Reflective Thinking Tendencies and Epistemological Beliefs in Terms of Learning Styles

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Abstract

This research has focused on whether preservice teachers' reflective thinking tendencies and epistemological beliefs differ in terms of learning styles. The participants involved 410 preservice Turkish teachers who were studying at six different universities. Three different measurement tools that Grasha-Riechmann Learning Style Inventory, Reflective Thinking Tendency Scale and Epistemological Beliefs Questionnaire were administered to the participants within the context of the research purpose. Analysis of the data has led to the conclusion that there is a relationship between reflective thinking tendencies and epistemological beliefs. Additionally, it has become clear that reflective thinking tendencies and epistemological beliefs differed in terms of learning styles.

Keywords: epistemological beliefs, learning styles, reflective thinking.

1. Introduction

People think and act differently from each other. Differences in behaviour and thinking also manifest themselves in learning as in other areas. Learning is not entirely based on general rules. Viewing learning as an effort that can be shaped by the individual's unique understanding, procedure or style distinguishes the meaning attached to learning from classical understanding. The common point that lies at the root and basis of the studies related to the learning has been the idea that learning is not static and one dimensional, and it is different in every human being (Reiff, 1992; Dunn & Dunn, 1979; Hofer, 2001). Individuals' levels of motivation and attitudes about learning and teaching and their reaction to specific classroom settings and teaching practices are different. This situation manifests itself in the name of 'individual differences'. Understanding these differences will enable teachers to meet the different learning needs of their students (Felder & Brent, 2005). Considering individual differences is one of the right criteria to ensure that the individual is aware of what and how to learn. These individual differences are also at the core of learning styles. There are cognitive, motivational, and psychological elements of learning styles that are student behaviour that indicate how best to learn (Keefe, 1985). In other words, learning styles are personal traits that affect learners' ability to acquire knowledge, interact with peers and their teachers, and participate in learning experiences. Cognitive diversity, social influences, motivations, emotions, problem-solving skills, memory and perception processes, and the ability to process information define and describe learning styles of the learners (Grasha, 2002).

Some students may have more than one learning style and are easily recognized within the classroom thanks to their dominant characteristics. Each learning style has both positive and negative qualities, while learning style preferences are not firm and rigid. For this reason, it would be wrong to see learning styles as totally good or bad. Learning styles can vary and be regulated depending on factors such as classroom climate, teacher characteristics, and teaching methods and techniques (Grasha, 2002). Grasha and Riechmann (1996) view learning styles as different roles for students' interactions with teachers, classmates, and the content of lessons. They argue that they can be defined as social and emotional dimensions such as attitudes towards learning, teachers, class, and classmates. Depending on these, the model they set out is based on the reactions of students given to real class activities (Baneshi, at al, 2014).

1.1 Reflective Thinking

Reflection is an important part of learning and teaching experiences (Tok, 2008). Dewey (1933) defines reflective thinking as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends" (re-ed 1997: 7). Reflective thinking is not to

be equated with random thinking in any matter. It is portrayed as a deliberate and conscious thinking about any action for the development of it (Hatton & Smith, 1994:7). Rodgers (2002) set out from Dewey's thoughts, speaks of four criteria that define reflective thinking: "(a) Reflection is a meaning-making process that moves a learner from one experience into the next with deeper understanding of its relationships with and connections to other experiences and ideas. (b) Reflection is a systematic, rigorous, disciplined way of thinking, with its roots in scientific inquiry (c) Reflection needs to happen in community, in interaction with others. (d) Reflection requires attitudes that value the personal and intellectual growth of oneself and of others." Reflection requires the ability to focus on the process rather than the outcome, to follow a process in which knowledge is transferred into behaviour, and to evaluate this process. Being reflective means for the individual to think about his own learning-thinking approaches and be aware of what she/he does and what she/he will do (Başol & Gencel, 2013; Ünver, 2003; Baysal & Demirbaş, 2012). This awareness is shaped by inquiry, monitoring the results of the actions, and considering one's own observations and others' feedback during the evaluation (Norton, 1994; Hasırcı & Sadık, 2011). Being active in the planning of future goals and aware of the previous experiences are in line with reflective thinking.

1.2 Epistemological Belief

Epistemology, which is at the root of all disciplines and deals with the knowledge in a broader sense, deals with the source, accuracy, possibility and boundaries of knowledge. On the other hand, epistemological belief is defined as personal beliefs about knowing and the nature of knowledge (Schommer, 1990). Schommer (1990) dimensioned the concept of epistemological belief, which means individuals' beliefs about knowledge and learning, as the source of knowledge, the precision of knowledge, the organization of knowledge, the control of learning, and the pace of learning.

Epistemological beliefs can be thought of as independent. In other words, it is not necessary that beliefs develop together; the epistemological beliefs that individuals possess can show different levels of complexity (Schommer, 1990; Aypay, 2011). Advanced epistemological beliefs involve believing that everybody is an individual and that individuals must manifest their individual differences (Kaleci, 2012). Those with superficial epistemological beliefs acknowledge that people who have knowledge have the authority and knowledge is clear and precise while those whose epistemological beliefs are advanced accept that the knowledge is flexible and changeable, and learning requires effort (Schommer, 1990; Başbay, 2013). This belief is the result of realizing that learning is a process.

There have been many studies on learning styles. The learning styles were investigated in relation to academic achievement (Snyder, 1999; Cassidy & Eachus, 2000; Arslan & Babadoğan, 2005; Ekici, 2013; Moghadam, at al., 2015), teaching styles (Bilgin & Bahar, 2008; Kaleci, 2012), learning strategies (Deryakulu, 2004; Yılmaz, 2011; Tezci & Ataseven, 2016), thinking styles (Ural & Esmer, 2017), attitudes towards the profession (Çiğdem & Memiş, 2011; Pehlivan, 2010), problem solving skills (Şirin & Güzel, 2006; Gencel, 2015), critical thinking skills (Colucciello, 1999; Tümkaya, 2011; Açışlı, 2016; Erdamar & Alpan, 2017), emotional intelligence (Alavinia & Ebrahimpour, 2012; Öznacar, at al., 2018), and metacognition (Başbay, 2013). There are also studies investigating the relationship between learning styles, epistemological beliefs and reflective thinking (Phan, 2008; Mahasneh, 2013; Güneş at al, 2017; Çelik, 2017).

In this study, it was aimed to examine whether the reflective thinking tendencies and epistemological beliefs differ in terms of learning styles, and whether there is a correlation between reflective thinking tendencies and epistemological beliefs. The research was shaped by the following questions: 1. Based on preservice teachers' learning styles (a) do their reflective thinking tendencies differ? (b) do their epistemological belief levels differ? 2. Is there a relationship between their reflective thinking tendencies and epistemological beliefs?

2. Method

This research is a correlational study based on survey model.

2.1 Participant Characteristics

The data of the study were collected from 410 preservice Turkish teachers studying at six different state universities during 2017-2018 academic year.

Table 1. Descriptive statistics of participants

		n	%
Gender	Male	147	35,9
	Female	263	64,1
Grade	3	243	59,3
	4	167	40,7
Learning styles	Independent	108	26,3
	Avoidant	33	8,0
	Collaborative	97	23,7
	Dependent	90	22,0
	Competitive	30	7,3
	Participant	52	12,7

2.2. Instruments

2.2.1 Grasha-Riechmann Learning Style Inventory

The scale involving 60 items that are rated on a five-point Likert scale was adapted by Sarıtaş and Süral (2010) and is composed of six dimensions. Each dimension consists of 10 items. When learning styles of individuals are determined, each learning style is determined at three levels of "low", "medium" and "high" level. The Cronbach Alpha coefficient of the scale is .802. The Grasha-Riechmann Learning Style Scale, defined as a social interaction scale, positions learning styles as independent-dependent, avoidant-participant, collaborative-competitive on three major lines, each representing two opposite directions (Cassidy, 2004). Grasha-Riechmann learning style degrees are shown in Table 2.

Table 2. Grasha-Riechmann Learning Styles Degree

Learning Styles	Learning Styles Degree		
	Low	Medium	High
Independent	[1.0 - 2.7]	[2.8 - 3.8]	[3.9 - 5.0]
Avoidant	[1.0 - 1.8]	[1.9 - 3.1]	[3.2 - 5.0]
Collaborative	[1.0 - 2.7]	[2.8 - 3.4]	[3.5 - 5.0]
Dependent	[1.0 - 2.9]	[3.0 - 4.0]	[4.1 - 5.0]
Competitive	[1.0 - 1.7]	[1.8 - 2.8]	[2.9 - 5.0]
Participant	[1.0 - 3.0]	[3.1 - 4.1]	[4.2 - 5.0]

The key features of the learning styles determined in the inventory are given below:

a) Independent learning style: Students with this style love to work on their own and are confident in their own learning skills.

b) Avoidant learning style: Students who are disinterested in the classroom and get bored by the classroom environment fall into this class. They do not like learning and do not want to participate in classroom activities.

c) Collaborative learning style: Students in this group are more eager to learn, learn by having fun, and take charge of their learning.

d) Dependent learning style: Students with a dependent learning style are students who are not curious to learn and learn only what is expected of them.

e) Competitive learning style: Students with a competitive style are students who try hard in the class to achieve higher success than others do.

f) Participant learning style: Students with this style love to share their ideas and talents with other students.

2.2.2 Reflective Thinking Tendency Scale

This scale was developed by Semerci (2007). It involves 35 items under seven dimensions. The items are rated on a 5-point Likert scale. The Cronbach Alpha coefficient of the scale is 0.908. The dimensions of the scale are "continuous and intentional thinking", "open-mindedness" "interrogative and effective teaching" "teaching responsibility and science" "researcher" "foresighted and sincere" and "looking professional".

2.2.3 Epistemological Beliefs Questionnaire

This scale was adapted by Aypay (2011) from Chan and Elliot. The scale is composed of four dimensions called as "Innate/Fixed Ability, Learning Effort, Learning Process/Expert Knowledge, and Certainty Knowledge". It has 30 items that are rated on a 5-point Likert scale. The Cronbach alpha of the scale is .78 for the total scale, and .77, .74, .59, and .52 for the dimensions, respectively. The higher scores obtained from the dimensions indicate that their beliefs regarding the dimension is higher (Aypay, 2011).

2.3. Data Analysis

In the study, the measurement model was examined using confirmatory factor analysis. As validity and reliability studies of the scales were carried out earlier, confirmatory factor analysis was used to determine the structural validity within the scope of this study (Büyüköztürk, 2008). The fit of the model with the data is tested using fit indices. Software like AMOS or LISREL, which are used to conduct CFA, able to produce various goodness of fit indices. The findings regarding χ^2/sd, IFI, GFI, CFI, and RMSEA are presented below. The threshold for the χ^2/sd, which indicates the fit of the model with the data, is 3 while the acceptable value is 5 (Gürbüz & Şahin, 2016). An IFI value, which tests the fit of the model insensitive to the sample size, greater than 0.90 indicates a good fit while a value above 0.85 indicates an acceptable. Similarly, a GFI value, which tests the fit of the model insensitive to the sample size, greater than 0.90 indicates a good fit while a value above 0.85 indicates an acceptable fit (Meydan & Şeşen, 2011). The CFI proposed by Bentler (1990) compares the tested model with the basic model and gives a fit value between 0 and 1. For a good fit, CFI is expected to be above 0.95 while 0.90 or above indicates an acceptable fit. For a good fit, RMSEA, which indicates the degree to which the model fits the sample covariance, is expected to be below 0.05 while 0.08 or below indicates an acceptable fit (Gürbüz & Şahin, 2016). The Cronbach alpha coefficients of the scales along with the fit index values obtained from the CFA result are shown in Table 3.

Table 3. Goodness of fit statistics

Tests	$\Delta\chi^2$/sd	IFI	GFI	CFI	RMSEA	α
Reflective Thinking Tendency Scale	1,573	0,909	0,898	0,907	0,037	0,86
Epistemological Beliefs Questionnaire	1,726	0,909	0,906	0,907	0,042	0,79

RMSEA= Root Mean Square Error of Approximation; CFI= Comparative Fit Index; GFI= Goodness of Fit Index

Table 3 shows the CFA fit index values of the modified model. When the table is examined, it can be seen that the fit indices are within the acceptable limits. It was considered appropriate to improve the first-order multi-factor model of both scales. As a result of examination, the relationships between the items were evaluated, and the 20th item of the reflective thinking tendency scale and the 29th item of the epistemological belief scale were excluded. The Cronbach alpha coefficients were calculated to determine the reliability of the measurement tools. The Cronbach alpha coefficient ranging from 0.00 to 0.40 indicates that the instrument was not reliable; a value between 0.40-0.60 indicates that it has low reliability, a value between 0.60-0.80 indicates reliability, and a value between 0.80-1.00 indicates high reliability (Özdamar, 1999). It can be stated that the reflective thinking scale is highly reliable as a whole, and the epistemological belief scale is highly reliable as a whole.

3. Results

3.1 Do preservice Teachers' Reflective Thinking Tendencies Differ in Terms of Their Learning Styles?

Table 4. Results of ANOVA on reflective thinking tendencies based on learning styles

Reflective Thinking Dimension	Learning Styles	n	Mean	sd	Post Hoc differences between groups	F	p
Continuous and intentional thinking	1	108	4,12	0,53	---	5,000	0,000
	2	33	3,83	0,56	3		
	3	97	4,19	0,45	2,4		
	4	90	3,90	0,64	3		
	5	30	3,81	0,66	---		
	6	52	4,09	0,53	---		
	Total	410	4,04	0,57			
Open-minded	1	108	4,25	0,55	2,3,5	5,831	0,000
	2	33	3,70	0,69	1		
	3	97	3,99	0,69	1		
	4	90	4,03	0,71	---		
	5	30	3,87	0,62	1		
	6	52	4,27	0,58	---		
	Total	410	4,07	0,66			
Interrogative and effective teaching	1	108	4,44	0,70	4	6,331	0,000
	2	33	4,07	0,73	---		
	3	97	4,38	0,51	4		
	4	90	3,98	0,76	1,3,5		
	5	30	4,12	0,62	---		
	6	52	4,35	0,63	4		
	Total	410	4,26	0,68			
Teaching responsibility and science	1	108	4,19	0,56	2	5,303	0,000
	2	33	3,74	0,65	1,3		
	3	97	4,19	0,60	2		
	4	90	3,91	0,69	---		
	5	30	3,88	0,54	---		
	6	52	4,17	0,68	---		
	Total	410	4,06	0,63			
Researcher	1	108	4,10	0,58	4	5,834	0,000
	2	33	3,75	0,57	---		
	3	97	4,06	0,59	4		
	4	90	3,74	0,61	1,3		
	5	30	3,83	0,62	---		
	6	52	4,06	0,55	---		
	Total	410	3,96	0,60			
Foresighted and sincere	1	108	4,15	0,58	4,5	6,297	0,000
	2	33	3,83	0,78	---		
	3	97	4,14	0,63	5		
	4	90	3,85	0,75	1,6		
	5	30	3,63	0,65	1,3,6		
	6	52	4,21	0,58	4,5		
	Total	410	4,02	0,67			
Looking professional	1	108	4,22	0,93	2	5,482	0,000
	2	33	3,48	0,85	1,3,6		
	3	97	4,34	0,84	2		
	4	90	3,98	0,94	---		
	5	30	4,10	0,82	---		
	6	52	4,27	0,92	2		
	Total	410	4,13	0,92			

When ANOVA results in Table 4 are examined, it is seen that reflective thinking levels of preservice teachers differ statistically in terms of learning styles in all dimensions.

It is assumed that the variances are not equal in the dimensions of "continuous and intentional thinking", "open-minded", "interrogative and effective teaching" and "foresighted and sincere". According to Games Howell analysis, the following results were obtained. Individuals with collaborative learning style had significantly higher scores from dimension of continuous and intentional thinking than those with avoidant and dependent learning styles. Individuals with independent learning style had significantly higher scores from dimension of open-minded than those with avoidant, collaborative, and competitive learning styles. Individuals with independent learning style had significantly higher scores from dimension of foresighted and sincere than those with dependent learning style. On the other hand, individuals with competitive learning style had significantly lower scores from dimension of foresighted and sincere than those with independent, collaborative, and participant learning styles. Individuals with dependent learning style had significantly lower scores from dimension of interrogative and effective teaching than those with independent, collaborative, and competitive learning styles. It is assumed that the variances are equal in the dimensions of teaching responsibility and science, researcher, and looking professional. According to the Scheffe test, the following results were obtained. Individuals with avoidant learning style had significantly lower scores from teaching responsibility and science dimension than those with independent and collaborative learning styles. Individuals with dependent learning style had significantly lower scores from researcher dimension than those with independent and collaborative learning styles. Individuals with avoidant learning style had significantly lower scores from looking professional dimension than those with independent, collaborative, and participant learning styles.

3.2 Do preservice Teachers' Epistemological Belief Levels Differ in Terms of Their Learning Styles?

Table 5. Results of ANOVA on epistemological belief levels based on learning styles

Epistemological Belief Dimension	Learning Styles	n	Mean	sd	Post Hoc differences between groups	F	p
Learning Process/Expert Knowledge	1	108	3,91	0,51	2,4	14,446	0,000
	2	33	3,25	0,71	1,3,6		
	3	97	4,02	0,56	2,4		
	4	90	3,48	0,65	1,3,6		
	5	30	3,70	0,64	---		
	6	52	3,84	0,58	2,4		
	Total	410	3,76	0,64			
Innate/Fixed Ability	1	108	2,62	0,50	4,6	5,161	0,000
	2	33	2,61	0,65	---		
	3	97	2,56	0,68	6		
	4	90	2,38	0,66	1,5		
	5	30	2,75	0,53	4,6		
	6	52	2,22	0,69	1,3,5		
	Total	410	2,51	0,64			
Leaming Effort	1	108	3,62	0,73	2,4	8,910	0,000
	2	33	3,13	0,85	1,3		
	3	97	3,73	0,70	2,4		
	4	90	3,14	0,70	1,3		
	5	30	3,55	0,65	---		
	6	52	3,53	0,71	---		
	Total	410	3,76	0,64			
Certainty Knowledge	1	108	2,59	0,61	---	2,780	0,017
	2	33	2,87	0,58	6		
	3	97	2,77	0,66	---		
	4	90	2,76	0,60	---		
	5	30	2,63	0,52	---		
	6	52	2,50	0,59	2		
	Total	410	2,68	0,62	---		

When ANOVA results are examined, it is seen that the epistemological beliefs differ significantly in terms of learning styles in all dimensions as can be seen in Table 5.

It is assumed that the variances are equal in the dimensions of learning effort, learning process/expert knowledge, and certainty knowledge. According to Scheffe test, the following results were obtained. From the dimension of learning process/expert knowledge, individuals with independent learning style had significantly higher scores than those with avoidant and dependent learning styles while individuals with avoidant learning style had significantly lower scores than those with independent, collaborative, and participant learning styles. From the learning effort dimension, individuals with independent and collaborative learning styles had significantly higher scores than those with avoidant and dependent learning styles. Finally, individuals with avoidant learning style had significantly higher scores from the dimension of certainty knowledge than those with participant learning style. It is assumed that the variances are not equal in the dimension of innate/fixed ability. According to Games Howell analysis, the following results were obtained. Individuals with independent learning style had significantly higher scores than those with dependent and participant learning styles while individuals with dependent learning style had significantly lower scores than those with independent and competitive learning styles.

3.3 Is there a Relationship between Preservice Teachers' Reflective Thinking Tendencies and Epistemological Beliefs?

A correlation analysis was conducted to determine the relationship between preservice teachers' reflective thinking tendencies and epistemological beliefs. The results can be seen in Table 6.

Table 6. Correlation analysis of reflective thinking and epistemological beliefs

	1	2	3	4	5	6	7	8	9	10	11
1Continuous and intentional thinking	1										
2Open-minded	,309**	1									
3Interrogative and effective teaching	,403**	,451**	1								
4Teaching responsibility and science	,330**	,244**	,339**	1							
5 Researcher	,382**	,220**	,371**	,496**	1						
6Foresighted and sincere	,277**	,233**	,221**	,389**	,457**	1					
7Looking professional	,313**	,240**	,327**	,347**	,313**	,273**	1				
8Learning Process/Expert Knowledge	,311**	,187**	,248**	,304**	,282**	,356**	,278**	1			
9Innate/Fixed Ability	-,133**	-,157**	-,139**	-,150**	-,017	-,029	-,179**	-,018	1		
10Learning Effort	,123*	,091	,167**	,160**	,231**	,246**	,161**	,537**	,098*	1	
11Certainty Knowledge	-,098*	-,121*	-,131**	-,101*	-,037	-,075	-,165**	-,054	,393**	,123*	1

When Table 6 is examined, the relationships between reflective thinking tendencies and epistemological beliefs can be seen. Continuous and intentional thinking, one of the dimensions of reflective thinking tendencies, was significantly and positively correlated with learning effort (r=0,123; p<0,05) and learning process/expert knowledge (r=0,311; p<0,01) while it significantly and negatively correlated with innate/fixed ability (r=-0,133; p<0,01) and certainty of knowledge (r=-0,098; p<0,05). Significant and positive correlation between open-minded and learning process/expert knowledge (r=0,187; p<0,01), and significant and negative correlation between innate/fixed ability (r=-0,157; p<0,01) and certainty of knowledge (r=-0,121; p<0,05) were found. Interrogative and effective teaching

dimension was significantly and positively correlated with learning process/expert knowledge (r=0,248; p<0,01) and learning effort (r=0,167; p<0,01) while it significantly and negatively correlated with innate/fixed ability (r=-0,139; p<0,01) and certainty of knowledge (r=-0,131; p<0,01). Finally, teaching responsibility and science dimension was significantly and positively correlated with learning process/expert knowledge (r=0,304; p<0,01) and learning effort (r=0,160; p<0,01) while it was positively and negatively correlated with innate/fixed ability (r=-0,150; p<0,01) and certainty of knowledge (r=-0,101; p<0,05). Researcher dimension was significantly and positively correlated with learning process/expert knowledge (r=0,282; p<0,01) and learning effort (r=0,231; p<0,01). Foresighted and sincere dimension was also significantly and positively correlated with learning process/expert knowledge (r=0,356; p<0,01) and learning effort (r=0,246; p<0,01). Moreover, looking professional dimension was significantly and positively correlated with learning process/expert knowledge (r=0,278; p<0,01) and learning effort (r=0,161; p<0,01) while it significantly and negatively correlated with innate/fixed ability (r=-0,179; p<0,01) and certainty of knowledge (r=-0,165; p<0,01).

4. Discussion

4.1 Results Regarding the Reflective Thinking Tendencies in Terms of Learning Styles

When preservice teachers' learning styles were evaluated in terms of the dimensions of reflective thinking tendencies, it was observed that the individuals with the collaborative learning style had higher mean from continuous and intentional thinking dimension than those with avoidant learning styles and dependent learning styles. Continuous and intentional thinking is to be aware of one's own thinking process during learning, be careful while thinking and to control it. It seems normal for individuals with dependent learning style which means acting in accordance with the authority and avoidant learning style which is the unwillingness to learn to be inadequate at this dimension when compared with individuals with collaborative learning style.

Individuals with independent learning style had higher scores from open-minded dimension than those with avoidant, competitive, and collaborative learning styles. Open-mindedness means being open to different opinions and criticisms, seeing them objectively, and adapting them to the world of their own mind. The most basic features of the independent style are to choose learning what one thinks important, to act for the improvement of one's skills, to be self-controlled and self-confident (Grasha, 2002). These features can be associated with open-mindedness, one of the important dimensions of reflective thinking. Nevertheless, it has been determined that the avoidant learning style has the lowest mean in open-mindedness.

Individuals with dependent style had the lowest scores from interrogative and effective teaching dimension. This situation can be explained by their low intellectual curiosity and their focus on learning only what is necessary.

Individuals with avoidant style had lower scores from teaching responsibility and science dimension than those with independent learning styles and collaborative learning styles. One of the most basic characteristics of individuals with an avoidant style is that they do not take responsibility for their learning. Their lack of willing and enthusiasm for learning the content, drops in their performance when they are reminded their drawbacks, and their attention to entertainment supports this result (Grasha, 2002). However, individuals with independent and collaborative styles are willing to learn and take responsibility.

Individuals with dependent learning style had lower scores from researcher dimension than those with independent and collaborative learning styles. One of the characteristics of those who prefer the dependent style is that they learn what they need. The fact that they show very little of their mental curiosity can support this result.

It was determined that, when compared to individuals with dependent and competitive learning styles, individuals with independent learning style had higher scores in foresighted and sincere dimension of reflective thinking tendencies. It was determined that, when compared to individuals with dependent and competitive learning styles, individuals with independent learning style had higher scores in foresighted and sincere dimension of reflective thinking tendencies. Individuals with competitive learning style had lower scores than other participants. It might be considered that those with competitive style view the classroom as an environment in which they must win; therefore, they are inadequate in the dimension of foresighted and sincere. Individuals with avoidant learning style had lower scores from looking professional dimension than those with independent, collaborative, and participant learning styles. The most prominent feature of the avoidant learning style is that they are not as enthusiastic as other social learning styles based on learning content and participating in the classroom environment (Grasha, 2002). The fact that individuals with an avoidant style do not carry this interest and enthusiasm as much as others may have a reason that their attitudes towards the profession are lower than the others.

There are studies that investigate whether reflective thinking tendencies change according to learning styles. However, since there has been no study with the measurement tools applied in this study, it has been decided to interpret the results of the research which examine the subject using different measurement tools. In his study, using different data collection tools, Çelik (2017) found a difference in reflective thinking levels of students with diverging and assimilating styles although that difference is not significant. Mahasneh (2013) investigated undergraduates' reflective thinking levels in terms of their learning styles. In that study, deep learning style was positively correlated with habitual action and critic reflection.

4.2 Results Regarding the Epistemological Belief Levels in Terms of Learning Styles

It has been determined that preservice teachers tend to think that the process of acquiring knowledge is important, expert knowledge should be questioned and the effort to learn is important. On the other hand, it has been determined that the participants were uncertain about innate/fixed ability and certainty of knowledge.

It was observed that individuals with independent style had strong beliefs about the importance of learning process and the questionability of expert knowledge while those with avoidant style had weak beliefs. Individuals with independent learning style thought that the learning process was important and that the authority should be questioned. The differences between the individuals with independent and avoidant styles in terms of participation in the lessons and willingness to learn and the fact that individuals with avoidant style are not interested in what is going on in the classroom can support this result. This situation is also in line with the result regarding the certainty of knowledge. Individuals with avoidant style tend to believe that knowledge is certain more strongly than the others do. Accordingly, individuals with avoidant style had weaker beliefs within the context of knowledge because viewing knowledge as certain indicates the immaturity of the epistemological belief in this dimension (Başbay, 2013).

Individuals with independent and collaborative learning styles believe that learning depends on effort more than those with avoidant and dependent learning styles do. The confidence of individuals with independent learning style in their learning ability, their consideration of learning as a process involving effort, eagerness of individuals with collaborative style to learning, and their responsibility for learning explain the reason behind their beliefs regarding learning effort. Individuals with avoidant style have weak interest and effort in learning. Individuals with dependent learning style learn only what is needed and require an authority to direct them during learning (Ural & Esmer, 2017). These characteristics of the individuals with avoidant and dependent styles might explain their weak beliefs about learning effort.

From the innate/fixed ability dimension, individuals with independent style had higher scores than those with dependent and participant learning styles while individuals with dependent style had lower scores than those with independent and competitive styles. This result is surprising since the individuals with independent learning style who believe that learning depends on effort had high scores. On the other hand, this result can be considered as natural since these dimensions are independent from each other (Aypay, 2011). The finding that preservice teachers' epistemological beliefs differed in terms of their learning styles is consistent with the study of Güneş at al. (2017), in which they found that epistemological beliefs differed in terms of learning styles using Scientific Epistemological Beliefs Scale and The Index of Learning Styles as the data collection tools. On the other hand, this finding contradicts with the results of a study conducted by Kaleci (2012) on math preservice teachers. The reason behind this contradiction might source from the sample or data collection tools.

4.3 Results Regarding the Relationship between Reflective Thinking Tendencies and Epistemological Beliefs

The results showed that there were significant relationships between the majority of dimensions of reflective thinking tendencies and epistemological beliefs.

With the increase in the beliefs which is the process is important in learning and expert knowledge should be questioned, tendencies of continuous and intentional thinking, open-mindedness, interrogative and effective teaching, teaching responsibility and science, being a researcher, being foresighted and sincere, and looking professional is increased as well. It can be expressed that preservice teachers who believed that process is important in learning can think reflectively.

As the preservice teachers' beliefs that ability to learn can be developed over time increased, their tendencies of continuous and intentional thinking, open-mindedness, interrogative and effective teaching, teaching responsibility and science, and looking professional increased as well. This dimension was not correlated with being a researcher and being foresighted and sincere.

As the preservice teachers' beliefs that learning depends on effort increased, their tendencies of continuous and intentional thinking, interrogative and effective teaching, being a researcher, being foresighted and sincere, and

looking professional increased as well. On the other hand, as the preservice teachers' belief that the knowledge is certain and permanent increases, their tendencies of continuous and intentional thinking, interrogative and effective teaching open-mindedness, teaching responsibility and science, and looking professional decrease. Similarly, in a longitudinal study conducted by Phan (2008), it was found that epistemological beliefs had an important role in reflection. It was concluded that individuals lacking reflection skills believe that knowledge can be gained with little effort; it is certain; and not open to interpretation.

4.4 Limitations of the Study

This study was quantitative and the data were collected from only third and fourth year students. These aspects can be regarded as the limitations of the study.

5. Conclusion and Recommendations

In this study, preservice teachers' reflective thinking tendencies and epistemological beliefs were investigated in terms of their learning styles, and the relationship between them was examined. Based on the analysis of the data, it can be expressed that their reflective thinking tendencies and epistemological beliefs differed in terms of their learning styles. Based on these findings, it is recommended for educators to internalize the individual differences and take the advantages and disadvantages of students' different learning styles into consideration. Within this context, teaching environments in line with students' understandings of knowledge and learning should be created. The parallelism between reflective thinking tendencies and epistemological beliefs should be made use of and improvements in these skills of students are recommended. The topic of this study can be investigated in other fields including different variables by using the same or different data collection tools. Moreover, the details regarding the reflective thinking tendencies and epistemological beliefs in terms of learning styles can be grasped through longitudinal or experimental studies.

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