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DOES CULTURE HAVE AN EFFECT ON EPISTEMOLOGICAL BELIEFS? A CROSS-CULTURE COMPARISON BETWEEN IRAQ AND GHANA

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ABSTRACT

This research examines the differences between Iraqi and Ghanaian pre-service teachers in terms of epistemological beliefs from a multicultural perspective. The research was designed according to the survey model, which is one of the quantitative research methods. The participants of the study consisted of 332 pre-service teachers, 165 from Ghana and 167 from Iraq. In this study, Schommer's epistemological beliefs questionnaire was used. It was determined that regarding independent variables (gender, department, country) epistemological beliefs significantly became dissimilar in several circumstances. The study revealed that gender and department have a very low effect on epistemological beliefs. However, country variable appeared as a very effective variable on epistemological beliefs; path analysis, effect size and discriminant analysis provided consistent results with each other and it was confirmed that culture has a significant effect on epistemological beliefs. As a result of discriminant analysis, it was observed that classifications of the country have a very big success rate of 95.4%. According to these findings, without a doubt, epistemological beliefs could change in terms of culture. After this point, the situation needs to be explained is which variable or variables could be classified in the cultural universal causes this difference. When these variables are revealed, it will be possible to know explicitly how epistemological beliefs develop.

Keywords: *Epistemological Beliefs, Culture, Ghana, Iraq, Pre-Service Teachers*

INTRODUCTION

Learners' belief regarding knowledge and nature of learning are defined as epistemological belief (Schommer, 1990). The term "epistemology" is derived from Greek epistēmē (knowledge) and logos (reason) (Buehl & Alexander, 2001). Hofer and Pintrich (1997), Deryakulu (2004) as well as Tezci and Uysal (2004) described epistemological belief as a subjective condition which explains what knowledge is and how knowing and learning occurs.

Scientific studies on epistemological beliefs are based on the study conducted by Perry in the early 1950s. Perry (1968) examined how college students' beliefs on knowledge and learning changed during academic studies. This study attempted to determine how knowledge was perceived during the first years of college and then how it changed later on. Another study in regard to specifying how beliefs changed with time was conducted by Schommer-Aikins and Hutter (2002). Results from this

study suggest that during the first years of learning, the belief of students in the certainty and simplicity of knowledge changes to complex, uncertain and temporary and absolute knowledge which could only be acquired through reasoning and scientific studies.

Schommer (1990) states that individuals who develop a system of epistemological belief will become more successful at organizing and structuring new knowledge. Thus, they will experience high academic success. Moreover, many studies (King & Kitchener, 1994; Schommer & Aikins, 2002; Hofer, 2001) indicate epistemological beliefs as extremely important for thinking, learning, reasoning, and comprehension as well as for academic success, motivation, and problem-solving. As Piaget explained in his theory of cognitive development, unlimited new knowledge needed to be evaluated and assessed at all life stages. During the process of evaluating, assessing, and comprehending this knowledge, individuals have to enable their cognitive and affective structures. Epistemological beliefs that appear at this stage, with using the learners' cognitive and affective processes, play a huge role in understanding, explaining, assessing, and structuring new knowledge they encountered.

According to Hofer (2001) epistemological beliefs could explain how individuals obtain new knowledge, how they define it, how they conclude and how they can make a crucial decision that potentially could affect themselves or society. Moreover, this may help individuals to understand how they know what they know or how they trust what they trust. Evcim (2010) suggest that epistemological beliefs remain idiosyncratic to that person and epistemological beliefs could be affected due to the individual differences and perspective on facts and circumstances. As for Deryakulu and Büyüköztürk (2005), Deryakulu (2006), and Eroğlu and Güven (2006), they stated that epistemological beliefs are a very effective variable in terms of learning. Similarly, in a study conducted by Deryakulu (2004), individuals who have developed a system of epistemological beliefs use more learning strategies, therefore they have high rate of academic success compared to individuals who have not developed a system of epistemological beliefs. Izgar and Dilmaç (2008) and Gürol, Altunbaş and Karaaslan (2010) pointed out that teachers who have a high value of epistemological beliefs also have a high value of teaching self-efficacy. Researchers have investigated epistemological beliefs mostly from academic success point of view and this reflects the amount of research that was conducted. Many studies concerning the relationship between epistemological beliefs and academic success were encountered in the body of literature (Schommer, 1990; Schommer, 1993; Schommer & Dunnel, 1997; Qian & Elvermann, 2000; Kember, 2001; Deryakulu, 2002; Duell & Barker, 2003; Schommer-Aikins, Duell & Hutter, 2005; Strathopoulou & Vosniadou, 2007; Chen & Pajares, 2010; Koç-Erdamar & Bangir-Alpan, 2011; Sapancı, 2012; Aydın & Geçici, 2017).

Previous research shows that there are various approaches and models related to epistemological beliefs. Some of them include: Perry's Scheme of Intellectual and Ethical Development, King-Kitchener's Reflective Judgment Model, Belenky's Women Ways of Knowing, Magolda's Epistemological Reflection Model, Kuhn's Argumentative Decision Making Model, and Schommer's Epistemological Beliefs Questionnaire. Perry, in his Scheme of Intellectual and Ethical Development, proposes individual's epistemological developments in sequential order. There are four basic developmental stages, and these are defined as dualism, multiplism, relativism and commitment. In dualism, knowledge is believed to be absolute and certain and right knowledge could only be handed down by the authority. After some period of time, individuals adopt a multiplism point of view in which theyput their trust in themselves, believe that not only knowledge cannot be absolute and certain but also the knowledge handed down by authority cannot be absolute and certain either. In Belenky's Women Ways of Knowing, in order to improve Perry's study, women's epistemological developments were exclusively investigated, and a series of epistemological developments chain was created. According to studies, women's epistemological developments occurred in five basic developmental stages. These are (i) silence, (ii) subjective knowing, (iii) received knowing, (iv) procedural knowing and (v) constructed knowing. In Kuhn's Argumentative Decision Making Model, situations they encountered on a daily basis during their period of development or their manners and behaviors towards incidents have been scrutinized and individuals' epistemological beliefs were grouped into four categories as realist, absolutist, multiplist, and evaluatist. In Magolda's Epistemological Reflection Model, over the course of five years, evenly distributed male and female college students'

epistemological beliefs were examined longitudinally. When the results of the study were analyzed, four categories were created to explain how learning occurs. These categories were defined as absolute, transitional, independent and contextual. When Reflective Judgment Model which was developed by King and Kitchener (2004) were examined, it can be seen that individual's epistemological structure development were divided into seven stages. In the first stage, knowledge is assumed to be absolute and certain. Moreover, knowledge can be obtained by only observation, not including any personal opinions. In the second stage, it is said that in addition to observation results, authority opinions should be included as well. In the third stage, free from personal beliefs, authority opinions are believed to be absolute and certain. In the fourth stage, it is accepted that existing knowledge can change. In the fifth stage, it is stated that knowledge has a subjective structure whereas in the sixth stage, it is argued that existing knowledge can be structured personally. In the seventh stage, individuals believe knowledge has a complex structure. Also, Schommer (1990) investigated the structures of epistemological beliefs and its influence on learning process. In this study, scientific findings from other studies were developed by Perry (1970), Schoenfeld (1983), Dweck & Leggett (1988) and were used (Boden, 2005).

Based on the large body of literature on epistemological beliefs, some researchers (Perry, 1970; Kuhn 1991; Baxter Magolda 1992; King & Kitchener 1994; Koç & Memduhoğlu, 2017; Yıldırır & Çirkinoğlu-Şekercioğlu, 2018) attempted to determine development stages of learners on epistemic thinking with profound interviews. Schommer (1990) developed a scale comprising 63 items for statistical analysis and measuring learners' epistemological beliefs. The scale was used in many studies throughout the world. In these studies, individuals epistemological beliefs and relation between gender (Schommer 1993; Paulsen & Wells, 1998; Deryakulu, 2004; Aydın & Geçici, 2017), age level (Paulsen and Wells, 1998; Schommer, 1998; Kutluca, Soysal & Radmard, 2018), grade level (Paulsen & Wells, 1998; Eroğlu & Güven, 2006; Kurt, 2009; Meral & Çolak, 2009; Şenler & İrven, 2016; Koç & Memduhoğlu, 2017; Kutluca, 2018), residential area, domains of learning (Buehl & Alexander, 2005; Koç & Memduhoğlu, 2017), family structure (Schommer, 1990), and problem solving skills (Karadağ, Alpaslan, Yıldırım-Şişman & Pekin-İşeri, 2018) were proven.

The present study, which goes beyond mentioning independent variables in previous studies, approached epistemological beliefs in terms of cultural context. Hofer and Pintrich (1997) referred to lack of cross-culture comparisons on epistemological beliefs, thereby claiming epistemological beliefs had been affected by cultures. Schommer-Aikins (2002) emphasizes on cross-cultural dimensionality of epistemology and suggest that different factor structures could reflect cultural differences. Bahçıvan (2017) also recommends cross-cultural studies in terms of epistemological beliefs and asserts that in different cultures, authority-oriented beliefs could show different results. Moreover, critical factors that support learning and achievement are also strongly influenced by sociocultural factors (King & McInerney, 2019; Li & Yamamoto, 2020). Therefore, it is important to test the cross-cultural applicability of the models (King, McInerney & Pitliya, 2018).

This study aims to make a cross-culture comparison on epistemological beliefs which touched upon previous studies. Pre-service teachers that received education from Ghana and Iraq universities were compared in terms of epistemological beliefs and an attempt was made to determine if classification of epistemological beliefs could be made in accordance with cultures. There hasn't been any study investigating epistemological belief with regard to Iraqi and Ghanaian learners in the reviewed body of literature. Conducted studies (Enman & Lupart, 2000; Hofer, 2000; Schommer, 1993; Schommer & Dunnell, 1994; Wood & Kardash, 2002) provided inconsistent results for gender and department concerning epistemological belief. Thus, in this study independent variables are considered as dependent variables. Even though many studies constantly stated that epistemological beliefs could be affected by cultural differences, there hasn't been sufficient number of studies exploring this subject. The reason for this may be the difficulty to reach out to people from different regions, or lack of reliable and valid measurement scale adapted accordingly to different regions. It can be said that this study is the first one to present findings on the body of literature concerning the countries involved.

METHODOLOGY

This study was designed as a survey research. In order to investigate if classification of epistemological beliefs could be made in accordance with cultural factors, individuals from Ghana and Iraq are compared. Cultural features of the society which comprises individual lives in affect behavior, judgment standards, norms, and its perspective. Thus, individuals who come from different cultures may have a different structure of belief and judgment. It is stated that culture has a substantial amount of influence on individuals (Earley & Mosakowski, 2004). Ghanaian individuals still uphold their old traditions according to evidence presented in several studies (Tsey, 1997; Tabi, Powell & Hodnicki, 2006). Similarly, it was noted that Iraq is one of the countries that attempted to preserve their old cultural practices. Therefore, the research was carried out in order to determine if cultural classification of epistemological beliefs could be made about individuals from both of these countries.

Participants

This study was conducted with pre-service teachers from Ghana and Iraq. Within this framework, 165 of the participants from Ghana were female (50.3%) and 163 were male (49.7%). From Iraq, 89 (53.3%) were female and 78 (46.7%) were male comprising a total number of 167 students that participated.

Ethical Approval

This research received ethical approval from the University Research Ethics Board. All participants provided written informed consent, before participating in the research.

Measures

In this study, Schommer's (1990) epistemological beliefs questionnaire was used. The measurement scale comprises 63 items in 12 subsets (learning is quick, can't learn how to learn, learn first time, concentrated effort is waste of time, success is unrelated to hard work, avoid ambiguity, seek single answers, avoid integration, depend on authority, ability to learn is innate, don't criticize authority, knowledge is certain) and four factors (fixed ability, simple knowledge, quick learning, certain knowledge). The scale uses 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Some epistemological sub-dimensions comprise of two subsets whereas some sub-dimensions consist of three or more subsets. The Cronbach's alpha value of the scale was determined as .89.

Statistical Analysis

SPSS 21 (Statistical Package for Social Sciences) was used for this study to conduct basic statistical analyses. First, the data were evaluated in terms of normal distribution and linearity. The skewness and kurtosis values between [-1.5 and 1.5] can be accepted as an indicator of the normality of the distribution (Tabachnick & Fidell, 2007). When the kurtosis and skewness values of the scales were examined, it was observed that the normality assumption was met. Some index values were calculated and interpreted for the structural equation modeling of the research. The RMSEA value of 0.05 and below is a good fit, values between 0.08 and 0.1 are an acceptable fit; If GFI, AGFI, CFI and IFI values are close to 1, it indicates a good fit (Moosbrugger & Müller, 2003).

RESULTS

First of all, the relationship between independent and dependent variables were tested via SEM. Within this framework, two models were investigated. In the first model, independent variables were investigated by epistemological beliefs questionnaire's four-factor method. SEM is presented in Figure 1.

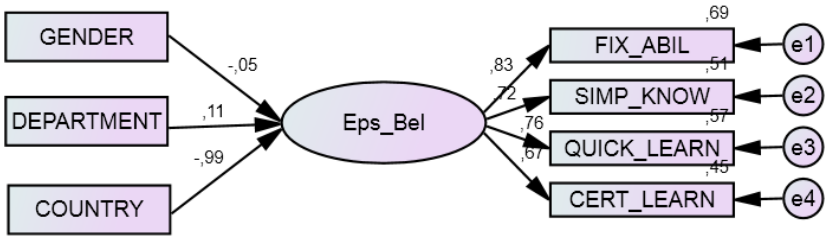

Figure 1. Model About Relationship Between SEM and Independent Variables Gender, Department and Country

As shown in Figure 1, no modifications were made to the model. Fit indices for the model are presented in Table 1.

Table 1
Summary of Goodness of Fit Statistics for Two Models

	df	X^2	X^2/df	AGFI	GFI	CFI	IFI	RMSEA	SRMR
Model	15	245.780	16.386	.77	.88	.88	.88	.176	.107

As indicated in Table 1, these fit indices are below the acceptable limit. In SEM studies, validation of a model is decided after comparing model's fit index values to a baseline. According to Totan, İkiz and Karaca (2010), there were many different opinions about model fit scale; nevertheless, many fit indices have values that range between 0-1 and values closer to range 1 indicates a good-fit. If the obtained ratio of x^2 to df is below two or three, it is a sign of an excellent fit (Schreiber, 2006), if the obtained ratio of x^2 to df is less than five, it is a sign of an average fit (Sümer, 2000). GFI and CFI have a range of 0.00 - 1.00 and figures that are closer to 1.00 are acceptable.

For GFI index, .95 and higher values indicate excellent fit of data (Schreiber, 2006). Moreover, for GFI index having a value of .85 or above is sufficient for model-data fit (Sümer, 2000). CFI compares the existing model with the null model and assumes there is no correlation between implicit variables. For this, an index of .90 and above is regarded as acceptable and .95 and above is a sign of perfect fit (Sümer, 2000). RMSEA and SRMR values' being close to zero or less than .05 indicates that model-data fit is excellent (Sümer, 2000). Additionally, IFI's value of .90 or above is another expected criterion (Wilson & Muon, 2008). After all these assessments, it turns out to be value of CMIN/DF, RMSEA, SRMR and CFI was at a less than acceptable limit after comparing with the acceptable limit of related indexes in the body of the literature. In SEM, regression weights of independent variable and dependent variable as well as dependent variable and its sub-dimensions can be measured. Regression weights regarding Graph 1 are presented in Table 1.

Table 1
Regression Weights Regarding the Model

			Estimate	S.E.	C.R.	P
Eps_Bel	<---	GENDER	-.061	.025	-2.461	,014
Eps_Bel	<---	DEPARTMENT	.113	.020	5.568	***
Eps_Bel	<---	COUNTRY	-1.331	.041	-32.802	***
FIX_ABIL	<---	Eps_Bel	1.000			
SIMP_KNOW	<---	Eps_Bel	.497	.026	19.354	***
QUICK_LEARN	<---	Eps_Bel	.714	.034	20.843	***
CERT_LEARN	<---	Eps_Bel	.449	.026	17.600	***

As observed from Table 1, all regressions are significant. In order to better assess gender variable, a t-test was performed for independent variables. It is stated that beliefs of Ghanaian pre-service teachers and gender have no significant correlation according to all the dimensions of epistemological beliefs scale(p>.05). However, Iraqi pre-service teachers differed significantly under the "SIMP_KNOW" [$\overline{X}_{Female}>\overline{X}_{Male}$] sub-dimension of epistemological beliefs scale (t(326)=3.081, p=.002<.05). In order to determine whether pre-service teachers' belief depends on the department they study a comparison was made and it is stated that in sub-dimensions FIX_ABIL ($\overline{X}_{Health}>\overline{X}_{Social\ Sciences}>\overline{X}_{Science}$), SIMP_KNOW ($\overline{X}_{Health}>\overline{X}_{Science}>\overline{X}_{Social\ Sciences}$) and QUICK_LEARN ($\overline{X}_{Health}>\overline{X}_{Science}>\overline{X}_{Social\ Sciences}$) it significantly differed (p<.05). Iraqi teachers' belief only significantly differed in sub-dimension of FIX_ABIL ($\overline{X}_{Science}>\overline{X}_{Social\ Sciences}$). When a comparison was made on the country which is the last independent variable of the study in all sub-dimensions [$\overline{X}_{Ghana}>\overline{X}_{Iraq}$] a significant amount of differences were identified.

In order to determine the effect of gender, department, and country on all dimensions of epistemological beliefs scale the significant differences in effect size were measured and are presented in Table 2.

Table 2
Effect Sizes of Sub-Dimensions of Epistemological Beliefs Scale

	Eta-Square		
Dimensions	Gender	Department	Country
FIX_ABIL	-	.044(Iraq) /.029(Ghana)	.698
SIMP_KNOW	.054(Iraq)	.066(Ghana)	.514
QUICK_LEARN	-	.115 (Ghana)	.566
CERT_LEARN	-	-	.468

As can be seen from the value of the effect sizes in Table 2, an independent variable (country) has the most effect on epistemological beliefs. There are many descriptions about interpretation of effect size. Christensen, Johnson and Turner (2015) suggested that 0.2 represents small effect size, 0.5 represents medium effect size, and 0.8 represents large effect size. Cohen (1988) suggests the following: ≥ 0.5: strong effect, ≥ 0.3: moderate effect ≥ .01 weak effect (Gliner, Morgan & Leech, 2015:308). Among them, the most comprehensive interpretation of effect size is from Hopkins (1997). When effect size values in Table 2 are compared to Hopkin's interpretation, it can be said that gender had an "Insubstantial", department had a "Small" and country had a "Moderate and High" effect upon sub-dimensions of epistemological beliefs questionnaire.

Epistemological beliefs scale comprises of 12 subsets apart from these sub-dimensions. A comparison between these sets and independent variables was conducted and SEM is presented in Figure 2.

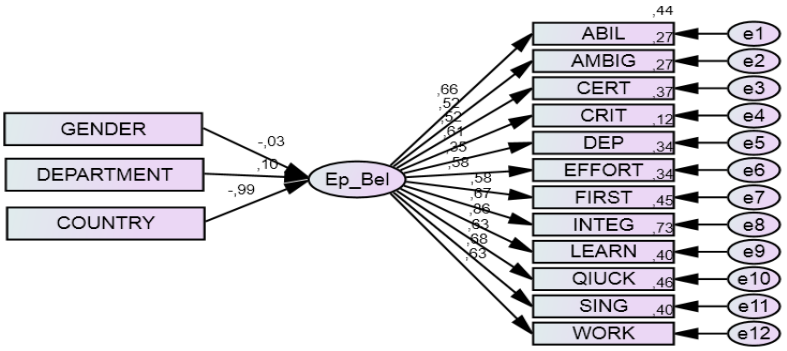

Figure 2. Model About Correlation Between Sub-Dimensions of Epistemological Beliefs Scale and Independent Variables (Gender, Department and Country)

As can be seen in Figure 2, no modifications were made to the model. Fit indices for the model are presented in Table 3.

Table 3
Summary of Goodness of Fit Statistics for Two Models

	df	X^2	X^2/df	AGFI	GFI	CFI	IFI	RMSEA	SRMR
Model	90	641.477	7.128	.80	.84	.86	.86	.111	.107

As seen in Table 3, these fit indices are below the acceptable limit. Accordingly, this performed model was not approved. Regression weights regarding Figure 2 are presented in Table 4.

Table 4
Regression Weights Regarding the Model

			Estimate	S.E.	C.R.	P
Ep_Bel	<---	GENDER	-.034	.015	-2.282	,022
Ep_Bel	<---	DEPARTMENT	.079	.013	6.102	***
Ep_Bel	<---	COUNTRY	-1.040	.052	-20.060	***
ABIL	<---	Ep_Bel	1.000			
AMBIG	<---	Ep_Bel	.547	.048	11.450	***
CERT	<---	Ep_Bel	.535	.047	11.489	***
CRIT	<---	Ep_Bel	.622	.047	13.109	***
DEP	<---	Ep_Bel	.532	.068	7.844	***
EFFORT	<---	Ep_Bel	1.026	.081	12.667	***
FIRST	<---	Ep_Bel	1.304	.103	12.610	***
INTEG	<---	Ep_Bel	.727	.050	14.398	***
LEARN	<---	Ep_Bel	1.469	.083	17.691	***
QIUCK	<---	Ep_Bel	.836	.061	13.608	***
SING	<---	Ep_Bel	.749	.051	14.554	***
WORK	<---	Ep_Bel	1.344	.098	13.673	***

According to the results, all regressions were significant. In order to make better assessment for gender variable, a t-test was applied to independent variables. Without countries included, there was no significant difference in all sub-dimensions between gender and dependent variable. (p>.05). However, Ghanaian pre-service teachers EFFORT [t=2.215 p=.027<.05, $\overline{X}_{\text{Female}}>\overline{X}_{\text{Male}}$] differed significantly AMBIG[t=2.335 p=.021<.05, $\overline{X}_{\text{Female}}>\overline{X}_{\text{Male}}$], SING[t=3.016 p=.003<.05, $\overline{X}_{\text{Female}}>\overline{X}_{\text{Male}}$] in sub-dimensions and [t=2.696 p=.008<.05, $\overline{X}_{\text{Female}}>\overline{X}_{\text{Male}}$] questionnaire from Iraqi pre-service teachers. To compare pre-service teachers' department in which they were enrolled, Iraqi pre-service teachers only differed significantly in ABIL, EFFORT and LEARN sub-dimensions, Ghanaian pre-service teachers differed in all dimensions and ABIL, AMBIG, DEP, EFFORT, INTEG, QUICK (p<.05). Means of Ghanaian pre-service teachers in all dimensions that differed significantly are put in order as follows:($\overline{X}_{\text{Health}}>\overline{X}_{\text{Science}}>\overline{X}_{\text{Social Sciences}}$). In terms of country, in all dimensions there was a significant difference in favor of Ghanaian pre-service teachers. Table 4 provides details about the effect sizes of all sub-dimensions of the questionnaire.

Table 4

Effect Sizes of Sub-Dimensions of Epistemological Beliefs Questionnaire That Have a Significant Difference

	Eta-Sqaure		
Dimensions	Gender	Department	Country
ABIL	-	.024(Iraq) /.101 (Ghana)	.429
AMBIG	.032(Iraq)	- /.145	.265
CERT	-	- /-	.287
CRIT	-	- /-	.386
DEP	-	- /.019	.128
EFFORT	.015 (Ghana)	.049 (Iraq) /.053(Ghana)	.342
FIRST	-	- /-	.347
INTEG	-	- /.073(Ghana)	.448
LEARN	-	.031(Iraq) / -	.746
QIUCK	-	- /.049(Gahana)	.403
SING	.052(Iraq)	- /-	.472
WORK	-	- /-	.412
TOTAL	.042(Iraq)	- /.039(Ghana)	.769

The country variable had the most effect on epistemological beliefs similar to epistemological beliefs questionnaire. In terms of subsets, effect of "gender" on epistemological beliefs is "Insubstantial". Effect of "department" on epistemological beliefs is "Small and Moderate". In subsets, effect size of "country" measured as "Small and Moderate", however, in all questionnaire effect size of "country" is "Very High".

These findings acquired from the effect sizes indicated whether epistemological beliefs of pre-service teachers could be classified according to countries. So, discriminant analysis was performed. After analysis, an odd function is created with the latent value of 3.320. Related to this function, canonical correlation coefficient is .877, Wilks' Lambda value is .231, and Chi-Square value is 720.652. (p=.000>.05). Box's M test was found as 3.369 regarding the analysis, and significance level was at .057. Obtained classification rates as a result of discriminant analysis is presented in Table 5.

Table 5
Classification Rates of Epistemological Beliefs According to Countries

			Predicted Group Membership		
		COUNTRY	Gana	Irak	Total
Original	Count	Ghana	309	19	328
		Iraq	4	163	167
	%	Ghana	94.2	5.8	100.0
		Iraq	2.4	97.6	100.0
Cross-validated[b]	Count	Ghana	307	21	328
		Iraq	4	163	167
	%	Ghana	93.6	6.4	100.0
		Iraq	2.4	97.6	100.0

a. 95,4% of original grouped cases correctly classified.

b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

c. 94,9% of cross-validated grouped cases correctly classified.

In terms of country, pre-service teachers classified with quite high success rate of 95.4% as presented in Table 5. In regard to countries, 309 Ghanaian pre-service teachers (94.2%) of 328 and 163 Iraqi

pre-service teachers (97.6%) of 167 were classified according to their epistemological beliefs. Score distribution of countries is shown more clearly in Figure 3.

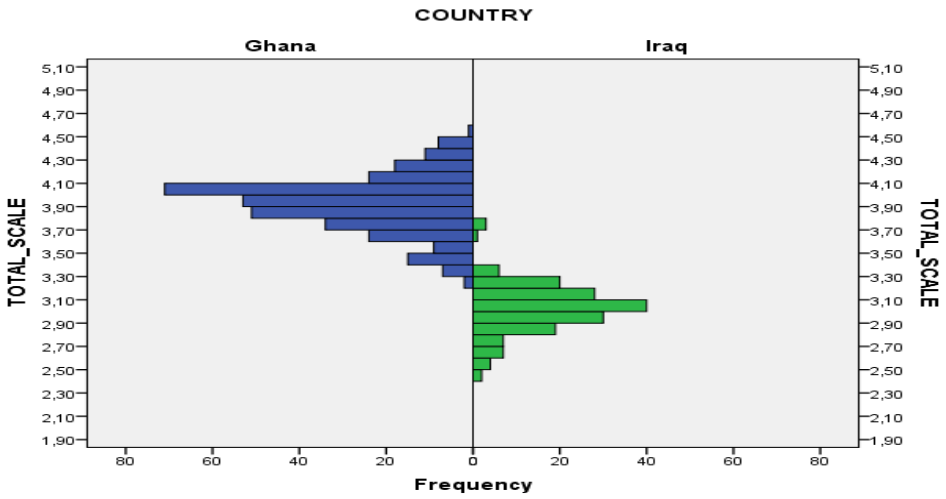

Figure 3. Pre service teachers' Score Distribution of Countries

Differentiation of epistemological beliefs to country is evident in Figure 3. Iraqi pre-service teachers' responses about epistemological belief questionnaire is lower than Ghanaian pre-service teachers. Iraqi pre-service teachers' scores are mostly in between 2.90 and 3.30, and on the other hand Ghanaian pre-service teachers' scores are concentrated around 3.70 and 4.10.

DISCUSSION

According to SEM, although all gender, department, and country regressions were significant; the model is not acceptable due to low numbers obtained from model fit indices. In SEM, after measuring effect sizes for regressions that were significant, it can be seen that gender has an insubstantial amount effect on epistemological beliefs of pre-service teachers. Department, which is another independent variable of the study had a very small effect size. However, country had a very high effect on epistemological beliefs of pre-service teachers. These findings clearly indicate the effect of culture on epistemological beliefs. Discriminant analysis was performed for better interpretation of this effect size and the results show a nearly perfect classification rate of 95.4% was achieved. Path analysis, effect size, and discriminant analysis provided consistent results with each other and effect of culture on epistemological belief was verified.

Obtained findings draw a striking resemblance to study findings of Chan and Elliott (2000). In a study conducted by Chan and Elliott (2000), it is stated that American and Hong Kong students have structurally and culturally very different epistemological beliefs. Also, Reybold (2002) suggests the following "*Epistemological beliefs are related with daily life and culture.*" Similarly, Demir (2012) indicates that the culture in which individual lives is very much involved is as much a variable which affects the development of epistemological beliefs. In a study on social studies teachers, Kaya and Ekici (2017) implies that culture is one of the factors that affects the development of epistemological belief of individuals and to develop their epistemological beliefs, individuals need to be in interaction with other cultures. Some researchers (Nietfeld & Enders, 2003; Ravindran, Greene & DeBacker, 2005; Hardre, Crowson, Ly & Xie, 2007; Paechter, Rebmann, Schloemer, Mokwinski, Hanekamp & Arendasy, 2013; Wang, Zhang, Zhang & Hou, 2013) tested epistemological beliefs scale constructed by Schraw, Bendixen & Dunkle (2002) on different cultures, an exploratory factor analysis and a confirmatory factor analysis was validated through the scale's factorial structure. Validation of scale dimensions and scale items can be evaluated as important evidence for measured variable. In validity and reliability studies conducted by some researchers (Chan, Ho & Ku, 2011; Teo, 2013; Bath & Smith, 2009;

Nussbaum & Bendixen, 2003; Çam, Topçu, Sülün, Güven & Arabacıoğlu, 2012; Velipaşaoğlu & Musal, 2013), dimensions and item numbers of the scale differed. The differentiated structures can be affected by variables such as time, residential area, culture, and nationality. Epistemological beliefs are not an unchangeable innate personality trait and due to having psychological structure, they are affected by some variables during developmental phase.

Murat, Radmard and Yıldırım (2015) conducted that teachers who had sophisticated epistemological belief had more success and these beliefs were embraced from their students. From this point of view, it can be predicted that Ghanaian pre-service teachers will have more success at their jobs than Iraqi pre-service teachers. This can introduce the necessity of assessing teachers' epistemological beliefs before service. Moreover, considering epistemological beliefs could change over time, a change may be provided for intended beliefs.

Result of the study states that epistemological beliefs can easily change between cultures. However, it is not apparent which variables in cultural universe could cause such result. In many studies about epistemological beliefs this situation was ignored. Possibly, culture pertains to society. Yet, it is possible to find similar aspects of countries in the depths of the concept of culture. There are situations that could change depending on the culture such as experiences the teachers go through during their education or philosophy of curriculum that it was built into. While the philosophy of curriculum built into doesn't change anything for the countries, the attitudes of teachers can change. For instance, to assess curriculum one should remember the criticism by Gervedink Nijhuis, Pieters and Voogt (2013) about Ghanaian curriculum not remaining sensitive to the culture. Ghanaian curriculum has a structure that allows change. Abudu and Mensah (2016) also state that teachers have a limited role in curriculum design. This study is the first one to present findings on the body of literature concerning the countries involved. At this point, the basic question that needs to be answered is which subcomponent of culture is important. Discovering which cultural features affect the epistemological beliefs will help pre-service teachers to control these beliefs.

CONCLUSION

In summary, the results of the study revealed that the genders and departments of pre-service teachers were not effective variables in terms of epistemological beliefs. However, in the study, it was determined that epistemological beliefs can be classified according to countries. This situation shows that the country in which the pre-service teachers live is an effective variable in terms of the development of their epistemological belief systems. As a result, some important evidence regarding the effect of culture on epistemological beliefs has been reached in the research.

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