

## **Investigation of Pre-Service Teachers' Individual Innovativeness Characteristics and Learning Styles According to Various Variables\***

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### **Abstract**

The aim of this study is to investigate the innovativeness characteristics and learning styles of the pre-service teachers in terms of gender and department variables and to determine whether the characteristics of innovativeness differ significantly according to their learning styles. In the study descriptive method was used in the survey model. The study group consisted of 232 pre-service teachers studying in the 4<sup>th</sup> grade of the education faculty of a state university in the Mediterranean region in Turkey. According to the findings obtained from the study, the mean score of innovativeness of pre-service teachers is very close to the accepted limit value for high level innovativeness. It was concluded that there was no significant difference between the pre-service teachers' scores of innovativeness and gender and department variables. Findings also reveal that learning style is a variable that causes differentiation in the characteristics of pre-service teachers' innovativeness.

**Keywords:** innovativeness, learning style, pre-service teachers

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## INTRODUCTION

The most important phenomenon affecting the current century is “information”. Today, individuals using and producing information are one of the basic criteria used in determining the development levels of countries. Therefore, the primary objective of the countries has been to transform into an information society. Ünal (2009, p.126) defines information society as “*A development stage where the information sector, information production, information capital and qualified human factor have gained importance with the development of new basic technologies and where the continuity of education comes to the fore and carries the society beyond economic, social, cultural and political aspects with the new developments such as communication technologies, information highways and electronic commerce*”. In the information society, it is possible for qualified individuals in the economy to be active and to participate in production increasingly (Şentürk, 2008).

The commonly agreed point about the individuals of the 21<sup>st</sup> century is the emphasis on them being more independent and more qualified. Education has the mission to regulate the environments that will enable individuals to be emancipated and empowered in accordance with the information society expectations and revitalize them (Pehlivanoğlu, p.3). Accordingly, an education system aiming to move beyond the age is open to innovations and should cover the whole of life and be able to analyze the needs of the time and renew itself accordingly (Akkoyunlu et al., 2008). In short, the reform of education systems needs to focus on the innovative ways of fulfilling our educational responsibilities (Windham, 1996). However, this must take place in all elements of the system. In this context, it is important that teachers, who are the practitioners of the system, have a personal and professional innovative identity.

Innovation is a concept with many different definitions. Because this concept is used in many different fields and social theory (Goldsmith & Foxall, 2003, p.322). Rogers defines (2003, p.12) innovation as “*An idea, practice, or project that is perceived as new by an individual or other unit of adoption*”. According to Shavinina (2013, p.31), “*Innovation is the implementation of ideas into practice in the form products, processes, and services*”. Rogers (2003), in his theory of diffusion of innovation, states that the adoption of an innovation by individuals differs in society. According to this, it has divided the individuals into five categories according to their adoption characteristics and described the dominant characteristics of each category Innovators are very willing to try new opinions. Although not accepted by other members of the social system, they play an important role in the diffusion of innovations. Therefore, innovator plays the role of a gatekeeper bringing the innovation in a social system. Early adopters have the biggest opinion leadership in most social systems. They are people who have knowledge and advice about innovation and they act as role models for other individuals. Therefore, the role of individuals in this category is to reduce the ambiguity about the opinion/innovation by adopting a new opinion/innovation and to pass on a subjective assessment of innovation to peers through interpersonal networks. Early majority adopt to new opinions just before an average member of the social system. They may be cautious for a while before accepting a new opinion. An acceptance period of innovation is longer than the innovators and early adopters. Late majority adopt new opinions immediately before an average member of the social system. This adoption may be from an economic necessity, as well as in response to increasing network pressures. They approach the innovation in a skeptical and cautious manner and do not adopt until others agree. They can be convinced of the utility of new opinions, but peer pressure is required to adopt them. Within the social system, laggards are the ones who adopt the innovation in a long period of time. Their reference point is past. Decisions are often made by looking at what has been done in previous generations. When the laggards finally adopted an innovation, a newer opinion might be started to be used by the innovators (Rogers, 2003, p.248-251).

The exchange of information is the essence of the process of the diffusion of an innovation, where the individual conveys a new opinion to one or several people. This is a communication process that involves creating and sharing information to achieve mutual understanding (Rogers, 2003). In this context, it can be said that education is a suitable system for the diffusion of innovation and the development of innovative individuals. Because the learning-teaching process is based on the

exchange of information and is based on mutual communication. In the process of learning-teaching, the behavior of individuals in receiving, communicating, sharing or applying new information can be affected by many variables. Curriculum, teachers' professional competence, teaching methods and techniques, use of instructional technologies, material use, and physical environment are some of the variables that make a difference by influencing the teaching and learning process. However, the learner himself is one of the most important variables affecting the process. At this point, general ability, cognitive processes, developmental characteristics, preliminary information, past experiences, family (Erden & Altun, 2006), level of motivation, interest-need and value given to the learning unit, having a purpose in learning, self-confidence (Senemoğlu, 2005), attitude (Felder & Brent, 2005) are the variables that affect the individual's learning and constitute the basis of individual differences. Learning styles are also one of the individual differences that can significantly affect the learning of the individual (Kurt & Ekici, 2013). Considering that the learning style is a communication channel between the individual and the information, it can be said that it may be related to the innovativeness feature. In this context, another variable in this study, which is dealt with individual innovativeness, is learning style.

Learning style can be defined as the characteristics of an individual that develops as a result of personal preferences in the process of learning and organizing a new knowledge and which affects a subjective approach to learning. Kolb (1985) has defined learning style as ways people follow and process information. According to Riding and Rayner (1998), learning styles are a series of individual differences. These differences, however, should be considered not only as a specific form of learning activity or as a particular personal preference in teaching, but also as differences in mental or personal psychology. Learners with different learning styles perceive, understand and try to solve learning tasks in a different, relatively stable way (Kauchak & Eggen, 2003). In this context, it can be said that learning styles will enable the teacher to recognize the learners and adopt the teaching accordingly. In this scope of study, "Kolb Learning Style Model" developed by Kolb which has an important place in the subject, has been discussed and explained.

### Kolb Learning Style Model

Kolb's learning style model is based on the experiential learning model. In the experiential learning model, the link between the activities and the formation of knowledge is important in the learning process. Thoughts are not static and are constantly in changes depending on experience. As in the learning models of Dewey, Lewin and Piaget, learning in this model is defined as a process and it is explained that it shows continuous changes as a result of experiences. The essence of Kolb's experiential learning model is constituted by a four-stage learning circle called "Concrete Experience", "Reflective Observation", "Abstract Conceptualisation" and "Active Experimentation" (Healey & Jenkins, 2000). The learning style of each individual is the component of these four basic forms. Therefore, a variety of situations are put together into a learning situation (Aşkar & Akkoyunlu, 1993). The learning styles and characteristics are shown in Figure 1 (Kolb, 1984; p.77-78).

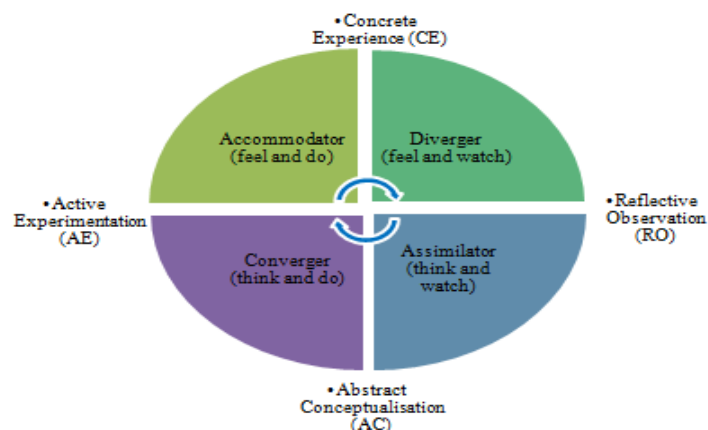


Figure 1: Kolbs' Learning Style Model

Innovativeness, is one of the qualities that individuals of the 21<sup>st</sup> century should have (Partnership for 21st Century Learning, 2016). The recognition of development programs as one of the best indicators of success is one of the reasons for focusing on innovativeness in developing countries (Rogers, 2003). Therefore, in the current century, it is very important to bring this feature to individuals. One of the most important roles in the construction of the social system belongs to the education system. This addresses the importance of education and teacher role in the process of creating a society of individuals with targeted characteristics. Teachers should master these knowledge and skills to educate learners in a way having that knowledge and skills. In the context of the quality of innovativeness, it can be said that teachers and pre-service teachers should display an innovation, search, find, adopt and share behaviors in a way that will lead the other members and students of the society. Because teachers have an innovative identity in a personal and professional sense, they will be open to change and open to improvement. This will be reflected in their practice in the learning-teaching process and will be able to lead the process of preparing learners in their future roles. Therefore, teachers should be encouraged to have the qualifications to provide positive learning outcomes for learners in the pre-service training process. In this context, it is considered that it is important to determine the learning styles and novelty characteristics that affect the pre-service teachers' preferences for receiving and processing new information. In this context, the main aim of this study is to examine the innovativeness characteristics and learning styles of the pre-service teachers in terms of gender and department variables and to determine whether the characteristics of innovativeness differ significantly according to their learning styles. According to this main objective, the questions of this study are as follows:

1. What is the distribution of pre-service teachers' level of innovativeness and categories of innovativeness?
2. Is there a significant difference between pre-service teachers' learning styles characteristics according to their gender and department variables?
3. What is the distribution of learning styles of pre-service teachers?
4. Is there a significant difference between pre-service teachers' learning styles according gender and department variables?
5. Is there a significant difference between the pre-service teachers' innovativeness scores according to their learning styles?

## METHOD

### Research Design

In this study, descriptive method was used in the survey model. In the survey model; the aim of the study is to describe the situation in the past or present. The subject matter of the study is attempted to be defined objectively, as it is, in the individual or object conditions. (Karasar, 2009). In survey researchs, the researcher does not intervene to sample (Şimşek, 2012). In this context, in this study, individual innovativeness characteristics and learning styles of pre-service teachers forming the working group were described. It was examined whether the learning styles and individual innovativeness characteristics of pre-service teachers differed according to gender and department variables. The findings obtained in the context of the research questions are given as they are without intervention.

### Participants

The study group consisted of 232 pre-service teachers studying in the 4<sup>th</sup> grade of the education faculty of a state university in the Mediterranean region in Turkey. For the purpose of the study, the study group was determined through criterion sampling among purposeful sampling

methods. Purposive sampling allows in-depth research by selecting information-rich situations depending on the purpose of the study (Büyüköztürk et.al, 2015). Criterion sampling involves selecting cases that meet some predetermined criterion of importance (Patton, 2001, p. 238). In this study, it was determined that the prospective teachers' education in the last year was a criterion. It was thought that the prospective teachers in the last year would have a high level of awareness about their learning styles as they took all the courses related to learning and teaching. In addition, senior teacher candidates have the opportunity to find and create different and innovative learning environments due to their school experience courses. For this reason, it was determined that the prospective teachers of the study group were studying in the 4th grade. 158 (68.1%) of the pre-service teacher were female and 74 (31.9%) were male.

### Data Collection Tools

Research data were obtained by using Learning Style Inventory and Individual Innovativeness Scale.

The Learning Style Inventory (LSI) developed by Kolb (1985) was adopted to Turkish by Aşkar and Akkoyunlu (1993). In LSI, four learning styles based on Kolb experiential learning theory have been defined. The inventory consists of 12 items, each with four expressions indicating the preference for learning. The cronbach-alpha reliability coefficients of the inventory were obtained as .66 for AC, .71 for RO, .79 for CE, .74 for AE.

The Individual Innovativeness Scale (IIS) developed by Hurt (1977) and adopted to Turkish by Kılıçer and Odabaşı (2010) consists of 20 items, 12 of which are positive and 8 of which are negative. IIS consists of four factors: *resistance to change*, *opinion leadership*, *openness to experience* and *risk taking*. According to the scores obtained from the scale, individuals can be classified in five different categories in terms of innovation. An assessment of the level of innovation of individuals can also be carried out. Levels and categories according to the mean score ranges to be obtained from IIS are presented in Table1.

**Table 1. Individual Innovation Scale Category and Levels**

	Category	Score	Level	Score
Innovativeness	Innovator	>80	High	>68
	Early Adopters	69-80		
	Early Majority	57-68	Intermediate	68-64
	Late Majority	46-56		
	Laggards	<46		

The reliability coefficient for the adoption study performed by Kılıçer and Odabaşı (2010) was found to be 88. In this study, the cronbach-alpha reliability coefficient for the whole scale was .87, and the reliability coefficients for the sub-dimensions were found as .80 for Resistance to Change; .77 for Opinion Leadership; .82 for Openness to Experience and .67 for Risk Taking.

### Data Analysis

Descriptive statistics were used to determine the distribution of pre-service teachers' innovativeness scores, levels, categories and learning styles. The normality of the data was examined before examining whether or not pre-service teachers' innovativeness scores differ according to gender, department and learning style variables. According to the results of normality tests, it was decided to use non-parametric tests in the analysis of the data. According to this, whether or not pre-service teachers' innovativeness scores differ according to gender variable was determined with the help of Mann Whitney-U test and whether they differ according to department and learning style variables was determined with the help of Kruskal Wallis-H test. In case of significant difference in the result of the analysis, Mann Whitney-U test was performed in order to determine which groups caused the difference. Prior to multiple comparisons, The Bonferroni correction involves using the .05 alpha value as the criteria of significance determination by dividing the alpha value by the number of

tests (Pallant, 2007 p.228). In order to determine which learning characteristics of pre-service teachers differ significantly according to learning style, four groups were compared and the level of significance was accepted as  $p < .0083$  ( $0.005/6 = 0.0083$ ). In addition, the effect size statistics were used to determine the effect level in the groups with significant difference. Accordingly,  $[r = z \text{ score} / \sqrt{n}]$  formula was used to calculate the impact size. The impact size was interpreted on the basis of Cohen's (1988) criterion (.1=small, .2=medium, .3=big). Chi-square test was used to determine whether the learning styles of the pre-service teachers differed significantly according to gender and department variables.

## FINDINGS

Findings for the first question (What is the distribution of the pre-service teachers' innovativeness levels and innovativeness categories?)

**Table 2. Descriptive Statistics of Pre-Service Teachers' Innovativeness Levels**

Innovativeness Levels	$\bar{X}$	S.D	f	%
Low	56.5	6.83	67	28.9
Medium	66.5	1.90	57	24.6
High	75.5	5.81	108	46.6
Total	67.82	9.76	232	100

When Table 2 is examined, it is seen that 46,6% of the pre-service teachers are highly innovative. The fact that it is followed by a low level innovativeness (28.9%) is a remarkable finding. 24.6% of pre-service teachers are innovative at a moderate level. Considering the means of pre-service teachers' innovativeness points ( $\bar{X} = 67.82$ ), it is seen that this value is very close to 68 which is the accepted limit value for high level innovativeness.

**Table 3. Descriptive Statistics of Pre-Service Teachers' Innovativeness Categories**

Innovativeness Categories	f	%
Laggards	5	2.2
Late Majority	17	7.3
Early Majority	102	44.0
Early Adopters	88	37.9
Innovator	20	8.6
Total	232	100

When Table 3 is examined, it is seen that the majority of pre-service teachers are included in the early adopters (44%), early majority (37,9%) and innovator (8,6%) categories. According to this, it is seen that 90.5% of the pre-service teachers are in the categories above the mean. The remaining 9.5% is in the late majority and laggards categories.

**Table 4. Descriptive Statistics on Individual Innovativeness Score of Pre-Service Teachers'**

	N	I	$\bar{X}$	S.D	$\bar{X}/I$
Innovativeness	232	20	67.82	9.76	3.40
Resistance to Change	232	8	20.52	5.07	2.57
Openness to Experience	232	5	20.37	3.03	4.07
Opinion Leadership	232	5	18.85	3.28	3.77
Risk Taking	232	2	7.12	1.70	3.56

When Table 4 is examined, it is seen that the highest mean score obtained from the individual innovativeness scale of the pre-service teachers is in the "Openness to Experience" sub-dimension ( $\bar{X} = 4.07$ ), while the lowest mean score is in the "Resistance to Change" sub-dimension ( $\bar{X} = 2.57$ ).

Findings for the second question (Is there a significant difference between pre-service teachers' learning styles characteristics according to their gender and department variables?)

**Table 5. Mann Whitney-U Test Results of Pre-Service Teachers' Innovativeness Scores According to Gender**

	Gender	N	Rank Av.	Rank Total	U	p
Resistance to Change	Female	158	114.68	18119.50	5558.50	0.55
	Male	74	120.39	8908.50		
Openness to Experience	Female	158	107.89	17047.00	4486.00	0.004*
	Male	74	134.88	9981.00		
Opinion Leadership	Female	158	112.68	17803.50	5242.50	0.20
	Male	74	124.66	9224.50		
Risk Taking	Female	158	105.56	16679.00	4118.00	0.00*
	Male	74	139.89	10349.00		
Innovativeness	Female	158	111.34	17592	5031.00	0.87
	Male	74	127.51	9436.00		

\*p< .05

When Table 5 is examined; it is observed that there is not a significant difference between pre-service teachers mean scores of innovativeness (U=5031.00; p>.05) according to gender. When analyzed according to the sub-dimensions, it was determined that there was a significant difference in the *Openness to Experience* (U=4486.00; p<.05) and *Risk Taking* (U=4118.00; p<.05) sub-dimensions according to the gender variable. When the means are taken into consideration, it is seen that the mean scores of male pre-service teachers in terms of both openness to experience and risk-taking sub-dimensions are higher than the mean of female pre-service teachers.

**Table 6. Kruskal Wallis-H Results of Pre-Service Teachers' Innovativeness Scores According to Department**

Variable	Department	N	Rank Av.	sd	X <sup>2</sup>	p
Resistance to Change	Pre-School T.	35	108.93	6	14.321	0,26
	Elementary School T.	48	113.78			
	Turkish T.	21	91.86			
	English T.	33	125.23			
	Mathematic T.	28	154.00			
	Science T.	22	121.95			
Openness to Experience	Guidance and Psyc. C.	45	104.39	6	14.354	0,26
	Pre-School T.	35	123.09			
	Elementary School T.	48	101.31			
	Turkish T.	21	125.79			
	English T.	33	145.62			
	Mathematic T.	28	90.45			
Opinion Leadership	Science T.	22	110.50	6	11.254	0.81
	Guidance and Psyc. C.	45	121.03			
	Pre-School T.	35	118.36			
	Elementary School T.	48	108.70			
	Turkish T.	21	109.00			
	English T.	33	148.70			
Risk Taking	Mathematic T.	28	112.11	6	1.297	0.972
	Science T.	22	94.05			
	Guidance and Psyc. C.	45	116.98			
	Pre-School T.	35	116.97			
	Elementary School T.	48	114.95			
	Turkish T.	21	117.33			
Innovativeness	English T.	33	121.21	6	9.963	0.13
	Maths T.	28	108.29			
	Science T.	22	109.30			
	Guidance and Psyc. C.	45	122.58			
	Pre-School T.	35	122.86			
	Elementary School T.	48	108.44			
Innovativeness	Turkish T.	21	129.79	6	9.963	0.13
	English T.	33	129.06			
	Mathematic T.	28	87.98			
	Science T.	22	105.41			
	Guidance and Psyc. C.	45	127.91			
	Pre-School T.	35	122.86			

When Table 6 is examined, it is seen that there is no significant difference between the mean innovativeness score ( $X^2_{(sd=6, n=232)} = 9.963, p>.05$ ) of the pre-service teachers according to the education department variable. When examined according to sub-dimensions, there is no significant difference too [*Resistance to Change* ( $X^2_{(sd=6, n=232)} = 14.321, p>.05$ ); *Openness to Experience* ( $X^2_{(sd=6, n=232)} = 14.354, p>.05$ ); *Opinion Leadership* ( $X^2_{(sd=6, n=232)} = 11.254, p>.05$ ); *Risk Taking* ( $X^2_{(sd=6, n=232)} = 1.297, p>.05$ )] ( $X^2_{(sd=6, n=232)} = 9.963, p>.05$ ).

Findings for the third question (What is the distribution of learning styles of pre-service teachers?)

**Table 7. Descriptive Statistics of Pre-Service Teachers' Learning Styles**

Learning Style	f	%
Diverger	60	25,9
Assimilator	72	31,0
Converger	58	25,0
Accommodator	42	18,1
Total	232	100

When Table 7 is examined, it is seen that the learning styles of pre-service teachers vary. According to this, it is seen that 31% of the teachers candidates have an assimilator learning style, 25,9% diverger learning style, 25% converger learning style and 18,1% accommodator learning style.

Findings for the fourth question (Is there a significant difference between pre-service teachers' learning styles according gender and department variables?)

**Table 8. Chi-Square Results of Pre-Service Teachers' Learning Styles According to Gender**

Learning Style	Diverger		Assimilator		Converger		Accommodator		Total	
	N	%	N	%	N	%	N	%	N	%
Female	41	25.9	41	25.9	47	29.7	29	18.4	158	100
Male	19	25.7	31	41.9	11	14.9	13	17.6	74	100
Total	60	25.9	72	31.0	58	25.0	42	18.1	232	100

$X^2 = 8.611$   $sd=3$   $P=0.035 < .05$

When Table 8 is examined, it is seen that there is a significant difference ( $X^2_{(sd=3, n=232)} = 8.611, p<.05$ ) between the gender of the pre-service teachers and their learning styles. Female pre-service teachers have a converger (29.7%) learning style and male teachers have an assimilator (41.9%) learning style.

**Table 9. Chi-Square Results of Pre-Service Teachers' Learning Styles According to Department**

Learning Style	Diverger		Assimilator		Converger		Accommodator		Total	
	N	%	N	%	N	%	N	%	N	%
Pre-Sch.T.	10	28.6	8	22.9	8	22.9	9	25.7	35	100
Elem. Sch.. T.	13	27.1	10	20.8	12	25	13	27.1	48	100
Turkish T.	5	23.8	11	52.4	3	14.3	2	9.5	21	100
English T.	9	27.3	10	30.3	8	24.2	6	18.2	33	100
Math. T.	6	21.4	9	32.1	10	35.7	3	10.7	28	100
Science T.	5	22.7	7	31.8	5	22.7	5	22.7	22	100
Guid.and Psyc. C.	12	26.7	17	37.8	12	26.7	4	8.9	45	100
Total	60	25.9	72	31	58	25	42	18.1	232	100

$X^2 = 16.366$   $sd=18$   $P=0.57 > .05$

When Table 9 is examined, it is seen that there is not a significant difference ( $X^2_{(sd=18, n=232)} = 16.366, p>.05$ ) between the departments of pre-service teachers and their learning styles.



Findings for the fifth question (Is there a significant difference between the pre-service teachers' innovativeness scores according to their learning styles?)

**Table 10. Kruskal Wallis-H Results of Pre-Service Teachers' Innovativeness Scores According to Learning Styles**

Variable	Learning Style	N	Mean Ranks	sd	X <sup>2</sup>	p
Resistance to Change	Diverger	58	131.53	3	11.454	0.01*
	Assimilator	60	126.45			
	Converger	72	94.59			
	Accommodator	42	108.24			
Openness to Experience	Diverger	58	104.35	3	4.344	0.23
	Assimilator	60	113.26			
	Converger	72	127.42			
	Accommodator	42	124.32			
Opinion Leadership	Diverger	58	112.62	3	8.430	0.04*
	Assimilator	60	102.45			
	Converger	72	136.02			
	Accommodator	42	119.18			
Risk Taking	Diverger	58	121.53	3	2.740	0.43
	Assimilator	60	110.97			
	Converger	72	125.04			
	Accommodator	42	106.99			
Innovativeness	Diverger	58	138.84	3	11.197	0.01*
	Assimilator	60	103.78			
	Converger	72	104.97			
	Accommodator	42	123.60			

\*p< .05

When Table 10 is examined, it is seen that there is a significant difference between the mean scores ( $X^2_{(sd=3, n=232)}=11.197$ ;  $p<.05$ ) of innovativeness of the pre-service teachers according to learning styles. When analyzed according to the sub-dimensions, it was determined that there was a significant difference between the sub-dimensions of *resistance to change* ( $X^2_{(sd=3, n=232)} = 11.454$ ,  $p<.05$ ) and *opinion leadership* ( $X^2_{(sd=3, n=232)} = 8.430$ ,  $p<.05$ ). In other words, the mean of pre-service teachers' innovation score is significantly different according to their learning styles. This finding can be interpreted as learning styles has an impact of on the innovativeness characteristics of the pre-service teachers. The Mann Whitney-U test was used to determine in which group or groups this difference exists. By applying Bonferroni correction, the significance level was accepted as 0.83 for all effects and p value was evaluated accordingly. The paired comparisons are given in

**Table 11. Differences Between the Distribution of Pre-Service Teachers' Innovativeness Scores According to Learning Styles**

Variable	Learning Style	N	Mean Ranks	Sum of Ranks	U	p	r
Resistance to Change	Diverger	60	68.68	4121.00	1189.00	0.003	-.27
	Converger	58	50.00	2900.00			
	Assimilator	72	73.48	1513.50	1513.50	0.007	-.24
	Converger	58	55.59	3224.50			
Opinion Leadership	Assimilator	72	57.35	4129.50	1501.50	0.006	-.24
	Converger	58	75.61	4385.50			
Innovativeness	Diverger	60	50.67	3040.00	1210.00	0.004	-.27
	Converger	58	68.64	3981.00			
	Assimilator	72	57.40	4132.50	1504.50	0.006	-.24
	Converger	58	75.56	4382.50			

When Table 11 is examined, it is seen that the mean score of innovativeness of the pre-service teachers who have diverger and converger learning style and the pre-service teachers who have assimilator and converger learning style are significantly different. The mean score of innovativeness of the pre-service teachers with converger learning styles is higher than the mean score of pre-service teachers with both assimilator and diverger learning styles. Similarly, it is seen that the mean scores of

pre-service teachers in resistance to change sub-dimension with diverger and converger learning style substantially differentiate with pre-service teachers with assimilator and converger learning style. The mean score for resistance to change for the pre-service teachers who have an assimilator learning style is higher than the mean score of pre-service teachers with both converger and diverger style. In the sub-dimension of opinion leadership, there is a significant difference between the mean scores of pre-service teachers with converger learning style than those who have assimilator style. The mean opinion leadership score of the pre-service teachers with converger learning style is higher than the mean score of pre-service teachers who have assimilator learning style. When the impact sizes are taken into consideration, it can be said that the pre-service teachers' learning styles have a small effect on the innovativeness scores.

## DISCUSSION AND CONCLUSION

In this study, it is aimed to examine the relationship between the pre-service teachers' innovativeness characteristics and learning styles. The findings obtained for this purpose are discussed below in accordance with the order of the questions of the study.

According to the findings obtained from the study, the mean score of innovativeness of pre-service teachers is very close to the accepted limit value for high level innovativeness. Therefore, it can be said that pre-service teachers have high level of innovativeness. A large proportion of pre-service teachers were in the categories (early majority, early adopter, innovator) above the mean, however, it was found that the agglomeration was in the Early Majority category. When evaluated according to the category characteristics of Rogers' (2003) diffusion of innovations model, it can be said that pre-service teachers in the Early Majority category tend to observe and make searches regarding individual or social benefits of innovation, not taking risk and behaving cautiously before accepting an innovation. In the context of this finding obtained in the literature, it is seen that similar findings have been reached in various studies conducted with teacher or pre-service teachers (Akça and Şakar, 2017; Çuhadar et al., 2013; Deniz, 2016; Kaya, 2017; Olpak et al., 2018; Öztürk-Yurtseven and Aldan-Karademir, 2017; Sarı and Kartal, 2018; Yenice and Yavaşoğlu, 2018; Yorulmaz et al., 2017). When the findings are considered in more detail, it can be said that the pre-service teachers in the category of "Early Adopter" are very close to the frequency values of the pre-service teachers in the category of "Early Majority". Rogers (2003) defines those found in this category as individuals who are a role model for other individuals, referring to their knowledge and advice about innovation. In the study, it was found that pre-service teachers could be considered as highly innovative. When both findings were evaluated together; it can be predicted that pre-service teachers may make an effort to follow the innovations, adopt them to the learning-teaching process and create innovative educational environments and this may positively affect the possibility of raising individuals who are open to innovations, questioning, experimenting and producing. However, it should be taken into consideration that there are many factors (knowledge, desire, applicability, usefulness, reliability, etc.) for the acceptance and implementation of an innovation.

In the study, there was no significant difference between the pre-service teachers' scores of innovativeness and gender variable. The findings obtained are similar to the findings of various studies conducted in the literature (Akça and Şakar, 2017; Başaran and Keleş, 2015; Çuhadar et al., 2013; Kılıçer, 2011; Özgür, 2013; Rogers, 2007; Ünal, 2014). On the other hand, a significant difference was obtained in favor of male pre-service teachers in the sub-dimensions of risk taking and openness to experience. Risk-taking is defined as purposeful activities (Levenson, 1990), which include potential negative outcomes but balanced with some positive outcomes (Moore and Gullone, 1996) and which either lead to innovation or threat may cause anxiety most individuals (Levenson, 1990). In Kalafat's (2012) study where personality traits and the relationship between teachers' competencies, openness to experience has been found to have a direct impact on self-development competence of personality dimension. According to this, it can be said that male pre-service teachers are more powerful than female teacher candidates regarding following innovations, having experiences about them, being open to changes and innovations, evaluating opportunities for self-development and taking risks against the uncertainties caused by innovations. At the same time, it can be said that this difference

may be due to the differences in the roles and responsibilities of women and men in Turkish society. In this study, there was no significant difference between the innovativeness scores of pre-service teachers and the departments they studied. In the literature, it is seen that different results were obtained when the studies on individual innovativeness and department or branch are examined. In some of the studies, no significant difference was found between individual innovativeness and department or branch variable which is parallel with the findings of this study (Adıgüzel et al., 2014; Kılıç, 2015; Örün et al., 2015; Rogers, 2007). In some studies, it is stated that there is a significant difference between individual innovativeness and department or branch variable in contradiction with the findings of this study (Bitkin, 2012; Öztürk-Yurtseven and Aldan-Karademir, 2017; Şahin-İzmirli and Gürbüz, 2018; Yılmaz et al., 2014).

In the study, it was determined that the learning styles of the pre-service teachers varied and all the learning styles in the learning style model of Kolb were represented. Kolb Boyatzis and Mainemelis (1999), says that study has revealed that learning style differs according to the choice of profession and education, and that individuals who choose professional career in science, study and education have an assimilator learning style. In the study conducted by Aşkar and Akkoyunlu (1993, p.43) it is emphasized that individuals who choose the teaching profession have an assimilator learning style. In this study, it was found out that pre-service teachers preferred predominantly assimilator learning style. This finding can be interpreted as the number of pre-service teachers who prefer to focus on abstract concepts and opinions during learning, create conceptual models, organize information and testing theories and ideas is more than the others. According to another finding of the study, the pre-service teachers who have accommodator learning style is less than other learning styles. When similar studies conducted with teacher and pre-service teachers are examined, it can be seen that parallel results have been reached with the findings of this study (Can, 2011; Demir, 2008; Gürsoy, 2008; Kahyaoğlu, 2011; Karademir and Tezel, 2010; Karakış, 2006; Kılıç, 2002; Ünal et al., 2013).

In the study, it was determined that there was a significant difference between the learning styles of the pre-service teachers and the gender variable. It was determined that female pre-service teachers preferred converger learning style and the male teaching candidates preferred assimilator learning style. Based on this finding, it can be said that the gender of the study group is a variable that causes differentiation in the learning style preferences of the study group. When the literature is reviewed, it was founds that parallel results with study were obtained (Başbay et al., 2018; Clump and Skogsbergboise, 2003; Ekici, 2013; Güven and Kürüm, 2007; Karadeniz-Bayrak and Altun, 2008; Karademir and Tezel, 2010) as well as different results were obtained (Açıslı, 2016; Alemdağ and Öncü, 2015; Can, 2011; Demir, 2008; Karakış, 2006; Ünal, et al., 2013). According to another finding obtained in the study, the learning styles of pre-service teachers did not show a significant difference according to the department variable. This finding supports many studies (Bahar et al., 2009; Genç and Kocaarslan, 2013; Mutlu, 2008; Ünal et al., 2013) in the literature.

In the research, it was determined that the mean scores of the innovativeness scores of pre-service teachers who diverger and converger learning style and pre-service teachers who assimilator and converger learning style differ significantly. Based on this finding, it can be concluded that learning styles are a variable that causes differentiation in the characteristics of pre-service teachers' innovativeness. The mean score of innovativeness of the pre-service teachers with converger learning styles is higher than the mean score of innovativeness of pre-service teachers with assimilator and diverger learning styles. At the same time, there was a significant difference in resistance to change and opinion leadership sub-dimensions. Individuals with converger learning styles according to Kolb's (1984) experiential learning model have the characteristics of learning by doing, analysing the ideas logically, systematic and planned problem solving. When evaluated according to this; it can be said that the pre-service teachers who prefer Abstract Conceptualization and Active Experimentation learning styles have the characteristics of being more innovative, open to changes brought by innovation and being less anxious and having the ability to be opinion leaders about innovations in their societies.

In the light of the findings obtained from the study, suggestions for the practitioners and the studies to be carried out are presented as follows:

Nowadays, integration of technology into educational applications, the fact that almost every discipline is in constant change and development, and the theoretical transformations in teaching and learning approaches clearly reveal the necessity of teachers to be innovative individuals. Teachers should be role models by pioneering and leading in adopting innovations, adopting to change and spreading innovation to society. For this reason, it can be suggested to include innovative practices in the pre-service trainings of pre-service teachers and to create innovative teaching environments by following current knowledge and technology. Thus, it can be ensured that pre-service teachers can experience the effects of efficient use by observing technology-supported and innovative teaching environments. At the same time, it may be encouraging for pre-service teachers to use technology-supported, innovative and creative teaching activities in their own courses and teaching practice processes.

Production is at the core of innovation and creativity. For this reason, it is possible to encourage pre-service teachers to carry out project studies that support original product development in pre-service training processes. Thus, it is possible for pre-service teachers to create their own innovative teacher identities.

Learning styles are the subjective preferences of an individual in receiving and organizing information, and the methods and techniques used in the learning-teaching process will not have the same effect on each individual. Therefore, the creation of different learning environments and the variety of methods should be applied. In the study, it was determined that the mean score of innovativeness of the pre-service teachers differed significantly according to their learning styles. In this context, it is advisable to create learning environments that allow learners to have different learning styles at the same time. In order to achieve this, technology-supported learning environments with the potential to provide innovative, creative and rich learning activities may be created.

The findings obtained from this study consist of the evaluations based on the individual perceptions of the pre-service teachers themselves. The study group of the research consisted of only pre-service teachers studying in a university. For this reason, it is recommended to conduct similar studies with pre-service teachers in different samplings in order to generalize the findings of the study.

Study may be carried out including different variables that may be related to innovativeness and learning styles (cognitive-affective characteristics, social-economic conditions, education of parents, etc.). However, studies may be conducted to examine factors (information, desire, applicability, usefulness, reliability, etc.) that will affect the acceptance and implementation of an innovation. Descriptive, experimental and qualitative studies may be conducted in which individual innovativeness and learning styles are examined in relation to other individual differences.

## REFERENCES

- Açışlı, S. (2016). Sınıf öğretmeni adaylarının öğrenme stilleri ile eleştirel düşünme eğilimlerinin incelenmesi. *İlköğretim Online*, 15(1), 273-285. doi: <http://dx.doi.org/10.17051/io.2016.78596>
- Adıgüzel, A., Kaya, A., Balay, R., & Göçen, A. (2014). Öğretmen adaylarının bireysel yenilikçilik özellikleri ile öğrenmeye ilişkin tutum düzeyleri. *Milli Eğitim Dergisi*, 43(204), 135-154.
- Akça, F., Şakar, Z., (2017). Öğretmen adaylarının bireysel yenilikçilik düzeylerinin incelenmesi. In Ö. Demirel and S. Dinçer (Edt.) *Küreselleşen dünyada eğitim* (pp.451-462) Ankara: Pegem Akademi. Doi: 10.14527/9786053188407.29
- Akkoyunlu, B., Altun, A., & Soylu, M. Y. (2008). *Öğretim tasarımı*. Ankara: Maya Akademi.

- Alemdağ, C., & Öncü, E. (2015). Kolb öğrenme stili modeline göre beden eğitimi öğretmeni adayları. *Alan Eğitimi Araştırmaları Dergisi (ALEG)*, 1(1), 1-12.
- Aşkar, P., & Akkoyunlu, B. (1993) Kolb öğrenme stili envanteri. *Eğitim ve Bilim*, 87, 37-47.
- Bahar, H. H., Özen, Y., & Gülaçtı, F. (2009). Eğitim fakültesi öğrencilerinin cinsiyet ve bransa göre akademik başarı durumları ile öğrenme stillerinin incelenmesi. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi*, 42(1), 69-86.
- Başaran, S. D., & Keleş, S. (2015). Yenilikçi kimdir? Öğretmenlerin yenilikçilik düzeylerinin incelenmesi Who is innovative? Examination of teachers' innovativeness level. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 30(4), 106-118.
- Başbay, A., Bıyıklı, C., & Demir, E. K. (2018). Öğrenme stilleri ile ders çalışma alışkanlıklarının incelenmesi. *İlköğretim Online*, 17(2), 848-863. doi 10.17051/ilkonline.2018.419316.
- Bitkin, A. (2012). *Öğretmen adaylarının bireysel yenilikçilik düzeyleri ile bilgi edinme becerileri arasındaki ilişki*. Yayınlanmamış yüksek lisans tezi, Harran Üniversitesi, Şanlıurfa.
- Büyüköztürk, Ş. (2011). *Sosyal bilimler için veri analizi el kitabı: istatistik, araştırma deseni SPSS uygulamaları ve yorum*. Ankara: Pegem Akademi.
- Büyüköztürk, Ş., Çakmak, E.K., Akgün, Ö.E., Karadeniz, Ş., & Demirel, F. (2008). *Bilimsel araştırma yöntemleri*. Ankara: Pegem Akademi.
- Can, Ş. (2011). Sınıf öğretmeni adaylarının öğrenme stilleri ile bazı değişkenler arasındaki ilişkinin araştırılması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*. 41, 70-82.
- Clump, M. A., & Skogsbergboise, K. (2003). Differences in learning styles of college students attending similar universities in different geographic location. *College Student Journal*, 37(4), 501-508.
- Çuhadar, C., Bülbül, T., & Ilgaz, G. (2013). Öğretmen adaylarının bireysel yenilikçilik özellikleri ile teknopedagojik eğitim yeterlikleri arasındaki ilişkinin incelenmesi. *İlköğretim Online*, 12(3), 797-807.
- Deniz, S. (2016). Öğretmen adaylarının bireysel yenilikçilik özellikleri. *Turkish Studies International Periodical for the Languages, Literature and History of Turkish or Turkic*, 11(9), 267-278.
- Demir, T. (2008). Türkçe eğitimi bölümü öğrencilerinin öğrenme stilleri ve bunların çeşitli değişkenlerle ilişkisi (Gazi Üniversitesi Örneği). *Uluslararası Sosyal Araştırmalar Dergisi*, 1(4), 129-148.
- Ekici, G. (2013). Gregorc ve Kolb öğrenme stili modellerine göre öğretmen adaylarının öğrenme stillerinin cinsiyet ve genel akademik başarı açısından incelenmesi. *Eğitim ve Bilim* 38(167), 211-225.
- Erden, M., & Altun, S. (2006). *Öğrenme stilleri*. İstanbul: Morpa Kültür Yayınları.
- Felder, R. M., & Brent, R. (2005). Understanding student differences. *Journal of Engineering Education*, 94(1), 57-72.
- Genç, M., & Kocaarslan, M. (2013). Öğretmen adaylarının öğrenme stillerinin çeşitli değişkenler açısından incelenmesi: Bartın Üniversitesi örneği. *Türkiye Sosyal Araştırmalar Dergisi*, 17(2), 327-344.

- Goldsmith, R. E., & Foxall, G. R. (2003). The measurement of innovativeness. In L. V. Shavinina (Ed.), *The international handbook on innovation* (pp. 321-330). Oxford: Elsevier Science.
- Gürsoy, T. (2008). *Öğretmen adaylarının öğrenme stillerinin çeşitli değişkenler açısından incelenmesi*. Yayınlanmamış Yüksek Lisans Tezi, Adnan Menderes Üniversitesi, Aydın.
- Güven, M., & Kürüm, D. (2007). Teacher candidates' learning styles and critical thinking dispositions. *Elektronik Sosyal Bilimler Dergisi*, 6(21), 60-90.
- Healey, M., & Jenkins, A. (2000). Kolb's experiential learning theory and its application in geography in higher education. *Journal of Geography*, 99(5), 185-195.
- Kahyaoglu, M. (2011). Öğretmen adaylarının öğrenme stilleri ile çevre eğitimi öz-yeterlikleri arasındaki ilişki. *Eğitim Bilimleri Araştırmaları Dergisi*. 1(2), 67-82.
- Kalafat, S. (2012). Lise öğretmenleri kişilik özelliklerinin öğretmen yeterliliklerine etkisi. *Yükseköğretim ve Bilim Dergisi*, 2(3), 193-204.
- Kaplan, E. J., & Kies, D. A. (1995). Teaching styles and learning styles: which came first? *Journal of Instructional Psychology*, 22(1), 29-33.
- Karasar, N. (2009). *Bilimsel araştırma yöntemi*. Ankara: Nobel Yayın Dağıtım.
- Karademir, E., & Tezel, Ö. (2010). Sınıf öğretmeni adaylarının öğrenme stillerinin demografik değişkenler açısından incelenmesi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, 28(2), 129-145.
- Karadeniz-Bayrak, B., & Altun, S. (2009). Is there any difference between learning styles of student science teachers in relation to both their grade and gender. *Procedia Social and Behavioral Sciences*, 1, 765-770.
- Karakış, Ö. (2006). *Bazı yükseköğretim kurumlarında farklı öğrenme stillerine sahip olan öğrencilerin genel öğrenme stratejilerini kullanma düzeyleri*. Yayınlanmamış Yüksek Lisans Tezi, Abant İzzet Baysal Üniversitesi, Bolu.
- Kaya, S. (2017). *Biyoloji öğretmenlerinin bireysel yenilikçilik düzeylerinin incelenmesi*. Yayınlanmamış Yüksek Lisans Tezi, Dicle Üniversitesi Eğitim Bilimleri Enstitüsü, Diyarbakır.
- Kauchak, D. P., & Eggen, P. D. (2003). *Learning and teaching research-based methods*. The USA: Pearson Education, Inc.
- Kılıç, E. (2002). Baskın öğrenme stiline öğrenme etkinlikleri tercihi ve akademik başarıya etkisi. *Eğitim Bilimleri ve Uygulama*, 1(1), 1-15.
- Kılıç, H. (2015). *İlköğretim branş öğretmenlerinin bireysel yenilikçilik düzeyleri ve yaşam boyu öğrenme eğilimleri (Denizli ili örneği)*. Yayınlanmamış Yüksek Lisans Tezi, Pamukkale Üniversitesi, Denizli.
- Kılıçer, K., & Odabaşı, H. F. (2010). Bireysel yenilikçilik ölçeği (byö): Türkçe'ye uyarlama, geçerlik ve güvenilirlik çalışması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 38, 150-164.
- Kılıçer, K. (2011). *Bilgisayar ve öğretim teknolojileri eğitimi öğretmen adaylarının bireysel yenilikçilik profilleri*. Yayınlanmamış Doktora Tezi, Anadolu Üniversitesi, Eskişehir.

- Kolb, D. A. (1984). *Experiential learning: experience as the source of learning and development*. New Jersey: Prentice Hall, Englewood Cliffs.
- Kolb, D. A. (1985). *Learning style inventory: experiences as the source of learning and development*. NJ: Prentice-Hall. Inc.
- Kolb, D. A., Boyatzis, R.E., & Mainemelis, C. (2000). Experiential theory: previous research and new directions. In R. J. Sternberg and L. F. Zhang (Eds.), *Perspectives on cognitive, learning, and thinking styles* (pp. 227-246). NJ: Lawrence Erlbaum.
- Kurt, H., & Ekici, G. (2013). Bireysel farklılıklar ve öğretime yansımaları. In G. Ekici and M. Güven (Ed.) *Öğrenme-öğretme yaklaşımları ve uygulama örnekleri* (pp.39-82). Ankara: Pegem Akademi Yayıncılık.
- Levenson M. R. (1990). Risk-taking and personality. *Journal of Personality and Social Psychology*, 58(6), 1073-1080.
- Moore S., & Gullone E. (1996). Predicting adolescent risk behavior using a personalized cost-benefit analysis. *Journal of Youth and Adolescence*, 25, 343-359.
- Mutlu, M. (2008). Eğitim fakültesi öğrencilerinin öğrenme stilleri. *Kazım Karabekir Eğitim Fakültesi Dergisi Dergisi*, 17, 1-21.
- Olpak, Y.Z., Arıcan, M., & Baltacı, S. (2018). Öğretmen adaylarının öğrenme yaklaşımlarının ve bireysel yenilikçilik özelliklerinin akran öğretime yönelik memnuniyetlerine etkisi. *YYÜ Eğitim Fakültesi Dergisi (YYU Journal of Education Faculty)*, 15(1), 525-551.
- Örün, Ö., Orhan, D., Dönmez, P., & Kurt, A. A. (2015). Öğretmen adaylarının bireysel yenilikçilik profilleri ve teknoloji tutum düzeyleri arasındaki ilişkinin incelenmesi. *Trakya Üniversitesi Eğitim Fakültesi Dergisi*, 5(1), 65-76.
- Özgür, H. (2013). Bilişim teknolojileri öğretmen adaylarının eleştirel düşünme eğilimleri ile bireysel yenilikçilik özellikleri arasındaki ilişkinin çeşitli değişkenler açısından incelenmesi. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, 9(2), 409-420.
- Öztürk-Yurtseven, G., & Aldan-Karademir, Ç. (2017). Pedagojik formasyon eğitimi sertifika programındaki öğretmen adaylarının bireysel yenilikçilik düzeyleri ve yaşam boyu öğrenme eğilimleri. *Eğitim Bilimleri Araştırmaları Dergisi* 7(2), 189-206.
- Pallant, J. (2011). *SPSS survival manual. A step by step guide to data analysis using SPSS (3rd. Edt.)*. Australia: Ligare Book Printer.
- Partnership for 21st Century Learning. (2016). Framework for 21st century learning. Retrived 21.06.2019 from [http://www.p21.org/storage/documents/docs/P21\\_framework\\_0816.pdf](http://www.p21.org/storage/documents/docs/P21_framework_0816.pdf)
- Patton, M. Q. (2001). *Qualitative research & evaluation methods*. (3rd ed.). Saint Paul, MN: Sage Publications.
- Pehlivanoğlu, S. (2011). Önsöz. In M. Özcan, *Bilgi çağında öğretmen eğitimi, nitelikleri ve gücü. Bir reform önerisi* (pp.3-4). Ankara: TED Eğitim Derneği İktisadi İşletmesi.
- Rogers, E. M. (2003). *Diffusion of innovations (5th ed.)*. New York: Free Press.
- Rogers, R. K. (2007). *Computer anxiety and innovativeness as predictors of technology integration*. Unpublished doctoral dissertation, Texas Tech University, Lubbock, TX.

- Senemođlu, N. (2005). *Geliřim öğrenme ve öğretim. Kuramdan uygulamaya*. Ankara: Gazi Kitabevi.
- Sarı, İ., & Kartal, F. (2018). Sosyal bilgiler öğretmen adaylarının teknoloji kullanımına yönelik tutumlarının bireysel yenilikçilik düzeyleri ve bazı deđişkenler açısından incelenmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi (KEFAD)*, 19(2), 1673-1689.
- Shavinina, L. V. (2013). The fundamentals of innovation education. In L.V. Shavinina (Edt.), *The international handbook on innovation* (pp. 29-51). New York: Routledge.
- Şahin-İzmirli, Ö., & Gürbüz, O. (2017). An investigation of the relationship between the individual innovativeness and problem solving skills of teacher candidates: The case of Canakkale Onsekiz Mart University. *SDU International Journal of Educational Studies*, 4(1), 29-43.
- Şimşek, A. (2012). Araştırma modelleri. In A. Şimşek (Edt.) *Sosyal bilimlerde araştırma yöntemleri* (pp.92-108). Eskişehir: Anadolu Üniversitesi Yayınları.
- Şentürk, Ü. (2008). Enformasyon toplumunda eğitimin yeri. *Türk Eğitim Bilimleri Dergisi*, 6(3), 487-506.
- Ünal, Y. (2009). Bilgi toplumunun tarihçesi. *Tarih Okulu*, V, 123-144.
- Ünal, K., Dilbaz-Alkan G., Özdemir, B., & Çakır, Ö. (2013), Eğitim fakültesi öğrencilerinin öğrenme stil ve stratejilerinin çeşitli deđişkenler açısından incelenmesi (Mersin Üniversitesi örneđi), *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, 9(3), 56-76.
- Ünal, H. (2014). Üniversite öğrencilerinin bireysel yenilikçilik kategorilerinin belirlenmesi. *Uluslararası Hakemli Akademik Spor Sağlık Ve Tıp Bilimleri Dergisi*, 4(11), 68-74.
- Windham, D. M. (1996). Planning for innovation in education. Paris: Unesco: International Institute for Educational Planning.
- Yenice, N., & Yavaşođlu, N. (2018). Fen bilgisi öğretmen adaylarının bireysel yenilikçilik düzeyleri ile bireysel yaratıcılıkları arasındaki ilişkinin incelenmesi. *Eğitimde Kuram ve Uygulama*, 14(2), 107-128. doi:10.17244/eku.334590.
- Yılmaz, F., Sođukçeşme, G., Ayhan, N., Tuncay, S., Sancar, S., & Deniz, Y. M. (2014). İlköğretim bölümü öğretmen adaylarının mesleki yenilikçilik düşüncelerinin çeşitli deđişkenler açısından incelenmesi. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 11(27), 259-276.
- Yorulmaz, A., Çokçalışkan, H., & Önal, H. (2017). Determination of classroom pre-service teachers' state of personal innovativeness. *Journal of Education and Training Studies*, 5(1), 28-34.