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The relationship between undergraduate students' locus of control and epistemological beliefs

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The aim of the study was to identify the correlation between undergraduate students' locus of control and their epistemological beliefs. The sample of the study includes a total of 278 undergraduate students attending the Faculty of Education and the Faculty of Engineering as well as to Balıkesir Vocational School of Balıkesir University during the academic year of 2009-2010. The data of the study were collected using Rotter Scale of the Internal-External Locus of Control and Epistemological Belief Scale. The study findings indicate that the students involved have developed/mature epistemological beliefs in regard to the factor stating that learning is based on one's efforts. In regard to the factor stating that learning is based on one's ability, they are found to have partially developed/mature epistemological beliefs. However, their epistemological beliefs in regard to the factor stating that there is only one truth are found to be underdeveloped/immature. It is found that there are statistically significant differences in their epistemological beliefs based on their gender as well as their departments/schools. A slightly positive, low correlation is identified between students' locus of control and their epistemological beliefs concerning the factor stating that learning is based on one's ability. Based on these findings, several administrative and educational suggestions are offered.

Keywords: Epistemology, epistemological belief, locus of control, undergraduate students.

INTRODUCTION

Epistemological beliefs have been examined in many studies. Some of these studies have showed the effects of epistemological beliefs on learning (Schommer, Amy and Rhodes, 1992; Hofer and Pintrich, 1997; Dweck and Leggett, 1988; Duell and Schommer-Aikins, 2001; Rodriguez and Cano, 2005). Other studies deal with the relationships between epistemological beliefs and several variables. Such variables studied in relation to epistemological beliefs are locus of control (Deryakulu, 2002; Yilmaz, 2007), academic achievement (Ryan, 1984; Hofer, 2000; Cano, 2005; Kizilgunes, Tekkaya and Sungur, 2009), gender (Baxter Magolda, 1992; Chan and

Elliott, 2002; Terzi, 2005), cultural background (Chan and Elliott, 2002), and domain differences (Hofer, 2001). Research concludes that there are relationships between students' age and gender and their epistemological beliefs (Oğuz, 2008) and that students' epistemological beliefs directly affect their academic achievement (Cano, 2005). This study deals with the potential relationship between epistemological beliefs and locus of control. Furthermore, it attempts to identify whether undergraduate students attending different departments have distinct epistemological beliefs. Being familiar with the undergraduate students' epistemological beliefs is a prerequisite for improving their epistemological beliefs. Therefore, proper learning environments in schools or classrooms should be emphasized. Such an approach requires employing the findings of the study in the practice.

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Literature Review

Locus of Control

'Locus of control' can be defined as expectations or beliefs that persons use to account for the relationship between their behavior and the results of their behavior (Deryakulu, 2002). Locus of control was first described by Rotter in 1966. For Rotter, locus of control is persons' perceptions regarding the relationship between their behavior and the results of their behavior. This concept refers to the perceptions of persons stating that any event, positive or negative, affecting them is perceived as a result of their ability, characteristics and the results of their behavior or as a result of external sources such as chance, fate and fortune (Dönmez, 1983; Dönmez, 1986). Individuals can have either internal locus of control or external locus of control. Those who have internal locus of control assume responsibility for their acts, whereas those with external locus of control do not assume any responsibility for their acts, but they consider several factors such as chance, fortune or other people responsible for the results of their acts. Research indicates that those students with internal locus of control are much more successful in contrast to those with external locus of control (Sherris, and Kahle, 1984; Park and Kim, 1998; Deryakulu, 2002).

Locus of control has been examined in terms of several variables. Specifically, the relationship between locus of control and gender (Manger and Eikeland, 2000) and between locus of control and such variables as achievement, teaching strategies and attribution (Sherris and Kahle, 1984; Park and Kim, 1998; Scharmman, 2006) have been investigated. Spector (1982) argues that locus of control is related to many organizational variables, such as job satisfaction, motivation and performance. Sherris and Kahle (1984) studied the effects of concept-related teaching and locus of control on meaningful learning. The study concluded that teaching is not influential on meaningful learning, but those students with internal locus of control are more successful than those with external locus of control. Coleman, Irving and Cooper (1999), on the other hand, suggest that those people with internal locus of control are related to affective devotion, while those having external locus of control to continuous devotion.

Manger and Eikeland (2000) reported that females have higher levels of internal locus of control in contrast to males. However, inconsistent findings have been reported in regard to locus of control in female and male students. For instance, Arıçak (1995) argues that male students have higher levels of internal locus of control, whereas, Gündüz (1986) and Yaşar (2006) state that there is no difference between girls and boys in terms of locus of control. Park and Kim (1998) made a comparison among students in terms of locus of control, attribution style and academic achievement. They concluded that

those students with internal locus of control who are on the consistent honor list are much more successful than those with external locus of control. Those students with higher levels of achievement generally attribute their achievement to their own efforts and to the positive effects of other people, whereas, those students with lower levels of achievement attribute their underachievement to lack of skills or lack of support from other people.

Epistemological Belief

Epistemology is defined as a discipline that investigates and questions the nature of knowledge, its limitations, its reliability, its validity and the ways in which to acquire knowledge as well as types of knowledge transfer (Demir and Acar, 1992). It can be stated that epistemology deals with three major topics, namely the sources of knowledge, the truth of knowledge and the limitations of knowledge. Additionally, epistemology is related to a range of practical philosophical disciplines including ethics and political philosophy within the context of the relationship between knowledge and value. Epistemology is known as the theory of knowledge or the philosophy of knowledge, and is a branch of philosophy (Özlem, 1996). To what extent is knowledge true and reliable? What is the knowledge one has? And how is this knowledge realized? Answers to such and other similar questions form the people's epistemological beliefs. Therefore, 'epistemological belief' can be defined as people's personal beliefs concerning knowledge, the sources of knowledge, the certainty of knowledge, the structure of knowledge, learning rates, and the control of learning (Schommer, 1990). In short, epistemological beliefs are personal and acquired through personal experience. Therefore, these beliefs are not objective. People's epistemological beliefs influence their understanding and learning (Müller, Rebmann and Liebsch, 2008). Schommer (1994) states that epistemological beliefs can be analyzed according to five dimensions, namely, the sources of knowledge (originating from experts), the certainty of knowledge, the simplicity of knowledge (the structure of knowledge), and learning rate and natural skills (the stability of knowledge). Epistemological beliefs are also regarded as a certain type of beliefs. Such beliefs are considered to include the criteria of limitations, certainty and knowing in regard to knowledge (Chan and Elliott, 2002).

There are numerous studies concerning epistemological beliefs (Schommer 1990; Oksal, Şenşekerçi and Bilgin, 2006; Ünal Çoban and Ergin, 2008). These studies mostly deal with students' epistemological beliefs and the relationships between epistemological beliefs and different variables. Such variables are as follows: gender (Terzi, 2005), gender and grade level (Marzooghi, Fouladchang and Shemshiri,

2007), gender and socio-economic status (Özkal, Tekkaya, Çakıroğlu and Sungur, 2010; Schommer-Aikins, Duell and Barker, 2003), the contribution of individual differences to types of knowing, and the strategies of studying and academic achievement (Paulsen and Wells, 1998). Terzi (2005) studied the epistemological beliefs of fourth-grade students and concluded that those students studying social sciences and female students have more positivist scientific understanding in contrast to those studying natural sciences and male students, respectively. In another study (Marzooghi, Fouladchang and Shemshiri, 2007), undergraduate students' epistemological beliefs were compared based on their gender and grade levels. It was found that male students had much more undeveloped epistemological beliefs in contrast to female students and that first-year students regarded learning as fast and knowledge as simple compared to fourth-year students. Schommer-Aikins, Duell and Barker (2003) analyzed the students' beliefs concerning the nature of knowing and learning, and their epistemological beliefs. They concluded that students' epistemological beliefs were similar for both mathematics and social sciences as well as for both mathematics and business/commerce. In another study (Chan, 2009), a statistically significant relationship was found between pre-service teachers' epistemological beliefs and their perceptions about learning, and therefore, their epistemological beliefs were stated as had a significant role in learning. Furthermore, Phan (2008) found that epistemological beliefs of art students affected their learning strategies.

Schommer (1998) analyzed the epistemological beliefs of people who had different occupations and concluded that their educational background played a role in estimating their beliefs about the nature of knowledge and the stability of knowledge. Oğuz (2008) reported that pre-service teachers believe that learning was based on one's efforts rather than one's skills. Furthermore, epistemological beliefs are stated as varying according to gender. Specifically, girls more frequently believe that learning depends on effort in contrast to boys. Başçiftçi, Güleç, Akdoğan and Koç (2011) dealt with pre-service teachers' epistemological beliefs and concluded that epistemological beliefs differed according to four sub-dimensions, namely, gender, the belief concerning the fact that learning depends on effort, the belief that learning depends on ability, and belief about the fact that there is only one truth.

Relationship between Locus of Control and Epistemological Beliefs

Although there are numerous studies dealing with locus of control and epistemological beliefs (Schommer, 1998; Park and Kim, 1998), the relationship between these two variables has been rarely studied (Deryakulu, 2002;

Yılmaz, 2007). The studies mainly include either locus of control or epistemological beliefs or in relation to other variables.

Deryakulu (2002), using a sample of undergraduate students, stated that locus of control, epistemological beliefs and grade level had significant differential effects on type of comprehension control. Those students with internal locus of control more frequently control their comprehension of a printed learning material in contrast to those with external locus of control. Yılmaz (2007) found a low, positive relationship between locus of control and beliefs concerning the fact that learning is based on effort and that learning depends on one's ability. However, no direct relationship was found between locus of control and beliefs about the fact that there is only one truth. Kıralp, Şahin and Dinçyürek (2008), using the scales used in this study, analyzed the epistemological beliefs of undergraduate psychological counselling and guidance students. They found that those students with internal locus of control had much more developed beliefs regarding the fact that there is only one truth and that learning depends on effort.

This study dealt with the determination of the undergraduate students' epistemological beliefs in relation to their learning and attempted to establish that any potential effect of these beliefs on their locus of control was a personal characteristic. The findings of the study were considered to be significant in contributing to creating awareness of the enrichment of learning environments. In parallel to the aim of the study, the study attempted to answer the following research questions:

- 1- Is there any significant difference between females and males in terms of locus of control?
- 2- What is the students' overall level of epistemological beliefs?
- 3- Do students' epistemological beliefs differ depending on their gender?
- 4- Do students' epistemological beliefs differ depending on the schools they are attending?
- 5- Is there any relationship between locus of control and epistemological beliefs?

METHOD

Participants

The participants of the study were a total of 278 undergraduate students attending the Necatibey Faculty of Education (NFE) and Faculty of Engineering (FE) and Balıkesir Vocational School (BVS) in Balıkesir University during the academic year 2009-2010. The number of undergraduate students based on the schools they were attending was as follows: 134 students from Necatibey

Table 1. The results of t-test for locus of control differences based on gender

	Gender	N	\bar{X}	SD	t	p
Locus of Control	Female	148	11.76	3.92	3.281	.001**
	Male	130	10.23	3.81		

Faculty of Education, 70 senior students from the Faculty of Engineering and 74 senior students from Balıkesir Vocational School. Of the participants, 148 are female and 130 are male.

Data Collection Tools

The Epistemological Belief Scale: The Epistemological Belief Scale is employed to determine students' epistemological beliefs. The scale was originally developed by Schommer (1990). It is a likert-type scale with sixty-three items (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). The scores used for the two extreme poles, strongly disagree and strongly agree, are one and five, respectively. The scale was adapted to Turkish by Deryakulu and Büyüköztürk (2002). It has three factors, and there are thirty-five items in the Turkish version. Factor 1 measures the belief that learning depends on effort. Factor 2 measures the belief that learning is based on ability. Factor 3 measures the belief that there is only one truth. Factor 1 includes a total of eighteen items, of which seventeen are negative, the remaining one is positive. Factor 2 involves nine items, all of which are positive statements. Factor 3 includes eight all-positive items. The Cronbach alpha reliability coefficients of the scale are as follows: .71 for overall scale; .83 for Factor 1; .62 for Factor 2 and .59 for Factor 3. Higher scores on the scale indicate that the person has immature/underdeveloped epistemological beliefs, whereas lower scores show that person has mature/developed epistemological beliefs. The maximum and minimum scores for Factors of the scale are as follows: 90 and 18 for Factor 1; 45 and 9 for Factor 2 and 40 and 8 for Factor 3.

The Rotter Scale of the Internal-External Locus of Control: In order to identify the students' locus of control the Rotter Scale of the Internal-External Locus of Control was used. The scale was developed by Rotter (1966) and adapted to Turkish by Dağ (1991). The Turkish version of the scale has a test-retest reliability coefficient of .83 and its Cronbach alpha internal consistency coefficient is .70. The scale includes a total of twenty-nine items, of which twenty-three are considered when scoring. Higher scores on the scale indicate external locus of control, whereas lower scores indicate internal locus of control. In this study, the limits of internal and external locus of control are set as follows: scores between 0 and 11 indicate

internal locus of control, while scores between 12 and 23 indicate external locus of control (Çolak, 2006; Sulu, 2007). The maximum score on the score is 23, and the minimum score is 0.

Data Analysis

In regard to data analysis, Scheffe Test was used to determine the level of significance of the results obtained through the use of mean, t-test and ANOVA. Pearson correlation coefficients were done for correlations. In the study, those scores near to the mean scores on each factor were regarded as referring to "partially developed" beliefs. Those scores above the mean scores were considered to refer to "undeveloped/immature" beliefs. Finally, those scores below the mean scores (i.e. ten points below the mean scores) were accepted as referring to developed beliefs.

This classification of beliefs can be exemplified as follows: immature/underdeveloped epistemological beliefs include the belief that knowledge is stable and has a simple structure and that if it is not learned at a certain time; it is difficult to learn later. Mature/developed epistemological beliefs involve the belief that knowledge is not certain and that ability to learn can be improved based on students' efforts (Deryakulu, 2002; Schommer, 1990).

RESULTS

Table 1 presents the results of the t-test concerning the first research question, whether locus of control varies based on the gender of the participants.

As seen in Table 1, the locus of control score of the female students was found to be (\bar{X} =11.76), while that of male students was found to be (\bar{X} =10.23). Therefore, the male students sampled had more internal locus of control in contrast to the female students in the sample. The difference between the scores of male and female students sampled was found to be statistically significant ($p < .01$).

Table 2 shows the findings in regard to the second research question concerning overall epistemological beliefs of the participants.

As indicated in Table 2, for Factor 1, the mean score

Table 2. Levels of students' epistemological beliefs

Factors	N	\bar{X}	SD
F1. Learning is based on one's efforts	278	35.16	9.68
F2. Learning is based on one's ability	278	21.89	6.40
F3. There is only one truth	278	25.94	5.47

Table 3. The results of the t-test concerning epistemological belief differences based on gender

Factors	Gender	N	\bar{X}	SD	t	p
Learning is based on one's efforts (F1)	Female	148	33.16	8.07	-3.753	.000**
	Male	130	37.43	10.82		
Learning is based on one's ability (F2)	Female	148	21.29	5.95	-1.669	.096
	Male	130	22.57	6.83		
There is only one truth (F3)	Female	148	26.81	5.22	2.858	.005*
	Male	130	24.95	5.60		

Table 4. The results of ANOVA concerning epistemological belief differences based on the participants' schools

Factors	Variables	N	\bar{X}	SD	F	df	p	Scheffe
F1. Learning is based on one's efforts	1- NFE	134	32.44	8.92	12.141	275	.00**	1-2;1-3
	2- FE	70	36.70	7.90				
	3- BVS	74	38.70	11.07				
	Total	278	35.16	9.68				
F2. Learning is based on one's ability	1- NFE	134	20.72	6.10	6.780	275	.001	1-3**
	2- FE	70	21.84	6.76				
	3- BVS	74	24.06	6.08				
	Total	278	21.89	6.40				
F3. There is only one truth	1- NFE	134	25.26	4.84	4.604	275	.011	1-3** 2-3*
	2- FE	70	25.51	5.48				
	3- BVS	74	27.56	6.22				
	Total	278	25.94	5.47				

was 35.16. Given that the maximum score for Factor 1 was 90 and that the mean score of the students for this Factor was 35.16, it is possible to argue that the participants had developed/mature beliefs in regard to the fact that learning depends on one's efforts. The mean score of the students for Factor 2 was found to be 21.89. Given that the maximum score for this Factor was 45, was safe to state that the participants had partially developed epistemological beliefs for Factor 2. The mean score of the students for Factor 3 was found to be 25.94. Given that the maximum score for Factor 3 was 40, it was possible to suggest that the participants had immature/undeveloped beliefs, indicating that they believed that there was only one truth.

Table 3 presents the results of the t-test concerning the third research question of whether there was a difference in epistemological beliefs resulting from gender.

As indicated by Table 3, there was a statistically significant difference at the level of ($p < .01$) for Factor 1 (learning depends on one's effort) and for Factor 3 (there is only one truth) between female and male students' scores. For Factor 1, female students were found to have much more developed/mature epistemological beliefs. However, for Factor 3, female students had much more underdeveloped/immature beliefs. In regard to Factor 2 (Learning depends on ability), the scores of female and male students sampled did not differ significantly.

Table 4 shows the results of ANOVA concerning whether there was a difference between the scores of the participants based on the schools they were attending.

As seen in Table 4, for Factor 1 and Factor 2, those students attending the NFE had the most developed epistemological beliefs, $F_1 = (X = 32.20)$ and $F_2 = (X = 21.84)$, respectively. In regard to Factor 3, it was

Table 5. Correlations between locus of control and epistemological beliefs

Factors	Locus of Control
F1. Learning is based on one's efforts	-.038
F2. Learning is based on one's ability	.208**
F3. There is only one truth	.068

N=278 $p < .01^{**}$

found that the students of BVS had the most underdeveloped/immature epistemological beliefs ($X=27.56$). The results of the variance analysis showed that the scores of the students attending different schools varied at statistically significant levels. More specifically, in regard to Factor 1, there was a statistically significant difference between the scores of the students attending the NFE and the scores of the students attending the Faculty of Engineering at the level of ($p < .00$). For Factor 2, there was a statistically significant difference between the scores of the students attending the NFE and the scores of the students attending the Balıkesir Vocational School at the level of ($p < .01$). Concerning Factor 3, a statistically significant difference at the level of ($p < .01$) was found between the scores of the NFE students and those of the BVS students. For the same factor, there was also a statistically significant difference between the scores of engineering students and those of the BVS students at the level of ($p < .05$). Table 5 shows the results of the Pearson correlation used to determine whether there was a relationship between locus of control and epistemological beliefs; the fifth research question.

As can be seen in Table 5, locus of control was found not to have a significant correlation with Factor 2 (Learning depends on ability) and Factor 3 (There is only one truth). However, Factor 2 (Learning depends on ability) was found to have a lower ($r = .208$) but significant ($p < .01$) correlation with locus of control.

DISCUSSION AND CONCLUSIONS

In the study that analysis the relationship between locus of control and epistemological beliefs in a sample involving undergraduate students from the Necatibey Faculty of Education, the Faculty of Engineering and the Vocational School, it was found that the male students had much more internal locus of control in contrast to the female students. There are inconsistent findings in studies dealing with locus of control and epistemological beliefs. For instance, Arıçak (1995), Amman, Aykora, Tekin and Kılıç (2010) and Özerdem (2003) argued that male students had internal locus of control. However, there were other studies suggesting that locus of control did not significantly differ between males and females

(Gündüz, 1986; Kıralp, Şahin and Dinçyürek, 2008; Serin and Derin 2008). On the other hand, Dönmez (1983) stated that there were many studies showing that locus of control might change from being internal to being external or vice versa. Kıralp, Şahin and Dinçyürek (2008) reported that locus of control become more internal as individuals get older. Instead of classifying persons as having internal locus of control or external locus of control, it should be emphasized that locus of control may change in terms of being internal or external (Dinçyürek, Çağlar and Birol, 2010). Additionally, there may be cultural characteristics that can affect such changes.

The participants were found to have developed/mature epistemological beliefs in regard to Factor 1 (learning depends on one's efforts) and Factor 2 (Learning depends on one's ability). The finding that the participants had developed beliefs regarding the fact that learning was based on one's efforts is consistent with the findings of previous studies (Chan, 2009; Schommer-Aikins, Duell and Barker, 2003). Similarly, it is consistent with the findings of the studies that used the same epistemological belief scale in Turker (Çağlayan and Mehtap, 2010; Karhan, 2007). However, it is not consistent with the findings of Eroğlu and Güven (2006) and of Gürol, Altunbaş and Karaarslan (2010) in that in these studies it was concluded that undergraduate students had underdeveloped/immature beliefs regarding the fact that learning depends on one's efforts. In the current study, it was found that the participants had partly developed epistemological beliefs regarding the fact that learning depends on one's ability to learn. This finding is consistent with the findings of Öngen (2003) and of Yılmaz and Kaya (2010). Regarding the epistemological beliefs concerning the fact that there is only one truth, it was found that participants had underdeveloped/immature epistemological beliefs, and this was considered an interesting finding of the current study; it can be regarded as a transformation from positivist paradigm to interpretive paradigm. Furthermore, this finding is inconsistent with the findings of a great deal of research carried out in Turkey (Erdem, Yılmaz and Akkoyunlu, 2008; Gürol, Altunbaş and Karaarslan 2010; Çağlayan and Mehtap, 2010).

Gender was found to be the reason for significant differences in terms of epistemological beliefs in this

study. In regard to Factor 1 (Learning depends on efforts), male participants were found to have much more developed beliefs, whereas for Factor 3 (there is only one truth) female students were found to have much more developed beliefs. However, for Factor 2 (Learning depends on ability), gender appeared to not lead to any significant difference in the epistemological beliefs of the participants. These findings of the current study were partly consistent with those of previous studies. Similarly, Erdem, Yılmaz and Akkoyunlu (2008) and Gürol, Altunbaş and Karaaslan (2010) concluded that male students had more mature epistemological beliefs regarding the fact that learning depends on one's efforts. However, the findings of the studies above regarding the fact that leaning is based on ability and that there is only one truth differed from those of the current study. Çağlayan and Mehtap (2010), using a sample of female students playing football, found that their views about the fact that learning is based on efforts and that there is only one truth significantly differed. It may be considered as evidence that they have developed epistemological beliefs concerning the related dimensions. This finding is consistent with the findings of the current study in relation to the female students. Meral and Çolak (2009) employed a different epistemological belief scale and found that female students had much stronger constructivist beliefs in contrast to male students. However, the findings of Meral and Çolak (2009) confirmed the fact that gender leads to a significant difference in epistemological beliefs. Demirli, Türel and Özmen (2010), using a sample of pre-service information technology teachers, concluded that female student teachers had more developed/mature beliefs about the fact that learning is based on one's efforts in comparison to male student teachers. Similarly, Eroğlu and Güven (2006) reported that female students had much more developed beliefs in regard to the fact that learning depends on one's efforts. However, in the studies carried out by İzgar and Dilmaç (2008), Karhan (2007), Rakıcioğlu (2005) and Terzi (2005) it was found that there was no difference in the epistemological beliefs of students and teachers depending on gender. Therefore, there are inconsistent findings about the epistemological beliefs based on gender. The reason for these inconsistent findings may be the fact that epistemological beliefs are personal constructs acquired through personal experience.

The study also concluded that there were significant differences in the epistemological beliefs of the students attending different schools. These differences were in favor of the students from the Necatibey Faculty of Education in regard to Factor 1 (Learning depends on efforts) and Factor 2 (Learning depends on ability). In other words, these students had much more developed epistemological beliefs about these two factors. It may be a result of the fact that there were more varied courses in Necatibey Faculty of Education and that each learning activity in the faculty required a distinct cognitive map.

The participants of the study were all senior students, and senior students from the Necatibey Faculty of Education took various courses, such as music, physical training, mathematics, statistics, and drama with varying degrees. The participants of the study, regardless of their school background, were found to have underdeveloped/immature beliefs about the fact that there is only one truth. This finding may indicate a change from a positivist paradigm focusing on one truth to a postmodern paradigm. In the same vein, Terzi (2005) found that the students from the Necatibey Faculty of Education much more inclined to a positivist paradigm. There was no previous finding on the differences in epistemological beliefs based on attending distinct schools or departments. However, studies carried with samples from different school types and departments point out such differences. For instance, there were studies reporting that epistemological beliefs differed based on the participants' departments (Eroğlu and Güven, 2006; Meral and Çolak, 2009; Terzi, 2005). There were also other studies reporting different epistemological beliefs as a result of distinct school types (İzgar and Dilmaç, 2008; Karhan, 2007; Kılıç et al., 2005).

The findings of the study showed that Factor 2 (Learning depends on ability) was found to have a lower ($r=.208$) but positive and significant ($p<.01$) correlation with locus of control. Therefore, it could be argued that the higher the locus of control score, the higher the belief that learning depends on one's ability. This finding was parallel to external locus of control. More specifically, individuals with external locus of control attributed events and their experience to external factors, chance, supernatural forces, etc. For instance, the statement, "I could not learn a foreign language because God did not give me the ability to learn a foreign language," was an example of having an external locus of control. This finding was partly parallel to the findings of Yılmaz (2007). Yılmaz (2007) found low and positive correlations for Factor 1 ($r=.124$) and Factor 2 ($r=.204$). Furthermore, it is also consistent with the finding of Kıralp, Şahin and Dinçyürek (2008). They concluded that those students with external locus of control had much more developed beliefs about the fact that learning depends on ability. They could not show a correlation between locus of control and effort and only one truth dimensions.

Administrative and Educational implications

Leadership styles of administrators affect many factors within the organizations as well as the epistemological assumptions of the employees. Epistemological assumptions behind the leadership styles of administrators concerned with the nature of human beings, the nature of learning, and the nature of organizations influence the decision making process of administrators, either consciously or unconsciously.

Therefore, epistemological beliefs of the school administrators have effects on educational processes, including learning environment and methods (Varaki, 2003; Greise, 1981).

Practices of the school systems in the information age challenge beliefs and values, and require reviewing the basic theories and assumptions. The major task of the school administrators is to ensure schooling survives in accordance with its objectives. Therefore, school administrators should be open to innovative and enriched teaching/learning environments that attract students and make them volunteer to learn. High-quality knowledge produced in innovative environments will lead to low-risk acts in terms of administration. In an environment that uses varied ways to reach knowledge, epistemological beliefs that argue there is only one way to reach knowledge and that there is only one truth should be excluded from the school environment. In fact, those school administrators who cannot achieve this will be eliminated by the system.

Learning is affected by individual differences. Therefore, teachers can employ enriched learning methods that make it possible to discover the multiple ways of reaching the truth. Each student has a different learning rate, epistemological belief towards learning, and a unique cognitive map. A learning method that encourages students to learn based on their effort may foster the external locus of control to internal locus of control. An innovative learning environment that improves learning based on students' own efforts may also contribute to developed and mature epistemological beliefs on the part of the students.

Limitations and Further Research

The sample of this study includes undergraduate students from three different schools. Future studies based on participants from more varied schools may provide more detailed findings about the epistemological beliefs of Turkish undergraduate students. Similar studies should be carried out using the samples of school administrators and faculty members. Such findings will make it possible to determine the sources of epistemological belief patterns (in-school processes vs. outside the school).

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