

INVESTIGATION OF EPISTEMOLOGICAL BELIEFS AND CREATIVITY FOSTERING BEHAVIOURS OF PROSPECTIVE TEACHERS' IN TERMS OF VARIOUS VARIABLES

Fatma Alkan and Ayşem Seda Yücel

This study aims to investigate the prospective teachers' epistemological beliefs and creativity fostering behaviour and changes with the same according to various variables. The study was designed based on the relational survey model. The sample of the research consisted of 420 prospective teachers. For the purpose of the study, the epistemological beliefs scale and creativity fostering teacher index were used as data collection tools. The difference between the epistemological beliefs and creativity fostering teacher index sub-dimensions according to gender, programme and university variables was examined by "Multivariate Variance Analysis MANOVA". As a result of the research, the prospective teachers' epistemological belief and creativity fostering behaviour were found to be average. However, when the changes in the sub-dimensions of epistemological belief scale according to gender and university variables were examined, the effect of both variables was significant. The changes in epistemological beliefs according to the class and education programme were not significant. There was also no significant difference in sub-dimensions of creativity fostering teacher index scales according to gender and programme and class and programme.

KEYWORDS: Epistemological Beliefs, Creativity Fostering Behaviour, Prospective Teachers

Fatma Alkan ✉

Associate Professor

Hacettepe University, Faculty of Education, Beytepe, Ankara, Turkey

E-mail: alkanf@hacettepe.edu.tr

Ayşem Seda Yücel

Professor, Hacettepe University Faculty of Education, Beytepe, Ankara, Turkey.

E-mail: aseda@hacettepe.edu.tr

INTRODUCTION

Beliefs have a feature that constitutes how individuals perceive, make sense of, and act against the events, phenomena, persons or objects they encounter in their lives. In other words, they are internal acceptances or propositions that are not questioned by individuals. The impact of belief systems is seen on the foundation of all decisions made and behaviours exhibited (Hofer & Pintrich, 1997). One of these belief systems is epistemological beliefs. Epistemological beliefs can be defined as individuals' personal beliefs about what knowledge is, its source, certainty, structure, speed of learning and learning control (Schommer, 1990). Epistemological beliefs are particular to individuals and are obtained through individuals' personal experiences. It has a subjective feature and is not objective. The epistemological beliefs concur that individuals have to play an important role in their understanding and learning of a concept or event (Muller, Rebmann, & Liebsch, 2008). Hence, in order to increase the quality of education given to students, teachers' epistemological beliefs should be taken into consideration in shaping the teaching and learning process. Teachers have influence in teaching practices in the classroom with the epistemological beliefs that they have (Lee, Zhang, Song & Huang, 2013). Pintrich (1990) asserts that epistemological beliefs are the most important foundation in the psychological structure of teacher education. The main hindrance in bringing innovation in education are these basic beliefs that the teacher has. He suggests that teachers can influence the change with their own beliefs (Terzi, Şahan, Çelik, & Zöğ, 2015). In the research studies, it has been stressed out that there is a strong relationship between the teacher's epistemological beliefs and classroom behaviours and learning environment (Brown, & Rose, 1995; Kagan, 1992; Nespor, 1987). Since epistemological beliefs have an impact on the decisions and choices that a teacher makes in the dimensions such as teaching method and classroom management, it influences the teaching strategies used and the openness of the student's alternative views, or more precisely, shapes the teaching according to his or her own personal beliefs (Hashweh, 1996). Briefly, the epistemological beliefs say that teachers have to play an important role in the emergence and formation of the epistemological beliefs of the students. Therefore, it is necessary to determine the epistemological beliefs of the teachers in the pre-service period and to investigate the relationship of these beliefs with other variables that will have a direct impact on the learning and teaching processes. One of the variables that may have an influence on the epistemological beliefs of prospective teachers is their creative behaviour.

Every individual has an innate creative behaviour, however, the emergence, progress and continuity of this behaviour may vary from

individual to individual (Ayan, & Dündar, 2009). In general, those who can bring different solutions to problems, are proactive, have the ability to communicate easily in social environments, are independent in thought and action but respect the thoughts and actions of the environment, are willing to work, are tolerant of new ideas, can make constructive criticisms, individuals with mental curiosity and patience are called creative individuals (Kandemir, 2006; Öztürk, 2008; San, 2008). When creative behaviour comes into question, it is necessary to put forth new products as a result of synthesis by benefiting from knowledge and experience accumulation. The individuals who adopt creative behaviour have a self-confident and entrepreneurial character in relation to establishing the relationship among things thought to be irrelevant and creating new ones. When it comes to teaching environments, teachers who have developed creative behaviours are expected to educate students who can look at life in a multi-faceted manner, can stand against the difficulties, are conscious of continuous self-improvement and aim to realize their own learning. Because creative teachers have the responsibilities of lifelong learning consciousness instead of stereotyped behaviours in learning and teaching environments and have an approach that can balance the values of society with change and innovation processes (Akcanca, & Cerrah Özsevgeç, 2016).

In order for teachers to develop creative behaviours in children, they have to become a model with a creative personality for children in the first place. In other words, teachers should have a fluent, flexible and original thinking power. In this way, teachers can organize a teaching-learning environment that will lead their students to creative behaviours and guide their development (Yenilmez, & Yolcu, 2007). The epistemological beliefs and creative behaviours that teachers have will help students to find solutions to problems, solve complex relationships between variables, and develop their abilities to explain their results. In the national and international literature, studies in which epistemological beliefs are examined (Aypay, 2011; Şahin Taşkın, 2012) and the relationship with various variables are analysed (Önen Öztürk, 2016; Aslan, 2017; Ekinci, & Tican, 2017; Bıkmaz, 2017; Kutluca, Soysal, & Radmard, 2018) stand out. Studies for determining the level of creativity mostly related to creative behaviors (Özel, & Bayındır, 2015; İnel Ekici, 2016; Gökden Kaya, 2018; Batdal Karaduman & Çiftci, 2018), revealing the relationship with various variables (Yenilmez, & Yolcu, 2007; Gök, & Erdoğan, 2011; İşleyen, & Küçük, 2013; Topoğlu, 2015; Akcanca, & Cerrah Özsevgeç, 2016; Yıldız, & Baltacı, 2018; Ulusoy Yılmaz, & Yıldız, 2019), for the development of creativity (Birişçi, & Karal, 2011; Dere, 2017) attract attention. Examining the relationship between prospective teachers' epistemological beliefs and their tendencies to foster exhibiting creative behaviour will shed light on the behaviours that prospective

teachers will show in the classroom when they start their profession and the quality of the learning environment they will prepare. Thus, it will provide useful information about training qualified prospective teachers. In this study, it is aimed to investigate the prospective teachers' epistemological beliefs and their tendencies to creativity fostering behaviour and their changes according to various variables.

RESEARCH METHODOLOGY

The study was designed based on the relational survey model. Relational survey is a model that enables to examine the relationship of two or more variables with one another (Fraenkel, Wallen & Hyun, 2012). The aim of this study was to determine the epistemological beliefs and creativity fostering teacher behaviour of prospective teachers'. The study also examined the relationship between these variables according to gender, programme and university region.

SAMPLING

The sample of the research consists of 420 prospective teachers' in Turkey. 50.2% of the students were female and 49.8% were male. 35.2% of the prospective teachers are studying in primary education programme, 36.7% in mathematics and science education programme and 28.1% in foreign language education programme. According to the university, 25.7% are in Eastern Anatolia, 38.6% are in Central Anatolia and 35.7% are in the Aegean Region (Table 1).

Table 1

Characteristics of Sampling.

		F	%
Gender	Female	211	50.2
	Male	209	49.8
Programme	Primary Education	148	35.2
	Mathematics and Science Education	154	36.7
	Foreign Language Education	118	28.1
University Region	Eastern Anatolia	108	25.7
	Central Anatolia	162	38.6
	Aegean Region	150	35.7

DATA COLLECTION TOOLS

The epistemological beliefs scale and creativity fostering teacher index were used as data collection tools in the study.

Epistemological Beliefs Scale for Pre-Service Teachers: Epistemological beliefs scale was developed by Conley, Pintrich, Vekiri and Harri, (2004) and adapted in Turkish by Akçay, Usta Gezer and Akçay (2016). The scale consisted of 19 statements in a 5-point Likert scale. The scale has three dimensions. These dimensions are justification of knowledge, source/certainty of knowledge and development of knowledge. The Cronbach Alpha reliability coefficient of the whole scale 0.853 and of the sub-dimensions are 0.814, 0.784, and 0.697 respectively.

Creativity Fostering Teacher Index: Creativity Fostering Teacher Index was developed by Soh (2000) and adapted in Turkish by Dikici (2013). The scale consisted of 33 statements in a 5-point Likert scale. The scale has nine dimensions. These dimensions are independence, integration, motivation, judgment, flexibility, evaluation, question, opportunities, and frustration. The Cronbach Alpha reliability coefficient of the whole scale 0.94 and of the sub-dimensions are 0.64, 0.67, 0.77, 0.62, 0.69, 0.57, 0.71, 0.64, and 0.75 respectively.

RESULTS OF THE STUDY

Assumptions of MANOVA

All assumptions required for MANOVA were justified before analysing the data. The results are given in Table 2.

Table 2
Descriptive Statistics for the Observed Variables.

	M	SD	Min	Max	Skew.	Kurt.	α
Epistemological beliefs	3.39	.47	1.53	4.63	-.512	1.148	0.801
Justification of knowledge	3.94	.67	1.14	5	-.951	1.336	0.834
Source/certainty of knowledge	2.51	.75	1	4.43	-.220	-.352	0.822
Development of knowledge	3.85	.47	1.20	5	-.736	.603	0.702
Creativity fostering teacher index	4.06	.61	1.82	5	-.883	.705	0.961
Independence	4.04	.83	1	5	-.911	.989	0.719
Integration	4.11	.81	1.25	5	-.844	.310	0.871
Motivation	4.10	.77	1.33	5	-.893	.581	0.796
Judgment	3.86	.71	1	5	-.755	.896	0.732
Flexibility	4.06	.71	1	5	-.783	.557	0.816
Evaluation	3.99	.69	1.67	5	-.617	.390	0.718
Question	4.09	.72	1.25	5	-.708	.314	0.799
Opportunities	4.05	.73	1	5	-.995	1.453	0.788
Frustration	4.19	.76	1	5	-1.179	1.541	0.902

Note: Skew.=Skewness; Kurt.=Kurtosis; α=Cronbach's alpha.

When the kurtosis and skewness values were examined, it can be seen that

the data are distributed normally (Tabachnick, & Fidell, 2013). To observe whether there are multivariate normality and extreme values, the mean and the trimmed mean were compared, and if these two mean values were very different from each other, the Q-Q plot was first checked to specify the outliers. In these data set when means were compared to 5% trimmed means a few outliers were observed and Mahalanobis distance value was examined. In the data file, outliers whose Mahalanobis distance is above the critical value were excluded from the data set. In order to meet the multivariate normality assumption, these data were excluded from the analysis and the remaining 420 data met the multivariate normality assumption. Homogeneity of variance-covariance matrices was evaluated by Box's M test and Levene's tests. The significance of the Box's M test is as follows [Box's M=87.821, $F(6.814):1.315$, $p>0.05$]. The homogeneity of covariance matrices was met. Another assumption of MANOVA is the homogeneity of the variances. Levene's test has been used for the equality of variances. Equality of variance in terms of dependent variables was accepted [$p>.05$]. The results have been given in Table 3 and Table 4.

Table 3

Levene's Test Results Regarding Homogeneity of Variances for Epistemological Beliefs.

The Dependent Variable	df1	df2	F	p
Justification of knowledge	2.312	5	414	.055
Source/certainty of knowledge	1.477	5	414	.196
Development of knowledge	1.387	5	414	.228

Table 4

Levene's Test Results Regarding Homogeneity Of Variances For Creativity Fostering Teacher Index.

The Dependent Variable	df1	df2	F	p
Independence	2.193	5	414	.054
Integration	1.537	5	414	.177
Motivation	.407	5	414	.844
Judgment	.994	5	414	.421
Flexibility	2.094	5	414	.065
Evaluation	1.389	5	414	.227
Question	1.061	5	414	.381
Opportunities	.672	5	414	.645
Frustration	.865	5	414	.505

The data given in Table 3 and 4 was found to meet the assumptions and was analysed in accordance with the purpose of the study.

Findings from Descriptive Statistics

Descriptive statistics related to the average of the epistemological beliefs, creativity fostering teacher index scales and all sub-dimensions of prospective teachers are summarized in Table 5.

Table 5
Descriptive Statistics.

ObservedVariables	N	Mean	SD
Justification of knowledge	420	3.96	.64
Source/certainty of knowledge	420	2.52	.75
Development of knowledge	420	3.86	.66
Independene	420	4.06	.81
Integration	420	4.12	.79
Motivation	420	3.87	.71
Judgment	420	4.07	.74
Flexibility	420	3.99	.70
Evaluation	420	4.09	.72
Question	420	4.05	.73
Opportunities	420	4.19	.77
Frustration	420	2.77	.83

MANOVA Findings

The comparison of justification of knowledge, source/certainty of knowledge, development of knowledge (sub-dimensions of epistemological beliefs) and independence, integration, motivation, judgment, flexibility, evaluation, question, opportunities, frustration (sub-dimensions of creativity fostering teacher index) of prospective teachers' according to gender and university was conducted with MANOVA. MANOVA findings are given for epistemological beliefs in Table 6 and Table 7 and the findings for creativity fostering teacher index are given in Table 8.

Table 6**MANOVA Findings for Epistemological Beliefs according to Gender and University.**

Source of the Variance		Value	F	Hypothesis df	Error df	p	η^2
Gender	Wilks' Lambda	.980	2.849	3	412	.037	.020
University	Wilks' Lambda	.970	2.140	6	824	.047	.015
Gender* University	Wilks' Lambda	.993	.504	6	824	.805	.004

The results in Table 6 show that there was significant difference on sub-dimension of scales according to gender and university ($F(\text{Gender}) = 2.849$; $\eta^2 = .020$ $p < 0.05$; $F(\text{University}) = 2.140$; $\eta^2 = .015$ $p < 0.05$). It was observed that the effect sizes were medium (Cohen, 1988). There was no significant difference when gender and university independent variables were considered simultaneously ($F(\text{Gender*university}) = .504$; $p > 0.05$). The ANOVA test was applied to determine which sub-dimensions of significant difference determined according to MANOVA. According to Tukey multiple comparison test gender has a significant impact on the development of knowledge sub-dimension of epistemological beliefs scale. At these sub-dimension girls have a high average. University variable was also influential on the epistemological beliefs. At justification of knowledge sub-dimension prospective teachers' who were studying at Eastern Anatolia have low average than Central Anatolia and Aegean Region, and at source/certainty of knowledge Eastern Anatolia region has low average than Central Anatolia region.

Table 7 shows the changes in epistemological beliefs according to the class and education programme.

Table 7**MANOVA Findings for Epistemological Beliefs according to Class and Programme.**

Source of the Variance		Value	F	Hypothesis df	Error df	p	η^2
Class	Wilks' Lambda	.985	.700	9	988	.709	.005
Programme	Wilks' Lambda	.984	1.128	6	812	.344	.008
Class* Programme	Wilks' Lambda	.928	1.702	18	1148	.033	.024

The results in Table 7 show that there were no significant difference on sub-dimension of scales according to class and programme ($F(\text{Class}) = .702$; $p > 0.05$;

F(Programme) =1.128; $p>0.05$). There was significant difference when class and department independent variables were considered simultaneously ($F(\text{Class*Programme}) =1.700$; $\eta^2=.024$ $p<0.05$). According to ANOVA results class and department common effect has a significant impact on justification of knowledge and development of knowledge sub-dimensions of epistemological beliefs scale.

According to the results, the significant difference in the justification of knowledge sub dimension resides at 2nd class primary education (X: 3.59) and foreign language education (X: 4.43) prospective teachers', in 3rd class foreign language education (X: 3.25) and mathematics and science education (X: 4.14) prospective teachers'. In the development of knowledge sub dimension significant difference between 2nd class primary education (X: 3.61) and foreign language education (X: 4.00) prospective teachers', in 3rd class foreign language education (X: 3.15) and primary education (X: 4.10) prospective teachers.

Table 8
MANOVA Findings for Creativity Fostering Teacher Index.

Source of the Variance		Value	F	Hypothesis df	Error df	p	η^2
Gender	Wilks'	.961	1.842	9	406	.059	.039
	Lambda						
Programme	Wilks'	.958	.989	18	812	.471	.021
	Lambda						
Gender*	Wilks'	.961	.900	18	812	.578	.020
	Lambda						

The results in Table 8 show that there were no significant differences on sub-dimension of scales according to gender and programme ($F(\text{Gender}) =1.842$; $\eta^2=.039$ $p>0.05$; $F(\text{Programme}) =.989$; $p>0.05$; $F(\text{Gender*programme}) =.961$; $p>0.05$). The change of creativity fostering teacher index according to class and education program was examined and no significant difference was found ($F(\text{Class}) =1.048$; $p>0.05$; $F(\text{Programme}) =1.073$; $p>0.05$; $F(\text{Gender*programme}) =1.165$; $p>0.05$).

DISCUSSION AND CONCLUSION

In this study, the prospective teachers' epistemological beliefs and their tendencies to foster creativity and their changes according to various variables have been analysed. As a result of the research, the prospective teachers' epistemological belief average is (X: 3.09), while the average creativity fostering behaviour is (X: 4.06). When the changes in the sub-dimensions of

epistemological belief scale according to gender and university variables are examined, the effect of both variables are significant. The percentage of explanation of the development of knowledge dimension of epistemological belief by the independent variable of gender is 2%, and the percentage of explanation by the variable of university is 1.5%. According to descriptive statistics, the average of female students in the sub-dimensions of epistemological belief scale is higher than male students. This result is similar to other study results (Aypay, 2011; Şahin Taşkın, 2012; Aslan, 2017; Kutluca, Soysal, & Radmard, 2018). Moreover, the difference between the sub-dimensions of epistemological belief scale according to the programme studied and grade variables is also significant. The result of the significant difference according to the programme studied and the grade is supported by other study findings as well (Aypay, 2011; Aslan, 2017). While it is observed that the epistemological belief averages of prospective teachers of sciences are higher, it cannot be generalized that the grade level will increase as the grade level increase on the basis of the grade. The reason for this is seen as the education system implemented in Turkey. According to the education system, students enter the university after a long and exhausting exam marathon. During this marathon, they just plan to settle into a higher education program without focusing on their wishes and abilities. As a result, their epistemological beliefs are immature (Schraw, Bendixen, & Dunkle, 2002). The aim of higher education programs should be advancing students' epistemological beliefs to a higher level. The epistemological beliefs of the students will develop with the practical studies they carry out when they enter to higher education from high school (Samarapungavan, Westby, & Bonder, 2006). It is also thought that the experience gained through lectures and practices at the university will play a role in the development of students' epistemological beliefs (Liu, & Tsai, 2008).

The change in another variable of the study, the tendency to show creativity fostering behaviours, has been examined with the variables of gender, programme studied and grade. None of these independent variables had a significant effect on the tendency to exhibit creativity fostering behaviours. This result is supported by other research findings done towards exhibiting creativity fostering behaviors (Ulusoy Yılmaz, & Yıldız, 2019; Batdal Karaduman, & Çiftci, 2018; İnel Ekici, 2016; Gökden Kaya, 2018). According to the results of the study conducted with prospective teachers studying at the faculties of education at different universities, the average tendency of prospective teachers to show creativity fostering behaviours ($X_{\text{lowest}}=3.86$; $X_{\text{highest}}=4.20$) is quite high. According to this, they think that they will exhibit behaviours that foster the creativity of their students in the teaching process. Teachers should pay attention to whether their own behaviours in their

professional lives improve their students' creative behaviours or not. It is of great importance that the teacher is a role model in demonstrating creative behaviour. Students learn quickly while observing models they respect or admire such as a teacher or someone their elders put forward (Bandura, 2001). Teachers should first appreciate their own behaviours in order to encourage creative behaviours in the classroom, and then be sensitive to the curiosity and personal characteristics of their students, and thus they can create awareness in the classroom (Soh, & Quek, 2004).

Teachers should add creativity to daily teaching practices, give students the opportunity to make choices, imagine and explore, follow motivational messages from students after the practices carried out in the classroom, model creativity in the class and support it (Beghetto, & Kaufman, 2014). Teachers' daily interaction with their students is seen as a dynamic way of developing their creative behaviours (Soh, 2015). Teachers should be informed about the importance of creativity in education and should participate in training programmes in order to realize the importance of modelling creativity (Cayirdag, 2017). In order for teachers to develop the creativity fostering behaviour, it is advised that teachers should follow current issues, increase their knowledge and skills through academic studies such as graduate education, and develop themselves by making trips, observations and researches in accordance with the information they obtain from there (Gökden Kaya, 2018). It is thought that the creativity fostering behaviours tendency of teachers and prospective teachers can develop by following the academic articles and thesis published in the field of education and being aware of new practices (İnel Ekici, 2016). It is stated by the prospective teachers that the programme followed in schools is not effective in developing creativity and the teacher plays an important role in this issue (Akçanca, & Cerrah Özsevgi, 2016). This research is significant in order to have information about prospective teachers' epistemological beliefs and their creativity fostering behaviour levels and to reveal their changes according to various variables. The teacher's role in the school is not limited to transferring information to the students. The teacher can develop creative behaviours of his or her student as a good model and mature his or her epistemological beliefs even at lower levels of education before coming to university. In future studies, the change of epistemological beliefs and creativity fostering behaviours with other variables can be examined, levels of high school students rather than prospective teachers can be determined and the effect of appropriate methods and techniques on these variables can be revealed.

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