The Relationships between Middle School Teachers' Epistemological Beliefs and Learner Autonomy Support Behaviours: The Role of Teaching-Learning Conceptions as the Mediating Variable

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Abstract

This study aims to reveal the predictive and explanatory relationships amongst the middle school teachers' epistemological beliefs, their teaching-learning conceptions and their learner autonomy support behaviours on the suggested model. Designed as a multi-factorial complex predictive correlational study, this paper employs 345 middle school teachers actively teaching various subject in the center of Manisa province in 2017-2018 academic year. "*Epistemic Belief Inventory*" was used to determine teachers' epistemological beliefs, while "*Teaching-Learning Conceptions Scale*" was utilised to determine their teaching–learning approaches. On the other hand, "*Learner Autonomy Support Scale*" was used to find out the participants' learner autonomy support behaviors. The structural equation modeling was utilised to test the suggested model. The findings have indicated that middle school teachers' sophisticated epistemological beliefs predict constructivist teaching-learning conceptions and learning autonomy support behaviours in a meaningful way positively while predicting the traditional teaching –learning conceptions negatively. Constructivist teaching-learning conceptions predict learner autonomy support behaviours meaningfully and positively. It was seen that there is not any relationship between traditional teaching learning conceptions and learner autonomy support behaviours. Another significant result is that constructivist teaching-learning conceptions have a mediating effect on sophisticated epistemological beliefs and learner autonomy support behaviours. The results reveal that teachers' epistemological beliefs have a direct influence on their teaching learning conceptions and learner autonomy support behaviours.

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Introduction

Epistemological beliefs, teachers' conceptions of teaching-learning and their learner autonomy support behaviours are discussed in this section. In consideration with the research purpose, the relationships between those three variables are examined after then.

Epistemological Beliefs

Gaining prominence as a philosophical discipline in the modern ages (Kulcu, 2000), epistemology substantially handles the issues of the sources, structures, methods, capabilities, limitations, and value of knowledge (Bolay, 2004; Demir & Akınoğlu, 2010; Tezci & Uysal, 2004). Epistemological beliefs on the other hand, are personal beliefs held by people about the nature of knowledge and acquisition of knowledge (Schommer, 1994, 1998). Described as personal thoughts and beliefs toward the entity or existence of knowledge, how it is acquired, its degree of certainty, and its limitations (Brownlee, Purdie, & Boulton-Lewis, 2001; Tezci & Uysal, 2004), epistemological beliefs have attracted a profound amount of psychologists' and educators' attention in recent decades (Hofer, 2001; Hofer & Pintrich, 1997; Tezci & Uysal, 2004). Apart from those issues that have been handled by conventional epistemology studies, epistemological belief research has been seeking to answer these questions: (a) how are epistemological beliefs conceptualized? (b) Are epistemological beliefs related to learning? (c) How are epistemological beliefs developed or changed over the course of time? And (d) Which factors influence epistemological beliefs? (Schommer, 1994).

Perry's (1970, as cited in Hofer & Pintrich, 1997) research on students attending Harvard University has been accepted as the pioneering of the epistemological belief studies. He suggested a model in which the development of epistemological beliefs follows one another sequentially. According to Perry, newcomers to university tend to believe that knowledge is simple, certain, and both produced and presented by experts/specialists. Towards the end of their undergraduate education however, most of these same individuals begin to believe that knowledge depends upon the context, that there are only a few absolute truths. Perry concludes that the meaning of knowledge for those persons turns into an inextricable form consisting of countless interrelated items, which is produced by individuals through personal observations and reasoning rather than by experts/specialists (Deryakulu, 2014; Dinç, İnel, & Üztemur, 2016; Schommer-Aikins, 2002).

Starting with Perry, epistemological belief model studies have been carried out by various researchers on varied samples names (Baxter-Magolda, 1992; Belenky, Clinchy, Goldberger, & Tarule, 1986; King & Kitchener, 1994; Kuhn, Cheney, & Weinstock, 2000). Schommer (1990) criticized epistemological development models which are designed to assess individuals' beliefs on knowledge and the acquisition of knowledge sequentially in a single-dimension sphere. She argued not only that such developmental models' approach to epistemological beliefs is not appropriate to comprehend the complex structure of these beliefs but also that they might impose certain constraints to multiple connections between epistemological beliefs and various aspects of learning. Schommer (1990) suggests a multi-dimensional model called epistemological belief system. Her system presupposes five dimensions three of which (structure, certainty, and source) are related to knowledge itself, whereas the remaining two (control and speed) are linked to the acquisition of knowledge. According to her system, each dimension contains two categories.

Schommer (1990) asserts that it is not obligatory to expect one's epistemological belief development to progress synchronically in accordance with a pre-given coherent order. For example, an individual may hold that knowledge is absolute and unchangeable while at the same time believing that it has an integrated, combined, and complex structure(Schommer, 1994). In order to test her five-dimensional theory, Schommer (1990) developed a Likert scale consisting of 63 items. After conducting a pilot study to assess the validity and reliability of her scale, four factors or dimensions were determined to align with naive epistemological beliefs, namely: (i) simple knowledge, (ii) certain knowledge, (iii) quick learning, and (iv) one's ability being fixed from the birth. Whether Schommer's model adequately represent epistemological beliefs structurally and theoretically has been an issue

criticised and contested by various researchers in the field(Burr & Hofer, 2002; Hofer, 2001; Hofer & Pintrich, 1997; Schraw, 2013; Schraw, Bendixen, & Dunkle, 2002). Particiulary, her scale not including the dimension of the source of knowledge, which is one of the five dimensions of her model, rearded as an important structural deficit. In addition, Hofer and Pintrich (1997) indicated that Schommer's model has a number of theoretical defects, stating that while the dimensions of simple knowledge and certain knowledge fit into the previous epistemological models, the belief that one's ability is set from birth is outside of the theoretical structure. They also stressed that beliefs about knowledge are not the same thing as the speed of learning (Hofer & Pintrich, 1997). Schommer's (1990) scale has been translated into various languages and applied in different cultural spheres. All of these studies work to accelerate research on the impact of epistemological beliefs on learning and teaching (Deryakulu, 2014).

The following studies indicate that epistemological beliefs not only have an impact on but are also influenced by various variables. It has founded out that epistemological beliefs influence teachers' general beliefs of education (Brownlee et al., 2012) as well as their teaching approaches (Hashweh, 1996; Lee, Zhang, Song, & Huang, 2013; Mansour, 2013; Schraw & Olafson, 2002) and teaching strategies (Icen, 2012) in the classroom. The relevant research reveals that epistemological beliefs have an impact on students' academic success (Cano, 2005; Buehl & Alexander, 2005; Uztemur, Dinc, & Acun, 2020), their active participation in learning processes (Schommer, 1994), their tendency to take academic risks (Dweck & Leggett, 1988; Uztemur et al., 2020), their skills of comprehending the reading tasks (Braten & Strømsø, 2010; Ryan, 1984), their skills of online searching (Barzilai & Zohar, 2012; Hofer, 2004; Mason & Boldrin, 2008), and their study strategies (Deryakulu, 2004; Holschuh, 1998; Schommer, 1998). The relevant literature also reveals that there are significant and meaningful relationships between epistemological beliefs and critical thinking (Basbay, 2013; Hofer, 2004), epistemological beliefs and motivation (Chen & Pajares, 2010; Paulsen & Feldman, 1999; Ricco, Pierce, & Medinilla, 2010), epistemological beliefs and cultural differences (Chan, 2004; Chan & Elliott, 2002; Deryakulu & Buyukozturk, 2002), and epistemological beliefs and the field of study (Deryakulu & Buyukozturk, 2005; Hofer, 2000).

Teaching –Learning Conceptions

The conceptions about teaching and learning refer to the beliefs held by teachers about their preferred ways of learning and teaching (Chan & Elliot, 2004). In other words, teachers' epistemological beliefs correspond to their conceptualisation of teaching (Chan, 2003). In the act of teaching, teachers are the key factors as they take the role of administering the implementation of the teaching processes. Although teachers are not educated dominantly about one or another educational philosophy or approach in their preservice education, they develop a basic belief and value system about teaching and learning under the influence of the all components of the training they get and the environments they live and work in (Doganay & Sari, 2003).

Researchers and educators emphasise that teachers' belief and value system will shape their teaching practices and approaches and therefore it will affect their teaching strategies and in-class performances. (Cheng, Chan, Tang, & Cheng, 2009). In the related literature, the conception of teaching and learning is characterized in different ways. Koballa, Graber, Coleman, and Kemp (2000), investigated the conceptions of teaching and learning of chemistry student teachers by phenomenographic studies. They identified three conceptions of it: knowledge transfer, interacting and problem solving. Tsai (2002) has also defined that Taiwanese science teachers have three different conceptions of teaching: traditional, procedural and constructivist. Based on the previous studies, Van Rossum and Hamer (2006, as cited in Otting, Zwaal, Tempelaar, & Gijselaers, 2010) describe six different learning and teaching conceptions that have a hierarchical structure and that are differing from one another characteristically. The hierarchical and relational structure of the conceptions of teaching and learning is shown in Table 1.

Table 1. van Rossum and Hamer's Teaching-Learning Conceptions

	Conception of Learning	**Conception of Teaching**
Conception 1	Increase of knowledge	Well-structured lectures
Conception 2	Memorising	Lectures with opportunities for questions
Conception 3	Memorising and application	Interactive lectures
Conception 4	Understanding subject matter	Coaching and facilitating
Conception 5	Understanding reality	Dialogue
Conception 6	Self-realisation	Inspiration

As shown in Table 1, conceptions 1, 2, and 3 are defined as teacher-centered whereas conceptions 4, 5, and 6 are categorised as student-centered. Although, the boundaries within the two groups are not sharp, student-centered approaches mainly focus on knowledge construction processes, while teacher-centered ones ordinarily stress on content-oriented knowledge transmission (Otting et al., 2010). Based on the related literature (Brooks & Brooks, 1999; Chan & Elliot, 2004; Cheng et al., 2009; Clements & Battista, 1990; Schunk, 2012) and studies conducted in Turkish context (Aypay, 2011; Bahcivan, 2014; Bas, 2015; Bikmaz, 2011; Oguz, 2011; Sahin & Yilmaz, 2011) teacher-centered conceptions are classified as traditional while student-centered conceptions categorised as constructivist in the current study.

Traditional conception of teaching is generally defined with teacher-centered teaching strategies, because, knowledge acquisition is considered as a one-way transmission process from teachers to students. During this process, teacher-student interaction is limited or restricted (Cheng et al., 2009). Students cannot actively participate in the learning process; while teachers conduct the act of transmission they only watch this process in a passive manner (Acikgoz, 2003; Ozden, 2005). Their creative thinking skills and cooperative learning activities are neglected. Besides, the learners' may not get any support in with regard to autonomous learning (Brooks & Brooks, 1999; Chan & Elliot, 2004). Students are required to accept the presented knowledge/information without questioning it. Teaching-learning processes are mostly formed from rote-learning and memorisation. Reward, punishment and competition are the concepts forming and leading educational activities carried out in classrooms (Khalid & Azeem, 2012; Senemoglu, 2004).

According to the constructivist teaching-learning conception, knowledge is constructed by means of the interaction between students, teachers and the educational materials (Cheng et al., 2009). Students become active participants of their learning process. As persons attribute differing meanings to concepts, things and events while interacting with other human beings and materials, the process and/or outcome of learning may express different meanings for each learner (Biggs, 1996; Yurdakul, 2008). As a result, the constructivist approach grounds on students' comparing and contrasting the existing knowledge with their own prior knowledge, blending, reinterpretating and adapting them into new situations (Perkins, 1999). Constructivist approach does not consider knowledge as a thing or phenomenon which is being independent of the knower (Phillips, 2000). According to this approach; rather than presenting and transmissing knowledge to students, the role of a teacher is to guide and help students to construct their own personal knowledge (Acikgoz, 2003; Brooks & Brooks, 1999; Ozden, 2005; Phillips, 2000).

Learner Autonomy Support

According to Wang (2011) instead of teacher centered learning environments, contemporary educational approaches foresee and adapt a learning context in which every single student personally participates in teaching-learning activities under the guidance of teachers and in which learner autonomy is supported is being considered more significant. In such a learning context, teachers generally support their students to take the responsibility of their own learning, to become entrepreneurs, and to develop autonomous behavioural patterns (Brooks & Brooks, 1999; Oguz, Altinkurt, Yilmaz, & Hatipoglu, 2014). The principles of student centered learning approach assume students as individuals who are autonomous, who are able to take their own decisions, to put those

decisions into practices and to take the responsibility of their decisions and actions. Those principles also require students to be able to work collaboratively, to critise themselves objectively for improving their own deficiencies/shortcomings, and to be willing to work together with their teachers to create a positive learning context (Sanal, 2016).

Holec (1981) defined learner autonomy as individual's taking responsibility of their own learning. Autonomy is defined as students' accepting, approving and confirming their own behaviours completely and undertaking their responsibility (Deci & Ryan, 1987). Instead of thinking that people behaviours are controlled by some authorities and directed to one way or the other, autonomy is concerned with individuals' thinking that they can make decisions on their own. So, the development of students' autonomous learning behaviours may enable them to have self-esteem and self-confidence to take parts in defining the aims and objectives of learning and actively engage in the processes of learning and assessment (Gagne & Deci, 2005; Oguz, 2013a; Wang, 2011). A student, who learns autonomously, can locate her/his needs, can make decisions on her/his own learning, and by means of actively using self-control mechanisms can make self-assessment. It is required from teachers to prepare the appropriate conditions for their students to make this happen (Aydogdu, 2009). In order to improve learners' autonomy, teachers should give importance to students' viewpoints; allow them to express their feelings and thoughts; and provide them with the necessary opportunities to make their own choices (Deci & Ryan, 1985, 1987). In order to enable students to cope with problems they encounter in learning environments, teachers who provide autonomy support should inform them about the relevant issues (Black & Deci, 2000). Learners feel more autonomous in an environment where teachers respect students' views and choices, where learners are provided with a communicative context in which they can freely express themselves, and where teachers provide a set of sensible rules and conditions while setting boundaries. Through increasing intrinsic motivation, autonomy supporting environments enable students to see and feel themselves as individuals being responsible in learning processes and activities. Whereas, controlled environments prevent learners to internalise the processes and outcomes of learning through diminishing intrinsic motivation (Oguz, 2013b). Autonomy support ensures students' to feel free in learning processes and to promote their individual development. In order to attain this goal, students have to fulfil some duties such as activating their personal capacities, making their own decisions, and taking the responsibility of their own learning. In addition to the processes of their socialisation, it is expected that autonomy support will contribute to students in many respects, such as questioning what happens around them and viewing those events or processes from various angles (Gunes, 2012).

Little (2001) states that learner autonomy support behaviours do not mean to provide students with unlimited freedom. Instead, freedom in this context is limited and depends on some conditions. Besides, learner autonomy support does not foresee an isolated learning environment in which students are given the full control of a learning process. (Benson, 2001; Stefanou, Perencevich, DiCintio, & Turner, 2004; Ozdere, 2015). Providing students with autonomy support means helping them to improve their self-confidence, increasing their motivation to understand fastly, learn more and improve their creative thinking skills (Deci & Ryan, 1987). Besides, teachers should be tolerant, patient and respectful as well as avoiding from judging students' behaviours. Observing and guiding students in addition to the above will enable students to set their own learning targets and plans, to assess themselves and to become successful (Little, 2004; Reeve, Bolt, & Cai, 1999; Wenden, 1991).

Current Study

Belief is a term used to characterise the relationships affecting a teacher's thoughts, plannings and decisions about objects, people and events (Mansour, 2009). Pajares (1992) states that examining teachers' beliefs with the implementation of appropriate research methods may provide valuable feedback for teaching and learning contexts. The discussions on whether pedagogical beliefs influence teachers' practices or whether practices affect beliefs still continue (Mansour, 2013). Ernest (1988) emphasizes that teachers' beliefs have a strong influence on their teaching approaches and practices. Clark and Peterson (1986) defined teachers' beliefs as a rich store of their knowledge and experience

affecting their plannings, interactive thoughts and decisions. Beliefs do not only affect behaviours but they also affect individuals' perceptions of their environments and their attention (Mansour, 2009). Holding that individuals' beliefs are the most important indicator of the decisions that they make throughout their lifetimes, Pajares (1992) in parallel with Haney, Czerniak, and Lumpe (1996) states that the teachers' pedagogical beliefs affect their inclass behaviours. Besides, a research study (Haney et al., 1996) concludes that domain specific teacher beliefs have influence on teachers' rutin decision-making activities related to the selection of topics, topic titles, topics to be skipped and the time to be allocated to a specific topic. So, in order to figure out teachers' inclass performances and propose alternative ways for improving their inclass practices, it is important to know their thoughts and beliefs. Amongst the other beliefs teachers hold, epistemological beliefs are the ones, influence their choices and decisions, such as how to manage the class, what method to use, what to focus on and etc. (Chan & Elliot, 2000).

A teacher with naive epistemological belief mostly believes that knowledge is simple, certain and clear; knowledge is stable and handed down by the experts/specialists, learning may either take shape suddenly or it may never occur at all, and the ability of learning is genetically fixed from the birth. According to Schommer's (1990) model, a teacher having sophisticated epistemological beliefs thinks that knowledge is complex, uncertain and tentative. Students can construct their own knowledge through slow and gradual learning and reasoning processes (Chan & Elliot, 2004; Schommer, 1994). Besides, studies conducted by Hashweh (1996) and Icen (2012) conclude that teachers' epistemological beliefs have impact on their use of teaching strategies and make them to be more open and sensitive towards students' alternative thoughts. So, these studies indicate that there might be some links between constructivist teaching-learning conceptions and teachers having sophisticated epistemological beliefs and profound learning conceptions. Teachers having traditional teaching–learning conceptions and limited/surface learning approaches are more likely to have naive epistemological beliefs within the dimensions of expert's/specialist's authority and certainty of knowledge (Chan, 2003; Chan & Elliot, 2004; Otting et al., 2010; Schunk, 2012). There are numerous studies proving that epistemological beliefs directly influence teaching-learning conceptions and that there are some significant relationships between those two variables (Aypay, 2010, 2011; Bahcivan, 2014; Bikmaz, 2011; Cano, 2005; Chan, 2003, 2004, 2011; Chan & Elliot, 2004; Cheng et al., 2009; Kanadlı & Akbas, 2015; Kizilgunes, Tekkaya, & Sungur, 2009; Lee et al., 2013; Otting et al., 2010; Ozkal, Tekkaya, Cakıroglu, & Sungur, 2009; Phan, 2008; Rodriguez & Cano, 2007; Tanriverdi, 2012; Taskin, 2012; Yilmaz & Sahin, 2011).

Studying with student teachers in Hong Kong, Chan and Elliot (2004) found out that there are significant relationships between the dimensions of innate ability, expert's/specialist's authority and certain knowledge, and traditional teaching-learning approach; while there is meaningful relationships between the dimension of learning effort and constructivist approach within their research carried out with student teachers. Otting et al. (2010) found out positive relationships between the certainty of knowledge dimension and traditional teaching–learning conceptions in their study carried out in the Netherlands. The researchers also stated that student teachers who have already adopted constructivist teaching-learning approach do not regard teacher as the unique authority in classroom. Chan (2003) on the other hand, found out that students teachers having naive epistemological beliefs in relationship with innate ability, expert's/specialist's authority and certainty of knowledge dimensions also possess a relatively superficial learning approach. Kizilgunes et al.'s study (2009) carried out with grade eight students in Turkey found out a positive relationship between the certainty of knowledge dimension and superficial learning approach. Positive relationships between the certainty of knowledge dimension and superficial learning approach have also been found out in Cano's (2005) study carried out with middle school students in Spain. Tanrıverdi's study (2012) concludes that student teachers believing that ability comes by birth also have a superficial learning approach and being superficially motivated. Whereas, those believing that learning depends on effort and having inner motivation for learning generally tend to use deep learning strategies. All those results reveal that there is a close relationship between epistemological beliefs and teaching-learning conceptions.

The relevant literature emphasises that teachers' learner autonomy support behaviours take shape within the framework of epistemological beliefs and constructivist teaching-learning conceptions (Pajares, 1992; Reeve et al., 1999; Roth & Weinstock, 2013; Wang, 2011). Teachers' epistemological beliefs influence their teaching practices and inclass behaviours too. This situation indirectly influences students' roles in the classroom and their attitudes towards the subject (Roth & Weinstock, 2013). Brownlee et al.'s (2012) research concludes that teachers' epistemological beliefs strongly influence their students' epistemological development and play role in shaping of their students' epistemological beliefs. In another study, Brownlee, Edwards, Berthelsen, and Boulton-Lewis (2011) asserted that teachers having developed epistemological belief perceive their students as talented, active and engaging students who make sense of their lives and who should be respected as learners.

Such an epistemological view can help with the emergence of a teaching and teacher model. In this model, the teacher is a person who is respectful to students' perspectives, tries to provide students with various learning opportunities, allows them to express their ideas, and supports learner autonomy (Roth & Weinstock, 2013). On the other hand, Brownlee et al. (2011) also found out in the same studies mentioned above that teachers with naive epistemological belief have perceived their students as individuals learning through modelling, imitation and memorisation. The research findings discussed reveal that a teacher having sophisticated epistemological beliefs and constructivist teaching-learning conceptions normally comprehends that the act of knowing takes place in student's own minds. She/he agrees that each student's view in the class is precious, and tends to perform learner autonomy support behaviours. A teacher performing autonomy support behaviours does not expect everyone to agree with herself/himself. S/he also encourages her/his students to think critically and make choices. On the other hand, teachers with naive epistemological beliefs in relation with the dimensions of the source of knowledge and certainty of knowledge most probably expect students to respond the questions with just one true answer. Multi-perspectivity and making decisions with the involvement of whole-class are not much approved as they may affect the teacher's in class authority. It is highly difficult to observe learner autonomy support behaviours in such contexts where traditional teaching-learning conceptions are dominant (Roth & Weinstock, 2013). Roth and Weinstock's (2013) study conducted in Israel concludes that teachers with naive epistemological beliefs rarely tend to support learner autonomy.

The studies in the relevant literature on epistemological beliefs and teaching–learning conceptions reveal that most of them employ student teachers and students attending lower grades. There are only a few of them employing practicing teachers. Apart from the investigation carried out by Ekinci (2016), there is not any other study using teachers' data and discussing the relationships between teaching-learning conceptions and learner autonomy support behaviours (Bas, 2014, 2015; Chai, 2010; Engin & Dasdemir, 2015; Hashweh, 1996; Lee et al., 2013; Schraw & Olafson, 2003). Besides, the number of studies conducted to explore how and in what ways epistemological beliefs affect teachers' inclass teaching practices, their learner autonomy support behaviours and their behaviour patterns is very few (Brownlee et al., 2011, 2012; Roth & Weinstock, 2013; Schraw & Olafson, 2003). The relevant literature does not include a study discussing the relationships amongst teachers' epistemological beliefs, their teaching-learning conceptions and their learner autonomy support behaviours all together. However, the need to search how and in what ways the reflections of the relationships amongst these three variables exist in Turkish culture has been arising. Revealing the relationship between epistemological beliefs and teachers' practices, it is hoped to increase the attention to epistemological beliefs in Turkey where the significance of constructivist approach in teacher education is emphasized extensively. If we consider the fact that students' ambition for autonomous learning and their skills related to autonomous learning come to fore in middle school level (Lietaert, Roorda, Laevers, Verschueren, & Fraine, 2015; Marks, 2000; Stroet, Opdenakker, & Minnaert, 2013), it is important for teachers to adopt constructivist teaching conceptions, to be sensitive of individual differences in teaching-learning processes and to bring their students in the skills of taking responsibility in learning processes (Kuzgun & Deryakulu, 2017). Middle school teachers' autonomous learning support behaviours play important roles in students' becoming aware of their own interests and abilities and seing themselves as one of the main constituents of the learning process. A teacher

who willingly performs students' autonomous learning support behaviours, not only provides the necessary information/knowledge but only tries to understand her/his students' thoughts and feelings. Teachers in this group encourage their students to attend classes freely without putting any pressure on them. Relevant studies indicate that students attending the classes of those teachers who are adopting traditional teaching approaches have low academic success rate (Grolnick & Ryan, 1987) and poor conceptual understandings (Benware & Deci, 1984; Matric & Kosir, 2014). Besides, it has been reported that students in this type of classes tend to have emotional problems and learning difficulties (Grolnick, Kurowski, Dunlap, & Hevey, 2000).

The comparative investigation of the relevant literature led the authors to draw a model showing the relationships amongst middle school teachers' epistemological beliefs, their teaching–learning conceptions and their learner autonomy support tendencies. The suggested model is shown in Figure 1 below.
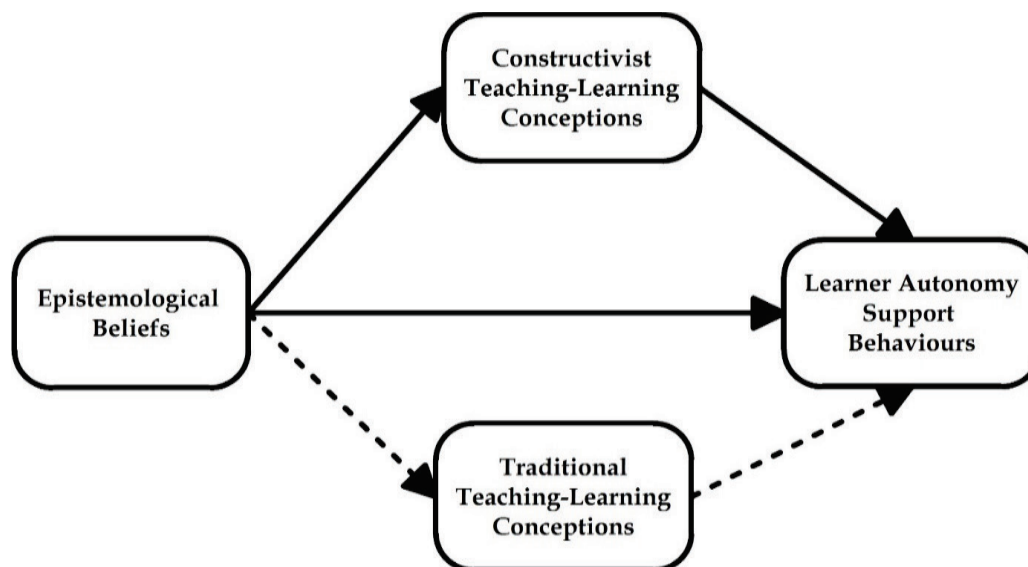

Figure 1. The Model Asserting the Relationships amongst Middle School Teachers' Epistemological Beliefs, Teaching–Learning Conceptions and Learner Autonomy Support Behaviours

According to the model visualised in Figure 1 it has been assumed that a) middle school teachers' epistemological beliefs have a direct impact on their teaching-learning conceptions and learner autonomy support behaviours; b) middle school teachers' teaching–learning conceptions directly influence their learner autonomy support behaviours and also predict them.

The current research is based on the hypotheses that teachers with sophisticated epistemological beliefs normally adopt constructivist teaching-learning conceptions and they tend to support learner autonomy; while teachers with naive epistemological beliefs adopt traditional teaching-learning conceptions, and they rarely provide learner autonomy support. These hypotheses led the researchers to formulate this research problem: *"What kinds of relationships exist amongst teachers' epistemological beliefs, their teaching–learning conceptions and their learner autonomy support behaviours?"* and *"In which directions do these relationships take place?"* Within the framework of the general purpose of the research and main hypotheses presented above, this study aims to answer the following research question and then test the hypotheses below.

RQ: What do the correlational and descriptive statistics tell us about the relationships amongst the variables of epistemological beliefs, teaching-learning conceptions and learner autonomy support behaviours?

H1: Sophisticated epistemological beliefs positively predict constructivist teaching-learning conceptions?

H2: Sophisticated epistemological beliefs negatively predict traditional teaching-learning conceptions?

H3: Sophisticated epistemological beliefs positively predict learner autonomy support behaviours?

H4: Constructivist teaching–learning conceptions positively predict learner autonomy support behaviours.

H5: Traditional teaching–learning conceptions negatively predict learner autonomy support behaviours.

H6: The variables of constructivist and traditional teaching-learning conceptions have mediating effect amongst the independent (sophisticated epistemological beliefs) and the dependent (learner autonomy support behaviours) variables within the context of the tested model.

Method

The research model, population and sampling procedures, data collection tools and data analysis processes have been discussed in this section.

Research Model

In this study, a multi-factorial complex predictive correlational model has been adapted to examine the structural relationships amongst the middle school teachers' epistemological beliefs, their teaching-learning conceptions and their learner autonomy support behaviours. In predictive correlation studies, one of the variables is examined to predict the characteristics of the next one. Then, it is aimed to conceive the relationships amongst all variables. If the data set include only one predictive variable one-factor predictive correlational design would be appropriate. If there are two or more predictive variable multi-factorial predictive correlational design is relevant to analyze and evaluate the available data. Multi-factorial complex predictive correlational design may not only be used to test the direct relationships amongst the variables but could also be utilised to test indirect relationships. Studies conducted to test direct and indirect relationships amongst the all variables are generally named as multi-factorial complex predictive correlational design (Buyukozturk, Cakmak, Akgun, Karadeniz, & Demirel, 2014; Fraenkel, Wallen, & Hyun, 2012). In this research, middle school teachers' epistemological beliefs and teaching-learning conceptions have been identified as the predictive variables, while learner autonomy support behaviours have been identified as the dependent variables. Based on the relevant literature a model has been devised to conceive the relationships amongst those variables. Structural equation modeling (SEM) was used to test the devised model, which is shown in Figure 1 above.

Population and Sample

Middle school teachers working in central Manisa in 2017-2018 academic year constitute the target population of the study. There were approximately 1300 middle school teachers working in the area at the time of data collection. 345 teachers specialised in various subject areas being taught in middle schools were randomly selected as the study sample. It was found out that this sample size has the power of representing the population with only 4.52 % of error rate. Demographical information about the teachers participating in the study is given in Table 2.

Table 2. The Participating Teachers' Demographic Characteristics

Variable	Category	Frequency f	Percentage %
	Maths	53	15.4
	Turkish	45	13
	Science	42	12.2
	Social Studies	38	11
	English	35	10.1
Subject Area	Physical Education	28	8.1
	Religious Education	25	7.2
	Design and Technology	22	6.4
	Music	21	6.1
	Visual Arts	20	5.8
	Information Technologies	16	4.6
Gender	Female	192	55.7
	Male	153	44.3
	5 years and under	48	13.9
	Between 6-10 years	79	22.9
Length of Service	Between 11-15 years	75	21.7
	Between 16-20 years	78	22.6
	21 years and over	65	18.8
Socio-economics status of the area where the participants' schools are located	Low	143	41.4
	Moderate	146	42.3
	High	56	16.2

Table 2 reveals that the participating teachers' demographic characteristics appropriately represent the whole population in Turkish schools, especially the ones that located in relatively bigger cities like Manisa.

Data Collection Tools
Necessary information about the data collection tools used in this study is given below.

Epistemological Belief Inventory
"*Epistemic Belief Inventory*" developed by Schraw et al. (2002) was used to determine the middle school teachers' epistemological beliefs. Schommer (1990) converted her epistemological belief system consisting of five dimensions into a scale and then tested it. Her scale did not include the dimension of the source of knowledge (Schommer, 1990). In order to develop a valid, reliable and useful tool to measure epistemological beliefs, which inludes the dimension of the source of knowledge, Schraw et al. (2002) developed the epistemic belief inventory formed from 15 items and five dimensions. The dimensions of five point likert scale are respectively a) expert's/specialist's authority (α: .68) b) certain knowledge (α: .62) c) quick learning (α: .58) d) simple knowledge (α: .62) e) innate ability (α: .62). Higher scores obtained from the inventory indicate that epistemological beliefs are undeveloped and immature. The total scores obtained from the inventory are not normally used, because the scores of each dimension are analysed individually

The inventory was adapted into Turkish culture by Dinc et al. (2016) consisting 15 items and four factors. Although three factors (certain knowledge, simple knowledge and innate ability) in the Turkish version of the inventory are closely compatible with the original ones, the dimensions of expert's/specialist's authority and quick learning were merged into the same dimension. After conducting confirmatory factor analysis, the researchers observed that adaptive values are good. As this result means that the factors of quick learning and expert's/specialist's authority combined into a single dimension, the fourth factor of the inventory was renamed as the 'process of access to knowledge and knowledge acquisition'. (Dinc et al., 2016). The reliability co-efficients of the inventory were calculated

as α: .80 in the dimension of the process of the access to knowledge and knowledge acquisition (8 items), α: .40 in the dimension of the certainty of knowledge (3 items), α: .43 in the dimension of the innate ability (2 items), and α: .48 in the dimension of the simple knowledge (2 items) by Dinc et al. (2016). The reliability co-efficients at the current study on the other hand, have been founded as α: .44 in the dimensions of expert's/specialist's authority (2 items, one of which is: *people should not question those who hold power and authority or those facts that have been accepted by all*); α: .42 in the dimensions of certain knowledge (3 items, one of which is: *if two people discuss an issue, at least one of them is wrong*); α: .39 in the dimensions of quick learning (2 items, one of which is: *is waste of time to work on problem that could not be solved quickly*); α: .41 in the dimensions of simple knowledge (3 items, one of which is: *the existence of many theories on a topic makes what has known about it more complex*); α: .51 in the dimensions of innate ability (4 items, one of which is: *people's capacities of intelligence come from the birth*).

In order to make all three research tools compatible and comparable to one another, the scores obtained for the items in the epistemic belief inventory are reversed. Thus, the higher scores obtained for the inventory now indicate developed epistemological beliefs. In order to test the structure of Schraw et al's (2002) original inventory formed from five dimensions, a confirmatory factor analysis (CFA) was applied to epistemic belief inventory. After eliminating two items whose factor loads are found less than .40, the CFA scores indicated that the structure of the original inventory formed from five dimensions is confirmed (χ2=72.085, sd=35, p<0.01, χ2/df=2.06, RMSEA=0.05, AGFI=-.92, GFI=.96, IFI=.92, CFI=.92). This finding does not verify Dinc et al.'s (2016) adaptation study.

The Teaching-Learning Conceptions Scale

'Teaching-Learning Conceptions Scale' developed by Chan and Elliott (2004) was used to determine middle school teachers' teaching and learning conceptions. Designed as a five point Likert type scale, it consists of two dimensions. The first one named as traditional includes 18 items, while the second one called constructivist approach consists of 12 items. The dimension of the traditional includes items, such as "*good teaching occurs when the teacher talks most in the classroom*", while the constructivist dimension covers items like "*each child is unique or special and she/he has the right of having education appropriate to the need special to her/him*". The results of the CFA operated on the original scale reveleated that the fit indexes are at acceptable levels (RMSEA= .05, AGFI = .91, GFI = .93, RMR= .50). Alfa internal consistency coefficient for the whole scale was found out as .86 while it was found out as .84 for the sub dimensions (constructivist and traditional conceptions). The higher scores obtained for a dimension of the scale show that teaching and learning conceptions in the respective dimension is embraced more (Chan & Elliott, 2004).

The scale was adapted into Turkish by Aypay (2011) and it came out as compatible with the original version. The results of adaptation study carried out by Aypay (2011) revealed that for the dimension of constructivist approach alpha co-efficient is α: .88, while it was α: .83 for the traditional approach. After a CFA test conducted on the Teaching-Learning Conceptions Scale, one item from the constructivist teaching-learning conceptions dimension and nine items from the traditional teaching-learning conceptions dimension were excluded from the data set, because their factor loads were found below .40. The second CFA conducted on this version of the scale revealed that the scale still preserves its two dimensional structure and its fit indexes were at acceptable levels (χ2=282.792, df= 155, p<0.01, χ2/df=1.824, RMSEA=.05, AGFI=.89, GFI=.92, IFI=.91, CFI=.91). Within the current research the same scores were found to be α: .83 for the first dimension and α: .81 for the second dimension. Higher scores obtained for the sub-dimensions indicate that the respective dimension was embraced.

Learner Autonomy Support Scale

Learner Autonomy Support Scale developed by Oguz (2013a) was used to determine the participating teachers' learner autonomy support behaviours in this study. Designed as a five point Likert scale, Learner Autonomy Support Scale is formed from 16 items. It aims to determine teachers' views about the necessity and performing of learner autonomy support behaviours. In accordance with the research purpose, the necessity part of the scale was not used in the current study. The answers given to the items of the scale were graded in between 1-never and 5-always. Higher scores obtained

from the scale indicate that teachers performing behaviours accordingly support learner autonomy in a higher degree. The scale consists of three factors. Named as feeling and thought support, the first factor or dimension includes 7 items (an example is: *"Approaching students with an empathetic perspective"*). The second dimension, learning process support includes 5 items (an example is: *"Supporting students to do independent practices like exercises, repeating, reading summarizing and etc."*). The third one, evaluation support is formed from 4 items (an example is: *"Supporting students to participate in decision making processes related to measurement and evaluation"*). The total variance that the scale factors explain is 62.06 %. The alpha coefficient of the scale as a whole is α: 0.92. The alpha coefficients of the sub-factors are .88 for the feeling and thought support, α: .80 for the learning process support and α: .86 for evaluation support. In the current study they have been found to be α: .77, α: .81 and α: .81 respectively. On the other hand, the CFA conducted by Oguz (2013a) reveal acceptable fit indexes ($\chi2$=296.45, df=101, p<0.01, $\chi2$/df=2.93, RMSEA=.07, AGFI=-.86, GFI=.90, SRMR=.052, CFI=.97).

Because, the current study focuses on teachers' learner autonomy support behaviours, the necessity part of the origina scale was not used. A CFA was conducted on the data obtained from the scale. Three items from feeling and thought support dimension and one item from evaluation support dimension were excluded from the data set because their factor loads were found out to be less than .40. Another CFA was conducted on the remaining items. The findings showed that the scale has a three dimensional structure as in its original version and its fit indexes were in acceptable level ($\chi2$=110.456, df=51, p<.01, $\chi2$/df=2.166, RMSEA=.06, AGFI=.91, GFI=.94, IFI=.95, CFI=.95).

Data Analysis

SPSS was utilised in descriptive statistics. The test of normality and the analysis of missing values were carried out to prepare the available data for analysis. It has been seen that there are no missing values and the data are evenly distributed in the scales. After the multivariate normality and extreme value analyses conducted in AMOS, 20 extreme values whose Mahalanobis D2 distances were meaningful (p=.01) were removed from the data set (Tabachnick & Fidell, 2013). In order to provide the reliability and validity of the data obtained through three scales, confirmatory factor analyses (CFA) were conducted onto data collected by means of each scale respectively. While the CFA analyses were conducted in AMOS, it was confirmed that each item meets the assumption of normality by means of having the skewness and kurtosis values in between ± 2. It is important for the normal distribution of the data that for 1 % confidence bounds, the interval values of the skewness and kurtosis should be ±1.96, while it should be ±2.58 for 5 % confidence bounds (Gravetter & Wallnau, 2014; Liu, Marchewka, Lu, & Yu, 2005; Trochim & Donnelly, 2006).

In order to test the compatibility of the proposed model with the available data, path analyses consisting of the combination of measurement model and structural model were carried out by using AMOS. For the compatibility of CFA and SEM models, the values of the division of chi-square by degree of freedom ($\chi2$/df), root mean square error of approximation (RMSEA), adjusted goodness of fit index (AGFI), goodness of fit index (GFI), incremental fit index (IFI) and comparative fit index (CFI) have been regarded as the criteria (Celik & Yilmaz, 2013; Kline, 2011; Schumacker & Lomax, 2010). Criteria values belonging to fit indexes have been given in details in Table 5 in the findings. While conducting CFA and SEM analyses, theoretically supported modifications (error bindings) were made amongst the variables to improve the fit index values of the relevant model. After each error bindings, chi-square difference tests were conducted to compare and contrast the emerging model and the previous one in accordance with the significance of the fit indexes and chi-square tests. In order to test H6 hypothesis, the mediating effect of the mediation variable (constructivist teaching-learning conceptions) on independent (sophisticated epistemological beliefs) and dependent (learner autonomy support behaviours) is investigated. These three conditions stated below need to be provided before carrying out the mediation analysis (Baron & Kenny, 1986; MacKinnon, Fairchild, & Fritz, 2007; Yilmaz & Ilhan-Dalbudak, 2018):

- The independent variable must directly and meaningfully predict the dependent variable.
- The independent variable must be an important predictor (definer) of the dependent variable. There should be a direct regressional relationship amongst these two variables.
- The mediation variable must be an important predictor (definer) of the dependent variable. There should be a meaningful relationship amongst these two variables.

According to Yılmaz and Ilhan-Dalbudak (2018), the mediation variable can only reflect the observed relationships amongst the independent and the dependent variables fully or partly. If it fully reflects the relationship it is called whole mediation while it only reflect some parts of the relationships it is named as partial mediation. In the whole mediation case, it is expected that if the mediation variable (constructivist teaching-learning conceptions) is added into the analysis, it makes the relationships amongst the independent (sophisticated epistemological beliefs) and the dependent (learner autonomy support behaviours) weaker and statistically non-significant. In the partial mediation case, mediation variable can not measure the relationships amongst the dependent and independent variables fully. Although the significance of the relationships amongst the independent and dependent variables continues, its level of co-efficiency and significance decreases. Bias-corrected bootstrapping suggested by Preacher and Hayes (2008), conducted in AMOS to test the statistical significance of the indirect effect of the epistemic beliefs on learner autonomy support behaviours through the meadiation of the constructivist teaching-learning conceptions. The sample size were increased to 10.000 and 95% confidence bounds were attained. Besides, a "Sobel Test" was used (Sobel, 1982). In order to attain significant mediating effect, it is required that there should not be the value of zero in between the confidence bounds (Preacher & Hayes, 2008) and the Sobel Test co-efficient having the value over 1.96 (Frazier, Tix, & Barron, 2004).

Results

Table 3 presents the results of the descriptive statistics about the participating middle school teachers' epistemological beliefs, teaching-learning conceptions and learner autonomy support behaviours.

Table 3. Descriptive Statistics and Correlation Coefficients

Variable	$\overline{X}$	S	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
E./Specialist's Authority	4.49	.82	1									
Certain Knowledge	4.04	.95	.37**	1								
Simple Knowledge	3.67	1.03	.22**	.25**	1							
Quick Learning	4.36	.90	.32**	.33**	.27**	1						
Innate Ability	4.22	.86	.29**	.21**	.19**	.35**	1					
Constructivist Approach	4.56	.47	.14**	.16**	.04	.20**	.28**	1				
Traditional Approach	2.47	.83	-.30**	-.29**	-.08	-.18**	-.20**	-.20**	1			
Emotional Support	4.39	.58	.17**	.19**	.13*	.19**	.16**	.36**	-.15**	1		
Learning Processes Support	4.25	.62	.10	.11*	.17**	.17**	.29**	.29**	-.10*	.60**	1	
Evaluation Support	4.11	.73	.08	.14*	.17**	.07	.09	.27**	-.09	.50**	.56**	1

**= p< 0.01 *= p< 0.05

As the data presented in Table 3 indicates, each dimension of the epistemic belief inventory has been investigated separately as a requirement of the multi-dimensional structure of the epistemological beliefs (Schommer, 1990). In other words, individuals may have differing beliefs in respect of each dimension of the inventory. For instance, a person having naïve epistemological beliefs in the dimension of the certainty knowledge may also have sophisticated beliefs in simple knowledge dimension. It is the same for sub-dimensions of the learner autonomy support scale and teaching-learning conceptions scale. For example, a teacher may embrace traditional and constructivist teaching conceptions in differing extents in accordance with her/his average scores obtained from teaching learning conceptions scale. As a result of this, instead of the total scores obtained for each instrument, the relationships

amongst the dimensions are presented. The data in Table 3 reveals that the scores obtained for the sub dimensions of middle school teachers' epistemological beliefs, constructivist teaching-learning conceptions and learner autonomy support behaviours are high. These results can be interpreted as adapting constructivist teaching-learning conceptions, middle school teachers have sophisticated epistemological beliefs and they tend to provide learner autonomy support in their practices. When the correlation coefficients examined, it is observed that traditional teaching-learning approach has a negative meaningful relationship (except for evaluation support dimension) at a low level with all of the other variables.

It is seen that the relationships between the scores obtained for the subdimensions of the epistemological belief inventory are rather low. Some meaningful relationships exist in between teachers having constructivist teaching-learning conceptions and their epistemological beliefs (except for simple knowledge dimension). It is seen that the sub dimensions forming the learner autonomy support behaviour slightly related to one another. Limited positive meaningful relationships between the sub dimensions of epistemological beliefs and sub dimensions of learner autonomy support have also been found out, which are not higher than .60. Besides, the variance inflation factor (VIF) of the arising new model were found out as less than 10 and tolerance values were found to be more than .20 (Field, 2013; Licht, 1995). This can be interpreted as each observed variable in the established model measures a different characteristic, which could be interpreted as there is not any multi-correlation problem amongst the variables.

SEM analysis conducted to test the sufficiency of the theoretical model representing the relationships between middle school teachers' epistemological beliefs, teaching-learning conceptions and learner autonomy support behaviours by means of the available data shown in Figure 2.
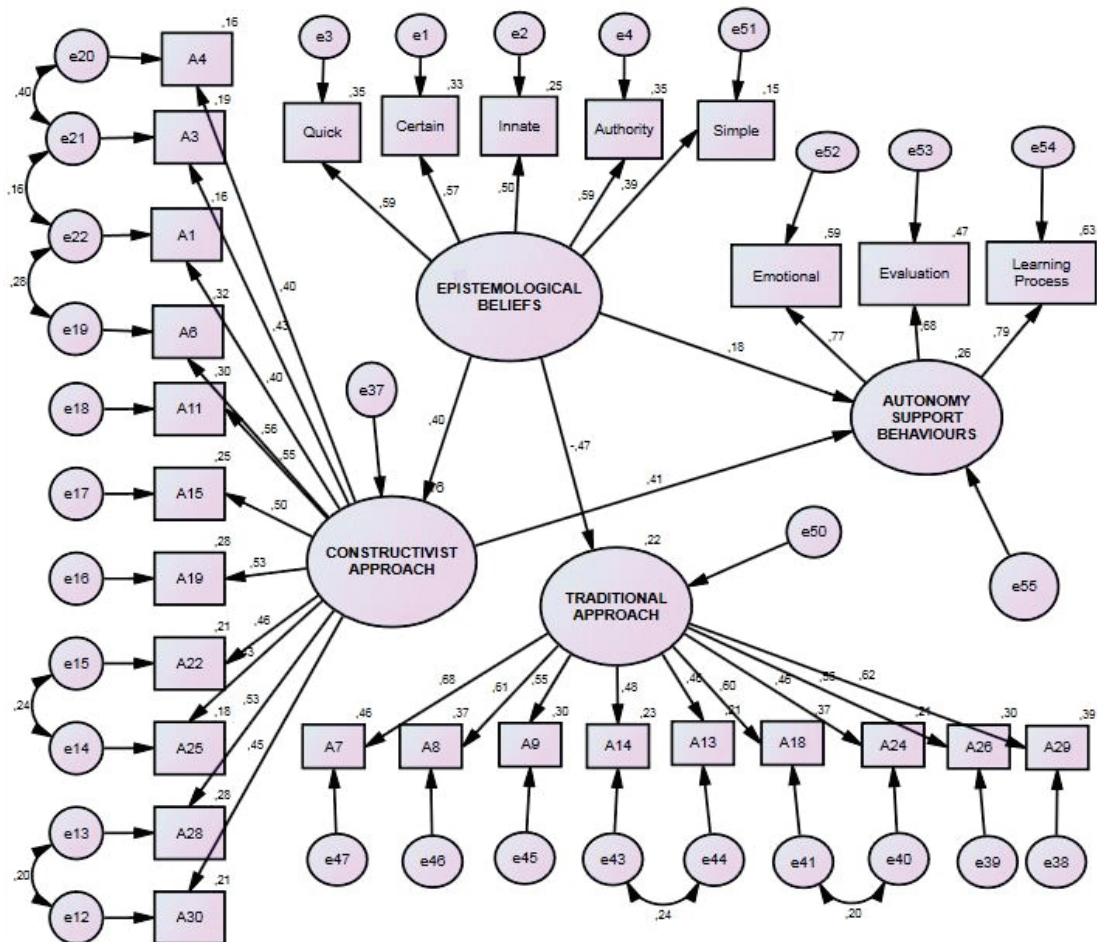

Figure 2. The SEM model representing the relationships between intrinsic and extrinsic variables

As it is seen in Figure 2, the error bindings suggested for the variables located in similar structures were made. Table 4 introduces the values emerged after these bindings.

Table 4. Fit Index Values About the Model

Model	χ2	df	χ2/sd	GFI	AGFI	CFI	RMSEA
The model without error binding	701,002	346	2,026	,863	,840	,828	,056
Error binding between e20 and e21	651,792	345	1,889	,873	,851	,851	,052
Error binding between e19 and e22	621,667	344	1,807	,881	,860	,865	,050
Error binding between e14 and e15	607,480	343	1,771	,885	,863	,878	,049
Error binding between e43 and e44	590,834	342	1,728	,888	,867	,886	,047
Error binding between e40 and e41	580,201	341	1,701	,896	,869	,893	,047
Error binding between e12 and e13	568,938	340	1,673	,898	,871	,898	,046
Error binding between e21 and e22	558,206	339	1,647	,901	,873	,900	,045

Table 4 indicates that dividing the model without error bindings into the chi-square's degree of freedom and the RMSEA values are in an acceptable level. However, GFI, AGFI and CFI values are not found in acceptable. In consideration with suggested modification indexes, the errors of the items A3 and A4 located in teaching-learning conceptions scale were related. The analysis was repeated after this binding. In order to compare the emerging new model with the previous one a chi-square difference test ($\chi2$ difference test) was conducted (Tabachnick & Fidell, 2013).

The error bindings being done after the chi-square test, better accord the model [$\chi2_{fark}$ (1, N = 325) = 49.21, p< .05]. AGFI values in the new model navigated to an acceptable level but the GFI and CFI values were still low. Thus, the errors of the items A1 and A6 located in teaching-learning conceptions scale were related to each other again. The chi-square test conducted after then revealed that the error bindings made the scale even more compatible [$\chi2_{fark}$ (1, N = 325) = 30.12, p< .05]. The same procedures were applied in between items A22 and A25 [$\chi2_{fark}$ (1, N = 325) = 14.18, p< .05], A13 and A14 [$\chi2_{fark}$ (1, N = 325) = 16.64, p< .05], A18 and A24 [$\chi2_{fark}$ (1, N = 325) = 10.63, p< .05], A28 and A30 [$\chi2_{fark}$ (1, N = 325) = 11.26, p< .05], and A1 and A3 [$\chi2_{fark}$ (1, N = 325) = 10.73, p< .05]. It was seen that the final version of the model has acceptable GFI and CFI values [$\chi2$ = 558.206, $\chi2$/sd = 1.647, GFI = .90, AGFI = .87, CFI = .90, RMSEA = .04]. The values of the fit indexes taken as references to define the compatibility of the final version of the model and the fitting values of the model are presented in Table 5.

Table 5. The Values of the Fit Indexes Taken as References* and the Values Representing the Theoretical Model

Fit Indexes	Perfect Correspondence Criteria	Acceptable Correspondence Criteria	Model's Fit Indexes	Result
χ2/sd	0 ≤ χ2/sd ≤ 2	2 ≤ χ2/sd ≤ 3	1,569	Perfect Correspondence
RMSEA	.00 ≤ RMSEA ≤ .05	.05 ≤ RMSEA ≤ .08	,042	Perfect Correspondence
CFI	.95 ≤ CFI ≤ 1.00	.90 ≤ CFI ≤ .95	,908	Acceptable Correspondence
GFI	.95 ≤ NFI ≤ 1.00	.90 ≤ NFI ≤ .95	,900	Acceptable Correspondence
AGFI	.95 ≤ NNFI ≤ 1.00	.85 ≤ NNFI ≤ .90	,878	Acceptable Correspondence
IFI	.95 ≤ IFI ≤ 1.00	.90 ≤ IFI ≤ .95	,910	Acceptable Correspondence

*(Celik & Yilmaz, 2013; Cokluk, Sekercioglu, & Buyukozturk, 2014)

As seen in Table 5, tested theoretical model has a compatible structure with the data set and the fit indexes of the model are at an acceptable level. $\chi2$ value's being below 2 is the first parameter indicating that the model is perfectly compatible with the data (Kline, 2011). Another compatibility criterion, RMSEA, being below .05 also shows the perfect fit of the model with the data set. The other compatibility criteria also found out to be at acceptable levels. This indicates that the tested model fits

well with the data set in general (Celik & Yilmaz, 2013; Cokluk et al., 2014; Schumacker & Lomax, 2010). The standardized regression coefficients, t score, standard error, explained variance and the values of significance about the variables included in the SEM analysis are presented in Table 6.

Table 6. The Results of the SEM Analysis

Hypothesis	Independent V.→ Dependent V.	SPC	t-value	SE	Explained Variance	Result
H1	S. E.B→CONS	.40	4,51**	.026	.166	Supported
H2	E.B→TRAD	-.47	-5,83**	.068	.224	Supported
H3	E.B→LAS	.18	2,18*	.144	.263	Supported
H4	CONS→LAS	.41	4,37**	.601		Supported
H5	TRAD→LAS	-.01	-.12	.172	-	Not Supported

**= p< 0.01, *= p< 0.05 (SPC: Standardised Path Coefficient, SE: Standard Error, S.E.B: Sophisticated Epistemological Beliefs, CONS: Constructivist Approach, TRAD: Traditional Approach, LAS: Learning Autonomy Support)

As seen in Table 6, middle school teachers' epistemological beliefs meaningfully and positively predict their constructivist teaching-learning conceptions (β=.40, p< .01) and their learner autonomy support behaviours (β=.18, p< .01). So, these findings confirm hypotheses H1 and H3. Teachers' sophisticated epistemological beliefs meaningfully and negatively predicted traditional teaching-learning conceptions (β=.47, p< .01) which confirmed the hypothesis H2. Being an internal or sub variable, constructivist teaching-learning conceptions meaningfully and positively predicted learner autonomy support behaviours. This means that hypothesis H4 has also been confirmed (β=.41, p< .01). On the other hand, H5 hypothesis, which was assuming that traditional teaching-learning conceptions meaningfully and negatively predict the learner autonomy support behaviours has not been confirmed. As the extrinsic variable teachers' epistemological beliefs only explain 17 % of the change occurred in constructivist teaching-learning conceptions, whereas these beliefs explain 22 % of the change in traditional teaching-learning conceptions. Epistemological beliefs and constructivist teaching-learning conceptions represent 26 % of the total variance of the learner autonomy support behaviours, which was assigned as dependent variable.

In consideration with the above issues, teaching-learning conceptions variable did not included in mediation analysis, because H5 hypothesis had not been verified beforehand. In order to measure the mediation effect of the constructivist teaching-learning conceptions on the relationships between sophisticated epistemological beliefs and learner autonomy support behaviours, the significance of the relationships amongst the independent and the dependent variables (H6 Hypothesis) are examined first. Figure 3 reveals this.
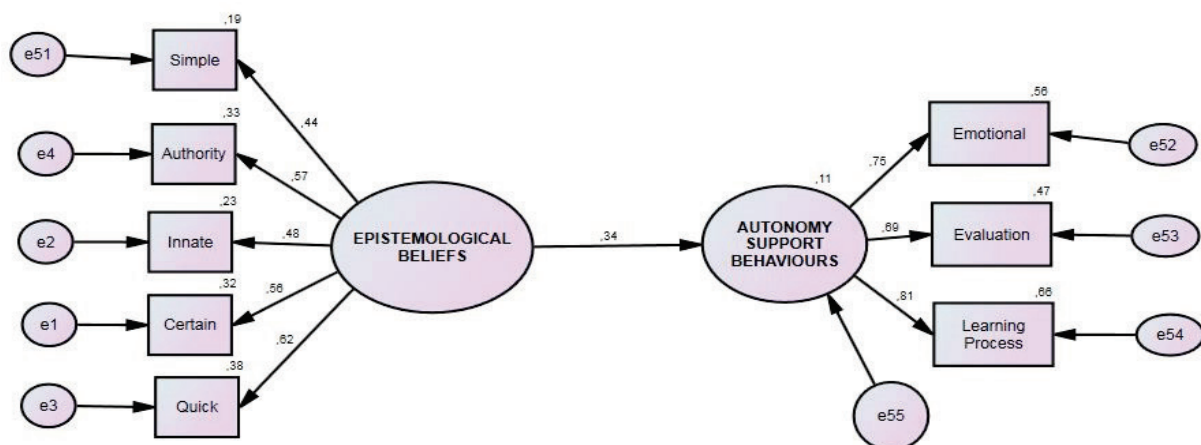

Figure 3. The Structural Modelling Representing the Relationships between Epistemological Beliefs and Learner Autonomy Support Behaviours

As seen in Figure 3, sophisticated epistemological beliefs predicts learner autonomy support behaviours in positive direction significantly (β=.33, p< .01). In the following phase, constructivist teaching-learning conceptions are added into the model that was formed from epistemological beliefs and learner autonomy support behaviours as the mediation variable. Then, H6 hypothesis, which was supposed to have partial mediation effect, was tested. The results were visualised in Figure 4.
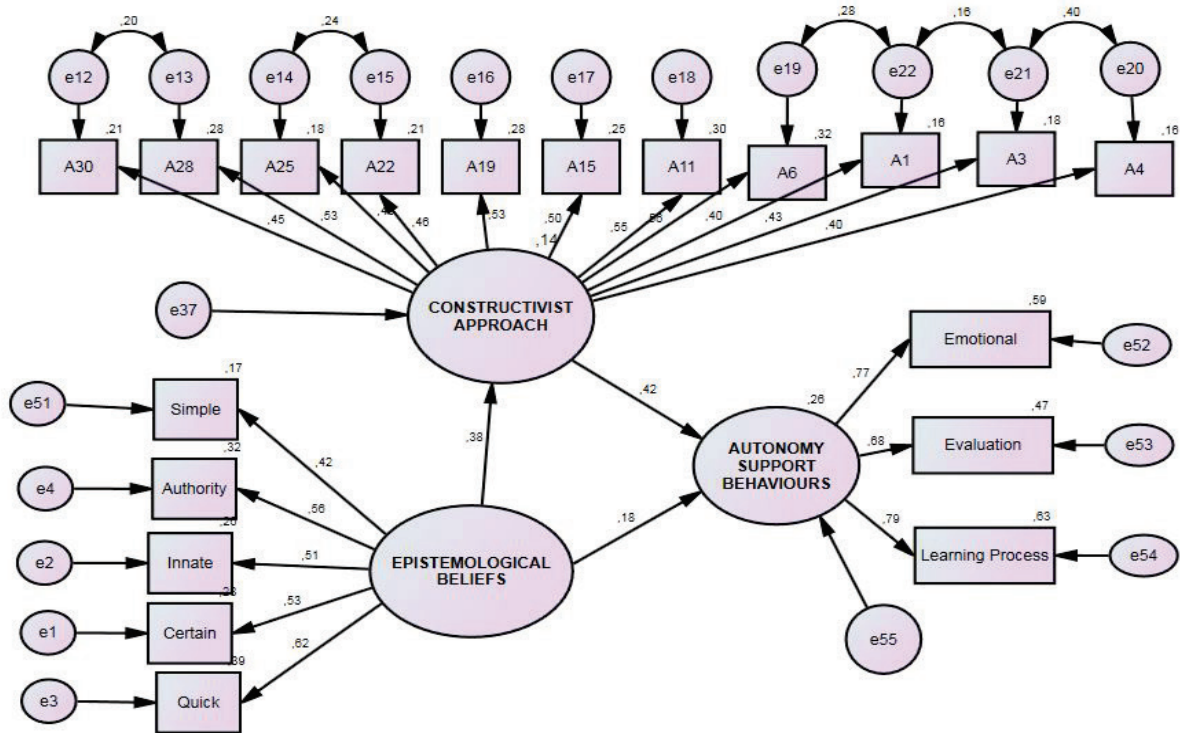

Figure 4. The Mediation Model Representing the Relationships between Constructivist Teaching-Learning Conceptions, Epistemological Beliefs and Learner Autonomy Support Behaviours

The examination of the Figure 4 indicates that when constructivist teaching-learning conceptions are added into the model as mediation variable, it turns into a situation in which sophisticated epistemological beliefs positively predicts the learner autonomy support behaviours, but its co-efficiency score decreases from .33 to .18. Besides its p value rises from .01 to .02. As a result, it could be said that there is a partial mediation affect between the independent and dependent variables. A Sobel test was then conducted to see whether the decrease of the influence of the independent variable on the dependent one was significant or not. This test also supposed to reveal the significance of the mediation effect. The findings of the Sobel Test are presented in Table 7 (Preacher & Hayes, 2008).

Table 7. The Results of the Sobel Test, Presenting the Significance of the Effect of the Mediating Variable in between the Independent and the Dependent Variables

	Model Paths	SPC	SE	p	%95 CI		Sobel Test	
					Lower	Upper	Test Statistic (z)	p
Direct	S.E.B→CONS	.38***	.08	.006	.25	.55		
	CONS →LAS	.41***	.08	.009	.28	.54		
	S.E.B.→LAS	.18**	.09	.04	.04	.34	3.06615907	.002
Indirect	S.E.B→CONS→LAS	.15**	.05	.004	.09	.28		
Total	(S.E.B→LAS) + (S.E.B→CONS→LAS)	.33**	.08	.01	.17	.48		

SPC= Standardised Path Coefficient, SE = Standard Error, CI = Confidence Interval, ***p: .01, **p: .05

Table 7 reveals constructivist teaching-learning conceptions' have significant partial mediation effect on the relationships between sophisticated epistemological beliefs and learner autonomy support behaviours (z: 3.06, p< .01). After the bootsraping of 10.000, it was find out that the indirect path coefficient is significant and there is not any zero value amongst confidence bounds (Bootsrap Coefficient= .15, %95 Confidence Intervals= .09 and .28). So, sophisticated epistemic beliefs and constructivist teaching-learning approaches explain 26% of the variance in learner autonomy support behaviours. The removal of the mediating variable (constructivist teaching-learning approaches) concludes with the result of this rate going down to 16%. When the new model's fit indexes were examined, it was seen that dividing chi-square to its degree of freedom and RMSEA values were perfect, while the other fit indexes were in acceptable level ($\chi2$=248.818, df=144, p<.01, $\chi2$/df=1.728, RMSEA=.04, AGFI=.90, GFI=.92, IFI=.92, CFI=.91). Accordingly, it could be stated that sophisticated epistemological beliefs influence learner autonomy support behaviours through the mediating effects of constructivist teaching-learning conceptions along with directly having effect on it.

Conclusion and Discussion

This study suggests a structural model about the relationships amongst middle school teachers' epistemological beliefs, teaching-learning conceptions and learner autonomy support behaviours. After seven theoretically supported modifications performed on the data set, it was seen that fit idexes were increased. New versions of the model that were taken shape after each modification were significantly different from the previous version (chi-square difference test). These results could be interpreted as the compatibility among the the theoretical model and the data set has been getting stronger (Tabachnick & Fidell, 2013). The results of the research have indicated that the theoretical model is compatible with the data set. Accordingly, teachers' sophisticated epistemological beliefs predict their teaching-learning conceptions and the H1 hypothesis has been confirmed. These findings are coherent with studies in the relevant literature, which state that teachers with sophisticated epistemological belief have constructivist teaching-learning conceptions while teachers having naive epistemological beliefs have traditional teaching-learning conceptions (Aypay, 2010, 2011; Bahcivan, 2014; Bikmaz, 2011; Chan, 2003, 2004, 2011; Chan & Elliot, 2004; Cheng et al., 2009; Kanadlı & Akbas, 2015; Kizilgunes et al., 2009; Lee et al., 2013; Otting et al., 2010; Phan, 2008; Tanriverdi, 2012; Taskin, 2012; Tezci, Erdener, & Atici, 2016; Yilmaz & Sahin, 2011). It is found out that the development of teachers' epistemological beliefs ensures that they adopt the constructivist teaching-learning conceptions better. Teachers believing that knowledge is certain and stable, and possessing a naive epistemological belief in the expert's/specialist's authority dimension generally adopt a traditional teaching-learning approach in class (Otting et al., 2010). Teachers in this group do not pay much special attention to students' knowledge construction processes. This finding confirmed H2 hypothesis, which assumed that teachers' sophisticated epistemological beliefs predict traditional teaching-learning conceptions negatively. The studies in the literature prove the existence of meaningful relationships between the sub dimensions of epistemological beliefs and teaching-learning conceptions. Studies carried out by Chan (2003), Chan and Elliot (2004) and Ekinci (2017) have been concluded that there is a positive meaningful correlation between the dimension of expert's/specialist's authority and traditional teaching-learning approach; while there are negative meaningful correlations between expert's/specialist's authority dimension and constructivist teaching-learning conceptions. In the dimensions of certainty of knowledge and innate ability, similar relationships amongst the variables have also been found out (Aypay, 2011; Chan, 2003; Otting et al., 2010; Rodriguez & Cano, 2007).

The findings of the descriptive statistics reveal that middle school teachers got high scores from the epistemological belief inventory (the general average of the inventory = 4,56) and therefore they have sophisticated epistemological beliefs. When it is considered that their scores of constructivist teaching-learning approach were so high ($\overline{X}$= 4.56) it is not surprising that their scores of traditional teaching-learning conceptions remained at a low level ($\overline{X}$= 2.47) and there was a reversed correlation between these two variables (r= -.20). These results are coherent with the studies indicating that middle school teachers mostly adopt constructivist teaching-learning conceptions (Aypay, 2011; Bikmaz, 2011;

Chan & Elliot, 2004; Ekinci, 2017; Otting et al., 2010). Whether teachers adopting constructivist teaching-learning conceptions reflect their views into their practices in real classroom environments has been a subject of debate. Mansour's (2013) study carried out in Egypt concludes that teachers adopting constructivist teaching-learning conceptions generally tend to reflect traditional teaching-learning conceptions in their inclass behavioral patterns. Researchers need to handle this contradictive situation while examining teachers' teaching-learning conceptions and their classroom practices. The findings of Mansour's (2013) study has also implications with the findings obtained for the hypothesis H5' in the current research. In relation with the hypothesis H5, it was expected that the teachers adopting traditional teaching-learning conceptions obtain low scores in regards with learner autonomy support behaviours. Besides, their traditional teaching-learning conceptions were assumed to directly and negatively influence their learner autonomy support behaviours. The research results indicate that performing learner autonomy support behaviours, not many middle school teachers adopt traditional teaching-learning conceptions, and the relationships between these two variables are rather weak. This situation mainly arisen because even those teachers who stated that they generally adopt traditional teaching-learning conceptions also denoting that they exhibit learner autonomy support behaviours. So, it might be appropriate to support the findings of the quantitative research with qualitative data to explain why hypothesis H5 not being able to be supported.

Middle school teachers' epistemological beliefs positively and meaningfully predicted their learner autonomy support behaviours and hypothesis H3 has been supported. These results indicate that teachers with sophisticated epistemological beliefs are aware of students' not being passive during the knowledge construction processes, and students' personal experience and interests having important roles in learning activities. It is remarkable that although there are many descriptive studies aiming to define the level of teachers' performing learner autonomy support behaviours (Bozack, Vega, McCaslin, & Good, 2008; Guvenc & Guvenc, 2014; Oguz, 2013a, 2013b; Oguz et al., 2014; Ozkal & Demirkol, 2014), there is only one single study revealing the relationships between epistemological beliefs and learner autonomy support behaviours (Roth & Weinstock, 2013). Roth and Weinstock's (2013) study proved that teachers' sophisticated epistemological beliefs had an impact on their performing of learner autonomy support behaviours. In terms of indicating the influences of epistemological beliefs on teachers' behavioral patterns, it is important that the hypothesis H3 has been confirmed. In teaching-learning processes, sophisticated teachers who believe that there can not be a certain knowledge in its fullest sense and knowledge can change according to the context; do not perceive themselves as omniscient authorities who can not be questioned. They also provide their students with autonomy support and mediate the environment to make students' hidden/reserved skills and abilities come to light. Such a sophisticated epistemological belief naturally brings along constructivist teaching-learning conceptions. The fact that epistemological beliefs and constructivist teaching-learning conceptions explain a 26 % of the total variance for the learner autonomy support behaviours they also indicate that these three variables are in a very tight relationship with one another. As a result, supporting hypothesis H4, constructivist teaching-learning conceptions positively and meaningfully predict learner autonomy support behaviours. The examination of the relevant literature revealed that there are moderate level positive relationships amongst teachers' constructivist teaching-learning conceptions and their learner autonomy support behaviours (Ekinci, 2016). The research results permits us to claim that teachers adopting constructivist teaching-learning conceptions perform learner autonomy support behaviours more often. This claim also related to H6 hypothesis foreseeing a partial mediation effect of the constructivist teaching-learning conceptions on epistemological beliefs and learner autonomy support. Having very similar characteristics, it may seem possible to consider these two variables as a single one to a certain degree. However, learner autonomy support behaviours scale completely focuses on teachers' actions rather than their perceptions, attitudes and opinions. When the possibility that there may be differences and contradictions amongst teachers' views and practices (Mansour, 2013) is considered it will be more appropriate to handle these two separately. There is not any study dealing with the relationships between these two variables in the relevant literature. The findings indicate that teachers adopting constructivist teaching-learning conceptions perform learner

autonomy support behaviours more often. The results indicate that the participating teachers mostly stated that they perform autonomy support behaviours. Therefore, it is necessary to support this finding with qualitative data based on classroom observations.

The results of the research have indicated that teachers' beliefs and conceptions naturally influence their in class practices. Hashweh's (1996) and Icen's (2012) studies indicated that sophisticated epistemological beliefs positively influence teachers' teaching styles and their in class behaviours. So, the development of teachers' epistemological beliefs is expected to positively influence both teaching-learning conceptions and learner autonomy. Although, the pre-service teachers education provided in various institutes has similar characteristics in nature, teachers' personal differences (learning styles, teaching-learning conceptions, locus of control, epistemological beliefs, self-efficacy beliefs and etc.) create variances amongst their beliefs, perceptions about and comprehension of the learning processes (Kuzgun & Deryakulu, 2017). In their pre-service education, teachers not only learn more about their subject areas but also gain experience in different learning methods and techniques (Guven, 2004). Considering that epistemological beliefs they hold, influence teachers' perspectives of teaching, the necessity for investigating the significance of epistemological beliefs in teacher training processes comes to fore. It is also important and necessary to improve student teachers skills and expertise of constructivist teaching-learning processes and learner autonomy support competencies.

Limitations and Suggestions

In order to determine teachers' in-class behaviour patterns clearly, it is important and necessary to support the results of the current quantitative study with in depth qualitative research. As a consequence of only recruiting middle school teachers in the study sample, thes paper does not compare and contrast the progress and change of teaching and learning conceptions and autonomous learning support behaviours of teachers teaching at different schooling levels (primary, middle school and secondary). This could be evaluated as one of the limitations of the current study. Another limitation is the fact that the number of the items forming the dimensions of the epistemic belief inventory is few and their alpha coefficients are low. On the other hand, the examination of the studies making use of the "Epistemic Belief Inventory" employed in this study indicates that this problem is not a particular to the current study (Bath & Smith, 2009; Chan & Elliott, 2004; Chan, Ho, & Ku, 2011; Cam, Topcu, Sulun, Guven, & Arabacioglu, 2012; Dinc et al., 2016; Nussbaum & Bendixen, 2003; Velipasaoglu & Musal, 2013). "Epistemological Beliefs Questionnaire" developed by Schommer (1990) and being the first one in the field has alpha coefficients changing between.51 and .78. Starting from the point that Schommer's scale has low alpha coefficients, Schraw et al. (2002) intended to develop a new inventory having higher scores. Nevertheless, they ended up with the current inventory having alpha coefficients being stucked in between .58 ile .68. In consideration with a complex and multi-dimensional psychological structure like epistemological beliefs, this could be regarded as ordinary or normal. Cultural variances and semantic shifts arising from the translation processes might be regarded as causes of getting lower alpha coefficient scores for epistemological belief scales (Cam et al., 2012). Getting lower alpha coefficient scores and factor loads from the epistemological belief scales also resulted in limited number of items forming each dimension of those scales. For instance, staring with a 28 item scale in their pilot studies, Schraw et al. (2002) were ended up with the Epistemic Belief Inventory used in this study, which has only 15 items. As a result of this, each dimension of the inventory, whis has five dimensions, is formed from three items (Schraw et al., 2002). A review of the adaptation studies of this inventory into the Turkish culture reveals that these attempts ended up with a version of inventory formed from 14 (Cam et al., 2012), 19 (Velipasaoglu & Musal, 2013) and 15 (Dinc et al., 2016) items. On the other hand, Cortina (1993) asserts that there is not any correlation between having limited number of items in each dimension and getting lower alpha coefficient scores. Cortina (1993) claims that the possibility of getting higher alpha coefficient scores for a particular dimension having a number of items is not an extraordinary situation. The main reason of getting lower alpha coefficient is the fact that the correlation in between those items is low (Cortina, 1993). Briggs and Cheek (1986) argued that it would be sufficient enough to accept the correlation in between the items forming a particular dimension amongst .20 and .40 as reliability criteria. Besides, there are some studies in the

relevant literature claiming that getting .60 alpha coefficient scores for scales having less than 10 items is sufficient for satisfying the reliability criteria (Cortina, 1993; Cronbach & Meehl, 1955; Cetin, Ilhan, & Yilmaz, 2014; Sipahi, Yurtkoru, & Çinko, 2010). In consideration with this point, it could be asserted that the findings must carefully be evaluated, because the dimensions of expert's/specialist's authoritiy, quick learning and simple knowledge in the inventory used in this study are formed from two items each.

Another limitation of the current study is related to the use of "Teaching-Learning Conceptions Scale" developed by Chan and Eliot (2004) in the context of Far East culture and adapted into Turkish. After conducting a CFA, 10 items were excluded from this scale because their factor loads were very low and/or their p values were not significant. Both the original version of the scale and its Turkish adaptation study were carried out with student teachers, but it has been used to measure practicing teachers' traching-learning conceptions for the first time in this study. Thus, it can be argued that this might be a reason for getting low factor loads for some items from the CFA test. This also can be evaluated as student and practicing teachers have differing teaching-learning conceptions. In addition, EFA and CFA test conducted for the adaptation study of this scale employed the same data. Hence, it could be evaluated that this might be hindering the effect and reflections of the scale on different samples. It has been stated that carrying out EFA and CFA on the same samples might be ended up with tautological results (Dogan, Soysal, & Karaman, 2017). As a matter of fact, omitting 10 items from the scale after its implementation with teachers could be evaluated in this context. On the other hand, the relevant literature (Cokluk et al., 2014; Dogan et al., 2017; Schmitt, 2011) presents differing conceptions to his issue; some authors claim that both EFA and CFA could be carried out with the same sample, while others argue that the structure obtained after an EFA should be confirmed with a CFA carried out with a different sample. Besides, there is another view asserting that the data set could be divided into two parts and then EFA and CFA might be conducted with the data collected from each part separately. Omitting some items from the scale can be evaluated as it is not compatible with Turkish culture. In addition, it was seen that most of the omitted items were related to the dimension of traditional teaching-learning conceptions. Hence, this could be interpreted as teachers not being able fully conceptualize traditional ways of teaching and learning. Getting lower factor loads for some items having the traces of the Far Eastern culture that give priority to respecting the authority and obedience (such as "In order to control students, it is necessary to reprimand them regularly.") (Chan & Elliott, 2000, 2002, 2004), could be presented as an example of cultural differences related to teaching-learning processes. In order to provide the compatibility of the suggested theoretical model with the data set, it is highly important to omit those items that are not working with the other ones coherently before conducting SEM analyses. It can be inferred that having only two dimensions and being formed from 20 items, the Teaching-Learning Conceptions Scale" possesses a relatively stronger content validity than the Epistemic Belief Inventory. In addition, its acceptable fit indexes and perfect alpha coefficient scores could be regarded as evidences of this scale's validity and reliability.

Besides, considering the fact that students' need for autonomous learning support increases in parallel whit their educational progress (Holec, 1981; Lietaert et al., 2015; Stroet et al., 2013), it is necessary to empirically investigate the degree of which teachers and academics meet their students' this type of expectations. Examining the relationships amongst three main variables in a broad level, this study does not attempt to compare and contrast teachers' beliefs and viewpoints in consideration with the subjets they teach. Teachers' in-class behaviours are related to the structure of the respecting subject and its content. For instance, in order to define whether teachers' epistemological beliefs, their teaching-learning conceptions and their autonomous learning support behaviours differ in accordance with the subject they teach. Moreover, in order to support the significance of the results of the current study, further research comprising of qualitative observations may shed lights on how teachers reverberate their personal epistemologies into their teaching practices.

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