



The Investigation of the Epistemological Beliefs of University Students According to Gender, Grade, Fields of Study, Academic Success and Their Learning Styles

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Abstract

The aim of this study is to investigate the epistemological beliefs of university students according to their genders, classes, fields of Study, academic success and learning styles. This study was carried out with 246 females and 242 males, in total 488 university students. The data was collected through Epistemological Beliefs Questionnaire (EBQ), Kolb Learning Style Inventory (KLSI) and Personal Information Form. According to the findings, the epistemological beliefs do not differ depending on the gender of the students. According to the grade levels, it was found out that two beliefs, one of which is that "Learning depends on the effort" and the other one is that "There is one unchanging truth", differ. However; the belief concerning that "learning depends on ability" does not differ. It was seen that the common interaction between the gender and the grade level did not differ significantly in the sub-dimensions of the beliefs concerning that "learning depends on effort" and of the beliefs concerning that "learning depends on ability"; whereas it differs meaningfully in the sub-dimension of the beliefs that "There is one unchanging truth". Results showed that the males in the second grade believed that there is more than one unchanging truth. It was realized that the epistemological beliefs of the students differ according to their fields of study; however, they do not differ according to the common effect of the academic success and the field of Study. It was understood that the students from the field of social sciences in the sub-dimension of the belief concerning that "learning depends on effort"; the students from the field of health in the sub-dimension of the belief concerning that "learning depends on ability"; the students from the field of science-techniques were more developed/mature in the sub-dimension of the belief concerning that "There is one unchanging truth". It was determined that a great majority of university students have "Assimilating" and "Converging" learning styles. It was seen that there is not a meaningful difference in the sub-dimension of the beliefs concerning that "learning depends on effort" in terms of different learning styles. On the other hand, it was realized that there is a meaningful difference in the sub-dimensions of the beliefs concerning that "learning depends on ability" and of the beliefs that "There is one unchanging truth" in favour of the students who have "Diverging" learning styles. It was suggested for the further studies to investigate the epistemological beliefs of the university instructors and the personal characteristics (locus of control, learned helplessness) of the students.

Key Words

Epistemological Beliefs, Kolb Learning Styles, University Students.

The interest of the psychologists and the educators towards the epistemological beliefs increases gradually and the research on this field is growing (En-

twistle & Entwistle, 1992; Glover & Ronning, 1987; Gustafsson & Undbeim, 1995; Sternberg, 1985). Hofer and Pintrich (2002) stated that the research on this field is categorized into three groups. The first group of this research was intended for explaining the individual differences in the educational life (Baxter Magolda, 1987; Perry, 1970). The second group of this research emphasized the cause and result relationships related with individual differences (Kitchener & King, 1981). The third and the most recent research were the ones which intended for the relationship between epistemological beliefs

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and learning (Akpinar, Dönder, & Tan, 2010; Cheng, Chan, Tang, & Cheng, 2009; Ryan, 1984; Schoenfeld, 1983; Schommer, Crouse, & Rhodes, 1992).

The effect of the beliefs on the opinions and behaviours made the classification of the beliefs in many different categories necessary in terms of teaching and learning processes (Entwistle, 1981; Ramsden, 1988; Schommer & Walker, 1995; Schommer-Aikins & Hutter, 2002). The beliefs are generally situations related with the subjects, the events and the cognitive schema that the individuals consider as true (Krows, 1999). The term epistemology can be defined as “the resource, the nature, the limitations and the accuracy of the human knowledge” (Hofer & Pintrich, 2002). Epistemological beliefs reflect the individual sights such as “what is knowledge?”, “how is knowledge gained?”, “what is the certainty degree of knowledge?”, “what are the limits and the criteria for knowledge?”, and “is knowledge something that takes place out of the student and that is gained as a result of the loading the discipline fields to the student by the authorities (experts) or is it something that is gained in the light of the discipline fields through interaction?” (Brownlee, Purdie, & Boulton-Lewis, 2001; Hofer & Pintrich, 1997; Ravindran, Greene, & DeBacker, 2005).

It is suggested that the epistemological beliefs of the students affect the readiness level, that is highly important in learning and deeper inspection characteristics, positively (Aksan & Sözer 2007; Woolfolk, 1993). In order to provide effective teaching and learning, the investigation of the relationship between the learning styles and epistemological beliefs also have an importance in addition to the other variables. Each of the learning styles emphasizes a different dimension, cognitive, affective, and physiologic (Chan, 2003; Dunn & Dunn, 1992; Özer, 1998; Tolhurst, 2007).

Experiential learning theory lies on the basis of the learning style model developed by Kolb. Based on this theory, it was aimed to explain how the individuals approach to the events, facts and ideas and how they solve the problems. In the experiential learning theory, the learning was designed on a learning cycle and four learning styles were defined in this cycle. These learning styles are concrete experience, abstract conceptualization, active experimentation and reflective observation (Kolb, 1984). In the experiential learning theory, the learning style of the individual is not defined by only one skill. The learning style of the individual is composed of four learning skills. Kolb defined four different learning styles in accordance with the existence of these four skills. These are converging, diverging, assimilating,

and accommodating learning styles (Butler, 1987; Ergür, 1998; Felder, 1996; Jonnassen & Grobowski, 1993; Kolb, 1984; Kolb, Boyatzis, & Mainemelis, 2001; Riding & Rayner, 1998).

The research which investigated the relationship between the epistemological beliefs and the learning behaviours (learning and studying strategies, approaches and styles etc.) of the university students revealed that these two variables have an effect on each other (Cano, 2005; Dahl, Bals, & Turi, 2005; Deryakulu, 2004; Deryakulu, Büyüköztürk, & Özçınar, 2009). The results showed that when the beliefs of the students concerning that “learning is realized on their own” increase, their success about managing their cognitive knowledge effectively also increases (Biggs, 1991; Ekici, 2002; Felder & Brent, 2005; Felder & Silverman, 1988).

When the results of the research are taken into account, it can be said that arranging the learning environments according to the learning styles and the epistemological beliefs of the students, is essential in reaching the desired level in education (Bilgin & Durmuş, 2003; Buehl & Alexander, 2001; Chai, Khine, & Teo, 2006; Hein & Budny, 1999; Koçak, 2007). Therefore, it is very important to investigate the epistemological beliefs of the students in terms of different variables and learning styles and to compose an action plan accordingly. The following questions were raised in line with this objective:

- Are there meaningful differences among the epistemological beliefs of the university students (Effort, Ability, and One Unchanging Truth) when their genders and grade levels are considered?
- Are there meaningful differences among the epistemological beliefs of the university students (Effort, Ability, and One Unchanging Truth) and their fields of Study and academic success levels?
- What is the distribution of the university students according to their learning styles?
- Are there meaningful differences among the epistemological beliefs of the university students (Effort, Ability, and One Unchanging Truth) and their learning styles?

Method

The Model of the Study

This descriptive research is a causal comparative study in which students’ epistemological beliefs are investigated in terms of gender, grade, specialization area, academic achievement and learning

styles. Studies researching the reasons and results of differences among human groups without any intervention on conditions and participants are called causal comparative studies (Büyükoztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2009, p. 15; Cohen & Manion, 1998, p. 146).

Sample

The sample of this research consists of 488 students who were attending the University of Çukurova and who were randomly selected. The participants were chosen through probability-based cluster sampling. 85 of these students were from the field of Health (Faculties of Medicine and Dentistry), 210 of them were from the field of Social Sciences (Faculties of Education, Fine Arts, Administrative Sciences and Divinity) and 193 of them were from the field of Science and Techniques (Faculties of Sciences and Letters, Engineering, Fisheries and Agriculture). 246 of these students were female and 242 of them were male. 121 of the students who were taken into the sample of this research were first grade students, 174 of them were second grade students, 102 of them were third grade students and 91 of them were fourth grade students. The students' ages ranged from 18 to 25 (\bar{x} = 21.30, SD =1.76).

Data Collection Tools

Epistemological Beliefs Questionnaire: The Epistemological Beliefs Questionnaire which was developed by Schommer (1990) and the validity and the reliability of which on Turkish university students were determined by Deryakulu and Büyükoztürk (2005) was used. The scale was a 5-point Likert Scale. The scale had a structure of three factors and consisted of 34 items. There were 17 items in the first factor named "the belief concerning that learning depends on effort" (Range 17-85), 9 items in the second factor named "the belief concerning that learning depends on ability" (Range 9-45) and 8 items in the third factor named "the belief concerning that there is one unchanging truth" (Range 8-40). The Cronbach Alpha internal consistency coefficient was .84 for the first factor, .69 for the second factor, .64 for the third factor and .91 for the whole scale. The high score taken from each factor of the scale showed that the individual had immature and undeveloped beliefs about that factor and the low score showed that the individual had mature and developed beliefs about that factor.

Kolb Learning Style Inventory: Learning Style Inventory developed by Kolb in 1984 was used so as to determine the learning styles. The four learning styles that are stated in the Kolb Learning Style Model were defined in the Kolb Learning Style Inventory adapted to Turkish by Aşkar and Akkoyunlu (1993). The Inventory consists of 12 items with 4 choices which ask individuals to list 4 learning styles that describe their own learning styles best.

The validity and reliability of the inventory were studied by Aşkar and Akkoyunlu (1993) with 62 females and 41 males, totally 103 adults. The reliability of the scores of 4 basic learning types in the inventory and the unified scores were calculated by Cronbach Alpha. According to the findings obtained, the Cronbach Alpha reliability score for concrete experience was .58, was .70 for reflective observation, was .71 for abstract conceptualization, was .65 for active experimentation, was .77 for abstract-concrete, and was .76 for active-reflective.

When the Cronbach Alpha reliability score of Kolb Learning Style Inventory was considered again for this study, it was found as .68 for concrete experience, as .71 for reflective observation, as .78 for abstract conceptualization and as .71 for active experimentation. The Cronbach Alpha reliability scores of the unified scores was found as .75 for abstract-concrete, and as .72 for active-reflective.

Personal Information Form: In this form, there were some questions about the students' fields of study, genders, ages, grade levels and academic successes.

Data Analysis

The data was analyzed with SPSS 11.5 packet program. The collected data was calculated by scores, percentages, mean, standard deviation, one way analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA). Scheffe test was used of in the multiunit comparisons. The significance level of .05 was taken as the criteria while interpreting the results.

Results

As the result of the analysis, it was seen that there was no difference between dependent variables according to the gender of the students (Wilk's Lambda (Λ)=0.992; $F_{(3,478)}=1.221$, $p>.05$). The values obtained for the belief concerning that "learning depends on effort" ($F_{(1,480)} = 1.259$, $p> 0.05$), the belief concerning that "learning depends on ability" ($F_{(1,480)} = 1.087$, $p> 0.05$) and the belief concerning

that there is one unchanging truth ($F_{(1,480)}=0.885$, $p>0.05$) were not meaningful.

According to the grade levels of the students, it was found out that the scores of the belief concerning that "learning depends on effort" ($F_{(3,480)}=5.647$, $p<0.05$) and the scores of the belief concerning that there is one unchanging truth ($F_{(3,480)}=3.860$, $p<0.05$) differ meaningfully, however; the scores of the belief concerning that "learning depends on ability" ($F_{(3,480)}=1.137$, $p>0.05$) do not differ (Wilk's Lambda(Λ)=0.939; $F_{(9,1163)}=3.388$, $p<0.05$). According to the results of Scheffe test results, the first and the fourth grade students had developed more mature beliefs about the belief concerning that "learning depends on effort" than the third grade students.

It was seen that the common interaction of gender and grade levels do not differ meaningfully in the sub-dimensions of the belief concerning that "learning depends on effort" ($F_{(3,480)}=3.613$, $p>0.05$) and of the belief concerning that "learning depends on ability" ($F_{(3,480)}=0.753$, $p>0.05$) whereas it differs meaningfully in the sub-dimension ($F_{(3,480)}=2.858$, $p<0.05$) of the belief concerning that there is one unchanging truth (Wilk's Lambda(Λ)=0.970; $F_{(9,1163)}=1.616$, $p>0.05$). Scheffe test results showed that the males in the second grade believed that there is one unchanging truth more than the males in the third and fourth grades and the females in the third grade.

In the results of the analysis, it was seen that there was a difference in dependent variables according to the students' fields of Study (Wilk's Lambda (Λ)=0.954; $F_{(6,954)}=3.814$, $p<0.05$). The values obtained for the variables of the belief concerning that "learning depends on effort" ($F_{(2,479)}=5.852$, $p<0.05$), of the belief concerning that "learning depends on ability" ($F_{(2,479)}=3.883$, $p<0.05$) and of the belief concerning that there is one unchanging truth ($F_{(2,479)}=3.908$, $p<0.05$) were meaningful. According to the results of Scheffe test, it was understood that the students from the field of social sciences were more developed/mature than the students from the fields of health and science-techniques in the sub-dimension of the belief concerning that "learning depends on effort". It was also realized that the students from the field of health were more developed/mature than the students from the fields of social sciences and science-techniques in the sub-dimension of the belief concerning that "learning depends on ability". It was also concluded that the students from the field of science-techniques were more developed/mature than the students from the fields of health and social sciences in the sub-dimension of the belief concerning that there is one unchanging truth.

It was found that the scores of the sub-dimensions of the belief concerning that the learning depends on effort ($F_{(2,479)}=0.229$; $p>0.05$), of the belief concerning that "learning depends on ability" ($F_{(2,479)}=0.877$; $p>0.05$) and of the belief concerning that there is one unchanging truth ($F_{(2,479)}=0.655$; $p>0.05$) do not differ meaningfully according to the academic successes of the students (Wilk's Lambda (Λ)=0.989; $F_{(6,954)}=0.886$, $p>0.05$).

It was seen that the common interaction of fields of study and academic success level do not differ meaningfully in the sub-dimensions of the belief concerning that "learning depends on effort" ($F_{(4,479)}=0.425$, $p>0.05$), of the belief concerning that "learning depends on ability" ($F_{(4,479)}=1.728$, $p>0.05$) and of the belief concerning that there is one unchanging truth ($F_{(4,479)}=0.204$, $p>0.05$); (Wilk's Lambda(Λ)=0.980; $F_{(12,1427)}=0.810$, $p>0.05$).

It was seen that most students have the *assimilating* learning style with 49.4 %. The other learning styles that the students have are respectively the *converging* learning style with 26.4 %, the *diverging* learning style with 14.8 % and the *accommodating* learning style with 9.4 %. This result shows that a great majority of university students have assimilating and converging learning styles and fewer of them have diverging and accommodating learning styles.

According to the results of analysis of variance, it was found that there was not a meaningful difference in terms of learning styles in the sub-dimension of the belief concerning that "learning depends on effort" ($F_{(2,485)}=0.927$, $p>0.05$). On the other hand, it was seen that there is a meaningful difference in the sub-dimensions of the belief concerning that "learning depends on ability" ($F_{(2,485)}=4.711$, $p<0.05$) and of the belief concerning that there is one unchanging truth ($F_{(2,485)}=3.406$, $p<0.05$). The results of Scheffe test showed that the difference in both the sub-dimension of the belief concerning that the learning depends on ability and the sub-dimension of the belief concerning that there is one unchanging truth were in favour of the students who have *diverging* learning styles resulting from the mean of the students who have *assimilating*, *accommodating* and *converging* learning styles. Accordingly, the students who have *diverging* learning styles accredited in the belief concerning that the learning depends on ability and the belief concerning that there is one unchanging truth more strongly than the students who have *assimilating*, *accommodating* and *converging* learning styles.

Discussion

According to the literature review, it was seen that different results were obtained from the studies which aimed to investigate the relationship between the gender and the epistemological beliefs. Similar to the findings of this research, it was also found that the epistemological beliefs do not differ meaningfully according to the gender in some recent studies (Aksan & Sözer, 2007; Izgar & Dilmaç, 2008; Terzi, 2005). Nonetheless, it was stated in some studies that there was a meaningful difference between the epistemological beliefs among male and female students and the sub-dimensions of “the belief concerning that learning depends on effort” and of “the belief concerning that learning depends on ability” in favour of the female students, however; there was not a meaningful difference in the sub-dimension of “the belief concerning that there is one unchanging truth” according to the gender (Belenky, Clinchy, Goldberger, & Tarule 1986; Demir, 2005; Deryakulu & Büyüköztürk, 2005; Enman & Lupart, 2000; Erdem, 2008; Eroğlu & Güven, 2006; Neber & Schommer-Aikins, 2002; Öngen, 2003; Schommer, 1993).

When the results were considered according to the grade levels of the students, it was understood that the first and the fourth grade students accredited the belief concerning that learning depends on effort more strongly than the belief concerning that learning depends on ability compared to the third grade students. This finding supports the studies carried out on similar topics with university students (Erdem, Yılmaz, & Akkoyunlu, 2008; Marrs, 2005). Nevertheless, Eroğlu and Güven (2006) found that there is not a meaningful difference in the sub-dimension of the belief concerning that learning depends on effort according to the grade levels of the students. They also stated that there is a difference in the sub-dimensions of the belief concerning that learning depends on ability and of the belief concerning that there is one unchanging truth in favour of the first grade students. It was also claimed that the beliefs of the first grade students on both the sub-dimension of the belief concerning that learning depends on ability and the sub-dimension of the belief concerning that there is one unchanging truth differ meaningfully from the beliefs of the fourth grade students. In the study of Meral and Çolak (2009) with the teacher candidates, it was revealed that the scientific epistemological beliefs of the students do not differ meaningfully in terms of students' grade levels.

It was seen that the common interaction of the gender and the grade levels differ meaningfully in the

sub-dimension of the belief concerning that there is one unchanging truth. It was understood that the second grade male students accredited the belief concerning that there is one unchanging truth more than the third and fourth grade male students and third grade female students. This finding can be interpreted in a way that, the belief towards the one unchanging truth goes parallel to the increase in the grade levels of the male students. When the female students were taken into account, it was noticed that only the third grade female students do not accredit the belief concerning that there is one unchanging truth. It was seen that the reality about the expectation of a decrease in the belief concerning that there is one unchanging truth in the higher grade levels of both male and female students is not valid for the female students in the sample of this study.

As a result of the analysis, it was revealed that the results were in favour of the students from the field of *social sciences* in the sub-dimension of the belief concerning that learning depends on effort, in favour of the students from the field of *health* in the sub-dimension of the belief concerning that learning depends on ability and in favour of the students from the field of *science-techniques* in the sub-dimension of the belief concerning that there is one unchanging truth. These results show consistency with the ones obtained in the studies of claiming that the epistemological beliefs of the students from the field of social sciences and related areas are more developed/mature than of the students from the field of basic and applied sciences and related areas (Deryakulu & Büyüköztürk, 2005; Enman & Lupart, 2000; Jehng, Johnson, & Anderson, 1993). It was also determined that there are some researches which provide different results (Eroğlu & Güven, 2006).

It was found out that the scores of the belief concerning that “learning depends on effort”, the belief concerning that “learning depends on ability” and the belief concerning that “there is one unchanging truth” do not differ meaningfully according to the academic success levels of the students. Similarly, Erdem (2008) found that there is not a meaningful difference in epistemological beliefs depending on the student's academic success level.

In this study, it was seen that a great majority of university students have assimilating and converging learning styles and fewer of them have diverging and accommodating learning styles. This finding supports other studies carried out on similar topics with university students. In

most of the studies, it was revealed that the number of the students who preferred the *assimilating* learning style is significantly higher than the number of the students who preferred the other learning styles, on the other side, the number of the students who preferred *accommodating* learning style is generally less than the number of the students who preferred the other learning styles (Aşkar & Akkoyunlu, 1993; Hasırcı Kaf, 2006; Kılıç, 2002). There are also few studies which reported different results (Demirbaş & Demirkan, 2003; Fowler, 2002; Kılıç & Karadeniz, 2004).

The findings showed that the students who have *diverging* learning style accredited the belief concerning that “learning depends on ability” and the belief concerning “there is one unchanging truth” more strongly than the students who have *assimilating*, *accommodating* and *converging* learning styles. Deryakulu et al., (2009) found in their study which investigates the variables affecting the academic success and learning styles that the epistemological beliefs are important variables that predict the converging learning style. However, it was seen that the studies about the relationship between epistemological beliefs and learning are limited with the learning strategies and the increase in the students’ success when they start to accredit the learning goes up and they manage their cognitive knowledge more effectively (Cano, 2005; Dahl et al., 2005; Deryakulu, 2004).

The findings obtained from this study are important for the students as well as for the university instructors. The instructors need to realize the probability of teaching process’ as an effective variable on the epistemological beliefs of the students and to be open to the alternative solutions and ideas from the students. These findings might similarly help university instructors to consider the learning styles of the students in their classes. In this way, the students could learn easily and develop positive attitudes towards the classes. Investigation of the epistemological beliefs of the instructors, comparison with the ones of the students and investigation of the personal characteristics of the students rather than their educational characteristics might contribute to a better understanding of the topic in further studies.

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