

A Relational Study of Pre-Service Teachers' Epistemological Beliefs, Educational Philosophy Tendencies and Teaching-Learning Conceptions¹

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Abstract

The aim of this study is to analyze, using a path analysis model, the predictive relationships among pre-service teachers' epistemological beliefs, their educational philosophy tendencies and their teaching-learning conceptions. A relational screening model and predictive correlational design were used in this study. The sample of this study consisted of 1621 pre-service teachers from the faculty of education in a state university in Turkey. The Epistemological Beliefs Scale adapted by Deryakulu & Büyüköztürk (2005), the Teaching-Learning Conceptions Scale adapted by Aypay (2011), and the Educational Philosophy Tendency Scale developed by researchers were all used as data collection tools. Path analysis was used to calculate predictive relationships among pre-service teachers' epistemological beliefs, their educational philosophy tendencies, and their teaching-learning conceptions. Study findings indicate that pre-service teachers' epistemological beliefs and their educational philosophy tendencies are statistically significant predictors of their teaching-learning conceptions. The findings also indicated that pre-service teachers' epistemological beliefs are statistically significant predictors of their educational philosophy tendencies. In this context, predictive relationships among variables were scrutinized and a number of suggestions were made in light of these findings.

Keywords: Epistemological Beliefs, Educational Philosophy Tendencies, Teaching-Learning Conceptions.

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Introduction

Epistemology is a fundamental branch of philosophy which investigates the nature and source of knowledge (Cevizci, 2015a). Beliefs, on the other hand, signify an individuals' sense of self-acceptance that they develop based on events and phenomena they come across in the course of their lifetime (Deryakulu, 2017). Thusly, epistemological beliefs can be defined as individuals' sense of self-acceptance regarding the theory, source, and potentiality of knowledge (Hofer, 2001). Various models related to epistemological beliefs have been developed since the 1960s (Brownlee et al., 2002; Hofer and Pintrich, 1997). Some of these models approached epistemological beliefs from a one-dimensional point of view (Belenky et al., 1986; King and Kitchener, 1994; Kuhn, 1991; Magolda, 1992; Perry, 1968), while Schommer (1990) developed a multi-dimensional model suggesting that epistemological beliefs are not only directly related to beliefs regarding the nature of knowledge but also involve beliefs regarding learning processes. According to this model, people who believe that knowledge is relative and that effort plays an important role during the learning process have developed epistemological beliefs, while people who believe knowledge is absolute and unchangeable and talent plays an important role during the learning process have undeveloped epistemological beliefs (Schommer, 1993).

Schommer's (1990) model, which approaches epistemological beliefs in a multi-dimensional way, closely scrutinized what kind of effects that a sense of self-acceptance derived from the nature of both knowledge and learning had on the learning and teaching process. Hence, many studies in the body of relevant literature (Bedel and Çakır, 2013; Cano, 2005; Chan, 2003; Hofer, 2004; Karataş, 2011; Öngen, 2003; Phan, 2008; Rodriguez & Cano, 2006; Schommer-Aikins and Hutter, 2002) reveal that epistemological beliefs are contingent on a variety of factors such as academic success, meta-cognitive awareness levels, learning approaches, and problem-solving strategies. Another factor tied to epistemological beliefs is individuals' educational philosophy tendencies (Biçer et al., 2013; Kahramanoğlu and Özbakış, 2018; Önen, 2011). Accordingly, Yazıcı (2016) states that an epistemological point of view serves as the basis for most tendencies related to the educational philosophy.

Educational philosophy is a branch of philosophy that develops philosophical proposals and solutions to educational issues (Noddings, 2016). Tezci and Kervan (2019) point out that the educational philosophy plays a role in determining the purpose, extent, and function of education. Tendencies, on the other hand, refer to "a potential quality found in a particular thing or object" (Cevizci, 2015b: 149). Therefore, educational philosophy tendencies can be defined as a perspective that an individual possesses regarding the purpose and function of education. Thus, it is possible that individuals' educational philosophy tendencies have an important effect on the learning and teaching process. Furthermore, many studies in the relevant literature (Akgün, 2015; Duman, 2008; Duman and

Ulubey, 2008; Kozikoğlu and Erden, 2018) show that educational philosophy tendencies are related to a variety of factors in the learning and teaching process such as critical thinking tendencies, abilities to utilize teaching technologies, learning strategies, and critical pedagogical approaches. Another factor related to educational philosophy tendencies is teaching-learning conceptions (Baş, 2015); epistemological beliefs have also been shown to be related to teaching-learning conceptions (Ekinçi, 2017; Tezci et al., 2016; Wong et al., 2009). That is to say, it is clear that epistemological beliefs are closely related to both educational philosophy tendencies *and* teaching-learning conceptions.

Individuals' teaching-learning conceptions constitute a sense of self-acceptance that they developed with respect to the concepts of teaching and learning. These conceptions can be classified into two groups: traditional conceptions and constructivist conceptions (Chan, 2004; Chan & Elliot, 2004; Schunk, 2014). People with constructivist conceptions are active members of the learning process, while people with traditional conceptions are passive members of said process (Brooks and Brooks, 1999; Philips, 1995). It is likely that behind the effects of changes that take place in both epistemological beliefs and educational philosophy tendencies lie individuals' tendencies which make them gravitate towards constructivist rather than traditional conceptions (Özden, 2014). As a result of these changes in epistemological beliefs, a trend towards pragmatism has emerged, taking the place of idealism and realism to a large extent. Taking into account that pragmatism serves as the basis for other branches of contemporary educational philosophies such as progressivism and reconstructionism (Guttek, 2006; Yazıcı, 2016) and that these branches form a base for constructivist teaching-learning conceptions (Aslan, 2018), the change that occurs during the teaching and learning process can be more clearly understood.

Also, in the Turkish education system, traditional conceptions was replaced by constructivist conceptions of learning as of the 2005-2006 academic year (Gür et al., 2013). During the learning and teaching process, teachers with constructivist conceptions of teaching create a positive classroom environment that puts focus on and emphasizes students' interests and needs (Aytaç and Uyangör, 2020; Baş and Beyhan, 2013). Also, students have higher levels of academic success in a learning setting designed in accordance with constructivist conceptions (Ayaz and Şekerci, 2015; Kim, 2005). Thus, it can be said that teachers' teaching-learning conceptions affect the learning and teaching process (Baş, 2014). Teachers' epistemological beliefs (Tezci et al., 2016) and their educational philosophy tendencies (Baş, 2015) constitute the basis for their teaching-learning conceptions. Consequently, both teachers' beliefs about knowledge and the nature of knowledge *and* their philosophical approach toward education are important variables which shed light on their conceptions interiorized during the learning and teaching process.

Teachers' beliefs and conceptions begin to take shape before they start serving as teachers. Thus, the quality of education provided for pre-service teachers in education faculties plays becomes

more prominent as it plays a key role in their development (Doğanay and Sarı, 2003; Pajares, 1992). Teachers with developed epistemological beliefs are inclined more towards contemporary educational philosophies (Biçer et al., 2013) and favor constructivist teaching-learning conceptions (Turan, 2018). In this context, analyzing the correlation among pre-service teachers' epistemological beliefs, their educational philosophy tendencies and their teaching-learning conceptions may provide various clues about the environment that they will create in their classrooms when they start teaching. As Tezci and Uysal (2004) state, individuals' philosophical approaches may shape the way they implement their ideas and curricula.

The body of relevant literature includes studies analyzing the relationship between epistemological beliefs and teaching-learning conceptions (Ekinci, 2017; Tezci et al., 2016; Wong et al., 2009) and also educational philosophy tendencies (Biçer et al., 2013; Kahramanoğlu and Özbakiş, 2018; Önen, 2011). Although these studies analyzed predictive relationships between teachers' epistemological beliefs and their teaching-learning conceptions, predictive relationships between teachers' epistemological beliefs and their educational philosophy tendencies have not yet been examined. Studies analyzing relationships between teachers' epistemological beliefs and their educational philosophy tendencies focused solely on their reciprocal relationship. Moreover, there are a limited number of studies analyzing the relationship between teachers' educational philosophy tendencies and their teaching-learning conceptions (Aslan, 2018; Baş, 2015). In short, no studies which use a path analysis model to examine predictive relationships among teachers' epistemological beliefs, their educational philosophy tendencies, and their teaching-learning conceptions have been encountered in the current body of relevant literature.

Meydan and Şeşen (2015) suggest that the path analysis model allows researchers to examine not only direct effects among variables but also indirect and total effects among them and to gain a better and clearer understanding of these effects as the model visualizes the analysis as a whole in one image. This study aims to reveal which, if any, dimensions of epistemological beliefs affect pertinent educational philosophy tendencies and teaching-learning conceptions, and, if there are such effects, to find out their scope and extent. Keeping this aspect of the study in mind, it is believed that this study distinguish itself from other studies in the relevant literature. This study will provide a wide variety of perspectives for many people: program development specialists creating teacher training programs, faculty members and instructors putting teaching programs and exercises into practice, and researchers reviewing the body of relevant literature and determining the relationships between the variables in this study and other variables in their own studies. Thusly, the purpose of this study is to analyze the predictive relationships among pre-service teachers' epistemological beliefs, their educational philosophy tendencies, and their teaching-learning conceptions using a path analysis model.

Methods

A relational screening model and predictive correlational design were used in this study. Relational screening models aim to determine the presence and/or level of change between two or more variables (Karasar, 2006). Predictive correlational design was used in order to determine the effects of known variables on unknown variables (Büyüköztürk et al., 2011). Thusly, predictive correlational design was used in this study as the predictive correlations among epistemological beliefs, pre-service teachers' educational philosophy tendencies, and teaching-learning conceptions were examined.

Population and Sample

The population of the study consisted of all pre-service teachers from every class level who were in standard academic programs and degree programs in the Necatibey Faculty of Education at Balıkesir University during the 2017-2018 academic year. As the goal was to reach the entire population, an additional sampling method was not deemed necessary.

The population of the study consisted of approximately 3000 pre-service teachers. However, by the end of the data collection process, analyses had been conducted with only 1621 of them. As in the overall study, all of the pre-service teachers in specific departments were asked to participate. Therefore, reaching a certain percentage of pre-service teachers in specific degree programs wasn't included as an objective; instead, including as many pre-service teachers as possible from each department was set as a goal. Furthermore, there are a different number of pre-service teachers studying in each department, which is a result of the marked variance in pre-service teacher enrollment numbers for individual departments. Hence, the sample size accounted for roughly 55% of the entire population. Özen and Gül (2007) stated that sample size should account for at least 30% of the entire population, meaning that the sample size of this study adequately represents the population. Data from the sample can be found in Table 1.

Table 1: Sample data

Categories	Groups	Frequency (f)	Percentage (%)
Gender	Female	1186	73.2
	Male	435	26.8
Grade level	Freshman	413	25.5
	Sophomore	399	24.6
	Junior	454	28
	Senior	355	21.9
Degree Program / Department	Mathematics and Science Education	572	35.3
	Primary Education	314	19.4
	Turkish Language and Social Sciences Education	284	17.5
	English Language Education	137	8.5
	Guidance and Psychological Counseling	125	7.7
	Computer/Instructional Technologies Education	103	6.4
	Music Education	86	5.3
Total		1621	100

1186 (73.2%) female and 435 (26.8%) male pre-service teachers participated in the study. 413 (25.5%) of the pre-service teachers who participated in the study were freshmen, 399 (24.6%) of them were sophomores, 454 (28%) of them are juniors, and 355 (21.9%) of them were seniors. 572 (35.3%) of pre-service teachers were studying for a degree in Mathematics and Science Education, 314 (19.4%) in Primary Education, 284 (17.5%) in Turkish Language and Social Sciences Education, 137 (8.5%) in English, 125 (7.7%) in Guidance and Psychological Counseling, 103 (6.4%) in Computer/Instructional Technologies Education, and 86 (5.3%) in Music Education.

Data Collection Tools

Epistemological Beliefs Scale

The Epistemological Beliefs Scale was developed by Schommer (1990) and adapted by Deryakulu and Büyüköztürk (2002). Soon after, Deryakulu and Büyüköztürk (2005) re-examined the factor structure of the scale. Results from this subsequent analysis confirmed that the scale consists of 34 items and its factor structure remains unchanged. Sub-dimensions of the scale were named thusly: The Belief of Learning Depends on Effort /BLDE (17 items), The Belief of Learning Depends on Ability /BLDA (8 items), and The Belief of There is Only One True Truth /BOTT (9 items). After conducting reliability analysis, Cronbach's alpha values for the sub-dimensions were calculated to be 0.84, 0.69, and 0.81, respectively (Deryakulu and Büyüköztürk, 2005). A high score on these sub-dimensions indicates that participant beliefs regarding the relevant dimension are stronger. Furthermore, acquiring high scores from the BLDE sub-dimension is a sign of holding developed beliefs, while high scores received from the BLDA and the BOTT sub-dimensions indicate undeveloped/immature beliefs (İlhan et al., 2013).

Educational Philosophy Tendency Scale

The Educational Philosophy Tendency Scale was developed by researchers using two sample groups. One of the groups, which consisted of 535 participants, was subjected to exploratory factor analysis, item analysis, reliability analysis, and confirmatory factor analysis, while only a confirmatory factor analysis was used with the 398-person sample group. The results of the confirmatory factor analysis were used to develop a scale with four dimensions and 36 items. These dimensions were named thusly: Progressive Educational Philosophy Tendency (PREPT), Reconstructionist Educational Philosophy Tendency (REPT), Essentialist Educational Philosophy Tendency (EEPT), and Perennialist Educational Philosophy Tendency (PEPT). After conducting the confirmatory factor analysis with the first sample group, fit values (CMIN/DF: 1.92, RMSEA: 0.041, CFI: 0.92, NNFI: 0.91, GFI: 0.90, AGFI: 0.88, RMR: 0.055, SRMR: 0.058) were found to be within acceptable ranges. Fit values (CMIN/DF: 1.95, RMSEA: 0.049, CFI: 0.91, NNFI: 0.90, GFI: 0.86, AGFI: 0.85, RMR: 0.050, SRMR: 0.058) of the second group also fell within acceptable ranges.

The results gathered from item analysis showed that there were statistically significant differences between the upper 27% and lower 27% of the total group. The results of the reliability analysis revealed that the Cronbach's alpha value for the entire scale was found to be 0.83, while it was calculated as 0.89 for the Progressive Educational Philosophy Tendency (13 items) sub-dimension, 0.84 for the Reconstructionist Educational Philosophy Tendency (9 items) sub-dimension, 0.82 for the Essentialist Educational Philosophy Tendency (7 items) sub-dimension, and 0.66 for the Perennialist Educational Philosophy Tendency (7 items) sub-dimension. High scores on these sub-dimensions indicate stronger tendencies regarding relevant sub-dimensions.

Teaching-Learning Conceptions Scale

Teaching-Learning Conceptions Scale was developed by Chan and Elliott (2004) and adapted by Aypay (2011). 341 pre-service teachers participated in a study conducted with the adapted scale. In the evaluation group, researchers worked with 30 items which were translated into Turkish and edited to ensure that they were grammatically correct. Firstly, confirmatory factor analysis was conducted and, based on the results of the analysis, fit indices of the 30-item scale and its 2 sub-dimensions indicated a partial fit with the model. These two sub-dimensions were called Traditional Teaching-Learning Conceptions (18 items) and Constructivist Teaching-Learning Conceptions (12 items). Reliability analysis results showed that the Cronbach's alpha values of the entire scale were found to be 0.71, 0.88, and 0.83 for the entire scale and the two sub-dimensions, respectively. The split-half correlation value was found to be 0.77. High scores on these sub-dimensions indicate that participants have interiorized the understanding in the relevant sub-dimension (Aypay, 2011).

Data Collection and Analysis

As a first step, before collecting research data, permission was obtained from the researchers who adapted the scales used in this study to use their work. Afterwards, all necessary permissions were received from the institution where this study was conducted, and then, the data was collected personally by the researcher. The study was completed in its entirety during the week of April 16th, 2018-April 20th, 2018. In the first step, researchers created a detailed schedule that contained the class hours and times in which they were going to work with the pre-service teachers. They contacted the course instructors to keep them informed of all developments prior to meeting with the pre-service teachers. It can be stated with certainty that the reason the requisite number of pre-service teachers was not reached was some of the pre-service teachers' nonattendance during the week of the study; put another way, some pre-service teachers skipped class and, consequently, the study as well. During the process of data entry, 26 pieces of data were removed from the data set due to missing and/or incorrect content. The scales that were used in this study only allowed participants to fill out one column, which may produce extreme values. Finally, the data set was tested for normality. Measures of skewness and kurtosis in the data set for sub-dimensions of scales can be found in Table 2.

Table 2. Measures of skewness and kurtosis for sub-dimensions of scales

Sub-dimensions	N	Skewness	Kurtosis
Progressive Educational Philosophy Tendency (PREPT)	1621	-.81	-.12
Reconstructionist Educational Philosophy Tendency (REPT)	1621	-.31	-.50
Essentialist Educational Philosophy Tendency (EEPT)	1621	.67	.20
Perennialist Educational Philosophy Tendency (PEPT)	1621	-.34	.17
The Belief of Learning Depends on Effort (BLDE)	1621	-.00	-.07
The Belief of Learning Depends on Ability (BLDA)	1621	.74	.51
The Belief of There is Only One True Truth (BOTT)	1621	.13	.08
Traditional Teaching-Learning Conceptions (TTLC)	1621	.28	-.20
Constructivist Teaching-Learning Conceptions (CTLTC)	1621	-.45	-.08

The values in Table 2 show that skewness and kurtosis in the data set for each sub-dimension range from -1 to +1. Morgan et al. (2004) state that skewness and kurtosis in a data set ranging from -1 to +1 is enough to infer that data is normally distributed. West et al. (1995), on the other hand, claim that in order to have a normally distributed set of data, skewness should be less than 2 while kurtosis should be less than 7. Keeping this in mind, the skewness and kurtosis of data sets in this study were found to be within acceptable ranges and data was deemed to be normally distributed. The data set was checked for extreme values and no problems were found. Path analysis was used to calculate predictive relationships among pre-service teachers' epistemological beliefs, their educational philosophy tendencies, and their teaching-learning conceptions. The path analysis model was examined based on *observed* variables; various fit indices of the model (χ^2/df , RMSEA, CFI, GFI, NNFI, NFI, RMR, and SRMR) were assessed. Shur's (2008) coefficients were utilized in the interpretation of path coefficients. Accordingly, coefficient values less than 0.10 were identified as having a low effect, values between 0.10 and 0.50 as having a moderate effect, and values higher than 0.50 as having a strong effect. The theoretical model can be found in Figure 1.

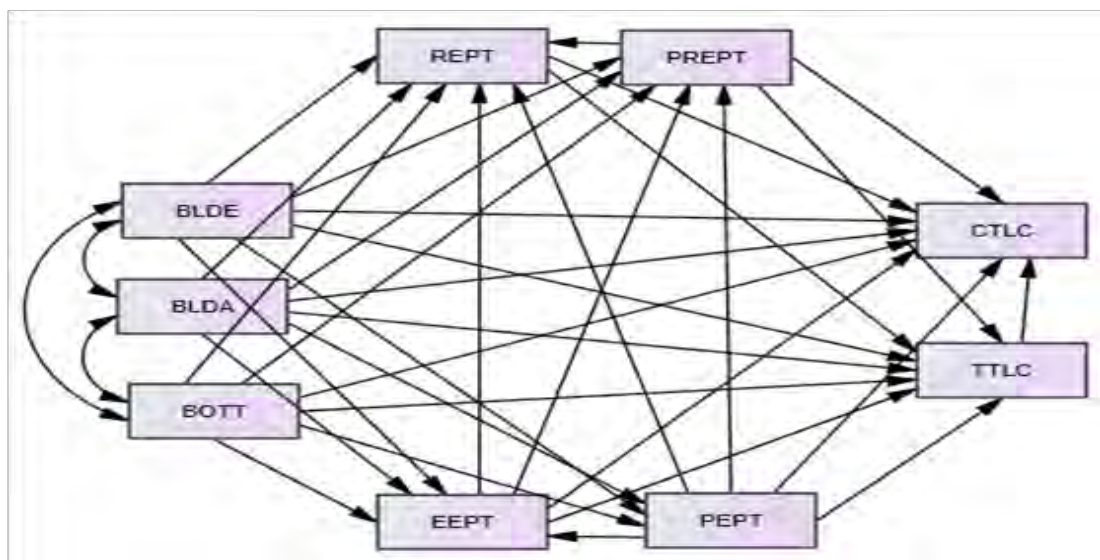


Figure 1. Theoretical model

Findings

After conducting analyses on the evaluation model, paths which did not evince significant effects were removed from the model. Meanwhile, path coefficients of the model were tested to see whether or not they were statistically significant and consequently, seven paths were removed from the model. Data regarding direct effects can be found in Table 3.

Table 3. Measures of direct effects

			Path	t	p
BLDE	→	PREPT	.37	17.672	.000**
BLDE	→	REPT	.20	10.290	.000**
BLDE	→	PEPT	.00	.105	.917
BLDE	→	EEPT	-.06	-2.984	.006**
BLDA	→	PEPT	.08	3.033	.002**
BLDA	→	EEPT	.25	10.816	.000**
BLDA	→	PREPT	-.16	-6.551	.000**
BLDA	→	REPT	.02	.785	.432
BOTT	→	PEPT	.33	12.701	.000**
BOTT	→	EEPT	.10	4.167	.004**
BOTT	→	PREPT	.05	2.191	.028*
BOTT	→	REPT	.01	.495	.621
PEPT	→	TTLC	.26	12.390	.000**
PEPT	→	CTLC	.02	.720	.472
EEPT	→	TTLC	.21	9.550	.000**
EEPT	→	CTLC	-.02	-.844	.399
PREPT	→	CTLC	.47	19.516	.000**
PREPT	→	TTLC	-.14	-5.493	.000**
REPT	→	CTLC	.12	4.863	.000**
REPT	→	TTLC	.05	2.033	.042*
BLDE	→	CTLC	.25	12.942	.000**
BLDE	→	TTLC	.06	2.871	.004**
BLDA	→	TTLC	.21	10.136	.000**
BLDA	→	CTLC	-.08	-3.992	.000**
BOTT	→	TTLC	.27	13.133	.000**
BOTT	→	CTLC	.08	3.675	.000**
PEPT	→	EEPT	.42	19.857	.000**
PEPT	→	PREPT	.10	4.165	.000**
PEPT	→	REPT	.03	1.923	.054
EEPT	→	PREPT	-.26	-11.747	.000**
EEPT	→	REPT	-.02	-1.646	.100
PREPT	→	REPT	.60	31.270	.000**
TTLC	→	CTLC	-.06	-2.666	.008**

*p<.05, **p<.01

Table 3 includes data regarding path coefficients that revealed direct effects among variables and were obtained from the path analysis of the evaluation model. The BLDE dimension was found to have a statistically significant effect on PREPT ($\beta=0.37$, $p<0.01$), REPT ($\beta=0.20$, $p<0.01$), EEPT ($\beta=$ -

0.06, $p < 0.01$), CTLC ($\beta = 0.25$, $p < 0.01$), and TTLC ($\beta = 0.06$, $p < 0.01$), while it didn't have any significant effect on the PEPT ($\beta = 0.00$, $p > 0.05$) dimension. In addition, the effect of the BLDE dimension on PREPT, REPT, and CTLC dimensions was found to be moderate, while its effect on the EEPT dimension was low. The BLDA dimension was found to have a statistically significant effect on PEPT ($\beta = 0.08$, $p < 0.01$), EEPT ($\beta = 0.25$, $p < 0.01$), PREPT ($\beta = -0.16$, $p < 0.01$), TTLC ($\beta = 0.21$, $p < 0.01$), and CTLC ($\beta = -0.08$, $p < 0.01$), while it didn't have any significant effect on the REPT ($\beta = 0.02$, $p > 0.05$) dimension.

In addition, the effect of the BLDA dimension on EEPT, PREPT, and TTLC was found to be moderate, while its effect on the PEPT and CTLC dimensions were low. The BOTT dimension was found to have a statistically significant effect on PEPT ($\beta = 0.33$, $p < 0.01$), EEPT ($\beta = 0.10$, $p < 0.01$), PREPT ($\beta = 0.05$, $p < 0.05$), TTLC ($\beta = 0.27$, $p < 0.01$), and CTLC ($\beta = 0.08$, $p < 0.01$), while it didn't have any statistically significant effect on REPT ($\beta = 0.01$, $p > 0.05$) dimension. In addition, the effect of the BOTT dimension on PEPT, EEPT, and TTLC was found to be moderate, while its effect on the PREPT and CTLC dimensions were low.

The PREPT dimension was found to have a statistically significant effect on CTLC ($\beta = 0.47$, $p < 0.01$), TTLC ($\beta = -0.14$, $p < 0.01$), and REPT ($\beta = 0.60$, $p < 0.01$). The effect of the PREPT dimension on CTLC and TTLC were found to be moderate, while its effect on REPT was high. The REPT dimension was found to have a statistically significant effect on CTLC ($\beta = 0.12$, $p < 0.01$) and TTLC ($\beta = 0.05$, $p < 0.05$). The effect of the REPT dimension on CTLC was found to be moderate, while its effect on the TTLC dimension was low.

The PEPT dimension was found to have a statistically significant effect on TTLC ($\beta = 0.26$, $p < 0.01$), EEPT ($\beta = 0.42$, $p < 0.01$), and PREPT ($\beta = 0.10$, $p < 0.01$), while it didn't have any statistically significant effect on the CTLC ($\beta = 0.02$, $p > 0.05$) and REPT ($\beta = 0.03$, $p > 0.05$) dimensions. The effect of the PEPT dimension on TTLC, EEPT, and PREPT was found to be moderate. The EEPT dimension was found to have a statistically significant effect on TTLC ($\beta = 0.21$, $p < 0.01$) and PREPT ($\beta = -0.26$, $p < 0.01$), while it didn't have any statistically significant effect on CTLC ($\beta = -0.02$, $p > 0.05$) and REPT ($\beta = -0.02$, $p > 0.05$) dimensions. The effect of the EEPT dimension on TTLC and PREPT was found to be moderate. Moreover, the TTLC sub-dimension was found to have a statistically significant and low effect on CTLC ($\beta = -0.06$, $p < 0.01$).

The goodness-of-fit tests (CMIN/DF: 1.557, RMSEA: 0.019, RMR: 0.002, SRMR: 0.006, GFI: 0.99, NFI: 0.99, NNFI: 0.99, CFI: 0.99) for the model showed that the sample data represented a perfect fit (Brown, 2006; Hu and Bentler, 1999; Sümer, 2000; Tabachnick and Fidell, 2001). The percentages that indicate how well variables were explained are as follows: 56% for the CTLC dimension, 53% for the TTLC dimension, 51% for the REPT dimension, 36% for the EEPT

dimension, 31% for the PREPT dimension, and 14% for the PEPT dimension. In addition, Figure 2 presents the standardized path coefficients found among variables.

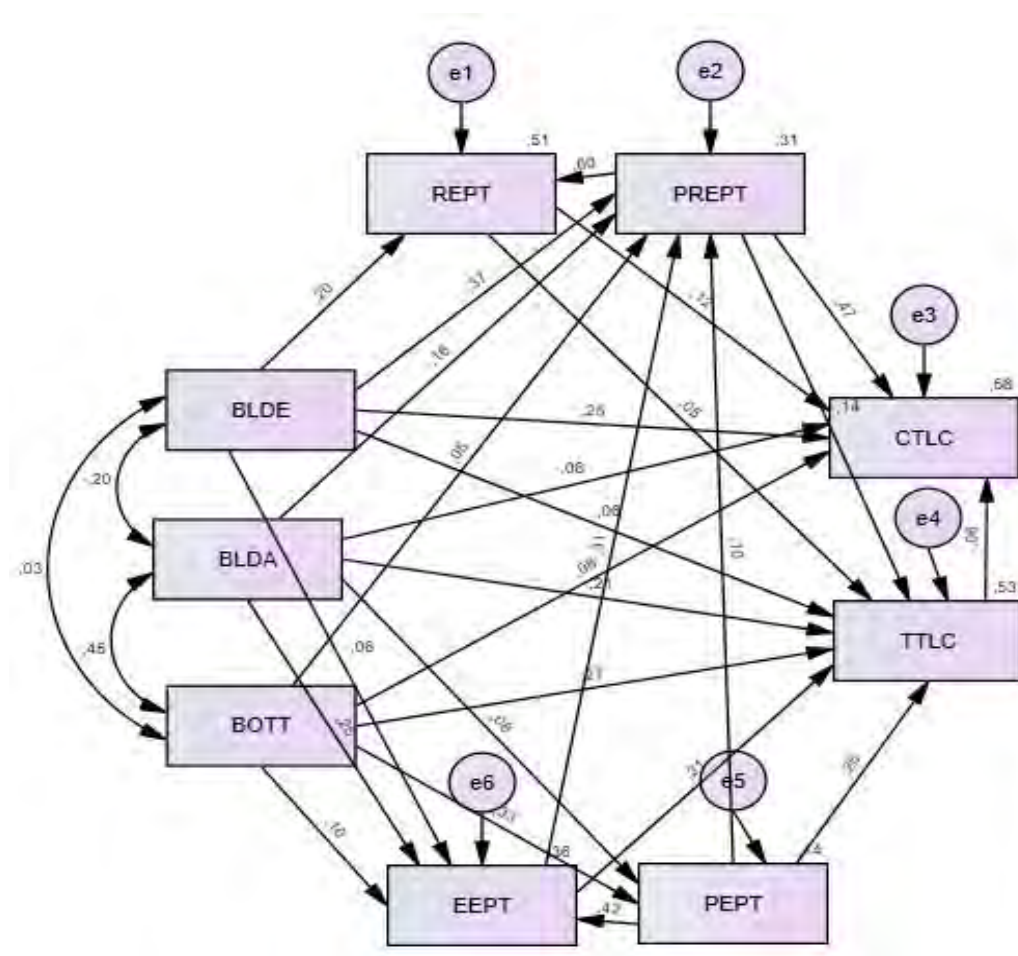


Figure 2. Standardized path coefficients

Indirect effects of the path analysis model are displayed in Table 4.

Table 4. Measures of indirect effects

	BLDE	BLDA	BOTT	PEPT	EEPT	PREPT	REPT	TTLC
PEPT								
EEPT		.03	.14					
PREPT	.02	-.08	-.04	-.13				
REPT	.24	-.15	.00	-.02	-.19			
TTLC	-.05	.11	.13	.09	.03	.03		
CTLC	.24	-.15	-.02	-.04	-.18	.08	-.00	

Based on the analysis results found in Table 4, the BLDE dimension has a positive, moderate, and indirect effect on REPT and CTLC, while it has a negative and indirect effect on TTLC and a positive, low, and indirect effect on PREPT. The BLDA dimension was found to have a negative and indirect effect on both REPT and CTLC, while it has a positive, moderate, and indirect effect on

TTLC. Also, the indirect effect of the BLDA dimension on PREPT was found to be negative and low, while its indirect effect on EEPT is positive and low.

Though the BOTT dimension didn't have an indirect effect on the REPT dimension, it has a positive, moderate, and statistically significant effect on both EEPT and TTLC, while its indirect effect on PREPT and CTLC was found to be negative and low. The PEPT dimension was found to have a negative, moderate, and indirect effect on PREPT, while its indirect effect on both the REPT and CTLC dimensions was negative and low. In addition, the PEPT dimension has a positive, low, and indirect effect on TTLC. The EEPT dimension was found to have a negative, moderate, and indirect effect on both REPT and CTLC, while its indirect effect on TTLC dimension was positive and low. The PREPT dimension was found to have a positive and low effect on both TTLC and CTLC. It is clear that the REPT dimension has no indirect effect on CTLC.

Discussion, Conclusion and Recommendations

A theoretical structure which revealed relationships among pre-service teachers' epistemological beliefs, their educational philosophy tendencies, and their teaching-learning conceptions was tested in this study. It was primarily aimed at bringing the effects of pre-service teachers' epistemological beliefs and their educational philosophy tendencies on their teaching-learning conceptions to light. The effects of pre-service teachers' epistemological beliefs on both their educational philosophy tendencies and the predictive relationships among these tendencies were also investigated.

Study results show that pre-service teachers' epistemological beliefs have a statistically significant effect on their educational philosophy tendencies. The BLDE dimension was found to significantly and positively predict both PREPT and REPT dimensions, while it significantly and negatively predicts EEPT. Based on this finding, it is evident that underlying pre-service teachers' contemporary educational philosophies are epistemological perspectives including beliefs that learning is tied to both effort and process. This being said, BLDA and BOTT dimensions were found to significantly and positively predict both PEPT and EEPT dimensions. Also, the BLDA dimension was discovered to negatively predict the PREPT dimension. Therefore, it can be said that underlying the traditional educational philosophies of pre-service teachers are epistemological perspectives including beliefs that learning is tied to talent and that knowledge is universal and unchangeable. That is to say, pre-service teachers who possess developed epistemological beliefs tend to embrace contemporary educational philosophies, while pre-service teachers with undeveloped epistemological beliefs are inclined to embrace traditional educational philosophies.

The reason why pre-service teachers' epistemological beliefs constitute the basis for their educational philosophy tendencies can be explained by the relationship among different branches of

philosophy. Epistemology, one of the most fundamental fields of philosophy (Cevizci, 2016), serves as a source for many key philosophical movements (Sönmez, 2008). Given that these key philosophical movements provide a basis for educational philosophies (Guttek, 2006), it is evident that epistemology is therefore an important factor in creating hypotheses for educational philosophies. Thus, Manav (2018) states that epistemology is a key element in being able to conceive original educational philosophies. Çüçen (2018), noting that epistemology serves as a source for educational philosophies, emphasizes that educational philosophies differ and become diversified based on epistemological approaches.

According to Yazıcı (2016), beliefs regarding the nature of knowledge reflect philosophical approaches in education. For this reason, pre-service teachers' epistemological beliefs may affect the formation of their educational philosophy tendencies. Thusly, reviews of relevant literature (Biçer et al., 2013; Önen, 2011; Uyangör et al., 2016) show that there are statistically significant relationships between epistemological beliefs and educational philosophy tendencies. For example, studies conducted by Biçer et al. (2013) revealed statistically significant relationships between pre-service teachers' beliefs regarding the importance of both effort and process in learning and their contemporary educational philosophy tendencies.

Epistemological beliefs were found to have a statistically significant effect on teaching-learning conceptions. The BLDE dimension was found to positively predict both the CTLC and TTLC dimensions. Also, the direct effect on TTLC dimension was found to be low, which means that pre-service teachers' constructivist teaching-learning conceptions are based on epistemological perspectives including beliefs that learning is tied to effort and to process. Furthermore, the BLDA and BOTT dimensions were found to positively predict the TTLC dimension, while the BLDA dimension negatively predicts CTLC. These findings indicate that pre-service teachers' traditional teaching-learning conceptions are based on epistemological perspectives including beliefs that learning is tied to talent and that knowledge is universal and unchangeable.

That is to say, pre-service teachers with developed epistemological beliefs often prefer constructivist teaching-learning conceptions while pre-service teachers with undeveloped epistemological beliefs gravitate towards traditional teaching-learning conceptions. Pajares (1992) points out that individuals' epistemological beliefs may affect their sense of self-acceptance regarding the concepts of teaching and learning. Schommer (1990) also puts emphasis on the relationship between epistemological beliefs and teaching and learning processes. Thusly, a variety of studies in the body of relevant literature (Ekinçi, 2017; Tezci et al., 2016; Turan, 2018; Wong et al., 2009) reveal that epistemological beliefs affect teaching-learning conceptions.

Educational philosophy tendencies were found to have statistically significant effects on teaching-learning conceptions. The PREPT dimension was found to positively predict the CTLC

dimension while it negatively predicts the TTLC dimension. Also, the predictive level of the REPT dimension on TTLC was found to be low, while both PEPT and EEPT dimensions positively predicted TTLC. Hence, pre-service teachers' constructivist teaching-learning conceptions were found to serve as a basis for their contemporary educational philosophy tendencies, while their traditional educational philosophy tendencies were based on their traditional teaching-learning conceptions.

Özden (2014) also noted that it is possible to uncover philosophical perspectives when examining the principles of teaching-learning conceptions. Moreover, analyses regarding fundamental principles of constructivist conception emphasize that individuals are active participants in the learning process (Brooks and Brooks, 1999). Taking the idea that pragmatism puts the focus on individuals' interests and needs and constitutes the basis for educational philosophies such as progressivism and reconstructionism as a given (Ornstein and Hunkins, 2014), the effect that contemporary educational philosophies have on constructionist conceptions can be readily understood. Thus, reviews of relevant literature (Aslan, 2018; Baş, 2015) reveal that pre-service teachers' educational philosophy tendencies affect their teaching-learning conceptions.

Statistically significant results were obtained by examining the relationships among pre-service teachers' educational philosophy tendencies. The PEPT dimension was found to have a positive effect on both the EEPT and PREPT dimensions, although its effect on the EEPT dimension was higher. The reason why the PEPT's effect on EEPT is higher can be attributed to the fact that both of these educational philosophies were fostered by similar philosophical movements. Arslan (2017) points out that perennialism and essentialism resemble each other to a great extent. Also, essentialism is an educational philosophy that emerged after perennialism, (Gutek, 2006) indicating that perennialism had an effect on the formation of basic principles of essentialism. In addition, the EEPT dimension was found to have a negative and statistically significant effect on PREPT, which can be ascribed to what is termed traditional-contemporary interaction among educational philosophies.

Gutek (2006) notes that progressivism is an educational philosophy that emerged in response to traditional educational philosophies which place central importance on topics and subjects during the learning process. Moreover, other results obtained from this study show that the PREPT dimension positively affects the REPT dimension. Given that educational principles of reconstructionism are based on pragmatism, which itself fostered progressivism (Ornstein, 1991; Ornstein and Hunkins, 2014), the interaction between these two educational philosophies can be seen more clearly. Thusly, reconstructionists seem to be, to a large extent, under the influence of progressivists while structuring their ideas regarding education (Sönmez, 2008; Turgut, 1992). There is a noticeable trend towards contemporary philosophies among pre-service teachers' educational philosophy tendencies. This trend can be observed when examining their teaching-learning conceptions. Accordingly, the TTLC dimension was found to, albeit slightly, negatively affect the CTLC dimension in this study. Studies in

the relevant literature (Kervan, 2017; Tezci et al., 2016) indicated that pre-service teachers' conceptions evinced a definite trend away from the traditional and toward the contemporary.

As a result, two key findings have been brought to light in this study. Firstly, epistemological beliefs were found to be a factor that affects both educational philosophy tendencies and teaching-learning conceptions. As Hofer and Pintrich (1997) state, this study uncovered the central role that epistemological beliefs play in affecting many factors tied to teaching and learning. Secondly, pre-service teachers' educational philosophy tendencies were also found to affect their teaching-learning conceptions. That is to say, pre-service teachers' epistemological beliefs and their educational philosophy tendencies play an important role in forming and shaping their teaching-learning conceptions. Changes in perspectives regarding the nature of knowledge in the last quarter century have inevitably affected education systems, and, consequently, a constructivist understanding has started to dominate the education systems of many countries. Thusly, the important role that faculties of education play in training constructivist teachers, required for a healthy, functioning education system, is an indisputable fact.

Pre-service teachers' embrace and possession of developed epistemological beliefs ensures that they also possess developed contemporary educational philosophy tendencies and constructivist teaching-learning conceptions. Accordingly, teacher-training programs offered by faculties of education should be designed in a way that contributes to develop pre-service teachers' epistemological beliefs. In this regard, many studies (Brownlee et al., 2001; Feucht et al., 2017) have confirmed that epistemological beliefs can be developed. Keeping this in mind, faculty members can serve as role models for pre-service teachers during their education and training. Teachers' beliefs may have an effect on how their students form their own beliefs (Brownlee, 2004; Kember, 1997). On the other hand, the structural model in this study was only applied to a sample made up of pre-service teachers; therefore, the same structural model can be applied to a sample consisting of in-service teachers.

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