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Examining the Variables Affecting Primary Teachers' Teaching and Learning Approaches with a Structural Equation Model *

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Abstract

Despite the efforts to adopt a learner-centered approach in education, teacher-centred activities are still in use in classroom practices. Practices during primary school years are of critical importance in order for students to be learners who can take their own responsibility. For this reason, it is significant to examine the teaching methods employed by primary school teachers together with their teaching learning approaches and the variables related to these approaches. The aim of the present study is to examine a structural equation model consisting of the variables of epistemological beliefs, general self-efficacy, individual innovativeness and experience specified to explain primary school teachers' teaching approaches and to determine the moderating role of gender in this model. While primary school teachers' teaching approaches and the relationships among these variables have been examined separately by various studies, no holistic study has been found to look into all of them over a single model. Such a study is considerably important both for its contribution to the literature and for planning and offering the support required by teachers for their professional development. Data were collected from 300 teachers within the scope of the study. The results of the path analysis show that the constructivist approaches of primary teachers are directly and positively correlated with the effort dimension of epistemological beliefs and individual innovativeness. Traditional approach sub-dimension, on the other hand, has a direct and positive relationship with the ability and one truth sub-dimensions of epistemological beliefs. Among the variables examined, "effort" has the strongest relationship with the constructivist approach. Moreover, individual innovativeness, which is both directly and indirectly related with teaching-learning approaches, has a stronger relationship with the constructivist approach compared with the traditional approach. Based on the results of the present study, taking these variables into consideration is significant to offer the support required by teachers who have a key role in putting the changes in education

Keywords

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system into practice effectively and to plan professional development programs in line with their needs. It could be recommended that these variables be considered in studies concerning the efficiency of professional development programs and that change be monitored in longitudinal studies.

Introduction

Many countries are moving from industry-based economies to information-based economies, and social and economic conditions are continuously changing (Binkley et al., 2012). In parallel with this, schools are working to prepare their students for regular economic, environmental and social changes, jobs that are not yet existing, technologies that are not yet discovered and social problems that are not yet foreseen (OECD, 2018). In this regard, it is expected that an educational approach which focuses on new knowledge and skills will be developed instead of the teaching focusing on basic information of the past (Binkley et al., 2012). In order to be able to adapt themselves with this change, students will need to acquire knowledge and skills that can develop new products, services, techniques and methods, ways of thinking and living, business and social models (OECD, 2018).

To this end, educational curricula are being updated for students to be active learners and take their own learning responsibilities both in Turkey and all around the world (Akpınar & Gezer, 2010; Ministry of National Education [MoNE], 2017; Muñiz, 2020). The renovated curriculum includes more quality and learner-centred learning times instead of longer learning times (OECD, 2018). With the rapid social and economic changes today, curricula should move away from a pre-determined static form to an adaptable dynamic form, schools and teachers should be able to implement the curriculum by adapting it to the individual and social change (Bümen, 2019; Bümen & Yazicilar, 2020; OECD, 2018). In this regard, teachers must employ active learning methods suitable for the learners' needs in class, create learning environments where information is constructed rather than transferred, and support associating the learning experiences with the real world (Scardamalia, Bransford, Kozma, & Quellmalz, 2012). However, considering in-class practices, it is seen that there are critical problems in the implications of the changes made for learner-centred practices in the curriculum (Boyraz & Güçlü, 2018; Muñiz, 2020; Ünsal, Çetin, Korkmaz, & Aydemir, 2019). Although some teachers state that they adopt a learner-centred approach, these practices cannot be sufficiently reflected on the classroom (Ekinci, 2016; Muñiz, 2020; Saracaloğlu & Altın, 2020). The difference between the change aimed by the curriculum and the one obtained is generally very big (OECD, 2018). Thus, teachers' curriculum of adaptation and implementation skills are extremely important (Bümen & Yazicilar, 2020). In order to enhance teachers' such skills, it is necessary to determine their teaching-learning approaches and related variables.

In the process of generating new knowledge, the use of information and communication technologies (ICT) is also important for both reaching information and supporting creativity. The gradually increasing focus on educational technologies in recent years has become more powerful with the distance learning aspect following the global health pandemic. Educational technologies can affect student achievement adversely if not used properly (OECD, 2015). Similarly, some teachers expressing their opinions about the distance education process during the pandemic stated that students' motivation was low and they did not attend distance education courses adequately (Bakioğlu & Çevik, 2020). When in-class practices are examined, it is seen that teacher-centred practices are carried out in some cases while learner-centred practices are not employed sufficiently (Bakioğlu & Çevik, 2020; Boyraz & Güçlü, 2018; Muñiz, 2020; Ünsal et al., 2019). Supporting student learning requires employing educational technologies in a way that would promote learner-centred practices rather than teacher-centred technology use (Hixon & Buckenmeyer, 2009; MoNE, 2017). In order for ICT to be integrated with teaching-learning processes, teachers should adopt the constructivist teaching-learning approach (Hixon & Buckenmeyer, 2009). In this respect, examining teachers' teaching-learning approaches and the variables affecting these approaches is considerably important to increase the efficiency of distance education and the effectiveness of technology use.

Teaching learning approaches are beliefs that indicate what the roles of teachers and students are and how teaching-learning processes should be conducted (Chan & Elliott, 2004). Therefore, they have a direct effect on in-class practices. In teaching learning approaches, which can be considered as the two ends of a line, the "teacher-centred" traditional approach focuses on the prescribed content and information transfer, while the "student-centred" constructivist approach concentrates upon students' active learning with a developmental understanding (Cheng, Chan, Tang, & Cheng, 2009; Schunk, 2015). The more student-centred learning environments the teachers creates in line with the constructivist approach in the class, the deeper the students' learning gets (Entwistle, Skinner, Entwistle, & Orr, 2010; Trigwell, Prosser, & Waterhouse, 1999). Since information can change depending on time and conditions in constructivism, it is important that the student develops an intrinsic discipline (Radmard, 2020). During the distance education process conducted due to the global pandemic, students with higher intrinsic discipline achieve more success (Bozkurt, 2020). In addition, teachers with a constructivist approach use technology more often in their in-class practices (Alt, 2018; Bağcı, 2019; Hixon & Buckenmeyer, 2009). Moreover, these teachers have higher intrinsic teaching motivation as well as supporting learner autonomy better (Ekinci, 2016; Yıldızlı, Saban, & Baştuğ, 2017). Thus, teachers adopting a constructivist learning teaching approach are expected to raise active students that can benefit from educational technologies and take their own learning responsibilities.

Contrary to the constructivist approach, the traditional approach sees the teacher as the source of information and the student as the passive receiver and teachers with such an approach employ teacher-centred strategies more. A teacher with a traditional approach usually uses direct teaching, the textbook is usually the main resource, the teacher acts as the single supplier of information and prevents students' participation in the teaching process (Chan & Elliott, 2004; Cheng et al., 2009; Saracaloğlu & Altın, 2020). Such teachers use technology rather for teacher-centred information transfer (Bağcı, 2019; Hixon & Buckenmeyer, 2009).

There are many variables related with teaching learning approaches. Some of them include epistemological beliefs, individual innovativeness, general self-efficacy, gender and professional experience (Aypay, 2011a; Baş, 2014; Karhan, 2007; Kurt, 2010; Lee & Tsai, 2005; Ocak, Ocak, Kalender, & Damla, 2017; Saçıcı, 2013). While Ekinci (2016) states that teaching-learning approaches do not vary significantly by gender, some researchers report that constructivist approach scores increase in favour of women (Aypay, 2010b; Baş, 2014; Yaylak, 2020). On the other hand, it is seen that traditional approach scores increase with professional experience and that teachers with fewer years of experience prefer the constructivist approach more frequently (Baş, 2014; Ekinci, 2016; Saracaloğlu & Altın, 2020).

Epistemological beliefs are one of the variables related with teaching learning approaches (Aypay, 2011b; Chan & Elliott, 2004; Cheng et al., 2009; Hofer & Pintrich, 1997; Phan, 2008; Üztemur, Dinç, & İnel, 2020). Schommer (1990) defines epistemological beliefs as the individuals' subjective beliefs about how knowing and learning occur. Personal epistemology is a five-dimensional belief system (beliefs in (a) the source of knowledge, (b) the certainty of knowledge, (c) structure of knowledge, (d) the speed of learning, and (e) the stability of knowledge) (Brownlee, Purdie, & Boulton-lewis, 2001; Schommer-Aikins, Duell, & Hutter, 2005). This belief system affects the individual's attitudes and behaviours as the process of perceiving, interpreting and internalizing knowledge (Hıdıroğlu, 2016). Individuals with mature epistemological beliefs believe that knowledge is developing, some part of it is yet undiscovered and a small part of knowledge is unchangeable. On the other hand, those with immature epistemological beliefs believe knowledge is unchangeable and there is too little knowledge to be discovered (Aypay, 2011b; Schommer, 1990). Teachers' epistemological beliefs affect their behaviours, decisions they make and their methods of planning and implementing their classes (Hofer & Pintrich, 1997; Karhan, 2007; Levitt, 2001; Pajares, 1992). The epistemological beliefs held by teachers may also determine their performance in class and attitudes towards students (Brownlee et al., 2001; Hofer & Pintrich, 1997; Pajares, 1992; Schommer, 1990). Epistemological beliefs have been found to be related with the use of technology as well. Karhan (2007) suggests that teachers who know how to use a computer, use the internet and benefit from computer technologies in class

have more mature epistemological beliefs than others. In conclusion, teachers' epistemological beliefs influence the ways they plan their lessons, the activities they perform in class and how and why they use technology (Bryan, 2003; Karhan, 2007; Teo, Chai, Hung, & Lee, 2008).

Teaching learning approaches and epistemological beliefs are related with each other when examined on the basis of sub-dimensions as well. The dimension of epistemological beliefs claiming that learning depends of effort is related with the constructivist approach (Alpan & Erdamar, 2014; Aypay, 2010a; Chan & Elliott, 2004); and the dimensions stating that learning depends on ability and there is only one truth are related with the traditional approach (Aypay, 2010a; Chan & Elliott, 2004). Besides these studies, some others have revealed relationships of epistemological beliefs with gender (Cano, 2005; Kurt, 2010; Özdemir, 2013) and experience (Alpan & Erdamar, 2014; Çetin, 2010; Hıdıroğlu, 2016; Karhan, 2007; Kurt, 2010; Munby, Cunningham, & Lock, 2000).

General self-efficacy is another variable reported to be related with teaching learning approaches (Ocak et al., 2017; Saçıcı, 2013). General self-efficacy is peoples' beliefs in their capabilities that determine their performance concerning the events that affect their lives (Bandura, 1977). This belief affects individuals' behaviours and efforts in situations they encounter. This also applies to teachers' professional performance. Thus, it is proposed that teachers' perceived self-efficacy have a direct effect on the decisions they make about their educational practices (Goddard, Hoy, & Hoy, 2004; Kurt, 2012). Teachers with high confidence in their capabilities believe that they are influential on students' achievement and motivation (Tschannen-Moran, Hoy, & Hoy, 1998). In addition to these studies, it is seen that as teachers' levels of general self-efficacy beliefs increase, they prefer the constructivist approach more, they get more open to new ideas, implement new strategies more, their technology acceptance levels increase, they engage students in the lesson better and they have more improved class management skills (Aktürk & Delen, 2020; Cansiz & Cansiz, 2019; Caprara, Barbaranelli, Steca, & Malone, 2006; Çınar & Taşkın, 2020; Tschannen-Moranet al., 1998). While some of the studies examining the factors affecting self-efficacy state that gender is related with self-efficacy, some others report no relationship between gender and self-efficacy (Çetin, 2010; Karhan, 2007; Özsoy, 2017). On the other hand, self-efficacy beliefs are known to increase with increased professional experience (Özsoy, 2017).

Another variable that is influential on teaching learning approaches is individual innovativeness (Uslu, 2018). Rogers (1983) defines innovation as "an object, idea or practice that is perceived as new by the individual or society". Individuals can be classified as innovators, early adopters, early majority, late majority and laggards depending on their innovativeness levels (Kılıçer & Odabaşı, 2010; Schlechty, 1993). Innovators are individuals with the highest tendency to accept innovations whereas laggards are more inclined to continue the old practice (Kılıçer & Odabaşı, 2010; Schlechty, 1993). Kozikoğlu and Küçük (2019) state that innovative teachers are more creative. Therefore, teachers' innovativeness levels could be associated with their in-class practices. When the literature on individual innovativeness is reviewed, it is seen that there are a very few number of studies showing that individual innovativeness is related with teaching learning approaches (Uslu, 2018). However, there are a great number of studies revealing that individuals' levels of innovativeness affect epistemological beliefs (Kurt, 2010; Lee & Tsai, 2005; Tsai, 2002). The literature also includes studies that report the relationship between epistemological beliefs and teaching learning approaches (Alpan & Erdamar, 2014; Aypay, 2010a; Chan & Elliott, 2004). In this respect, teachers who are innovative are expected to hold more epistemological beliefs and prefer the constructivist approach. Studies on the variables concerning teaching learning approaches have found relationships between teaching learning approaches and epistemological beliefs (Alpan & Erdamar, 2014; Aypay, 2010b, 2011a; Cano, 2005; Phan, 2008), teaching learning approaches and self-efficacy beliefs (Çayak, 2014; Ocak et al., 2017), epistemological beliefs and self-efficacy perceptions (Baltacı, 2013; Izgar & Dilmaç, 2008), between self-efficacy beliefs and individual innovativeness (Çalık, Koşar, Kılınç, & Er, 2013; Özsoy, 2017). These studies examine the variables concerning teaching learning approaches in pairs, which makes it impossible to consider the variables together and understand the relationships in a holistic way. However, no study has been found to reveal the relationship between individual innovativeness and

learning teaching approaches in the primary school teacher sample. Uslu (2018) studied pre-service teachers' teaching learning approaches on a model, but no study has examined these variables together in a primary school teacher sample.

Aim and Importance of the Study

The aim of the present study is to examine the variables specified to be related to primary school teachers' teaching learning approaches with a structural equation model. To this end, the study sought an answer to the following research questions:

1. What is the model that explains the relationships between teaching learning approaches of primary school teachers and their epistemological beliefs, individual innovativeness, general self-efficacy and experience?
2. What is the moderator role of gender in the relationships among the variables in the model established?

Examination of these variables and revealing their relationships with teaching learning approaches can offer evidence-based recommendations for planning and implementing activities that could promote the in-class reflections of the learner-centred practices highlighted in the changes in curriculum. This could make it possible to make evidence-based decisions concerning the steps to be taken for both pre-service and in-service training of primary school teachers. In addition, since no such study has been found to examine the given variables together, the present study can be claimed to be unique. Moreover, there are a very limited number of studies revealing that individual innovativeness is related to teaching learning approaches, and the relation between innovativeness and learning orientations has been examined at an institutional level (Lee & Tsai, 2005) and in a sample of pre-service teachers (Uslu, 2018). Testing the relationship between innovativeness and learning teaching approaches for primary school teachers can also make significant contributions to the literature. To conclude, the present study is expected to contribute to the literature by examining the relationship of a number of variables with learning teaching approaches of primary school teachers, and to implementation by revealing primary school teachers' states concerning the given variables.

Method

Research Model

The present study was conducted with a correlational research design as it aimed to describe the relationships among variables with no manipulation (Johnson & Christensen, 2014). A theoretical model was constructed to include the relationships among epistemological beliefs, general self-efficacy and individual innovativeness that are considered to be related with teaching learning approaches and presented in Figure 1 (Cheng et al., 2009; Kurt, 2010; Lee & Tsai, 2005; Ocak et al., 2017; Phan, 2008; Saçıcı, 2013; Tsai, 2002; Üztemur et al., 2020). The fitness of the data obtained and this theoretical model was measured with path analysis. Path analysis examines the relationships built theoretically among multiple variables and evaluates the fitness of the model with the data (Johnson & Christensen, 2014).

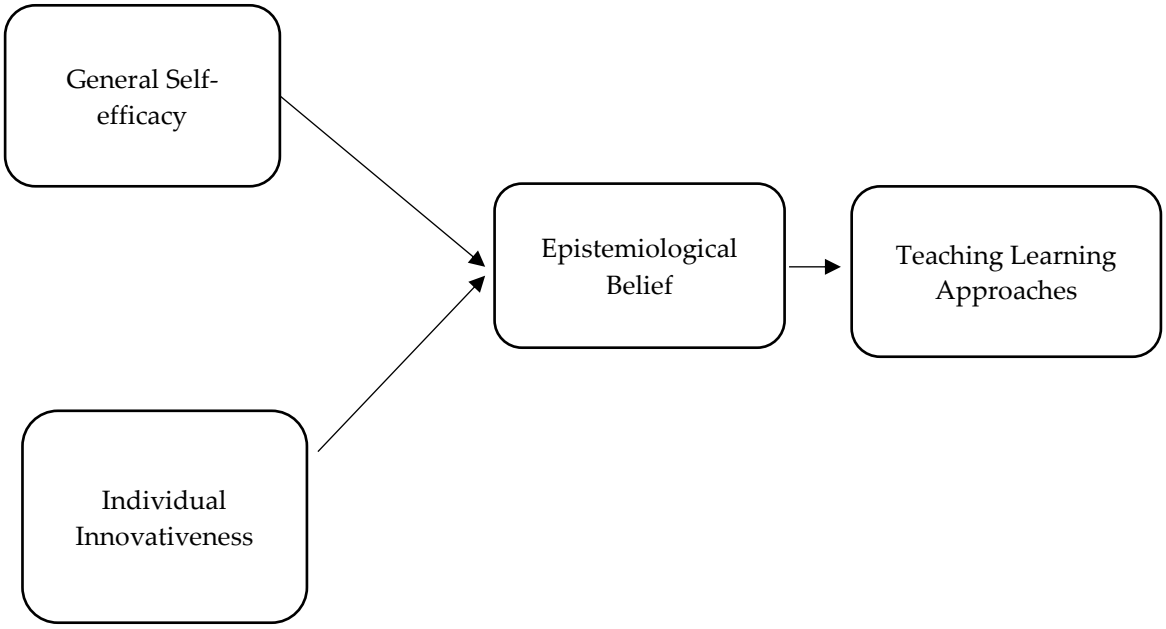

Figure 1. The theoretical model constructed based on the literature

Population and Sample

The population of the present study was selected to include the teachers working at primary schools affiliated to the Ministry of National Education in the 2018-2019 academic year in the city of Manisa. According to the 2018 data, the city's population is around 1 400 000 and the most crowded of the 10 towns with a population density of under 100 has a population of 55 000. the populations of the seven towns with a population density of over 100 are 100 000 and more (T.R. Manisa Governorate, 2020). In this respect, 100 000 can be a cut point for the population densities of the towns. Therefore, one town with a population of over 100 000 and one with a population of under 100 000 were included in the study. Variety was attained according to the location of settlement (town centre, smaller towns, villages) and class type (single-grade and multi-grade classes) and it was aimed to reach teachers from different settlement and school types. As a result, scales were sent to a total of 30 schools. Fifteen out of these schools are central schools while 15 are village schools and educational activities are carried out in multi-grade classes in 10 of them. The implementation of data collection took the participants 20 minutes on average and it was completed in approximately one month. Four hundred fifty teachers were contacted during the process, but data were obtained from 300 teachers. Sixteen forms that were not filled out in a reliable way and included five or more non-response items were excluded from the analysis and data collected from 284 teachers were analysed. Sixty-two point seven percent (n=178) of the participating teachers stated their gender as female. Seventy point eight percent (n=201) of the participants were mainstream class teachers and 29.2% (n= 83) were distributed among other branches (religious culture, guidance, foreign language and other). As for professional experience, 27.1% (n=77) had 6-10 years of experience and 26.1% (n=74) had 11-15 years of experience. Seventy eight percent (n=247) of the teachers are graduates of faculties of education and 85.6% (n=243) work in town centres.

Data Collection Instruments

Personal information form was used to determine the demographic characteristics of the participants. The form asked about the teachers' gender, experience, branch, age, type of school graduated, the location of the school and classroom types they were teaching.

The Teaching and Learning Conceptions Questionnaire (TLCQ) developed by Chan and Elliott (2004) consists of two factors as traditional and constructivist. The questionnaire was adapted into Turkish culture with a study conducted by Aypay (2011a) on a sample of pre-service teachers and exploratory and confirmatory factor analyses results were reported to be acceptable. Psychometric properties of the TLCQ for teachers were examined in the present study. In the exploratory factor

analysis conducted using maximum likelihood estimation to this end, KMO test result was found as .89 and it was concluded that there were sufficient items for each factor. Bartlett test result was found significant (p<.001), which can indicate that the correlations among the variables are adequate and the data set is suitable for factor analysis (Leech, Barrett, & Morgan, 2014). As the two factors in the questionnaire were expected to be correlated (Aypay, 2011a; Chan & Elliott, 2004), Varimax rotation was used (Brown, 2009). Items 1, 2, 7, 10, 20 and 27 were excluded one by one as they had a factor loading of under .30 or gave close factor loadings on more than one factor; and a construct was obtained to explain 43% of the total variance. Factor loadings of the items range between .51 and .72. Expert opinion was received to decide whether this construct could be used as a short form for content validity. Based on the opinions of a professor, two associate professors and a specialist in educational sciences, the short form was concluded to ensure content validity. Discriminant validity was performed as another version of convergent validity and divergent validity for the TLCQ and the data obtained are presented in Table 1.

Table 1. Reliability and Average Variance Extracted (AVE) Values of the Data from Teaching Learning Approaches Scale

Dimensions	Number of Items	Alpha	Composite Reliability	AVE
Traditional Approach	14	.89	.91	.41
Constructivist Approach	10	.83	.87	.41

In Table 1, Alpha coefficient of internal consistency (Cronbach, 1951) and construct reliability were calculated for the data obtained from the concerning scale. Measurement results can be asserted to have sufficient reliability since both values are higher than .70 (George & Mallery, 2019). For convergent validity, factor loadings and AVE values are expected to be higher than .50; however, in the event that construct reliability values are over .60, AVE values of over .40 can also be acceptable (Fornell & Larcker, 1981; Huang, Wang, Wu, & Wang, 2013). In this regard, it could be said that convergent validity of the constructs defined in TLCQ was acceptable.

For discriminant validity, on the other hand, correlations among the sub-scales of the TLCQ and square roots of AVE values were used and the results obtained are given in Table 2. Accordingly, AVE values pertaining to one sub-dimension must not be smaller than the correlation between that sub-dimension and others and must be higher than .50 (Fornell & Larcker, 1981).

Table 2. Descriptive Values, Correlations between Sub-scales and Square roots of AVE Values of the Learning-Teaching Conceptions Questionnaire

	$\bar{X}$	S	[1]	[2]
1. Traditional Approach	2.33	0.67	**.64**	
2. Constructivist Approach	4.39	0.45	.37	**.64**

On the right side of the table, the correlation matrix between the sub-scales of the TLCQ is shown. The diagonal elements of the correlation matrix (values in bold) show the square root of AVE while the non-diagonal elements show the correlation value between the sub-scales. As seen in Table 2, the square root of the AVE values calculated from each sub-scale is larger than the correlation values with other sub-scales (shared variance).

The Epistemological Beliefs Questionnaire (EBQ) was developed by Schommer (1990) and adapted to Turkish by Deryakulu and Büyüköztürk (2002, 2005) on a sample of preservice teachers. The sub-scales were titled as "the belief of learning depends on effort", "the belief of learning depends on ability" and "the belief of only one unchanging truth exists". The scores obtained from the scale are evaluated on factor basis; total scores obtained from the whole scale are not used (Deryakulu & Büyüköztürk, 2002, 2005). Psychometric properties of the EBQ for teachers were examined in the present study. In the exploratory factor analysis conducted using maximum likelihood estimation to this end,

KMO test result was found as .78, and Bartlett test was significant (p<.001). Thus, it could be concluded that there are sufficient items for factor analysis and the correlations among the variables are suitable for factor analysis (Leech et al., 2014). Since the sub-dimensions of the scale were not expected to be correlated with each other (Deryakulu & Büyüköztürk, 2002), Varimax rotation was used (Brown, 2009). In the exploratory factor analysis, items 4, 6, 2 and 17, which had a factor loading of under .30, and items 1, 3, 7, 15, and 16, which gave close loadings on more than one factor, were excluded one by one and the analysis was repeated (Leech et al., 2014). The occurring construct explained 41% of the total variance, with the factor loadings ranging between .43 and .71. Expert opinion was received to decide whether this construct could be used as a short form for content validity. Based on the opinions of a professor, two associate professors and a specialist in educational sciences, the short form was concluded to ensure content validity. Discriminant validity techniques were performed as another version of convergent validity and divergent validity for the EBQ and the data obtained are presented in Table 3.

Table 3. Reliability and AVE Values of the Epistemological Beliefs Questionnaire

Dimensions	Number of Items	Alpha	Composite Reliability	AVE
Belief in one truth	9	.84	.80	.42
Belief in effort	9	.75	.82	.36
Belief in ability	8	.72	.78	.45

In Table 3, Alpha coefficient of internal consistency (Cronbach, 1951) and construct reliability were calculated for the data obtained from the concerning scale. Measurement results can be asserted to be reliable as both values are higher than .70 (George & Mallery, 2019). For convergent validity, factor loadings and AVE values are suggested to be higher than .50; however, in the event that construct reliability values are over .60, AVE values of over .40 can also be acceptable (Fornell & Larcker, 1981; Huang et al., 2013). In this regard, it could be said that convergent validity was ensured for the EBQ.

For discriminant validity, on the other hand, correlations among the sub-scales of the EBQ and square roots of AVE values were used and the data obtained are presented in Table 4. Accordingly, AVE values pertaining to one sub-dimension must not be smaller than the correlation between that sub-dimension and others and must be higher than .50 (Fornell & Larcker, 1981).

Table 4. Descriptive Values, Correlations between Sub-scales and Square roots of AVE Values of the Epistemological Beliefs Questionnaire

	$\bar{X}$	S	[1]	[2]	[3]
1. Belief in one truth	2.12	0.66	**.65**		
2. Belief in effort	4.22	0.41	.24	**.60**	
3. Belief in ability	2.89	0.64	.45	.07	**.67**

On the right side of the table, the correlation matrix between the sub-scales of the EBQ is shown. The diagonal elements of the correlation matrix (values in bold) show the square root of AVE while the non-diagonal elements show the correlation values between the sub-scales. As seen in Table 4, the square root of the AVE values calculated from each sub-scale is larger than the correlation values with other sub-scales (shared variance).

General Self-efficacy Scale (GSES) was developed by Schwarzer and Jerusalem and adapted to more than 25 languages (Aypay, 2010b). The adaptation of the scale to Turkish culture was performed by Aypay (2010a) on a sample of preservice teachers. The original single-dimensional form of the scale consists of 10 items (Scholz, Doña, Sud, & Schwarzer, 2002). Total scores can be calculated over the scale, with low scores showing low general self- efficacy and high scores high self-efficacy (Aypay, 2010b). Psychometric properties of the GSES for teachers were examined in the present study. In the exploratory factor analysis conducted using maximum likelihood, KMO test result was found as .90 and Bartlett values significant (p<.001), which indicated that the correlations among the variables were adequate and

the data set was suitable for factor analysis (Leech et al., 2014). Although Aypay (2010a) used Varimax vertical rotation technique in the adaptation study, it was concluded that the dimensions were related since the correlation between the two factors was found as .67, the scale could give total scores and the original form of the scale had a single-factor; and Promax was selected among oblique rotations (Brown, 2009). The construct explained 57% of the total variance with factor loadings ranging between .50 and .78. Discriminant validity techniques were applied as another version of convergent validity and divergent validity for the TLCQ and the data obtained are presented in Table 5.

Table 5. Reliability and AVE Values of the General Self-efficacy

Dimensions	Number of Items	Alpha	Composite Reliability	AVE
Effort and Resistance	6	.84	.86	.51
Ability and Confidence	4	.72	.77	.47

In Table 5, Alpha coefficient of internal consistency (Cronbach, 1951) and construct reliability were achieved for the data obtained from the concerning scale. Measurement results can be asserted to be reliable as both values are higher than .70 (George & Mallery, 2019). For convergent validity, factor loadings and AVE values are suggested to be higher than .50; however, in the event that construct reliability values are over .60, AVE values of over .40 can also be acceptable (Fornell & Larcker, 1981; Huang et al., 2013). In this regard, it could be said that convergent validity was ensured for the GSES.

For discriminant validity, on the other hand, correlations among the sub-scales of the GSES and square roots of AVE values were used and the data obtained are presented in Table 6. Accordingly, AVE values pertaining to one sub-dimension must not be smaller than the correlation between that sub-dimension and others and must be higher than .50 (Fornell & Larcker, 1981).

Table 6. Descriptive Values, Correlations between Sub-scales and Square roots of AVE Values of the General Self-efficacy Scale

	$\bar{X}$	S	[1]	[2]
1. Effort and Resistance	3.15	0.39	**.71**	
2. Ability and Confidence	3.26	0.39	.67	**.69**

On the right side of the table, the correlation matrix between the sub-scales of the GSES is shown. The diagonal elements of the correlation matrix (values in bold) show the square root of AVE while the non-diagonal elements show the correlation values between the sub-scales. As seen in Table 6, the square root of the AVE values calculated from each sub-scale is larger than the correlation values with other sub-scales (shared variance).

The Individual Innovativeness Scale (IIS) was developed by Hurt, Joseph and Cook (1977) and adapted to Turkish by Kılıçer and Odabaşı (2010). Consisting of twenty items, the scale is used calculating total scores. The score obtained from the negative items are subtracted from the score obtained from the positive items and the total score is calculated by adding 42 points to this sum. Individuals are classified as innovators, early adopters, early majority, late majority and laggards according to the score range obtained (Kılıçer & Odabaşı, 2010).

Psychometric properties of the scale for teachers were examined in the present study. In the exploratory factor analysis conducted using maximum likelihood estimation to this end, KMO test result was found as .85, Bartlett test result as significant (p<.001), it was concluded that correlations between items were suitable for factor analysis with the number of items per factor (Leech et al., 2014). Since the factors were not expected to correlate with each other (Kılıçer & Odabaşı, 2010), Varimax rotation was employed. The construct obtained explained 53% of the total variance. Factor loadings ranged between .41 and .82. Discriminant validity techniques were applied as another version of convergent validity and divergent validity for the IIS and the data obtained are presented in Table 7.

Table 7. Reliability and AVE Values of the Individual Innovativeness Scale

Dimensions	Number of Items	Alpha	Composite Reliability	AVE
Resistance to Change	8	.82	.86	.44
Opinion Leadership	5	.76	.84	.51
Openness to Experience	5	.70	.74	.38
Risk Taking	2	.78	.73	.64

In Table 7, Alpha coefficient of internal consistency (Cronbach, 1951) and construct reliability were achieved for the data obtained from the concerning scale. Measurement results can be asserted to be reliable as both values are higher than .70 (George & Mallery, 2019). For convergent validity, factor loadings and AVE values are suggested to be higher than .50; however, in the event that construct reliability values are over .60, AVE values of over .40 can also be accepted (Fornell & Larcker, 1981; Huang et al., 2013). As AVE values are over or close to these limits, it could be said that convergent validity was ensured.

For discriminant validity, on the other hand, correlations among the sub-scales of the IIS and square roots of AVE values were used and the data obtained are presented in Table 8. Accordingly, AVE values pertaining to one sub-dimension must not be smaller than the correlation between that sub-dimension and others and must be higher than .50 (Fornell & Larcker, 1981).

Table 8. Descriptive Values, Correlations between Sub-scales and Square roots of AVE Values of the Individual Innovativeness Scale

	$\bar{X}$	S	[1]	[2]	[3]	[4]
1. Resistance to Change	2.49	0.65	**.67**			
2. Opinion Leadership	3.72	0.60	.31	**.71**		
3. Openness to Experience	3.76	0.56	.32	.56	**.62**	
4. Risk Taking	4.06	0,.67	.34	.41	.50	**.80**

On the right side of the table, the correlation matrix between the sub-scales of the IIS is shown. The diagonal elements of the correlation matrix (values in bold) show the square root of AVE while the non-diagonal elements show the correlation values between the sub-scales. As seen in Table 8, the square root of the AVE values calculated from each sub-scale is larger than the correlation values with other sub-scales (shared variance).

Data Analysis

After the data were digitalized, the pattern of missing data was evaluated to see whether it was missing completely at random or not with the listwise method, and it was replaced with the series mean as it was found to distribute randomly (Kalaycı, 2008). The fitness of the model constructed theoretically in the study with the data was tested with path analysis using maximum likelihood estimation. Analyses were performed on SPSS 25 (IBM Corp., 2017) and Lisrel 8.7 (Jöreskog & Sörbom, 2018) software. Before the analyses, univariate normality, multivariate normality, linear relationships between variables and multicollinearity assumptions were tested (Leech et al., 2014). Skewness values were examined for univariate normality and the occurring values were found to be beyond the limits of normal distribution. Z-scores were calculated to determine the data that show extreme deviation from normal distribution and 16 pieces of data remaining out of the +3.29 and -3.29 range were deleted (Ghasemi & Zahediasl, 2012). Since skewness values ranged between +1 and -1 (Büyüköztürk, 2007; Leech et al., 2014) and kurtosis values between +1.5 and -1.5 (George & Mallery, 2019), it was concluded that the assumption of univariate normality was met. Examining the multivariate normality assumption, total critical ratio was found as 10.85, which could be considered close to acceptable values (Byrne, 2010). Other assumptions to be tested are the absence of multiple collinearity and linear relationships between variables. To this end, correlations between the variables were examined and seen to range between .01 and .54 (see Appendix 1.). Thus, it can be said that no multiple collinearity problem exists.

Results

In this section, descriptive statistics of the variables are presented first which as followed by the graphs and tables showing the results obtained from the path analysis. Descriptive statistics of the variables are shown in Table 9.

Table 9. Descriptive Statistics of the Variables

Scales	Sub-scales	Maximum	Minimum	$\bar{X}$	Mod	Median	S
Teaching Learning Conceptions	Constructivist Approach	5.00	3.00	4.38	4.25	4.42	0.42
	Traditional Approach	4.61	1.06	2.54	2.28	2.44	0.59
Epistemological Belief	Effort	4.89	3.11	3.96	3.89	3.94	0.33
	Ability	4.71	1.00	2.19	2.00	2.14	0.69
	One truth	4.56	1.00	2.76	2.67	2.78	0.61
General Self-efficacy		4.00	2.29	3.20	3.00	3.13	0.36
Individual Innovativeness		94.00	39.00	67.70	63.00	67	9.13

In Table 9, it can be seen that teachers' mean score of constructivist approach ($\bar{X}$=4.38, S=0.45) concerning the sub-scales of learning teaching conceptions is higher than their mean score of traditional approach ($\bar{X}$ =2.54, S=0.67). As for epistemological beliefs, the highest mean is found in the subscale "learning depends on effort" ($\bar{X}$=3.96, S=0.33). Teachers' general self-efficacy scores are at moderate level ($\bar{X}$=3.20, S=0.36). In addition, in order to determine the categories of innovation, individual innovativeness scores were calculated as specified by the scale and assigned to categories. According to the distribution of teachers in the five categories of the innovativeness scale, it is seen that the ratio of innovators is low (8.45%), while the ratios of early adopters (36.9%) and early minority (44.7%) are higher and those of late majority (8.80%) and laggards (1.05%) are low.

Confirmatory factor analyses were performed to examine the measurement models before the path analysis. During these analyses, error variances of item 12 and item 13 were combined in line with the modification indices recommended for EBS. For GSES, on the other hand, error variances between item 1 and item 2 were combined from the recommended modification indices. Values obtained from the confirmatory factor analyses for all scales are presented in Table 10.

Table 10. Confirmatory Factor Analysis Results for the Scales Used

Fit Indices	Good Fit*	Adequate Fit*	TLCQ	EBS	GSES	IIS
RMSEA	0<RMSEA<0.05	0.05<RMSEA<0.08	.074	.075	.069	.059
SRMR	0<SRMR<0.05	0.05<SRMR<0.1	.075	.078	.044	.057
NNFI	0.97<NNFI<1	0.95<NNFI<0.97	.94	.90	.94	.95
CFI	0.97<CFI<1	0.95<CFI<0.97	.95	.91	.96	.95
χ^2			647**	555**	78**	326**
sd			251	271	33	163

* (Jöreskog & Sörbom, 2015; Şimşek, 2007) ** p<.01

It can be seen in Table 10 that the values obtained for all four scales are within or very close to acceptable limits. Thus, it could be said that the scales can be used in the sample of teachers.

When the first model that was constructed theoretically for the correlations between variables (Figure 1) was tested, it was seen that the fit indices between the model and data did not fall within acceptable limits. Therefore, some amendments were decided to be made on the model. To this end, the relationships between the subscales of general self-efficacy and epistemological beliefs that had insignificant t values were excluded from the model in the first place (Uslu, 2018). Afterwards, the

model was added the direct relationship of individual innovativeness with teaching learning approaches (Lee & Tsai, 2005). In addition, a relationship was built between ability and one truth, both of which are accepted as naïve epistemological beliefs and the belief that teaching learning ability is innate (Aypay, 2011a; Schommer, 1990, 1993). The new model constructed upon these amendments was tested with path analysis and the obtained fit indices (RMSEA: .076, SRMR:.075, NNFI:.91, CFI: .95) indicated adequate model-data fit (Hu & Bentler, 1999; Jöreskog & Sörbom, 1993). The relations between the variables and standardized solutions are presented in Figure 2.

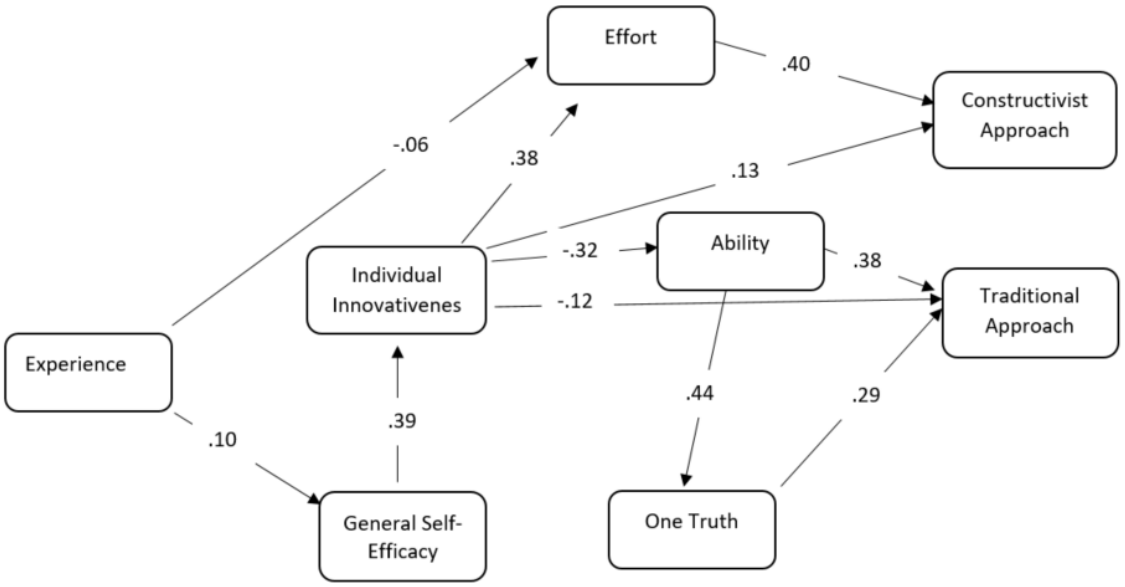

Figure 2. The relationship of teaching learning approaches with general self-efficacy, epistemological beliefs and individual innovativeness for all data (Standardized results)

Figure 2 shows that a direct relationship exists between teaching learning approaches and epistemological beliefs. Among the epistemological beliefs; effort is related with the constructivist approach while ability and one truth are related with the traditional approach. The understanding of individual innovativeness is directly and significantly correlated with the constructivist approach and epistemological beliefs. As individual innovativeness increases, effort dimension of epistemological beliefs increases as well while ability dimension decreases. Individual innovativeness has a positive correlation with the constructivist approach and a negative correlation with the traditional approach. General self-efficacy belief, on the other hand, is indirectly and significantly related with teaching learning beliefs. Moreover, teachers' experience has a direct and significant relationship with general self-efficacy and the effort dimension of epistemological beliefs. Total variances explained for the dependent variables are 21% for the constructivist approach dimension of teaching learning conceptions, 38% for the traditional approach dimension, 1% for general self-efficacy, 16% for individual innovativeness, 14% for the effort dimension of epistemological beliefs, 10% for the ability dimension and 20% for the one truth dimension.

The traditional approach has direct and significant relationships with epistemological beliefs and individual innovativeness. Other variables related with the traditional approach include the dimensions of epistemological beliefs that claim learning is dependent on ability and only one truth exists. Direct, indirect and total relations between the independent variables (general self-efficacy, individual innovativeness, effort, ability, one truth, experience) and dependent variables (constructivist approach, traditional approach) are given in Table 11.

Table 11. Direct, Indirect and Total Relations with Teaching Learning Approaches

Independent Variables	Moderator	Dependent Variables	Indirect	Direct	Total
Experience	→G Self-efficacy → Individual Innov.→ →G Self-efficacy → Individual Innov. → → Ability → →G Self-efficacy → Individual Innov.→ → Ability →One truth→	Traditional Approach	-.011*		-.011*
Experience	→G Self-efficacy → Individual Innov. → →G Self-efficacy → Individual Innov →. → Effort → → Effort →	Constructivist Approach	-.023*		-.023*
General Self-efficacy	→ Individual Innov → → Individual Innov → Ability → → Individual Innov → Ability → One Truth →	Traditional Approach	-.11*		-.11*
General Self-efficacy	→ Individual Innov → → Individual Innov →Effort →	Constructivist Approach	.11*		.11*
Individual Innovativeness	→ Ability → → Ability →One Truth→	Traditional Approach	-.14*	-.13*	-.27*
Individual Innovativeness	→Effort →	Constructivist Approach	.15*	.20*	.35*
Effort		Constructivist Approach		.40*	.40*
Ability	→ One Truth →	Traditional Approach	.13*	.38*	.51*
One Truth		Traditional Approach		.29*	.29*

* $p<.05$

In Table 11, it can be seen that teachers' professional experiences have an indirect relation with teaching learning approaches. Professional experience has a higher correlation with the constructivist approach than the traditional approach. There is a negative and significant correlation between professional experience and constructivist approach scores. General self-efficacy belief is indirectly related with teaching learning approaches. General self-efficacy has significant relations of negative direction with traditional approach scores and of positive direction with constructivist approach scores.

In this regard, it could be asserted that teachers with high general self-efficacy prefer the constructivist approach more. Individual innovativeness scores, another variable with direct and indirect relationships with teaching learning approaches, have negative significant correlations with traditional approach scores and positive significant correlations with constructivist approach scores. It can be said that innovative teachers accept the constructivist learning teaching approach more.

Another variable to be correlated with teaching learning approaches is epistemological beliefs. In terms of sub-dimensions; there is a positive significant relationship between the belief that learning depends on effort and the constructivist teaching learning approach. In other words, teachers' belief in their effect on students' own learning is associated with teachers' adoption of the constructivist approach. The belief that learning depends on ability and that there is only one truth as the other sub-dimensions of epistemological beliefs are directly and significantly correlated with the traditional approach. In other words, teachers with immature epistemological beliefs prefer the traditional learning teaching approach more.

Moderator Effect of Gender

Multiple group analysis was performed to test whether the relationship between variables differed by gender in the model constructed. The difference between the chi-square values of the two models built using women's and men's data is statistically significant (p<.05). The fit indices obtained from all three data sets (women, men and all data) are presented in Table 12.

Table 12. Fit Indices concerning the Analysis Conducted Using Three Data Sets

Fit Indices	Good Fit*	Adequate Fit*	All Data	Women	Men
RMSEA	0<RMSEA<0.05	0.05<RMSEA<0.08	.076	.071	.026
SRMR	0<SRMR<0.05	0.05<SRMR<0.1	.075	.079	.99
NNFI	0.97<NNFI<1	0.95<NNFI<0.97	.91	.93	.99
CFI	0.97<CFI<1	0.95<CFI<0.97	.95	.96	.99
χ^2			44.42**	32.72**	18**
sd			17	17	17

* (Jöreskog & Sörbom, 2015; Şimşek, 2007) ** p<.01

It can be seen in Table 12 that the fit indices of the model built over the men's data are better. Accordingly, it can be said that the relations examined in the model are higher for men. The models obtained from the women's and men's data are shown in Figure 3 and Figure 4.

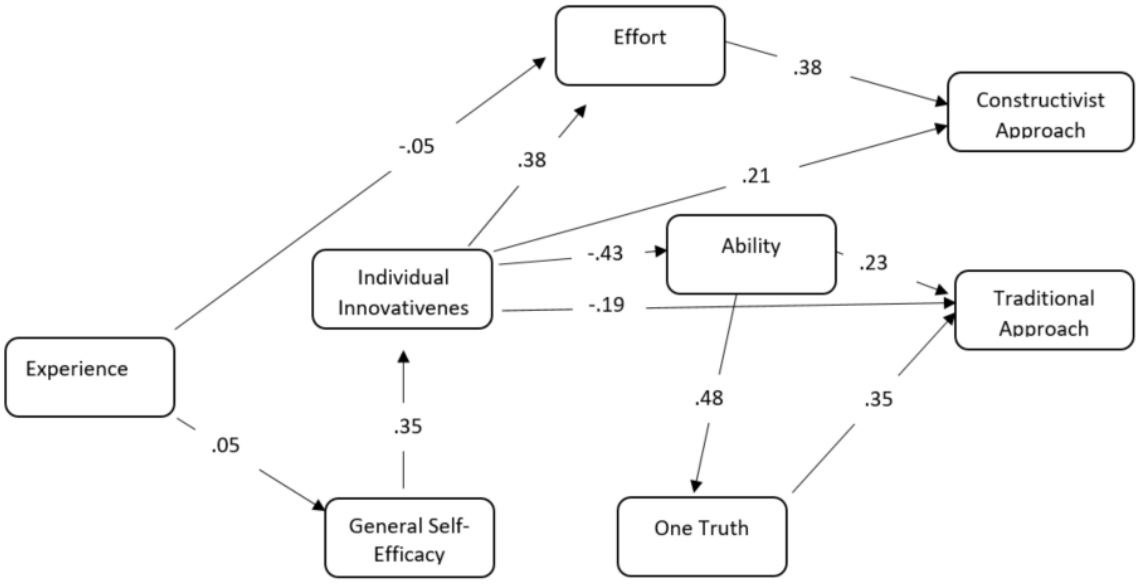

Figure 3. Relationship of teaching learning approaches with general self-efficacy, epistemological beliefs and individual innovativeness for the data pertaining to women (Standardized results)

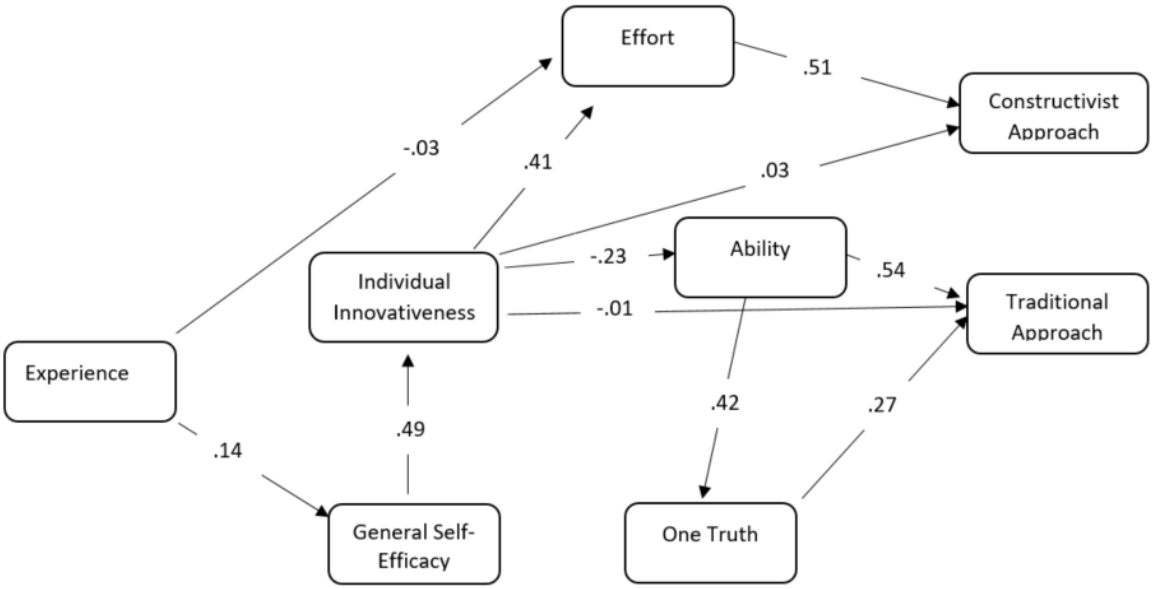

Figure 4. Relationship of teaching learning approaches with general self-efficacy, epistemological beliefs and individual innovativeness for the data pertaining to men (Standardized results)

Comparing Figure 3 and Figure 4, experience has a higher correlation with general self-efficacy in men. The most significant difference in the model seems to be in the relation of individual innovativeness with epistemological beliefs and teaching learning approaches. The negative correlation between individual innovativeness and the ability dimension of epistemological beliefs is much higher in men. On the other hand, the relation between individual innovativeness and teaching learning approaches is lower in men compared with women.

Discussion, Conclusion and Suggestions

The present study examined the variables related to teaching learning approaches of primary school teachers on a model. According to the findings, teachers' teaching learning approaches are directly or indirectly correlated with their epistemological beliefs, individual innovativeness, general self-efficacy and experiences. Gender has a moderator role in the relationships among these variables. The study makes significant contribution to the literature by examining the variables connected with teaching learning approaches on a model and by dealing with the relationship between individual innovativeness and learning teaching approaches in the sample of primary school teachers. In addition, practitioners can be supported in making evidence-based decisions by identifying the existing situation concerning the given variables.

Mean scores of the given variables show that teachers' scores on the constructivist dimension are higher than their traditional approach in their teaching learning approaches. Likewise, many studies conducted recently in the literature state that teachers' scores of constructivist teaching learning approaches are higher than their traditional approach scores (Baş, 2014; Engin & Daşdemir, 2015). It could be said that the constructivist-oriented curriculum that has been in practice since 2006 in Turkey has helped teachers to adopt the constructivist approach more. In addition, mean scores are higher on the dimension that claims learning is dependent on effort than other dimensions of epistemological beliefs. There are studies supporting this finding in the literature as well (Kaya & Ekici, 2017). Teachers' holding matured epistemological beliefs is consistent with their adoption of the constructivist learning teaching approach (Bahçivan, 2017; Chan & Elliott, 2004). The teachers who participated in the study have a moderate level general self-efficacy perception. Studies conducted in 25 different countries using this scale report similar results (Scholz et al., 2002). When individual innovativeness scores are examined, it is seen that the teachers are mostly in the early majority category and most of the participants defined themselves as early adopters and early majority. In the related literature, although

different results were obtained concerning teachers' levels of innovativeness, a great majority of studies report that teachers are in the early majority category (Başaran & Keleş, 2015; Kılıç, 2015).

Based on the findings, the most critical variable to have a direct connection with teaching learning approaches is epistemological beliefs. The belief that learning is dependent on effort among epistemological beliefs has a positive relationship with the constructivist teaching learning approach. However, the belief that learning depends on ability and that there is only one truth are related with the traditional teaching learning approach. In other words, teachers who have matured epistemological beliefs prefer the constructivist approach more while those holding immature epistemological beliefs tend to adopt the traditional approach. The literature includes many studies supporting these findings as well (Akyıldız, 2018; Bahçivan, 2017; Phan, 2008; Üztemur et al., 2020). The most important feature of the constructivist approach is that it allows the learner to construct, interpret and develop the knowledge (Karadağ, Deniz, Korkmaz, & Deniz, 2008). Teachers' epistemological beliefs are considered as an important factor that shape their beliefs about teaching which can affect their teaching practices (Hashweh, 1996; Tsai, 2002). In this respect, it is an expected result that epistemological beliefs are related with teaching learning approaches. Parallel with this relationship, the teachers composing the study group have matured epistemological beliefs and prefer the constructivist approach more.

Another variable that is directly or indirectly related with teaching learning approaches is individual innovativeness. Innovativeness has a positive relationship with the constructivist approach, and a negative relationship with the traditional approach. Similarly, innovativeness is stated to have possible relationships with teaching learning approaches by Uslu (2018) at the level of pre-service teachers and by Lee and Tsai (2005) in the context of institutions' learning orientations. However, no study has been found to examine the relations between innovativeness and learning teaching approaches in teachers working in primary schools. Moreover, innovative individuals are seen to hold more matured epistemological beliefs (Kurt, 2010; Lee & Tsai, 2005; Tsai, 2002) and such individuals are expected to adopt the constructivist teaching learning approach. In addition, it is stated that individuals who are open to innovation are reported to be more open to using technology and that teachers who use technology prefer the constructivist approach rather than the traditional approach (Teo & Zhou, 2017; Teo et al., 2008). In order for teachers to be able to adapt to the changes within the educational system more easily, embrace these changes and keep their individual innovativeness levels high, they can be included in the processes of planning and implementation of the change (Fullan, 2005).

Another variable that has an indirect relationship with teaching learning approaches is general self-efficacy. There is a positive relationship between self-efficacy and constructivist teaching learning approach. In addition, it is seen that general self-efficacy have a positive relationship with innovativeness and mature epistemological beliefs. The literature includes studies showing relationships among teaching learning approaches, innovativeness and epistemological beliefs (Aktaş & Aktaş, 2015; Aktürk & Delen, 2020; Ocak et al., 2017; Tschannen-Moran et al., 1998).

The model constructed indicates that another variable related to teaching learning approaches is experience. Experience has a positive relationship with constructivist approaches. Newly appointed young teachers can be said to prefer the constructivist approach more. Many researchers in the literature report that teachers adopt the traditional approach more as their experience increases (Ekinci, 2016; Saracaloğlu & Altın, 2020). Based on the positive effect of experience on self-efficacy (Dilmaç & İnanç, 2015; Durmuş, 2019; Özsoy, 2017), teachers with high general self-efficacy can be expected to adopt the constructivist approach more. However, as teachers begin to resist to change with increased experience (Kurt, 2010) and their belief that knowledge is dependent on effort decreases, teachers adopt more traditional teaching learning approach. Examined in terms of gender, it is seen that men have higher scores on traditional approach compared to women. In this regard, women can be claimed to adopt the constructivist teaching learning approach more than men do. While the literature includes studies reporting higher constructivism scores in favour of women, (Aypay, 2011a; Ecevit & Özdemir, 2020; Yaylak, 2020), there are also other studies that found no difference in terms of gender (Ekinci, 2016).

The present study can be said to have some limitations and weaknesses. The study group was restricted to 300 teachers working in the two towns of the city of Manisa. This can be considered a weakness for the study. Variables related to teaching learning approaches were limited to epistemological beliefs, general self-efficacy, individual innovativeness and experience. Despite these limitations and weaknesses, some recommendations can be made for practice and research.

The present study found that teachers' constructivist teaching learning approaches are high. However, there are studies, which show that teachers fail to fulfil the requirements of the constructivist approach in their in-class practices despite defining themselves as constructivists (Boyraz & Güçlü, 2018; Kaya & Ekici, 2017). Thus, studies can be conducted to measure teachers' teaching learning approaches through observations in addition to the self-reflection scales. Epistemological beliefs that were found to be in direct relation with teaching learning approaches in the model constructed are of improvable quality. Therefore, by conducting professional development studies on teachers' individual innovativeness, which is another important variable as well as their epistemological beliefs, teachers can be supported to have more mature epistemological beliefs and adopt innovations more easily. Generalizability could be increased through studies to be conducted with larger groups of teachers from different branches. Relationships of different variables with teaching learning approaches can also be examined. In this respect, it becomes necessary to plan professional development programs suitable with teachers' needs and to provide the support required in the process by teachers, who have a key role in putting the changes occurring in educational system into practice more effectively. To this end, it is considered important to carry out studies to develop the variables by taking the relationships between them into consideration. Thus, curricula that highlight learner-centred practices can be reflected more in the classroom and learner-centred distance learning practices can be employed. As a result, contribution could be made to teach students who can take their own responsivity.

In conclusion, in the present study which aimed to examine teachers' teaching learning approaches on a model, it was seen that teachers' teaching learning approaches have direct relations with their epistemological beliefs and individual innovativeness and indirect relations with general self-efficacy and branch. Presenting the relationships among these variables over a model both helped understanding the variables concerning teaching learning approaches in the literature and provided the decision makers that plan the change with evidence on the variables they need to consider to promote teachers' learning teaching approaches.

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Appendix 1. Correlation Analyses Between Variables

	1	2	3	4	5	6	7	8
1. Experience	1							
2. General self-efficacy	.11	1						
3. Individual Innovativeness	-.06	.40**	1					
4. Effort	-.07	.21**	.39**	1				
5. Ability	.08	.07	-.32**	-.24**	1			
6. One truth	.06	.01	-.19**	-.07	.45**	1		
7. Constructivist Approach	-.03	.17**	.28**	.45**	-.21**	-.05	1	
8. Traditional Approach	.12*	-.01	-.28**	-.24**	.54**	.48**	-.36**	1

* Correlation significant at .05 level

** Correlation significant at .01 level