30. Pre-Service EFL teachers reflection levels and epistemological beliefs

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Abstract

The most important change in the recent years is the adopting of "learner-centred education" philosophy in teaching programmes. When the roots of this method are examined, it is seen that there are certain areas of study affecting the constructivism approach. One of the most effective ones among these interdisciplinary areas is the area of epistemology studies. The epistemological beliefs play an important role in the individual's psychological, sociological, philosophical and behavioural development. The aim of the present paper is to measure pre-service EFL teachers' epistemological beliefs in relation to their reflection levels. Epistemological beliefs are important aspects of teachers' thinking processes as they indicate beliefs about sources of information. In order to measure pre-service EFL teachers' epistemological beliefs, the epistemological beliefs survey, developed by Chan and Eliott (2004), was used. This survey conceptualizes epistemological beliefs under four dimensions; namely *innate/fixed ability, learning effort/process, authority/expert knowledge and certainty knowledge*. For measuring pre-service EFL teachers' reflection levels, *Reflection Levels Questionnaire,* developed by Larrivee (2008), was used. This tool has four sub-dimensions, which are *pre-reflection, surface reflection, pedagogic reflection,* and *critical reflection*. The participants are 133 pre-service EFL teachers enrolled in an English Language and Literature department. The results of the study indicate that pre-service EFL teachers have moderate levels of epistemological beliefs and reflections levels. In addition, there are significant differences in epistemological beliefs and reflection levels in terms of grade level of the participants.

Keywords: Epistemological beliefs, Reflection levels, Pre-service EFL teachers, Pedagogical reflection

İngilizce yabancı dil öğretmenlerinin yansıtma seviyeleri ve epistemolojik inanışları

Öz

Son yıllardaki en büyük değişim öğretim programlarındaki "öğrenci merkezli eğitim" felsefesidir. Bu metodun kökleri araştırıldığında yapısalcı yaklaşımı etkileyen bir çok çalışma alanları olduğu görülmektedir. Bu disiplinlerarası alanlardan en önemlilerinden biri de epitemolojik çalışmalar alanıdır. Epistemolojik inanışlar bireyin psikolojik, sosyolojik, felsefi ve davranışsal gelişimleri üzerinde önemli bir role sahiptir. Bu çalışmanın amacı yabancı dil olarak İngilizce öğretecek olacak olan öğretmen adaylarının yansıtma (reflection) seviyeleri ile ilgili olarak düşüncelerini belirlemektir.

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Öğretmenlerin epistemolojik inançları bilgi kaynaklarını işaret ediyor olması sebebiyle büyük bir önem taşımaktadır. Yabancı dil öğretmen adaylarının *epistemolojik inanış* seviyelerini ölçmek maksadıyla Chan ve Eliot(2004) tarafından geliştirilen epistemolojik inanış tarama anketi kullanılmıştır. Bu anket epistemolojik inanışları 4 boyut altında sınıflandırmaktadır. Bunlar, *doğuştan/sabit kabiliyet, öğrenme gayreti/işlevi, yetkili/uzman bilgisi* ve *kesinlik bilgisi* olarak adlandırılabilir. Yabancı dil olarak İngilizce öğretecek olan öğretmen adaylarının yansıtma seviyelerini ölçmek için de Larrivee (2008) tarafından geliştirilen *Reflection Levels anketi* kullanılmıştır. Bu anket dört alt boyutu kapsamaktadır, bunlar; *ön yansıtma, yüzey yansıtma, pedagojik yansıtma,* ve *eleştirsel yansıtma'*dır. Çalışmaya İngiliz Dili ve Edebiyatı bölümünde öğrenim gören 113 yabancı dil öğretmeni adayı katılmıştır. Çalışmanın sonuçları bize yabancı dil öğretmen adaylarının epistemolojik inanış ve seviyelerinin orta düzeyde olduğunu göstermiştir. Buna ilaveten yabancı dil öğretmen adaylarının epistemolojik inanış ve seviyelerinin alt ve üst sınıf bazında incelendiğinde belirgin farklar olduğu da tespit edilmiştir.

Anahtar kelimeler: Epitemolojik inanışlar, yansıtma seviyeleri, yabancı dil(İngilizce) öğretmen adayları, pedagojik yansıtma

Introduction

When changing and developing approaches to education is examined historically, a myriad of radical changes are encountered. The most important change in the recent years is the adopting of "learner-centred education" philosophy in teaching programmes. When the roots of this approach are examined, it is seen that there are certain areas of study affecting the constructivism approach. One of the most effective ones among these interdisciplinary areas is the area of epistemology studies. Studies conducted on knowledge and learning is increasing due to work carried out on the integration of the areas of philosophy and education and the notion of "epistemology" is encountered as a new area of research, the importance of which began to be acknowledged only recently.

In today's world, in the process of becoming an information society, governments are forming their policies in line with these approaches. These policies lay the groundwork for the societalization of scientific knowledge. Within this context, through ensuring that the society utilize scientific information in practice by purchasing information and information technologies, governments spearhead the societal progress. It is the greatest fallacy of our age to think that it can be possible to societalize knowledge by merely purchasing commodified information, i.e. by rigging everywhere out with technological machines. Societies that take progress as the mere criterion for scientification may be condemned to remain the consuming side in a globalizing world. It is possible to prevent this by societalizing the knowledge that is becoming scientified by attributing it to the society. It has become much easier to do this via the mass communication tools and social media nowadays.

Scientific knowledge is one that is gained as a result of rationally researching into and finding out the relations between phenomena and events in a specific field. It bears the purpose of understanding and explaining. It is consistent, organized and systematic. The scientification of knowledge begins with Plato and Aristotle. Although there was a scientification of knowledge, the societalization of it did not progress at the same degree. Those who dealt with science back in that period oriented completely towards science and proceeded to work in many areas since they did not have financial concerns. In this way, knowledge progressed by scientification yet without any rigid form. The transmission of knowledge to the society on the other hand was ensured through schools of philosophy, starting with the elite. Since

it did not encompass the whole scale of its society, a complete societalizaton has not been achieved as of yet.(Palo, 2013).

The notion of "knowledge"

The questions of what knowledge is, what kinds of knowledge can be talked about, the degree to which knowledge is valid and what this validity is based on, what kinds of knowledge is or can be considered absolutely certain began to be asked with Socrates, Plato and Aristotle and prevailed until today by adding new questions or (sometimes) new issues with every century (Tepe, 1990). In the first age, knowledge began to be questioned as an object that is not completely known. A large majority of Plato's and Aristotle's studies focused on the questions of what knowledge is, the source of knowledge and the existence of knowledge. For instance, according to Plato, everything that we know and witness in this world is a reflection from another world. The actual knowledge and objects are in the world of ideas, we are the shadows of that world, casting on the wall. Therefore, in a period when the reality and existence of knowledge was being questioned so much, it is possible to say that the perspective on knowledge is at a very superior level. This is because knowledge not having been compartmentalized, reduced to the level of society and in the form of a whole, a valuable asset. The philosophers of the period were not only interested in philosophy, but also math, geometry, medicine and art, and closely at that. Doing science was not in individual's monopoly. Many philosophers had schools to their very own and the public endeavored to get their children close to this knowledge by sending their children to these schools (Cevizci, 2010, p. 88).

The only source of knowledge is the individual as the "societal element". The individual becomes the "societal element" through knowledge (Anik, 2009). At the same time according to Kulcu (2000), knowledge becomes societalized through individuals and individualized through societal channels. The societal and social dynamism and the conversion of this dynamism into development is a product of the reciprocal interaction between individual and societal knowledge. Towards ensuring this reciprocal interaction, different elements come into play. The library and information services, the aim of which is to provide knowledge to the individual to the extent that they may require in the fastest, most economical and effective ways, emerged in response to this very need.

Before professions were taught at educational institutions, informal education was present in master-apprentice relations which was provided within the limits of individuals' knowledge and skills. Education begins to be viewed as a prerequisite as a result of societal, economic, scientific and cultural developments. In time, educational institutions started to prepare the suitable amenities and conditions for this necessity that exhibits constancy. These amenities ensured that a profession can become a discipline at the university level, beyond cultivating suitable people, provided the profession with 'a professional status' (Eğitim, 1994, s.110; Lerner, 2007, p.307) within the society.

Epistemology

The notion of epistemology in general endeavors to evaluate the definition of knowledge, the process of reaching it and the validity of the knowledge. This state of affairs puts forth the significance of epistemology in acquiring knowledge and its use. In compliance with the constructivist approach adopted in current education, the importance of epistemology in education and training is increasing constantly. Within this context, the aim of this study is; to reveal the importance of epistemological convictions as requisite of the constructivism approach and to this end examine the notions of

"epistemological conviction" and "epistemological models" in order to establish the fundamental concepts related to epistemology; and to the end of putting forth the integration of epistemology and education. he study tackles "epistemological measurement tools", "studies of epistemological conviction" and "implications with regard to epistemology and education".

Those who tackle epistemology for the first time need to be careful. This is because the meaning of this term presents differences. An English speaker would generally be referring to the theory of knowledge which is a specialized branch of philosophy with the term 'epistemology'. French speakers on the other hand use this term rather in referring to scientific theories being examined. In fact, these two meanings are both correct etymologically, as Pierre Jacob rightly put forth. Likewise, the word 'episteme' (which is the equivalent of the word *doxa*, meaning 'conviction') can sometimes be translated as 'science' and sometimes as 'knowledge' (Jacob, 1989).

Epistemology is a dynamic area which can both affect the area of education and be affected by it. There are a great many factors determining an individual's epistemological convictions. Determining these factors is important in the development of both education-training environments and the process of teaching.

Epistemological cognition

Epistemic cognition can be defined as "ability to construct, evaluate, and use knowledge" by drawing on one's "dispositions, beliefs, and skills [to] determine what [is] actually known versus what one believes, doubts, or distrusts" (Greene & Yu, 2016, p. 46). That is to say, it is all about what individuals do when they are engaged in knowledge and truth. In that case, teachers occupy a peculiar place in that they both have their personal epistemological beliefs and are likely to affect their students' epistemological cognition (Fives et al., 2017; Buehl & Fives, 2016). According to Barnes et al. (2020), for teachers to be effective in fostering students' knowledge construction process, they must be aware of the dimensions of that knowledge.

Epistemology is a philosophical movement that is constructed on the basis of individuals' personal interpretations with regard to how they learn and teach as well as researching knowledge. Epistemological mentality determines the perspective of the individual on the basis of reality as to what knowledge is, how it is learned and produced (Tezci & Uysal, 2004). In other words, it is possible to express epistemological convictions as the individuals' convictions on what knowledge is and how learning occurs (Schommer, 1990). Epistemologial convictions in the sense of the nature of human knowledge and the validation of it; regarding how individuals know about the world, how they construct knowledge and knowing and how they interpret and validate it, epistemology has been among the areas of interest for philosophers, psychologists, specialists of psychological consultation and guidance as well as pedagogs. When it is viewed from the viewpoint of education, it is seen that studies regarding epistemological beliefs are focused mostly on the definition of knowledge, how it is formed, how it is evaluated and how knowing occurs (Hofer, 2002).

Implications in terms of epistemology and education

When the field studies conducted with epistemology, it is seen that in some western countries as well as some Asian countries, epistemological studies are regarded highly. As a result of examining these studies with the education dimension; it is seen that the studies are usually carried out with students, teachers

or teacher candidates. When the methodologies of these studies are examined, it is seen that both qualitative and quantitative data were obtained and in obtaining these data and it is seen that specifically different teaching approaches and strategies are emphasized. In the field study conducted, it is seen that there is a parallel relation between the teaching environment and epistemological beliefs.

With the 21st century, a lot of innovation came about in the world of education and this situation led the way for the development of new educational approaches. As is known, the most recent one among the educational approaches is constructivism. As a prerequisite for it being a student-centred approach, the constructivism approach aims that the individual learns by doing and experiencing.

When the epistemological beliefs are considered as the process of receiving knowledge, attributing meaning to it and internalizing it; it is impossible for these beliefs not to affect the attitudes and behaviour of the individual. This situation puts forth the epistemological belief development of the individual in them developing positive attitudes and behaviour. As determined in many studies, a host of different factors may be at play in the development of epistemological beliefs. Of these factors, age, educational level, level of education, gender, the process of teaching, the teaching approach and culture might form the important variables. Among these field studies, the place of specifically field-focused epistemology studies is rather incontrovertible. Especially when the studies conducted within the realm of science are examined, very important knowledge is obtained with regard to both the skill to interrogate and to think critically.

When the studies conducted regarding epistemology are examined, it is generally seen that researchers take teachers, teacher candidates and students as sample. This state of affairs exhibits the incontrovertible significance of education in the forming as well as the development of epistemological beliefs. That the individual can form their beliefs on the nature of science in a positive and developed way; is an educational, psychological, sociological and philosophical situation which can be procured throughout their education-training lives.

Epistemological models

The basis of many studies conducted on epistemology lies on the studies of Perry regarding mental and ethical development. Studies conducted in this area exhibited development between 1960s -1980s and reached a more extensively scaled quality with Schommer's studies (cited in, Aksan, 2006). In order to scrutinize epistemological belief models better; it is possible to congregate these models under the headings of developmental approaches, system approaches and case study approaches.

Developmental approaches

One of the epistemological belief models, developmental models are to be examined under the following models:

1.Scheme of intellectual and ethical development

Initially, Perry's study emerged as the first study regarding epistemological beliefs. In this sense, it can be stated that the basis for all models that emerged in relation to their epistemological beliefs is this very model (Whitmire, 2003; cited in. Kaplan, 2006). Perry scrutinized the change in the opinions of students regarding the nature of knowledge and ways to obtain knowledge over a period of four years.

In the Scheme of Intellectual and Ethical Development, a four-stage model was structured by combining some phases that are related to one another. The stages of this model determined by the researchers (Brownlee et al, 2002; Kaplan, 2006; Whitmire, 2003) can be put forth as; "dualism", "pluralism", "multiplism", "relativism", "fidelity", "contextual relativity", "commitment within relativism".

2. Scheme of intellectual and ethical development

They formed a model by examining the epistemological beliefs of women in 1986 and they named this model as "Scheme of Women's Ways of Knowing" (Deryakulu, 2004; Whitmire, 2003). In this model, similarly to Perry's taxonomy; five stages have been structured as 'silence, obtaining knowledge (perceived knowledge), subjective knowledge, procedural knowledge, structured knowledge (Hofer and Pintrich, 1997; Turgut, 2007). Silence forms the first stage of this model and women at this stage, while being passive, internalize authority. At the next step, "received knowledge"; all the ideas are acknowledged as good or bad, true or false.

Individuals who are at this stage think that knowledge comes from an external authority; though they still possess the tendencies to reform it and reformulate it (Hofer & Pintrich, 1997; Turgut, 2007). The individuals at the "subjective knowledge" stage of the model, which is the third stage on the other hand, do not trust an authority's knowledge for an extended time and consider themselves the source of knowledge. Subjective knowledge generally falls into the class of "multiplism" although it bears "dualistic" properties in Perry's taxonomy as well with these characteristics (Aksan, 2006). Individuals at the fourth stage of this model which is "procedural knowledge" consider knowledge open to interpretation and that it cannot be absolute.

3. *Argumentative reasoning*:

In this model developed by Kuhn; epistemological beliefs are put forth in three stages as "absolutist", "multiplist" and "evaluative (Kuhn, 1991). While absolutists think that knowledge is absolute and authority is the source where it originates, multiplists contend that knowledge of the authority is not absolute and that their own opinions can be at the same level of legitimacy as the authority.

Individuals at the "evaluative" stage on the other hand do not recognize absolute knowledge and contend that both the authority and themselves can be right or wrong and that opinions from both of these sources need to be compared and contrasted with others including their own (Aksan, 2006; Hofer, 2001; Hofer & Pintrich, 1997).

4. Epistemological reflection model:

As a result of a study conducted on college students; the four-stage reflection model comprised of "absolute, junctural, independent and contextual" stages (Whitmire, 2004; Brownlee et al, 2002; Kaplan, 2006). According to this model, individuals at the "absolute" stage state that knowledge is absolute, and it is presented via an authority. This stage which resembles the dualism stage of Perry, involves two stages. One of these is the "receiving pattern" which takes the environment into account in receiving knowledge, whereas the other one is the "mastery pattern" through which more effective communication is established such as asking questions. In the epistemological reflection model, individuals in the category of "transitional individuals"; are skeptical about whether the authorities can know everything and doubtful of the certainty or absoluteness of knowledge. Individuals in the "independent" category of the model think that knowledge is not absolute, that there can be independent

opinions and that their own opinions may be similar to the authority. In the "contextual" category which is the last stage of the model; knowledge is constantly recreated with new content in continual change and development (Hofer, 2001; Kaplan, 2006; Turgut, 2007).

5. Reflective judgement model: King and Kitchener's reflective judgement model emerged inspired by Perry's and Dewey's work on reflective thinking (cited in, Turgut, 2007). In the study conducted, interviews were made over a 15-year period with participants ranging from high-school students to adults. In the study, it was expected for students to explain four unstructured problems regarding current events and this seven stage model was developed in line with the solution proposals (Aksan, 2006; Turgut, 2007). The 7 stages of the scheme of reflective judgement can be expressed as such in 3 phases (cited in, Kaplan, 2006); "Pre-reflection Opinions Phase": The first phase in which knowledge can be obtained in absolute and concrete form with mere observations, the second phase in which knowledge cannot be obtained by mere observation and the third phase involving the perspective that knowledge can both be absolute and not so. "Semi-reflective Thinking" phase: It consists of the first stage in which there is ambiguity since it involves personal expressions and the second stage which states that knowledge is contextual and subjective. "Reflective Thinking" phase: It consists of the first stage which purports that knowledge is structured individually as a result of evaluating knowledge obtained by various sources and the second stage in which the individual is active in obtaining knowledge. This stage involves the researching of the data or evidence regarding the matter or problem at hand individually as well (Whitmire, 2004).

The last stage of the reflective judgement model exhibits quite a lot of similarities with the philosophy of current constructivism approach. As seen here, the individual constructs their own process of learning per se. In this sense, epistemology and its important contribution to the learning process is clearly seen.

Teacher reflection levels

Students bring along their individual and educational experiences and backgrounds, that is their personal epistemological belief system, that reflects their orientations about learning including their own beliefs, their parents' beliefs and their teachers and others beliefs. As Kardesh and Scholes (1996) put forward the role of learners' epistemological beliefs in general strategic learning and problem solving in particular might be considered as critical. In this respect, looking "insight into epistemological beliefs may advance our understanding of human learning" (Schommer, 1990, p.503), and the knowledge of epistemological belief system of learners and teachers is very significant.

The teachers have a heavy duty to teach each student as effectively as possible in order to be successful for the educational purposes. As well as technological progress, social and institutional components require teachers to be more skilful in teaching practice. The demands from teachers have increased nowadays and they have had to renew themselves in order to keep up and catch up with the improvements in the arena of education. At this terminal, the "reflective learning" model has become a significant element in the teachers' development process. Teaching activities might be described as an interactive activity, as the teacher forms their teaching models according to different aspects such as learners' profiles such as age, gender, background etc. When the learners engaged in a teaching process, teachers start a thinking process about evaluation of these activities. This procedure is described as reflection or reflective practices.

When the studies on reflection reviewed over the years, it can be said that reflection has been a difficult conception to describe. As the reflection is a conceptual item, it is important how to differentiate it from other perceptions and notions. If a teacher makes an evaluation for getting feedback related with his/her teaching activities, how long and how much does it take to think over and assess? The process of assessment requires an exact definition of reflection (Üğüten, 2017). As a result of the reflective learning became a hot spot, a confusion emerged about what it means on the whole, and it began to be discussed as a motto word that has lost its necessity (Burton 2009). The notion of Reflection was used firstly by the famous scholar John Dewey in the first quarter of the 20th century and it has extended its role as an alternative way for the current teacher education procedures, (Erginel-Şanal, 2006).

Reflection is a crucial part of teachers' thinking and an essential element of educational programmes of the teachers. Reflection also gives opportunities candidate(prospective) teachers to make observations and carry out evaluations of their own experiences and draw clear conceptual frameworks to improve and increase their orientations, suppositions and assumptions. (Pence & Macgillivray, 2008; Turnbull, 2005, cited in Kırmızı & Tosuncuoğlu, 2019).

Richards (1998) thinks that reflectivity is a significant component in the teacher-development processes. Richards & Farrell (2005) also say that reflectivity is a process of critical evaluation of experiences that give teachers better opportunities in understanding of teaching activities. Reflective learning is a means of thinking which includes queries such as "what has someone done, what is someone doing, which outcomes have I got, which possible feedback/s will someone get?" As it can be inferred from this description, reflective learning is significant skill for educators in the education-training activities in order for them to observe themselves and do self-judgements. The teacher adopts reflectivity will be a model for learners and so they can have positive attitudes to reflective learning from very young ages and evaluate their own learning process.

Kumaravadivelu (2003) suggested a categorization about the functions of the teachers in the process of teaching: passive technique implementers, reflective practitioners, and transformative individuals. In line with this, Dewey (1933, 1997), expressed that reflective teachers have three characteristics: open mindedness, responsibility and sincerity. Borg (2011) states that a reflective teacher consistently analyze his/her teaching activities and so they are able to have new insights and improve their educational activities.

Schön (1983) divided the reflective activities into two subclasses: reflection on action it corresponds to the assessment of knowledge achieved in the past, and reflection-in-action, it is carried out while teaching activities go on. In the year of 1991s, Van Manen added a new subclass to the related literature-reflection-for-action. Van Manen created and improved this category evaluating the current experiences.

To sum up, Reflection (reflective teaching, reflective research, reflection on practice) is one of the most significant notions in the field of educational activities today. Essentially, the notion of reflection was presented for the first time by Dewey in the year of 1933 in order to explain and guide the educational subjects in depth. It provides an opportunity with teachers to have an effective, purposeful and stable thinking process. It also investigates the problems of the practitioners and tries to produce appropriate and sensible remedies for them.

Research questions

1.What are pre-service EFL teachers' perceptions regarding epistemological beliefs?

2. What are pre-service EFL teachers' perceptions regarding reflection levels?

3.Are there statistically significant differences between male and female participants in terms of their epistemological beliefs and reflection levels?

4. Are there statistically significant differences among grade levels in terms of their epistemological beliefs and reflection levels?

5. Are there correlations between epistemological beliefs and reflection levels?

Methodology

Data collection tools

In the present study, two data collection tools were used.

Epistemological Beliefs Survey: This survey was developed by Chan and Eliott (2004). It includes five subscales, which are *Innate/Fixed Ability (8 items), Learning Effort/Process (11 items), Authority/Expert Knowledge (6 items), and Certainty Knowledge (5 items).*

Reflection Levels Questionnaire: In order to measure, EFL teachers' reflection levels, the questionnaire developed by Larrivee (2008) was used. This questionnaire aims to assess teachers' level of reflective practice on the basis of four levels, which are *pre-reflection, surface reflection, pedagogical reflection,* and *critical reflection.*

Table 1. Characteristics of reflection levels

Level of reflection	characteristics
pre-reflection	Teachers respond to classroom situations in automatic ways, take things for granted without questioning, and do not modify their teaching style in relation to students' feedback.
surface	Teachers focus on methods and strategies used to achieve predetermined goals.
pedagogical	Teachers consider the theories underlying teaching methods, the instructional goals, and the relationships between theory and practice. They attempt to develop connections between their theory and practice.
critical	Teachers examine ethical and social implication and significant of their classroom actions.

Table 2. Reliability analysis

Variable	**Number of items**	**Cronbach's alpha value**
Innate ability	8	,751
Learning effort / process	12	,756
Expert knowledge	6	,446
Certainty knowledge	5	,570
Epistemological beliefs scale total	**31**	**,762**
Pre-reflection	14	,749
Surface reflection	12	,702
Pedagogical reflection	13	,885
Critical reflection	14	,902
Reflection scale	**54**	**,881**
Total	84	,903

Participants

The total number of participants in the present study is 131, and 95 (72,5%) of them are female and 36 (27,5%) are male. The number of 1st grade participants is 77 (59,2%), 2nd grade 18 (18,5%), 3rd grade 6 (4,6%), and 4th grade 11 (5,4%). The number of graduate participants is 7 (5,4%). Random sampling was used in the selection of the participants.

Table 3. The characteristics of the participants

		Gender			
		Female	Male	Total	Percentage
Grade	1 grade	61	16	77	59,2
	2 grade	18	6	24	18,5
	3 grade	3	3	6	4,6
	4 grade	11	5	16	12,3
	graduate	2	5	7	5,4
Total		95	35	130	

Findings

In the first place, findings related to the overall epistemological and reflection levels of pre-service EFL teachers are presented. Then, comparisons based on gender and grade level are presented. Finally, the correlation between epistemological beliefs and reflection levels is presented. Table 4 presents the descriptive statistics regarding the epistemological beliefs are presented.

Table 4. Descriptive statistics regarding the epistemological beliefs

Variables	**Disagree**		**Undecided**		**Agree**	
	f	%	*f*	%	*f*	%
Epistemological beliefs	**62**	**49,6**	8	6,4	55	44
Innate ability	55	42,6	11	8,52	**63**	**48,83**
Learning effort / process	51	39,8	14	10,9	**63**	**49,2**
Expert knowledge	**55**	**43,6**	20	15,8	51	40,5
Certainty knowledge	**59**	**45,7**	20	15,5	50	38,7

As for innate ability, the participants moderately agreed with the items in this category (48,83%). In particular, depending on the items under this category, it can be said that the participants agree that people are born good learners, some children are born incapable of learning well in certain subjects, and the ability to learn is innate/inborn. On the other hand, the participants do not believe that our abilities to learn are fixed at birth, one's innate ability limits what one can learn. With regard to learning effort / process, the participants agreed with the items there. This means that most participants believe that knowing how to learn is more important than the acquired facts, everyone needs to learn how to learn, and learning something really well takes a long time or much effort. In short, the participants value the role of effort in learning.

When it comes to expert knowledge, the participants do not seem to agree with the items there (43,6%). Looking at the items, we can say that the participants do not believe all the facts written in textbooks. They assume that even advice from experts should be questioned. Nevertheless, the participants do not agree that knowledge is tentative and uncertain. Finally, in relation to certainty knowledge, it can be said that most of the participants disagreed with the items here (45,7%). To be more particular, the participants partially agree that scientists will ultimately get to the truth if they keep searching for it, anyone can arrive at truth if he or she tries hard whereas they do not think that scientific knowledge is certain and does not change.

Table 5. Descriptive statistics regarding the reflection levels

Variables	**Disagree**		**Undecided**		**Agree**	
	f	%	*f*	%	*f*	%
Reflection	45	47,3	4	4,2	**46**	**48,4**
Pre-reflection	**56**	**48,2**	9	7,7	51	43,9
Surface reflection	**52**	**47,7**	8	7,3	49	44,9
Pedagogical reflection	53	47,7	4	3,6	**54**	**48,6**
Critical reflection	**50**	**47,6**	7	6,3	48	45,7

The findings as to reflection levels are presented in Table 5. As we can understand from the table, the participants tend to pre-reflection items (48,6%), surface reflection items (47,7%), and critical reflection items (47,6%). They agree with the items related to pedagogical reflection (48,6%).

In relation to *pre-reflection*, it can be said that the participants agreed that they continue their academic lives without much consideration for alternatives and based on pre-set standards. Students who rated themselves high in pre-reflection section tend to be preoccupied with classroom management, control and student compliance, view classroom circumstances as beyond their control, and discuss problems simplistically or unidimensionally. What is worse, they have a tendency to attribute problems to students or others. However, the participants were reluctant to agree that they take things for granted without questioning, ignore the interdependence between teacher and students' actions, disregard students' perspectives without consideration, or fail to consider differing needs of learners.

As for *surface reflection*, the participants disagreed with some of the items. For example, they do not believe that they modify strategies without challenging underlying assumptions about teaching and learning, fail to connect specific methods to theories, fail to recognize patterns in students' behaviors. In addition, they also disagreed that they adjust teaching practices only to current situation without developing a long-term plan, they only focus on short-term results of problems or fail to innovative in cases of trouble.

With regard to *pedagogical reflection*, most of the participants agreed that they analyze relationship between teaching practices and student learning, seek ways to connect new concepts to students' prior knowledge, and identify alternative ways of representing ideas and concepts to students. Moreover, they also agreed that they would recognize the complexity of classroom dynamics, acknowledge what students bring to the learning process, consider students' perspectives in decision making, and they viewed teaching practices as open to further investigation.

Finally, when it comes to *critical reflection*, the participants agreed that they view practice within the broader sociological, cultural, historical, and political contexts and consider the ethical ramifications of classroom policies and practices. They also stated that they would acknowledge the social and political consequences of their teaching and would be active inquirers. What is more, they also stated that they would observe themselves in the process of teaching and would cultivate socially responsible actions in the students. On the other hand, the participants would not address issues of equity and social justice that arise in and outside of the classroom or challenge status quo norms and practices, especially with respect to power and control. They also reported that they would not challenge assumptions about students and expectations for students or put to question the commonly-held beliefs.

Another aim of the study was to focus on *gender differences* in terms of epistemological beliefs and reflection levels. The results are presented in Table 6. A number of statistically significant differences were observed between male and female students in terms of both epistemological beliefs and reflection levels. In relation to epistemological beliefs, it was seen that male students believe that smart students do not have to work hard (M=2,9143), value the effort in the learning process (M=3,9714), want to know how much experts know (M=4,1429), and that teachers / lecturers know a lot (M=3,3429).

As for reflection levels, female students tend to believe there should exist a teaching method applicable to all learning situations (M=3,8526), discuss problems simplistically or unidimensionally (M=3,2414), and tend to attribute ownership of problems to students or others (M=3,3929). On the other hand, male students think that there is no need for thoughtfully connecting teaching actions with student learning or behavior (M=2,8529).

Table 6. Gender differences in terms of epistemological beliefs and reflection levels.

	gender	f	m	t	df	sig.
Epistemological beliefs						
The really smart students don't have to work hard to do well in school	female	95	2,4737	-1,931	128	,056
	male	35	2,9143			
Learning something really well takes a long time or much effort	female	95	3,6105	-2,049	128	,042
	male	35	3,9714			
I often wonder how much experts really know	female	95	3,8421	-2,015	128	,046
	male	35	4,1429			
I am very aware that teachers/lecturers know a lot more than I do and so I agree with what they say is important rather than rely on my own judgment.	female	94	2,9362	-2,275	127	,025
	male	35	3,3429			
Reflection levels						
I believe there should exist a teaching method applicable to all learning situations	female	95	3,8526	3,661	128	,000
	male	35	3,2571			
I see no need for thoughtfully connecting teaching actions with student learning or behaviour.	female	87	2,4253	-2,224	119	,028
	male	34	2,8529			
I discuss problems simplistically or unidimensionally	female	87	3,2414	2,244	119	,027
	male	34	2,8235			
I attribute ownership of problems to students or others.	female	84	3,3929	2,444	116	,016
	male	34	2,9412			

Epistemological beliefs across grade level

In order to see whether there are statistically significant differences in epistemological beliefs in terms of grade level and graduation, the researchers conducted ANOVA. The results as to epistemological beliefs are presented in Table 7.

We can understand from the table that 3. grade students and 4. grade students differ in terms of their beliefs about whether students remain to be average when they start school average. Third grade students do not think so (M=2,000) while fourth grade students agree with that (M=3,0625**)**. Actually, students in 1. and 2. graders also have a low mean value for this item (M=2,3247, M=2,7500, respectively). It may be said that students do not believe that it is possible to become a better student than an average one. Another difference is between 3. grade students and graduate students. Graduate students do not think that a student can change throughout his or her education process. The participants differed in terms of item 2 as well. The remarkable difference is between 1. grade students and graduates. First grade students have more faith in the fact that there are solutions to most problems (M=2,8421) while graduates have less faith in that (M=2,2857). When it comes to the next item, which is related to *expert knowledge* and which states that ". I still believe in what the experts say even though it differs from what I know", on average all the participants seem to have a moderate level of agreement. First grade and 2. grade students differ in terms of this item. Second grade students have the highest mean score (M=3,000) for this item.

When it comes to whether scientists can reach truth, 1. grade and 3. grade students differ. First graders seem to have a lot more faith in scientists (M=3,7662) whereas 3. graders are rather cautious (M=2,8333). The good news for this item is that graduate students agree with that item (M=4,1429). This means that EFL teachers and teacher candidates have faith in science and scientists. Finally, as for the last item, which is related to whether scientific knowledge is absolute or not, most participants seem to differ. In general, it can be said that 1, 3 and 4. graders do not agree with that item whereas 2. graders and graduate agree with that.

Table 7. ANOVA results for epistemological beliefs in terms of grade level and graduation

	grade	f	m	F	sig.	groups
1. Students who begin school with "average" ability remain "average" throughout school (innate 7)	1 grade	77	2,3247	3,064	,019	3-4 3- graduate
	2 grade	24	2,7500			
	3 grade	6	2,0000			
	4 grade	16	3,0625			
	graduate	7	3,1429			
2. Most problems have one best solution no matter how difficult they are (learnereffort 12)	1 grade	76	2,8421	3,653	,008	2 -3 1 - graduate
	2 grade	24	3,0000			
	3 grade	6	2,1667			
	4 grade	16	2,1875			
	graduate	7	2,2857			
3. I still believe in what the experts say even though it differs from what I know (expertknow 6)	1 grade	77	2,3117	2,995	,021	1 -2
	2 grade	24	3,0000			
	3 grade	6	2,3333			
	4 grade	16	2,6875			

	graduate	7	2,4286			
4. If scientists try hard enough, they can find the truth to almost anything (certainty knowledge 2)	1 grade	77	3,7662			
	2 grade	24	3,7917	3,235	,015	1-3
	3 grade	6	2,8333			1-graduate
	4 grade	16	3,2667			
	graduate	7	4,1429			
5. Scientific knowledge is certain and does not change (certainty knowledge 5)	1 grade	77	2,4286			1- 2
	2 grade	24	3,4583			2-3
	3 grade	6	2,3333	4,578	,002	1-graduate
	4 grade	16	2,4375			
	graduate	7	3,5714			

Reflection levels across grade level

Within the scope of the study, reflection levels were also investigated in terms of grade level. The results are presented in Table 8. A careful analysis of Table 8 indicates that there are statistically significant differences across grade level in terms of all four sub-dimensions of reflection, which are pre-reflection, surface reflection, pedagogical reflection, and critical reflection.

As for *pre-reflection*, there are significant differences in terms of whether the participants are preoccupied with classroom management, control and student compliance. The results show that there are statistically significant differences between 1. grade and 4. graders as well as 1. graders and graduates. First grade students seem to be less interested in classroom management or students' compliance issues (M=3,0959) whereas 3. graders (M=3,6667) and graduates (M=3,8571) seem to be much more into it. This shows that there is an increase in the awareness of the participants in terms of practical issues of classroom such as management. Another difference is related to whether the participants would disregard students' ideas without consideration. Although statistically 1. and 2 graders are different, the results show that 1st, 3rd and 4th grade students disagree with this item, indicating that they value students' perspectives. Finally, when it comes to whether pre-service EFL teachers consider differing needs of learners 1st, 2nd, and 3rd grade students disagreed with the item, showing that they would consider differing needs of their prospective learners. On the contrary, 4th graders and graduates seem to agree with the items, which indicates that they would not be able to consider learners' perspectives. Caution is warranted in interpreting this. Students in 1st, 2nd, or 3rd grades may not still be able to have sufficient awareness on the subject while 4th graders and graduates have a high level of awareness because they either have a practicum process they attend, or they have already started teaching. Therefore, they are more aware of the issue.

With regard to *surface reflection*, statistically significant differences were seen in two items. For the item related to whether the participants can see the patterns and react students' responses differentially, it was seen that 1st graders (M=2,6567) are different from 2nd graders (M=3,3182), 3rd graders (M=3,2000) and 4th graders (M=3,3750). It seems that 2nd, 3rd, and 4th grade students do not think that they can react differently to students' answers and see the patterns in them. Luckily, this rate decreased with graduates (M=2,8571). Considering that all the graduates in the present study are employed as teachers, it seems that they can reach students' responses appropriately. The participants also differ in terms of whether they would use only short-term results to potential problems, which is another item

for surface reflection. 1st, 3rd, 4th graders in addition to graduates do not agree with the statement, indicating that they would not only focus on short-term results. But 3rd graders partially agree with the statement.

When it comes to *pedagogical reflection*, there are statistically significant differences in two of the items. The first one is related with whether the participants have genuine interest in effectiveness of teaching practices and whether they would take risks. The findings show that almost all groups differ from each other. The lowest ranking groups are graduates (M=3,000) and 1st graders (M=3,4308) while the highest-ranking groups are 3rd graders (M=4,2000), 2nd graders (M=3,812), and 4th graders (M=3,8125). Unfortunately, the lowest group is the graduates. This can be interpreted in two ways. First of all, novice EFL teachers do not have sufficient expertise to enable such curiosity and thus foster effectiveness. The only thing they consider is to be able to manage the process and the classroom environment, as was indicated above. The second interpretation is that novice EFL teachers lost their hope of cultivating a genuine interest in effectiveness. This second option seems to be a distant possibility. Another point where the participants differ is about whether they engage in constructive criticism of their own teaching. In this item, 1st grade students differ from 3rd and 4th grade students. First grade students are undecided about this item (M=3,2879) while 3rd graders agree (M=4,2000) and 4th graders partially agree (M=3,7500).

Finally, considering *critical reflection,* the participants of the study different in terms of whether or not they would encourage socially responsible actions in the students. Almost all groups seem to differ from each other, but the difference that merits attention is the one between 1st graders (M=3,8750), 2nd graders (M=3,7619) and graduates (M=4,5714). Graduates agree with the statement, indicating that they value socially responsible actions in the students. This can be interpreted as good news from a constructivist viewpoint.

Table 8. ANOVA results for reflection levels in terms of grade level and graduation

	grade	f	m	F	sig.	groups
I am preoccupied with classroom management, control and student compliance (prefer 5)	1 grade	73	3,0959	2,612	,039	1 – 4
	2 grade	22	3,5000			1- graduate
	3 grade	6	3,6667			
	4 grade	16	3,6250			
	graduate	7	3,8571			
I dismiss students' perspectives without due consideration. (preref8)	1 grade	72	2,3472	2,649	,037	1-2
	2 grade	22	3,0000			
	3 grade	6	2,5000			
	4 grade	15	2,8667			
	graduate	7	3,0000			
I fail to consider differing needs of learners. (preref13)	1 grade	69	2,4058	3,434	,011	1 – 2
	2 grade	22	2,9091			1- 4
	3 grade	5	2,6000			1- graduate
	4 grade	16	3,1875			
	graduate	7	3,1429			
	1 grade	67	2,6567	4,793	,001	1-2

I react to student responses differentially but fail to recognize the patterns. (surface6)	2 grade	22	3,3182			1-3
	3 grade	5	3,2000			1-4
	4 grade	16	3,3750			
	graduate	7	2,8571			
I implement solutions to problems that focus only on short-term results. (surface 8)	1 grade	66	2,5455	3,253	,015	1-2
	2 grade	22	3,3182			2-3
	3 grade	5	2,2000			
	4 grade	16	2,8750			
	graduate	6	2,8333			
I have genuine curiosity about the effectiveness of teaching practices, leading to experimentation and risk-taking. (pedagogical4)	1 grade	65	3,4308	2,670	,036	1-3
	2 grade	22	3,8182			1 - graduate
	3 grade	5	4,2000			2 - graduate
	4 grade	16	3,8125			3 - graduate
	graduate	7	3,0000			
I engage in constructive criticism of one's own teaching. (pedagogical5)	1 grade	66	3,2879	2,671	,036	1-3
	2 grade	22	3,6818			1-4
	3 grade	5	4,2000			
	4 grade	16	3,7500			
	graduate	7	3,4286			
I encourage socially responsible actions in the students. (critical14)	1 grade	64	3,8750	2,440	,051	1 -graduate
	2 grade	21	3,7619			2-3
	3 grade	5	4,6000			2-graduate
	4 grade	16	3,7500			3-4
	graduate	7	4,5714			

The final aim of the study was to reveal any potential correlations between and among the components of epistemological beliefs and reflection level. To do this, a correlation analysis was run. The results are presented in Table 9.

Table 9. Correlation analysis between epistemological beliefs and reflection levels

	Innate know.	Learner effort	Expert know	Certainty know	Pre-ref.	Surface ref.	Pedagogical ref.	critical ref.
Innate know.	1	-,073	,32**	,12	,57**	,49**	-,02	-,06
Learner effort		1	,30**	,35**	-,11	,03	,45**	,45**
Expert know			1	,27**	,30**	,32**	,20*	,18*
Certainty know				1	,22**	,28**	,20*	,15
Pre-ref.					1	,66**	-,10	-,12
Surface ref.						1	,11	,18*
Pedagogical ref.							1	,81**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Innate know= innate knowledge, Expert know= expert knowledge, Certainty know. = certainty knowledge, Pre-ref. = pre-reflection, Surface ref.= surface reflection, Pedagogical ref.= pedagogical reflection.

In order to see the possible correlation between and among the sub-dimensions of epistemological beliefs and reflection levels, correlation analysis was run. Significant positive correlations were found between the variables. In terms of the *innate knowledge, expert knowledge (r = .32, p < .01), innate knowledge* and *pre-reflection (r = .57, p < .01),* and *innate knowledge* and *surface reflection (r = .49, p < .01)*. Further inquiry indicated that the participants who believe that there is not much one can do to improve believe that there is no need for thoughtfully connection teaching actions with student behavior. Moreover, these who favor innate knowledge also assume that there is no need to see beyond the immediate demands of a teaching episode and tend to discuss potential problems simplistically or unidimensionally. This shows that when people epistemologically believe that knowledge is innate, they do not tend to further it. Significant positive correlation was observed between innate knowledge and surface reflection *(r = .49, p < .01)*. Detailed inquiry indicated that when participants believe that knowledge comes from birth, they tend to limit their technical questions about teaching, do not bother to connect theory and practice, provide limited access for different learning styles and only focus on short-term solutions for problems.

Secondly, significant positive correlation was found between *learner effort* and *pedagogical reflection (r = .45, p < .01)* and *learner effort* and *critical reflection (r = .45, p < .01)*. As for the correlation between *learning effort* and *pedagogical reflection,* a thorough analysis indicated that when participants believe that one needs to keep on trying to attain knowledge and view learning how to learn more important than learning facts, they tend to have a genuine curiosity about the effectiveness of teaching practices, and tend to value cooperative learning groups. Such findings point at the significance of experimentation and risk-taking. When participants value learning more than memorization, they tend to adjust methods and strategies based on students' relative performance, recognize the complexity of classroom dynamics, and acknowledge what students bring to the learning process. When it comes to the correlation between *learning effort* and *critical reflection,* significant insights were obtained. The findings show that when participants value putting effort to attaining knowledge, view learning how to learn more than memorization, they tend to view all options and question commonly-held beliefs. Moreover, they tend to observe themselves in the process and consider ethical issues pertaining to classroom practices. Focusing on the process enables one to observe oneself in the teaching process and promotes the idea of becoming active inquirer and creating socially responsible actions in the students.

Thirdly, a moderate level of correlation was observed between *expert knowledge* dimension and *pre reflection (r = .30, p < .01)*, *surface reflection (r = .32, p < .01)*, and *pedagogical reflection* components *(r = .20, p < .01*). Similarly, a moderate level of correlation was observed between *certainty knowledge* and *pre-reflection (r = .22, p < .01*) and *certainty knowledge* and *surface reflection (r = .28, p < .01*.)

Fourthly, significant positive correlation exists between *pre-reflection* and *surface reflection (r = .66, p < .01*.). A number of points are possible to draw from this correlation. First of all, when pre-service EFL teachers fail to question things, they tend to be limited in their teaching techniques, and do not question the applicability of teaching and learning techniques. What is more, they fail to provide long-term solutions for problems. Secondly, focusing on classroom management and control extensively leads to

limited space for learning styles. These findings suggest that pre-service EFL teachers' epistemological beliefs about pre-reflection level and surface reflection level must be paid special attention and their negative beliefs should be de-suggested.

Finally, highly positive correlation was observed between *pedagogical reflection* and *critical reflection* ($r = .81$, $p < .01$). Most items in pedagogical reflection correlated with the ones in critical reflection. From these correlations, we can say that if pre-service EFL teachers analyze relationship between teaching practices and student learning, they tend to view practice from a wider perspective, handle issues of equity and social justice that arise in and outside of the classroom, inquire the social and political consequences of his or her own teaching, and question commonly-held beliefs.

Discussion

The aim of the present study was to measure pre-service EFL teachers' epistemological beliefs, reflection levels, and the correlation between these two constructs. The construct of epistemological beliefs was conceptualized under four main sub-dimensions, which are *innate knowledge, learning effort, expert knowledge,* and *certainty knowledge.*

The findings on epistemological beliefs indicated that pre-service EFL teachers do not all the time think that all our knowledge and abilities to attain knowledge comes from birth. To support this, as for learning effort, the participants valued the role and importance of effort in the learning process. They stated that learning to learn is more important than acquiring facts. What is more, the participants in the present study do not believe everything presented to them and think that one can question even expert knowledge.

In terms of *pre-reflection*, the participants reported that they may tend to maintain their academic lives without much consideration for alternatives. Those who ranked high in terms of pre-reflection have a tendency to be more preoccupied with classroom management issues and discuss problems simplistically or unidimensionally. When it comes to *surface reflection*, it can be said that the participants had a moderate level of surface reflection. They believe that they may fail to decide on their strategies without challenging underlying assumptions about teaching and learning. In regard to *pedagogical reflection*, a moderate level of reflection was discovered. The participants agreed that they would recognize the complexity of classroom dynamics, acknowledge what students bring to the learning process, consider students' perspectives in decision making, and they viewed teaching practices as open to further investigation. Finally, in term of *critical reflection*, it was found that the participants have self-confidence in viewing practice within the broader sociological, cultural, historical, and political contexts and consider the ethical ramifications of classroom policies and practices and being aware of the social and political consequences of their teaching.

The study also focused on gender differences in terms of the variables of reflection levels and epistemological beliefs. In terms of reflection levels, female students believe that there must be a common method applicable to all situations and they tend to discuss problems more simplistically. On the other hand, according to male participants, there is no need for thoughtfully connecting teaching actions with student learning or behavior. As for epistemological beliefs, male and female participants differed on several points. For example, male participants believe that smart students do not have to work and they value the effort in the learning process.

Statistically significant differences were also observed in grade level and epistemological beliefs. The results about epistemological beliefs indicate that as pre-service teachers go upper grades, they start to be more concerned about classroom issues like classroom management, student control, etc.

The study found significant positive correlation between *innate knowledge, expert knowledge, innate knowledge* and *pre-reflection* and *innate knowledge* and *surface reflection*. Those who favor innate knowledge tend to believe that there is no need to explore things further. For example, most of them reported that there is not much one can do to improve believe that there is no need for thoughtfully connection teaching actions with student behavior. Detailed inquiry indicated that when participants believe that knowledge comes from birth, they tend to limit their technical questions about teaching, do not bother to connect theory and practice, provide limited access for different learning styles and only focus on short-term solutions for problems. It can be speculated that these findings indicate that one's cognition determines one's actions.

Another significant finding of the study was that there is strong positive correlation between epistemological beliefs about learning effort and pedagogical reflection. Findings indicated that when participants believe that one needs to keep on trying to attain knowledge and view learning how to learn more important than learning facts, they tend to have a genuine curiosity about the effectiveness of teaching practices and tend to value cooperative learning groups. These findings point at the importance of experimentation and risk-taking.

Conclusion

Societies comprised of questioning individuals have been directing the change and development of the current age. It is individuals who form and develop societies. The dimension of epistemological beliefs play an important role in the individual's psychological, sociological, philosophical and behavioural development. Individuals with developed epistemological beliefs can look at events with a rather critical, creative and objective perspective, which ensures that the individual can go about going through their scientific thinking steps. One of the most important factors affecting the individuals' epistemological beliefs' level of development is the process of education-training. This process involves an eight-year at the very least, long-winded period of studentship called "primary education". This situation puts forth that the period of studentship needs to be formed more qualitatively.

The present study has found that pre-service EFL teachers have varying levels of epistemological beliefs. With regard to beliefs, two points require attention. In the first place, teacher educators must be aware of the factors that enable pre-service teachers to form these beliefs. This is an area of study. Another point that merits attention is that, as was suggested by Buehl & Fives (2016) and Greene & Yu (2016), teachers' epistemological cognition must be supported for both pre-service and in-service teachers. For pre-service teachers, courses like *epistemology, the philosophy of science, etc* can be added to the program. And in-service teachers can be supported through in-service training programs. This is called epistemically informed praxis by Fives et al. (2007).

One of the limitations of the present study is that it failed to take into consideration the academic qualification of the participants. However, studies indicate that academic qualifications may or may not be influential in this regard. For example, Ansarin et al.'s study (2015) did not find any correlations between academic qualifications and reflection levels. On the other hand, in another study Rezaeyan and Nikoopour (2013) found a relation between academic qualifications and reflection levels. Therefore,

future studies can explore the such connections. Another limitation of the present study is that it failed to include year of experience as a variable. Future studies should include year of experience as a variable because literature indicates that it is important in terms of reflection levels (Ansarin et al., 2015).

An important concern as to epistemological beliefs is whether or to what extent teacher education programs and whether epistemological beliefs influence behaviors of teachers in classroom (Sosu and Gray, 2012). Most studies in literature on epistemological beliefs being cross-sectional studies, longitudinal studies are needed to investigate the role of teacher education programs on epistemological beliefs.

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