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The relationship between academic self-efficacy, learning styles and epistemological beliefs: A study on the students of the school of physical education and sports

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Abstract

The aim of this study is to examine the verbal and visual dominant learning styles and epistemological beliefs of the students educated in the School of Physical Education and Sports according to their academic self-efficacy influence levels. A total of 434 students (132 females and 302 males) participated in this study. The scales of Academic Self-efficacy, verbal and visual dominant learning styles and epistemological beliefs were used in the study. Hierarchical cluster analysis, k-means cluster analysis, multivariate analysis of variance and *post hoc* analyses were performed. Considering the results of this study, the individuals in the group called 'low academic self-efficacy' were found to have lower average scores in the verbal dominant learning style than those of other groups. In the consequence of the analyses made for epistemological beliefs, the individuals in the group called 'high academic self-efficacy' were found to have higher averages in 'the belief that learning depends on effort' than other groups.

Keywords: Self-efficacy, epistemology, verbal learning style, visual learning style.

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1. Introduction

The educational programs arranged for students have recently attracted attention in the respect that they enable students' academic performances to reach a maximum level and enable them to learn depending on their beliefs. In this context, the student should have a certain level of self-efficacy which expresses a belief about his/her capacity in order to show performance in an academic field (Bandura, 1997). In other words, academic self-efficacy can be said to be an individuals' belief in their performance shown in their education life. When the definitions of academic self-efficacy are examined in the literature, Zimmerman (1995) stated that individuals should have their own beliefs about some of their arrangement and legislation abilities for achieving academic performance. Bandura (1994) expressed that an individual states his/her belief that he/she performs his/her academic duties depending on his/her own abilities and academic self-efficacy is accepted as a motivational power. Dealt with in different studies, authors are seen to gather around a common opinion that academic duties are performing an activity based on an individual's beliefs with the best performance and a certain effort.

The students with high academic self-efficacy are stated to pay attention to achieving goals requiring learning by trying harder (Komarraju & Nadler, 2013) and to have higher willpower regarding success by struggling with the difficulties that they face in learning environments (Bahar, 2019). At this point, the students with high academic self-efficacy in educational environments are thought to get motivated to use their learning styles and cognitive abilities in the foreground by trying harder (Pajares, 1996; Wright, Jenkins, Guarnieri & Murdock, 2012).

Knowing the learning styles that have been adopted according to individuals' beliefs in their academic lives will allow them to be more efficient individuals during their education (Sahinel, 2012). At the same time, according to Pritchard (2008), learning styles are defined as a pathway an individual prefers in the perception of cited information and ability in an education environment. According to another definition, it is expressed as the pathway chosen in the course of getting and processing the information cited by the individual (Dalaman, Can & Durukan, 2019). When the studies made on this subject are examined, one of the most widely used learning styles by students regarding the process of information is seen to be verbal and visual learning styles (Chen & Sun, 2012; Pallapu, 2007). To determine which one of these learning styles is more dominant in the education process may help individuals to learn more easily and understandably in the learning process. Childers, Houston and Heckler (1985) developed a scale to determine verbal and visual learning styles (Style of Processing Scale—SOP). This scale is widely used to evaluate which one the students prefer in information process method and to evaluate their ability to use this method (Lightner & Eastman, 2002). In general, in cases in which visual learning is dominant, individual learns more with pictures, diagrams, and sketches, while in cases in which verbal learning is dominant, the students are said to prefer more written or oral explanations (Akgun, Kucuk, Cukurbasi & Tombuloglu, 2014). Many structures are put forward in the literature about learning styles. Besides, the epistemological belief concept explaining 'the beliefs belonging to an individual regarding what is information and how learning happens' (Schommer, 1990) is among the structures that influence the education process. At the same time, there are many studies indicating that these beliefs have effects on students' learning (Hofer & Pintrich, 2002; Tolhurst, 2007). The first studies about the epistemological beliefs were carried out in 1968 by William Perry. Then, when the literature is examined about epistemological beliefs, it can be seen that in many studies 'Epistemological Beliefs Scale' developed by Shommer (1990) is used. Many authors have adjusted this scale developed by Shommer into different languages; the scales being seen to have composed factor structures different from the original form of the scale (Chan, 2002; Clarebout, Elen, Luyten & Bamps, 2001; Deryakulu & Buyukozturk, 2005).

The students of the School of Physical Education and Sports are giving intensive theoretical and practical lessons during their 4-year education. The number of studies investigating teaching styles, epistemological beliefs and academic self-efficacy on these students under a different educational

program seems to be insufficient. The aim of this study is to evaluate the students' performances depending on which learning style they use and how they use it and how they perceive these learning styles based on their beliefs according to the self-efficacy levels of students educated in the School of Physical Education and Sports.

2. Methods

2.1. Participants

The sample consisted of 434 students (132 females, 302 males) educated at three departments (Departments of Physical Education and Sport Teaching, Sport Management, and Coaching Education) of School of Physical Education and Sports in Ege University. Seventy-five of these students are in first grade, 134 of them are in second grade, 110 of them are in third grade and 115 of them are in fourth grade. Participants ranged in age from 18 to 27 years.

2.2. Measures

2.2.1. The visual versus the verbal style of processing scale

This scale, which was developed to determine the dominant verbal or visual learning style by Childers, Houston and Heckler (1985), was adapted into Turkish by Akgun, Kucuk, Cukurbasi and Tonbuloglu (2014) and consisted of two subscales with a total of 16 items: visual (8 items), verbal (8 items). Students responded to a 4-point Likert-type scale with anchors of 'always true for me' (1) and 'always false for me' (4). Regarding the performed scoring, students with a higher score in one of these two subscales indicate that these students have dominance in that learning style (visual or verbal). Cronbach's alpha internal consistencies for verbal and visual were 0.69 and 0.71, respectively (Akgun, Kucuk, Cukurbasi & Tonbuloglu, 2014). In this study, the internal consistency coefficients for the subscales were 0.55 for verbal and 0.77 for visual.

2.2.2. Academic self-efficacy scale

This scale was developed by Jerusalem and Schwarzer in 1981 and adapted into Turkish by Y*i*lmaz, Gurcay and Ekici (2007). It consists of seven items. Students responded on a 4-point Likert-type scale from 1 (it fits me exactly) to 4 (it doesn't fit me at all). Scores can range from 7 to 28, and higher scores represent higher levels of self-efficacy. The results of the factor analysis show that the Turkish version of the scale has one dimension and seven items like the original version. Cronbach's alpha was found as *0*.79 (Y*i*lmaz, G*urc*ay & Ekici, 2007). The coefficient of internal consistency in the present study was $\alpha = 0.82$.

2.2.3. Epistemological beliefs scale

This scale was developed by Schommer (1990) and was adapted into Turkish by Deryakulu and Buyukozturk (2005). The scale was a 5-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree), and consisted of 34 items. There are three subscales, namely, 'The beliefs of learning depends on effort' (BLDE: 17 items), 'The beliefs of learning depends on ability' (BLDA: 8 items) and 'the belief of there is only one truth' (BOTT: 9 items). Cronbach's alphas for the adapted version of the subscales were 0.84, 0.69 and 0.64, respectively, and 0.81 for the whole scale (Deryakulu & Buyukozturk, 2005). In each subscale, high and low scores indicated that responding students possess immature and mature beliefs, respectively. In the present study, Cronbach's alpha coefficients were 0.95 for the belief of learning depends on effort, 0.81 for the belief of learning depends on the ability and 0.68 the belief of there is only one true truth.

2.3. Procedure

In this study, it has been followed by the author's human subject procedures as stipulated by her university's ethic committee overseeing human research. Before starting to investigate, all potential participants were informed about the current study via a written document and their rights to decide to participate voluntarily. Volunteer students were asked to fill in a personal information form and the scales. Afterwards, students completed the scales within a period of 15–20 minutes.

2.4. Data analyses

In this study, the SPSS 21.0 statistical program was used for data analysis. First, data analyses and descriptive statistics for all measures were presented as mean ± standard deviation. Pearson correlation analysis was performed to identify the relationships among all variables. Then, a hierarchical cluster analysis using Ward's method was applied and multivariate analysis of variance (MANOVA) was used to evaluate profiles with other variables. Also, The Ryan–Einot–Gabriel–Welsh Q (REGWQ) *post hoc* test was used. Finally, Partial eta-squared (η^2) and Hedges' *g* values were analysed so as to interpret meaningfulness.

3. Results

3.1. Descriptive statistics and correlational analyses

Descriptive statistics and Pearson's product–moment correlation coefficients between the visual versus the verbal style of processing, academic self-efficacy and epistemological beliefs subscales are presented in Table 1. The verbal subscale has a low-level positive relationship with the academic self-efficacy (r = 0.24, p < 0.01) and BLDE subscales (r = 0.12, p < 0.01) While the verbal subscale has a significant low-level negative relationship with BOTT subscale (r = −0.14, p < 0.01), it had no significant relationship with the BLDA. The visual subscale has a low-level negative relationship with BLDE (r = −0.14, p < 0.01). In contrast, it had no significant relationship with the other subscales. The academic self-efficacy has a low-level positive relationship with BLDE (r = 0.14, p < 0.01) and a low-level negative relationship with BOTT(r = −0.12, p < 0.05). In contrast, it had no significant relationship with the other subscales.

Table 1. Descriptive statistics and correlations between all variables of the overall sample

	M	SD	1	2	3	4	5	6
1.Verbal	17.96	2.79	1					
2.Visual	12.58	3.32	0.31**	1				
3.ASE	13.67	3.76	0.24**	.7	1			
4. BLDE	37.77	16.17	0.12*	0.14**	0.14**	1		
5. BLDA	19.95	6.91	−0.01	0.07	0.04	0.40**	1	
6. BOTT	27.67	6.33	−0.14**	−0.04	−0.12*	−0.26**	0.29**	1

*p < 0.05 **p < 0.01; *M*: Mean; SD: Standard deviation, ASE: Academic Self-Efficacy, BLDE: The Belief of Learning Depends on Effort, BLDA: The Belief of Learning Depends on Ability, BOTT: The Belief of There is Only One True Truth.

3.2. Cluster formation

The agglomeration schedule and the dendrogram indicated three clusters to be reasonable cluster solutions. After this analysis, the clusters obtained from the hierarchical analysis were validated with K-means cluster analysis. These clusters were examined and labelled. According to this, the first cluster was labelled as the 'high' group, the second cluster as the 'middle' group and the third cluster as the 'low' group. Based on these results, hierarchical cluster analysis came up with three profiles

that were all significantly different ($F_{(2,431)}$ = 1015.31, p < 0.001). The first cluster labelled as 'high' included 71 participants who were characterised by academic self-efficacy (M = 19.8, SD = 2.0), the second cluster labelled as 'middle' included 197 participants who were characterised by academic self-efficacy (M = 14.6, SD = 1.3) and the third cluster labelled as 'low' included 166 participants who were characterised by academic self-efficacy (M = 9.98, SD = 1.65).

Table 2. Mean and standard deviation values according to the clusters and the results of multivariate analysis of variance

	Cluster 1 High (n = 71)	Cluster 2 Middle (n = 197)	Cluster 3 Low (n = 166)				Hedges' g		
Variable	M (SD)	M (SD)	M (SD)	$F_{(2, 431)}$	ηp_2	*Post hoc*	1–2	1–3	2–3
Verbal	18.84(2.88)	18.12(2.70)	17.39(2.75)	7.49	0.06	3<1,2	—	0.51	0.26
Visual	12.98 (3.95)	12.72 (3.16)	12.24 (3.19)	1.57	0.03	None	—	—	—
BLDE	42.52 (16.55)	37.27 (15.14)	36.32 (16.91)	3.86	0.14	1 > 2,3	0.33	0.36	—
BLDA	20.80 (5.79)	19.82 (6.57)	19.74 (7.70)	.64	0.08	None	—	—	—
BOTT	26.00 (5.73)	27.84 (5.96)	28.20 (6.89)	3.16	0.06	1 < 2,3	−0.31	−0.33	—

M: Mean; SD: Standard deviation, BLDE: The belief of learning depends on effort, BLDA: The belief of learning depends on ability, BOTT: The belief of there is only one true truth.

3.3. Cluster differences in epistemology beliefs and style of information processing

To determine possible differences in visual and verbal style of processing and epistemological belief between three clusters, a one-way MANOVA was performed. Three clusters were the fixed factors and two visual and verbal style of processing, and three epistemological beliefs were the dependent variables of the analysis (Table 2). A statistically significant difference in verbal mean scores were found between groups ($F_{(2,431)}$ = 7.49, p < 0.01; ηp^2 = 0.06). According to *post hoc* analysis, Cluster 1 (Hedges' g = 0.51) and Cluster 2 (Hedges' g = 0.26) had higher scores than Cluster 3. No significant difference was found in visual mean scores between groups ($F_{(2, 431)}$ = 1.57, p > .05). All groups obtained similar visual scores. There were statistically significant differences in BLDE mean scores between groups ($F_{(2,431)}$ = 3.86, p < 0.05; ηp^2 = 0.14). The *post hoc* analysis results showed that Cluster 1 had significantly higher scores than Cluster 2 (Hedges' g = 0.33) and Cluster 3 (Hedges' g = 0.36). BOTT mean scores also showed significant differences between groups ($F_{(2,431)}$ = 3.16, p < 0.05; ηp^2 = 0.06). The *post hoc* analysis results revealed that Cluster 1 had significantly lower scores than Cluster 2 (Hedges' g = − 0.31) and Cluster 3 (Hedges' g = −0.33). When the BLDA mean scores were examined, no statistically significant difference between groups was found ($F_{(2,431)}$ = 0.64, p > 0.05).

4. Discussion

The objective of this study is to examine the epistemological beliefs and verbal and visual dominant learning styles according to their academic self-efficacy levels of the students receiving education in the school of physical education and sports. In this study, considering the Pearson correlation analysis results regarding the verbal and visual dominant learning styles, a positive low relationship is expected to be between visual sub-dimension and academic self-efficacy, while no relationship has been found between visual sub-dimension and academic self-efficacy. Meanwhile, individuals with low academic self-efficacy have a lower score in the visual dominant learning style than other groups, which is a remarkable result. When the studies performed are examined, the relationships between these two structures are observed to have been disclosed, although adequate information in literature hasn't been achieved regarding the relationship between the learning styles of students and their academic self-efficacies (Dumbauld et al., 2014; West, Kahn, Naute, 2007). Besides, Eroglu, Yıldırım and Sahan (2017), in their study with the students of faculty of sports sciences, stated that the self-efficacy levels of students were high. Nevertheless, Braakhuis (2015) expressed that the most preferred learning

style is the verbal learning style following kinaesthetic and multi-model learning in the learning styles of athletes. In this study, although the students with low academic self-efficacy have a higher tendency towards verbal learning, it can be thought that the reason why they got low scores in verbal learning style was caused by their high kinaesthetic perception depending on whether they could better express them physically. Baraahuis (2015) and Braakhuis et al. (2015) stated in their studies that athletes preferred kinaesthetic learning styles at most among learning styles. In the consequence of the analyses made regarding the epistemological beliefs in this study, a positive and low relationship was found between the belief that learning depends on effort and academic self-efficacy, while there was a negative and low relationship between the beliefs of there is only one truth and academic self-efficacy.

Despite this, the students in the group named as high academic self-efficacy have been determined to have higher averages than other groups having the belief that learning depends on effort. Mellat and Lavasani (2011), in their study with the students at Tehran University, found in the model they determined that epistemological beliefs have direct and the most effect on academic self-efficacy. Senemoğlu (2018) states that individuals with high self-efficacy act more persistently to the actions they try to handle. According to Bandura's (1977) perceived self-efficacy concept, individuals are not eager enough in coping with the difficulties of the action and in making efforts if they believe that they cannot reach the desired result in the process of realising an action. It is an expected situation that there is a perception that the students with academic self-efficacy because of their being athlete students will be successful in the consequence of a certain effort in their sports background.

Considering the studies regarding the belief, another sub-dimension of epistemological beliefs, that there is only one truth, the results of the studies made on university students in social and human sciences by Heigl and Thomas (2013) and those made on teachers in post-graduate educational programs by Izgar and Dilmaç (2008) have been observed to indicate a positive relationship between self-efficacy and 'the belief of there is only one truth', contrary to our findings. The reason why the results in the literature and the ones in this study are different from one another may result from the difference of the study samples. Considering that the participants in this study are athlete students, it can be thought that they have an experience that they can achieve information and success in their sports life in more than one way. Therefore, the students with high self-efficacy can be expected to believe that knowledge is flexible and changeable and that learning takes place with effort rather than that there is only one truth. Because it can be thought that their taking steps and then reaching a conclusion supports their self-confidence and increase their level of self-efficacy by believing that learning and coping with the hardships that they encounter both in sports and in academic environments will take place with effort.

5. Recommendations

Depending on these results, the teaching content should be presented by enriching it with different information resources for the purpose of supporting the self-efficacy perceptions in learning activities of students receiving education in the Faculty of Sports Sciences. In parallel to this, the efforts in the learning environment are advised to be supported by increasing the students' academic self-efficacy. Varying the teaching methods, lesson materials and activities used by the teachers during the classes can be effective for the sake of varying information resources.

In the prospective studies, on the sample of athlete students, using the qualitative method as well as a quantitative method within the frame of epistemological beliefs and academic self-efficacy is thought to be more effective in terms of enlightening the case. The comparison to be made by including different sample groups, epistemological beliefs and different cultures on academic self-efficacy, and by understanding the effects created by experience and teaching environments will be useful for the study.

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