of "The Belief that Learning Depends on Effort" for Factor 1 in Table 5 ($t_{(531)} = 1.86$ $p < .036$), it is seen that the students in the second teaching program have more mature beliefs than the students in the first teaching program. This finding could be interpreted as evidence that the students of the second teaching program have more of a belief that learning depends not on ability but on effort, compared to the students in the first teaching program.

It could be seen in Table 5 that in the sub-dimension of "The Belief that Learning Depends on Ability" (Factor 2) ($t_{(531)} = 1.94$ $p < .003$), the students in the first teaching program have more developed beliefs than those in the second teaching program. In other words, the students of the first teaching program have more of a belief that learning depends on ability, compared to the students of the second teaching program.

Findings and interpretation of the relationship between teacher candidates' parents' education level and their epistemological beliefs

Table 6
Anova Results for the Scores of Teachers Candidates' Epistemological Beliefs in terms of Parents' Level of Education

<i>Factor 1: The Belief that Learning Depends on Effort</i>					
<i>Source of Variance</i>	<i>SD</i>	<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>
Between Groups	6	340.17	56.69		
Within Groups	526	46589.58	88.57	0.640	.698
Total	532	46929.75			
<i>Factor 2: The Belief that Learning Depends on Ability</i>					
<i>Source of Variance</i>	<i>SD</i>	<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>
Between Groups	6	112.352	18.72		
Within Groups	526	15493.259	29.120	.636	.702
Total	532	15605.61			
<i>Factor 3: The Belief that there is Only One Truth</i>					
<i>Source of Variance</i>	<i>SD</i>	<i>Sum of Squares</i>	<i>Mean Square</i>	<i>F</i>	<i>p</i>
Between Groups	6	210.055	35.00		
Within Groups	526	14790.956	28.12	1.245	.282
Total	532	15001.01			

$p < .05$

The analysis of Table 6 shows that there is no significant difference between teacher candidates' epistemological beliefs in terms of their parents' level of education in any of the three factors.

Discussion and Conclusion

In this study, which explored the levels of epistemological beliefs of teacher candidates in terms of some selected variables, it was found that teacher candidates had developed the greatest in the dimension of "The Belief that Learning Depends on Ability" and the least in the dimension of "The Belief that Learning Depends on Effort." Gürol, Altunbaş and Karaaslan (2010), Erdem, Yılmaz and Akkoyunlu's (2008) studies, too, arrived at the conclusion that teacher candidates exhibited the least maturation in "The Belief that Learning Depends on Effort". In the mentioned researches, it was reported that teacher candidates had developed the greatest in "The Belief that there is Only One Truth" in contrast to this study.

Significant differences were found between faculties in the sub-dimensions of epistemological beliefs that hold that learning depends on effort, learning depends on ability, and that there is only one truth. Compared to the students in Necatibey Faculty of Education, the students of Faculty of Science and Literature had a stronger belief that learning depends on effort. When it is considered that students in Necatibey Faculty of Education received higher scores on the university placement test compared to students who placed in the Faculty of Science and Literature, it was understandable that Necatibey Faculty of Education students had more matured beliefs that support the concept that learning depends on ability. On the other hand, it was considered that the students of Necatibey Faculty of Education are the teachers of the future without completing any further educational programs; it was thought provoking that their beliefs were more mature about the concept that there is one single truth.

Significant differences were also found among departments in the sub-dimensions of epistemological beliefs that assert that learning depends on ability and that there is only one truth. A significant difference was found in favor of the Department of Chemistry Education in the sub-dimension of the belief that learning depends on ability when the Department of Chemistry Education was compared with the Department of Chemistry, the Department of Biology and the Department of Mathematics. In the sub-dimension of the belief that there is only one truth, significant differences were found between the Department of Turkish Language and Literature Education and the Department of Biology in favor of the Department of Turkish Language and Literature Education, between the Department of Chemistry Education and the Department of Biology, the Department of Turkish Language and Literature, the Department of Chemistry and the Department of Physics in favor of the Department of Chemistry Education. These findings support the results of the analysis based on the faculties. It had already been stated above that the beliefs of the students in Necatibey Faculty of Education had matured to a greater extent in the sub-dimensions of the belief that learning depends on ability and the belief that there is only one truth.

Significant differences were found between genders in the sub-dimensions of the epistemological beliefs that learning depends on effort and that learning depends on ability. The results were achieved that in the sub-dimension of the belief that learning depends on effort, male students had more matured beliefs than female students and that females had more matured beliefs about learning being dependent on ability. While this result is consistent with some other studies (Başçiftçi, Güleç, Akdoğan & Koç, 2011; Öngen, 2003), the findings do not agree with studies (Deryakulu & Büyüköztürk, 2005; Eroğlu & Güven, 2006; Güven, 2009) that have reached the

conclusion that compared to males, female students have more of a belief that learning is dependent on effort. In some other research (Erdem, Yılmaz & Akkoyunlu, 2008; Gürol, Altunbaş & Karaaslan, 2010), it has been found that the epistemological beliefs of male students in both sub-dimensions of the belief that learning depends on effort and that learning depends on ability are more developed than in female students. Kurt (2009) in a study on elementary and middle school students reached to the conclusion that girls have more matured beliefs compared to males on the truth of knowledge. In a study by Aksan and Sözer (2007), Terzi (2005), and Tümkaya (2012) no significant difference was found in any of the three dimensions of epistemological belief in terms of gender. Chan's research (2004) carried out in an educational institute in Hong Kong also indicated no significant difference between the epistemological beliefs of teacher candidates according to age, gender, and department.

The present study found that the students in the first teaching program had more matured beliefs in the sub-dimension of the epistemological belief that learning depends on effort but that the second teaching program students had beliefs that were more developed in the sub-dimension of the belief that learning depends on ability. In addition, there was no evidence of a difference between the epistemological beliefs of teacher candidates according to the educational level of their parents. This result is consistent with the findings of both Oğuz (2007) and Yılmaz (2007). Eroğlu and Güven (2006), however, found that students whose fathers were middle school, high school, and university graduates had more developed epistemological beliefs compared to students whose fathers were elementary school graduates. In the same study no significant difference was found between the epistemological beliefs of university students with the educational status of their mothers. Güven (2009) reported that there was significant difference between epistemological beliefs of the distance education students in the sub-dimension of the belief that learning depends on ability with the educational level of parents or family. In the study it was found that students with a low educational level of family had more developed beliefs in the dimension that learning depends on ability, compared to students within a family of medium and high levels of education. Schommer (1990, cited in Deryakulu & Büyüköztürk, 2002) arrived at the conclusion that students with parents with a higher level of education had been given more responsibility to them in the family and had been supported more to build their own beliefs and opinions, and at that level they have sophisticated epistemological beliefs.

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Öğretmen Adaylarının Epistemolojik İnançlarının Çeşitli Değişkenler Açısından İncelenmesi

Atf:

Er, K.O. (2013). A Study of the Epistemological Beliefs of Teacher Candidates in Terms of Various Variables. *Eğitim Araştırmaları-Eurasian Journal of Educational Research*, 50, 207-226.

(Özet)

Problem Durumu: Epistemolojik inançların hem öğrenme hem de öğretme sürecinde önemli etkileri vardır. Öğretmenlerin ve öğrencilerin sahip olduğu epistemolojik inanç düzeyleri, onların öğretme, öğrenme biçimlerini, algılarını, çabalarını, kazanımlarını yakından etkilemektedir. Son yıllarda yapılan çalışmalarla farklı öğretim düzeyinden öğrencilerin sahip oldukları epistemolojik inanç düzeyleri çeşitli değişkenler açısından araştırılmaktadır. Özellikle, öğretmen yetiştiren kurumlarda öğretmen adaylarının epistemolojik inanç düzeylerinin sürekli ve düzenli olarak belirlenmesi ve öğretmen yetiştirme programlarında öğretmen adaylarının epistemolojik inançlarının da dikkate alınması önemlidir.

Araştırmanın Amacı: Bu araştırmanın genel amacı, öğretmen adaylarının epistemolojik inançlarını çeşitli değişkenler açısından araştırmaktır.

Yöntem: Tarama yönteminin kullanıldığı bu çalışmada öğretmen adaylarına Schommer (1990) tarafından geliştirilen ve Deryakulu ve Büyüköztürk (2002) tarafından Türk öğrencilerine uygulanarak geçerlik güvenirlik çalışması yapılmış olan Epistemolojik İnanç Ölçeği (EIÖ) uygulanmıştır. Epistemolojik İnanç Ölçeği; on yedi maddeden oluşan "Öğrenmenin Çabaya Bağlı Olduğu İnanç", dokuz maddeden oluşan "Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç" ve sekiz maddeden oluşan "Tek Bir Doğrunun Var Olduğuna İnanç" olarak isimlendirilen üç alt faktörden oluşmaktadır. Epistemolojik İnanç Ölçeğinde puanların değerlendirilmesi faktör bazında yapılmakta, ölçeğin bütününden alınan puanlar genellikle pek kullanılmamaktadır. Bunun nedeni, ölçeğin her bir faktörünün diğer faktörlerden bağımsız bir inanç boyutunu olması ve her boyutunun öğrenme üzerinde farklı etkileri olduğunun saptanmasıdır. Ölçeğin her bir faktöründen alınan yüksek puan, bireyin o faktöre ilişkin olgunlaşmamış / gelişmemiş inançlara sahip olduğu, düşük puan ise bireyin o faktöre ilişkin olgunlaşmış / gelişmiş inançlara sahip olduğunu göstermektedir. Bu araştırmanın çalışma grubunu Balıkesir Üniversitesinde Necatibey Eğitim Fakültesi ve Fen Edebiyat Fakültesi'nde öğrenim gören öğrenciler oluşturmaktadır. Çalışmayı yanıtlayan 533 öğrenciden 216'sı Necatibey Eğitim Fakültesi, 317'si Fen Edebiyat Fakültesi öğrencisidir. Araştırmada Necatibey Eğitim Fakültesi Ortaöğretim Fen ve Matematik Alanları Eğitimi Bölümünden Fizik Öğretmenliği (n=32), Kimya Öğretmenliği (n=47), Biyoloji Öğretmenliği (n=39), Matematik Öğretmenliği (n=60) ve Ortaöğretim Sosyal Alanlar Eğitimi Bölümünden de Türk Dili ve Edebiyatı Öğretmenliği (n=36) 4 -5 sınıf öğrencileri çalışma grubuna alınmıştır. Fen Edebiyat Fakültesinden ise Fizik Bölümü (n=48), Kimya Bölümü

(n=81), Biyoloji Bölümü (n=94), Matematik Bölümü (n=40) ile Türk Dili ve Edebiyatı bölümü (n=56) 4 sınıf öğrencileri çalışma grubuna alınmıştır. Bu öğrencilerin 341'i kız, 192'si erkektir. Araştırma verilerinin analizinde, betimsel istatistikler, bağımsız örneklem için t testi ve tek faktörlü varyans analizi (ANOVA) kullanılmıştır. Varyans analizi testinin anlamlı çıktığı durumlarda, farklılığın ne yönde olduğunu belirlemek için de Scheffe testi uygulanmıştır.

Bulgular ve Sonuçlar: Araştırmada öğretmen adaylarının epistemolojik inanç düzeyinin orta düzeyde olgunlaştığı sonucuna ulaşılmıştır. Öğretmen adayları öğrenmenin çabadan çok yeteneğe bağlı olduğuna inanmaktadırlar. Fen Edebiyat Fakültesi öğrencileri, öğrenmenin yetenekten çok çabaya bağlı olduğuna Eğitim Fakültesi öğrencilerine göre daha çok inanmaktadırlar. Eğitim Fakültesi öğrencileri ise öğrenmenin yeteneğe bağlı olduğuna ve tek bir değişmez doğrunun olduğuna Fen Edebiyat Fakültesi öğrencilerine oranla daha güçlü bir biçimde inanmaktadırlar. Araştırmada epistemolojik inanç düzeyi ile bölümler ve öğretim türleri arasında anlamlı farklılıklar bulunmuştur. Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç" (2. Faktör) için Kimya öğretmenliği ile Biyoloji Bölümü, Kimya Bölümü, ve Matematik bölümü arasında Kimya öğretmenliği lehine anlamlı bir farklılık tespit edilmiştir. Üçüncü faktör "Tek Bir Doğrunun Var Olduğuna İnanç" için yapılan analiz sonucunda ise Matematik öğretmenliği ile Biyoloji ve Kimya bölümleri arasında Matematik öğretmenliği lehine, Türk Dili Edebiyatı Öğretmenliği ile Biyoloji Bölümü arasında Türk Dili ve Edebiyatı Öğretmenliği lehine, Kimya Öğretmenliği ile Biyoloji, Türk Dili ve Edebiyatı, Kimya ve Fizik Bölümleri arasında Kimya Öğretmenliği lehine anlamlı bir farklılık görülmüştür. Epistemolojik inanç düzeyi ile cinsiyet arasında da anlamlı farklılıklar bulunmuştur. Erkek öğrencilerin öğrenmenin yetenekten çok çabaya bağlı olduğuna kız öğrencilere oranla daha çok inandıkları belirlenmiştir. Son olarak, öğretmen adaylarının anne-babalarının eğitim seviyeleri ile epistemolojik inançları arasında ise anlamlı bir farklılık bulunmamıştır.

Tartışma ve Öneriler: Öğretmen adaylarının epistemolojik inanç düzeyinin orta düzeyde olgunlaştığı ve öğrenmenin çabadan çok yeteneğe bağlı olduğuna inandıkları sonucuna ulaşılmıştır. Üniversiteye giriş puanları göz önüne alındığında Fen Edebiyat Fakültesi öğrencilerine göre daha yüksek puanlarla bölümlerine yerleşen Eğitim Fakültesi öğrencilerinin öğrenmenin yeteneğe bağlı olduğuna olan inançlarının daha olgunlaşmış olması normal karşılanabilir. Ancak, Eğitim Fakültesi öğrencilerinin, doğrudan ek bir formasyon gerektirmeden geleceğin öğretmenleri olarak düşünüldüğünde tek bir doğrunun var olduğuna olan inançlarının daha olgunlaşmış olması düşündürücüdür. Öğretmen adaylarının epistemolojik inanç düzeylerini belirlemek ve olumlu anlamda yükseltmek için Eğitim Fakültelerinde öğrencilerin epistemolojik inanç düzeylerinin belirlenmesi onları daha yakından tanımamız açısından da önemlidir. Özellikle farklı üniversitelerde karşılaştırmalı nitel araştırmalar yapılarak özellikle tek bir doğruya olan inanç düzeyinin Eğitim Fakültesi öğrencilerinde neden gelişmiş olduğu araştırılmalıdır.

Anahtar Sözcükler: öğretmen yetiştirme, öğretmen adayları, epistemoloji, epistemolojik inanç