Evaluation of Innovativeness' Status of Teachers

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Abstract

This study aims to determine and evaluate the innovative teacher characteristics of teachers working at public-private science and social sciences high schools in Turkey. Science and social sciences high schools were established as educational institutions for students who will be scientists and are expected to be open to innovations, information technologies, learning, development and cooperation. The "Innovative Teacher Characteristics Scale (ITCS)" has been developed to obtain data. This research was carried out using the quantitative method based on the descriptive survey model. 384 teachers working at public-private science and social sciences high schools participated in this study. According to the findings, teachers perceive their being open to innovations, information technologies, learning, development and cooperation to be at a high level in the scope of sub-dimensions of innovative teacher characteristics. The mean scores of the factors show that the innovative teacher characteristics of the teachers differ significantly according to the types of schools (public-private), seniority, foreign language level and branch. On the contrary, they do not differ in terms of gender and education level.

Keywords: Innovation, Innovative Teacher, Innovative Teacher Characteristics.

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INTRODUCTION

In our century where science and technological developments are prevalent, the concept of innovation is used frequently in different fields. Different definitions of the concept of innovation from literature present common features derived from different perspectives. The English word 'innovation' is used as "inovasyon", "yenilik", "yenileşme", ve "yenilikçilik" in Turkish. Educators match the concept of innovation with the words, creativity, leadership, originality and entrepreneurship (Aybat, 2016: 164). In this study the concepts of 'innovation' and 'innovativeness' are preferred.

According to Adair (2008), innovation is to innovate, to put forward or present something new (a new idea, method or device). Rogers (2003) defined the concept of innovation as an idea, practice or object that is perceived as new by an individual, group or society. Birinci (2011: 27), on the other hand, defined innovation as a continuing process for achieving better living conditions, as a difference that can make itself felt in the form of new products, new services, new technologies, new methods and new structures. According to Top (2008: 211-215), innovation is to find new ways of doing things to create new forms, to find better ways to use products and services, and to facilitate more effective use of services and systems. Innovation is making something new for the first time, doing something brand new and putting the inventions into technology. In the light of these definitions, innovation can be described as a process of making a difference by introducing a new idea, a new application, a new process, a new service, a new technology and a new product, and by turning innovations into economic, individual and social benefits.

Innovativeness

The concept of innovativeness is a concept that finds its meaning in different fields in the age of science and technology, where changes and developments occur. Innovativeness is expressed by Glor (2001) as a process in which new ideas are implemented and used. According to Baykara (2014), innovativeness expresses an idea and turning it into a salable, new or improved product, or production of goods and services. Rogers (2003) argues that innovativeness is the degree of early adoption or willingness of the individual and society compared to other individuals and societies. Innovativeness differs from individual to individual based on the reactions of individuals to new things (ideas, products and practices) and their effects on their success and failures (Goldsmith and Foxall, 2003). Innovation can be expressed as a development of a new idea, new application and a new product to be adopted by the individual and society or open to innovation, change and development.

Education and Innovativeness

The individual is the most important factor in the emergence of a new idea, a new application and a new product. In this context, the education of the individual that is responsible for the innovation is also important. Training the individuals who will turn their new ideas, new products and new applications into economic, individual and social benefits are among the goals of education systems. It can be thought that there is a mutual interaction between innovation, innovativeness and education in the process of capacitating individuals for innovation. There is a general idea that education is a prerequisite for innovation and innovation is a prerequisite for innovativeness (Villalba, 2007: 8). In the context of this idea, individuals are trained to produce innovations through education. These individuals produce innovation, and the innovativeness process begins with the use and application of the innovations produced. With the use and implementation of the emerging innovations, the innovativeness process changes and improves education. As seen in Figure 1, there is a mutual interaction between education and innovation.

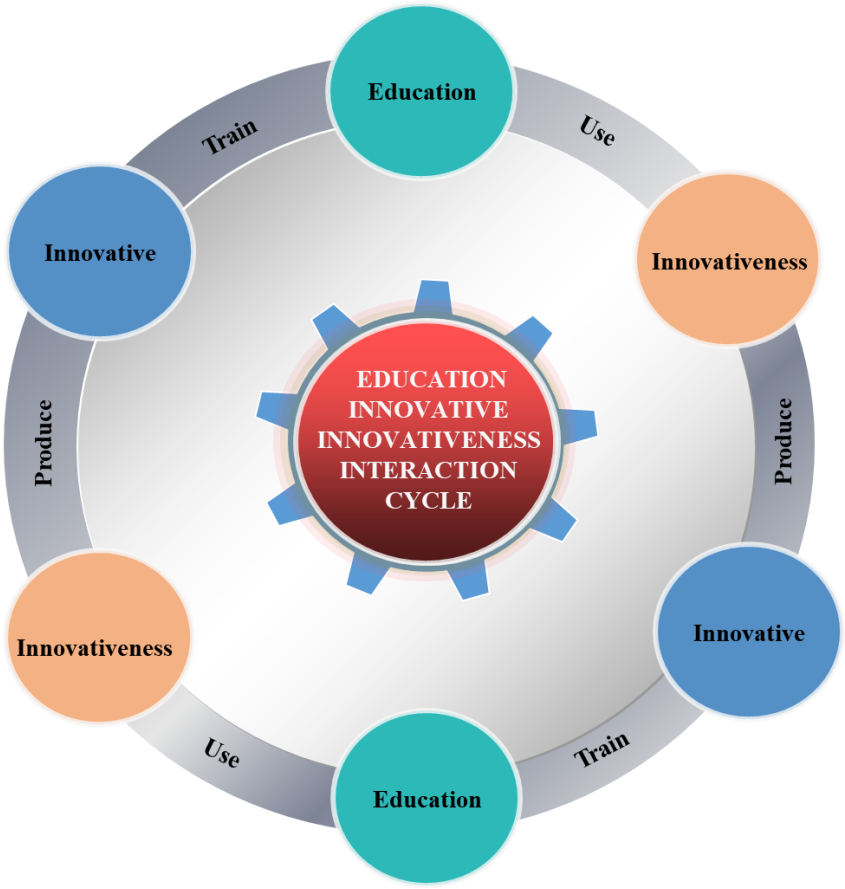

Figure 1: Education and Innovation Interaction Cycle

Through education, individuals produce innovations on the other hand education is influenced by the new ideas, practices and products of individuals. In this context, education prepares the ground for the production of innovations and is affected by the innovations produced, and its interaction with innovativeness continues. There are two reasons why innovativeness is necessary in education. The first is that education has to be reformed and be relevant to a society that is affected by changes in science and technology. The second is for competetion of educational institutions with each other. Educational institutions review their programs, learning and teaching environments, teaching principles and methods and technological tools in order to compete, review and respond to the changing expectations of individuals and society (Temizkan, 2014: 6).

The manpower needed by companies and business enterprises are provided by means of education. Universities focus on the quality of the manpower needed by companies and businesses to promote innovation. Universities develop educational programs to ensure that individuals are prepared for individual changing needs. Training of human resources is relevant to producing innovation. Education provides knowledge on the processes of producing innovation. Countries that promote lifelong learning in their education are more equipped to produce innovation. Their citizen are innovative and they tend to produce innovations and new ideas, practices and products by ensuring their professional and personal development is promoted. Economic, social and technological development stops when new ideas, practices and products that affect the economic, social and technological development of countries are not produced (Elçi, 2007: 98; Kurtuluş, 2012; Villalba, 2007: 8).

Innovativeness in education or innovative education is the process of changing educational programs, learning and teaching environments, teaching principles and methods, educational technologies, and human resources qualifications according to the needs of the country, society and

the individual. In such a case, the system educates individuals who are open to change, development, cooperation and communication, who use information technologies, open to innovations, and who can produce new science, art and technology through schools. As educational institutions, schools should be open to change, development and innovation. There is therefore a mutual interaction between innovativeness and school.

Innovator Teacher

The success of new practices in education largely depends on the behavior and understanding of the teacher. In our society where rapid changes are experienced, teachers are affected by these changes. Teachers who have an important role in education in order to meet the changing expectations of the individual and the society and keep up with the changes must be open to innovations, information technologies, development and cooperation, learning and innovative behaviors. Teachers need to have innovative behaviors to raise people who both produce and use innovations. In the context of teachers, innovative behavior can be defined as a process in which new ideas are produced, created, developed, implemented and changed by teachers to evaluate teachers' performance. In other words, innovative behavior is the process of adopting and implementing these ideas by introducing new ideas for products and working methods in the institution worked. Innovative behavior can be directed towards both administrative and technical innovations. Teachers are required to exhibit innovative behaviors for various reasons such as rapid scientific, technological and social changes occurring in the society. The innovative behaviors of teachers directly affect the success of schools (Shi, 2012; Thurlings, Evers & Vermeulen, 2015; Turgut & Begenirbaş, 2016).

The innovative behavior of teachers is necessary for responding to the rapidly changing society, providing a role model for the society in general, and new information and technologies required for innovative behaviors. In this context, school administrators should create suitable environments for teachers to demonstrate their innovative behaviors (Gkorezis, 2015). The search for innovative teachers has been an important agenda item in recent years. The Icelandic Ministry of Education has added innovation to its national curriculum as a new subject. In addition, the Icelandic Ministry of Education organizes trainings for teachers to solve problems arising from educational design, pedagogically and theoretically, for the development of innovative teachers (Shavinina, 2013). The teacher plays an important role in the success of the innovations in education system, otherwise it is difficult for the system to change. Teachers should also participate in deciding on the implementation of innovations in the education system.

Innovative teachers; are teachers who develop themselves in their profession, include student-centered activities, try new approaches and ways of sharing information, provide students 'participation in the lesson with different methods, and change students' habits and gain new skills (Ritchhart, 2004. Akt. Özgür, 2013). An innovative teacher is a creative, passionate person who thinks about others, knowledgeable, motivated and skilled in his profession. The innovative teacher has a desire to reinvent himself in the profession (Bitnn-Fnedlander, Dreyfus & Milgrong, 2004; Cumming & Owen, 2001). An innovative teacher is an individual who responds to changing society and individual expectations, is open to innovations, using information technologies, development and cooperation, learning and exhibiting innovative behaviors. The main features of innovative teachers are discussed below.

Innovator Teacher's Characteristics

Teachers who have an innovative understanding and behave innovatively can continue their professional development and ensure their professional performance to improve continuously (Balkar, 2015). Being able to respond to the individual and professional renewal needs of teachers also requires them to have innovative teacher attributes to adapt to their changing roles. Innovative teacher characteristics can be addressed in four dimensions. These dimensions can be expressed as a teacher

open to innovation, a teacher open to information technologies, a teacher open to learning, and a teacher open to development and cooperation.

The Teacher Open to Innovation

The rapid changes in science and technology affect our world. More information and technology are produced in the century we are in. Every knowledge and technology produced changes the social structure by showing its effect in every area of life. As a natural result of the change in the social structure, education systems change and continue to change. As an important element of the changing and developing education systems, teachers also need to be open to innovation. Because teachers have an important role in successful changes in education. Teachers are the basic element of the education system that provides socialization and is an effective factor in the beginning of change and innovation (Şen, 2013; Van Der Heijden et al., 2015). The fact that teachers have an important role in the change process of societies increases the importance of being open to changes and innovations.

The teacher should have the skills required by the age, be open to developments and innovations, have a structure where he constantly advances himself and is willing to learn (Altıntaş and Yeşiltepe, 2016). It is also important that the teacher is open to innovations, aware of the skills and knowledge he/she needs, and develops himself/herself as a continuous learning individual. While teachers are constantly improving themselves, they should work in a team with their colleagues and establish good relationships with their students (Güven, 2001). The innovative teacher should consider the individual differences and interests of the students in the learning-teaching process and prepare their students according to the needs of today and the future. Students' interests and expectations vary within the scope of scientific and technological developments. In this process of change, innovative teachers should encourage their students to make right decisions (Kuran, 2002).

In the information age, teachers should also be open to innovation as a natural result of changes in the educational programs of countries, the development of teaching methods and techniques, and the innovations brought by scientific and technological developments.

The Teacher Open to Information Technologies

One of the problems that teachers complain about the most is the difficulties they face in keeping up with the rapidly advancing technology. Teachers must understand that they have to keep up with the rapid change in technology and that schools will force them to change. Hundreds of new softwares, applications and tools are developed every day (Üre, 2002). In the age of information and technology, the scientific, technological, economical and social conditions that shape education systems continue to change. The speed of changing conditions will be felt faster in the future. It is necessary for societies and individuals to take advantage of information and education technologies in order to reach the education service they need at a high quality. Teachers should use educational technologies in learning and teaching environments, closely follow technological developments and use technology effectively as a tool to search for information (Çelikten, Şanal ve Yeni, 2005).

In the information and technology age, teachers have to use information technologies both in the classroom and school environment and in their professional development. In this context, teachers should be open to using information technologies.

The Teacher Open to Learning

The information society needs individuals with specialized knowledge and skills, equipped with new and up-to-date information, who can renew themselves, learn to learn, and know where and how they can use the information. Developing information and communication technologies have made it easier for individuals to access innovations and learn continuously (Şen, 2013). In this context,

it becomes evident that the teachers who will train the individuals for the information society should have the same characteristics.

The Teacher Open to Development and Cooperation

In line with the economic, scientific and technological developments in the world, the education system is expected to train qualified manpower that will provide the necessary change, development and innovation in social systems (Altıntaş & Yeşiltepe, 2016). A teacher who educates people for changes and developments occurring in social systems needs to develop himself professionally. Professional development for teachers entails pursuing developments, changes and innovations related to his professional life from the fist day of his practice. Professional development; is the process of getting the teacher renewed, updated, and to gain the knowledge and skills he/she needs (Hamarat, 2002). Teachers that are open to professional development have innovative teacher characteristics.

Teachers who are successful in their profession are free to collaborate with teachers in their own country and with those from other countries. Such teachers value collaboration, communication, sharing their experiences and knowledge with their colleagues. Collaboration with colleagues and sharing opinions on solutions to problems they face as teachers contributes to their professional development (Gökbulut, 2016). Teachers should collaborate with students, colleagues and parents using digital tools and resources (Orhan et al., 2014).

Collaboration of teachers with other teachers can encourage them to be innovative. There is thherefore a positive relationship between teachers' collaboration and their innovative teacher characteristics.

It is necessary to be open to innovations, information technologies, learning and development in our era in which scientific and technological developments are experienced by teachers who work in high schools that were established in order to train scientists in science and social sciences. In that respect the research was conducted in science and social sciences high schools. The purpose of this research was to determine the perceptions of teachers working at Public-Private Science and Social Sciences High Schools in terms of innovative teacher characteristics.

It is assumed that determining the status of teachers working at Public-Private Science and Social Sciences High Schools in the context of innovative teacher characteristics will provide important feedback to university and education faculty administrators, program development specialists and teachers, especially in the Ministry of Education (MEB) and Higher Education Institution (HEI). In terms of implementation, the results of the research are expected to shed light on the work done by individuals and institutions regarding the training and professional development of teachers.

METHOD

This research aims to determine the perceptions of teachers working at Public-Private Science and Social Sciences High Schools in the context of innovative teacher characteristics. The study was carried out based on the descriptive survey model using the quantitative method. Screening models try to find out the conditions, characteristics and relationship between them, instead of focusing on the causes of events (Creswell, 2005; Kaptan, 1995; Karasar, 1998). Based on this model, a description of the perceptions of teachers in Public-Private science and social sciences high schools in terms of their innovative teacher characteristics were examined. The singular screening model was used in Science and Social Sciences High Schools in order to make a general profile of the teachers in terms of innovative teacher characteristics. In addition, a relational screening model was used to determine whether there is a difference between the innovative teacher characteristics of teachers and their duties in science and social sciences high school. Relational screening model was used to investigate whether

teachers' innovative teacher characteristics differ from the variables of gender, branch, education level, foreign language knowledge and the level of innovation. Data were collected with the "Innovative Teacher Characteristics Scale (ITCS)".

Participants

The target population of this research consists of 1036 teachers and 92 administrators working at Public-Private science and social sciences high schools in Ankara, Turkey in the 2016-2017 academic year The sample consists of 384 teachers working at Public-Private science and social sciences high schools in Ankara in 2016-2017 academic year. The teachers that took part in the research were selected by simple random sampling method. In simple random sampling method, the chance of selecting individuals and objects is equal. In order to get a sample from the universe in this sampling method, the characteristics of the research subject must be equal (Kılıç & Ural, 2013; Aziz, 2014).

Table 1: Distribution of participants (teachers) by socio-demographic characteristics

Socio-Demographic Characteristics		*N*	*%*
Gender	Female	217	56.5
	Male	167	43.5
	Total	384	100%
Educational level	Undergraduate	259	67.4
	Graduate (Master's degree)	112	29.2
	Doctorate	13	3.4
	Total	384	100%
Seniority	5 years and less	37	9.6
	6-10 years	53	13.8
	11-15 years	67	17.4
	16-20 years	100	26.0
	21 years and over	127	33.1
	Total	384	100%
Foreign language	German	45	11.7
	Arabic	6	1.6
	French	14	3.6
	English	308	80.2
	Russian	1	0.3
	Unspecified	10	2.6
	Total	384	100%
Foreign language level	Basic	139	36.2
	Intermediate	150	39.1
	Advanced	84	21.9
	Unspecified	11	2.9
	Total	384	100%
School type 1	Public	308	80.2
	Private	76	19.8
	Total	384	100%
School type 2	Science	277	72.1
	Social science	107	27.9
	Toplam	384	100%

FINDINGS

Innovative Teacher Characteristics Level of Teachers

In order to respond to the first sub-problem of the research, descriptive statistics of the total and sub-dimension scores for participants' innovative teacher characteristics were calculated. The result of the calculation is given in Table 2.

Table 2: Descriptive statistics of teachers' ınnovative teacher characteristics scale (ıtcs) and sub-dimensions.

	ITCS	Teacher open to innovation	Teacher open to information technologies	Teacher open to learning	Teacher open to development and collaboration
N	384	384	384	384	384
$\overline{X}$	231.26	132.40	51.98	26.08	22.25
$\overline{X}$ / item number	4.36	4.57	4.33	4.35	3.71
S	20.08	9.92	5.91	3.05	4.60
Median	233	134	53	26	22
Minimum	174	101	33	18	12
Maksimum	265	145	60	30	30

An analysis of Table 2 shows that the average score of 384 teachers' innovative teacher characteristics scale is 231.26. When this value is divided by the number of items, 53, 4.36 is obtained. According to the previous calculation, this value is above 4.21 and it can be stated that teachers evaluate themselves as highly innovative. The same is true for the first, second and third factors. In the fourth factor, teachers' opinions are at a high level.

Scores Obtained from Teachers' Innovative Teacher Characteristics Scale Difference Status According to the Type of Institution They Work (Public-Private / Science-Social Sciences)

In order to examine the public-private difference, unrelated samples t-test was conducted. The result of the analysis is given in Table 3. When there is a significant difference between the groups after the t-test, Cohen's d values were calculated to determine the effect degree of the difference. Cohen's d value indicates small effect up to 0.2, medium effect up to 0.5, and high effect when above 0.8 (Taşpınar, 2016: 66).

Table 3: Independent groups t-test regarding the total average scores of ınnovative teachers' characteristics according to the type of school (public-private) teachers work at.

Scale / Size	School	N	$\overline{X}$	SS	sd	t	p	Impact (d)
ITC Total	Public	308	229.77	20.01	382	-2.96	0.003*	0.38
	Private	76	237.29	19.31				
Teacher open to innovation	Public	286	131.78	10.00	358	-2.40	0.017*	0.31
	Private	74	134.86	9.25				
Teacher open to information technologies	Public	286	51.71	5.94	353	-2.26	0.024*	0.31
	Private	69	53.49	5.64				
Teacher open to learning	Public	302	25.87	3.02	373	-1.79	0.074	-
	Private	73	26.58	3.10				
Teacher open to development and collaboration	Public	296	21.82	4.46	364	-3.07	0.002*	0.41
	Private	70	23.66	4.73				

*$p<0.05$ significant

When Table 3 is analyzed, it can be seen that the mean scores of the innovative teacher characteristics of the participants differed according to the type of school (public-private) ($t_{(382)}$=-2.96, p<.05). In other words, the difference between the participants' innovative teacher traits scores does not arise from luck and whether they work in Public-Private affects their scores. When the averages are examined, it can be stated that the average scores of teachers working in private schools ($\overline{X}$ = 237.29) are higher than the average of those working in public schools ($\overline{X}$ = 229.77). When the effects of teachers working in Public-Private schools on the characteristics of teachers are examined, it is seen that this effect is moderate (d = 0.38).

Considering the sub-factors, teacher open to innovation ($t_{(358)}$=-2.40, p<.05), teacher open to information technologies ($t_{(353)}$=-2.26, p<.05) and teacher open to development and cooperation ($t_{(364)}$=-3.07, p<.05) mean scores differ significantly according to gender, whereas teacher ($t_{(373)}$=-1.79, p<.05) mean scores that are open to learning do not differ significantly. The difference is in favor of private school staff for all three groups. Private school staff ($\overline{X}$ = 134.84) for teachers open to innovation, from public employees ($\overline{X}$ = 131.78); Private school workers ($\overline{X}$ = 53.49) for teachers open to information technologies have higher average than public workers ($\overline{X}$ = 51.71) and private school workers ($\overline{X}$ = 23.66) for teachers open to development and collaboration ($\overline{X}$ = 21.82). When the effects of working at Public-Private school on the dimensions of innovative teacher characteristics were examined, it was found that this effect was moderate for all three dimensions, but the greatest effect was for the teacher dimension open to development and collaboration (*d*= 0.31 for the teacher dimension open to innovation; teacher open to information technologies) (*d*= 0.31 for size and *d*= 0.41 for teacher size open to development and collaboration).

In order to examine the difference between science and social sciences, unrelated samples t-test was conducted. The result of the analysis is given in Table 4.

Table 4: Independent groups t-test regarding the total average scores of ınnovative teacher characteristics according to the type of school (science - social sciences) teachers work at

Scale / Size	School	N	$\overline{X}$	SS	sd	t	p	Impact (d)
ITCS Total	Science	277	231.25	19.54	382	0.00	0.997	-
	Social Sciences	107	231.26	21.49				
Teacher open to innovation	Science	262	132.37	9.85	358	-0.14	0.892	-
	Social Sciences	98	132.53	10.14				
Teacher open to information technologies	Science	255	52.10	5.80	353	0.23	0.817	-
	Social Sciences	100	51.94	6.24				
Teacher open to learning	Science	269	25.94	2.95	373	-0.66	0.507	-
	Social Sciences	106	26.18	3.27				
Teacher open to development and collaboration	Science	263	22.16	4.92	364	-0.07	0.948	-
	Social Sciences	103	22.19	4.92				

*p <0.05 significant

When Table 4 is analyzed, it is seen that the mean scores of the innovative teacher characteristics of the participants do not differ significantly according to the type of school (science-social sciences) ($t_{(382)}$ = -. 00, p> .05). In other words, the fact that the participants work in science high school or social science high school does not cause any difference in terms of innovative teacher characteristics scores.

In terms of sub-dimensions, it was seen that teachers' work in Science or Social Sciences High Schools did not cause a significant difference. Considering respectively; $t_{(358)}$ = -. 14, p> .05; $t_{(353)}$ =. 23, p> .05; It was calculated that $t_{(373)}$ = -. 66, p> .05 for teacher size open to learning and $t_{(364)}$ = -. 07, p> .05 for teacher size open to development and collaboration.

The Differences of the Scores Obtained from the Innovative Teacher Characteristics Scale of the Teachers According to the Gender of the Teachers

In order to determine the difference of teachers' scores from the innovative teacher characteristics scale according to the gender of the teachers (3rd sub problem a option), unrelated samples t-test and One Way ANOVA to determine the others (b, c, d and e options). The results of the analysis related to the t-test of unrelated samples made to examine the difference by gender are given in Table 5.

Table 5: Independent groups t-test regarding teachers' gender ınnovative teacher characteristics total score average

Scale / Size	School	N	$\overline{X}$	SS	sd	t	p	Impact (d)
ITCS Total	Female	217	232.64	20.21	382	1.54	0.123	-
	Male	167	229.46	19.81				
Teacher open to innovation	Female	201	133.76	9.74	358	2.92	0.004*	0.38
	Male	159	130.72	9.91				
Teacher open to information technologies	Female	203	51.89	6.23	353	-0.61	0.545	-
	Male	152	52.28	5.49				
Teacher open to learning	Female	213	26.03	2.96	373	0.17	0.868	-
	Male	162	25.98	3.16				
Teacher open to development and collaboration	Female	207	22.46	4.57	364	1.39	0.166	-
	Male	159	21.79	4.54				

*p <0.05 significant

When Table 5 is analyzed, it is seen that the participants' innovative teacher characteristics score averages do not differ significantly according to their gender ($t_{(382)}$=1.54, p>.05). In other words, the innovative teacher traits scores of the participants do not change depending on whether they are men or women. When examined according to the sub-dimensions; While factor 1 mean scores differed significantly by gender ($t_{(358)}$ 2.92, p<.05), factor 2 ($t_{(353)}$=-.61, p>.05), factor 3 ($t_{(373)}$=.17, p>.05) and factor 4 ($t_{(364)}$=1.39, p>.05) scores do not differ significantly by gender. When the average of the scores are examined, it is seen that the characteristics / scores ($\overline{X}$ = 133.76) of female teachers open to innovation are higher than male teachers ($\overline{X}$ = 130.72). The effect of gender on being a teacher open to innovation was found to be moderate (*d*=0.38).

The Differences of the Scores Obtained from the Innovative Teacher Characteristics Scale of the Teachers According to the Educational Level of the Teachers

Kruskal Wallis H test was conducted to examine whether there are any differences in the innovative teacher characteristics according to the education levels of the teachers. The result of the analysis is given in Table 6.

Table 6: Innovative teacher attributes scale scores according to education level, kruskal wallis h test result

Scale / Size	Eğitim Düzeyi	N	Sıra Ort.	sd	X^2	p	M-W (Significant F.)
ITCS Total	Undergraduate	259	197.20	2	2.49	0.287	-
	Graduate	112	186.24				
	Doctorate	13	152.69				
Teacher open to innovation	Undergraduate	243	183.04	2	1.95	0.377	-
	Graduate	104	179.40				
	Doctorate	13	141.88				
Teacher open to information technologies	Undergraduate	242	181.81	2	2.25	0.325	-
	Graduate	100	173.64				
	Doctorate	13	140.62				
Teacher open to learning	Undergraduate	252	191.93	2	2.25	0.325	-
	Graduate	110	183.63				
	Doctorate	13	148.69				
Teacher open to development and collaboration	Undergraduate	250	186.41	2	1.28	0.528	-
	Graduate	104	179.99				
	Doctorate	12	153.42				

*p <0.05 significant

When Table 6 is analyzed, it is seen that the participants' innovative teacher characteristics scores do not differ significantly according to their education level ($X^2_{(2)}$=2.49, p>.05).. Accordingly, innovative teacher characteristics of participants with different educational levels are similar. In other words, the education levels of the participants do not affect the innovative teacher characteristics. The level of education of teachers does not cause a significant difference in terms of all sub-dimensions of the scale (p> .05).

The Difference Status of Teachers from the Innovative Teacher Attributes Scale According to their Seniority

One Way ANOVA analysis was performed to examine whether the participants' innovative teacher characteristics score averages differ according to their seniority. The result of the analysis is given in Table 7.

Table 7: One-way analysis of variance results regarding ınnovative teacher characteristics total scores according to teachers' seniority

Scale / Size	Source of variance	Squares total	sd	Squares average	F	Anova straight	Difference Scheffe	Impact Size. η^2
ITC Total	Intergroup	4059.54	4	1014.89	2.56	0.038*	2 with 1,3,4,5	0.03
	In-group	150311.45	379	396.60				
	Total	154370.99	383					
Teacher open to innovation	Intergroup	759.95	4	189.99	1.95	0.101	-	-
	In-group	34557.38	355	97.35				
	Total	35317.33	359					
Teacher open to information technologies	Intergroup	225.93	4	56.48	1.62	0.168	-	-
	In-group	12170.95	350	34.77				
	Total	12396.87	354					
Teacher open to learning	Intergroup	57.72	4	14.43	1.57	0.182	-	-
	In-group	3400.27	370	9.19				
	Total	3457.99	374					
Teacher open to development and collaboration.	Intergroup	300.89	4	75.22	3.72	0.006*	1 ile 2	0.57
	In-group	7292.61	361	20.20				
	Total	7593.50	365					

*p <0.05 significant

Seniority: 1 = 5 years and less, 2 = 6-10 years, 3 = 11-15 years, 4 = 16-20 years, 5 = 21 years and above

According to the results of the analysis, the average scores of the teachers regarding innovative teacher characteristics differ significantly according to their seniority duration [$F_{(4; 383)}$=2.56, p<.05]. In other words, the innovative teacher characteristics of teachers change significantly depending on their seniority. This finding can also be interpreted as the effect of seniority on teachers' innovative teacher characteristics. Post-hoc Scheffe test was conducted to determine which groups the difference is between. According to the results of the test, the average score of the senior teachers for 6-10 years ($\overline{X}$ = 224.11) is significantly lower than the average scores of the other four seniority teachers. There was no significant difference between the average scores of other seniority levels. The eta square (η^2) value was calculated to investigate the level of influence of professional seniority duration on the participants' innovative teacher characteristics. (η^2), which takes a value between 0.00 and 1.00, gives the rate of disclosure of the total variance of the independent variable in the dependent variable. 0.01 means low impact, 0.06 medium effect and 0.14 high effect (Taşpınar, 2016: 90). It shows the level of influence of professional seniority duration on the participants' innovative teacher traits. η^2=0.03. Accordingly, the effect of professional seniority period on the participants' innovative teacher characteristics is moderate.

Considering the sub-dimensions, the mean scores of teachers who are open to development and collaboration differ significantly according to seniority [$F_{(4-365)}$=3.72, p<.05]; Teacher open to innovation [$F_{(4-359)}$=1.95, p>.05],; Teacher open to information technologies [$F_{(4-354)}$=1.62, p>.05] and teacher open to learning [$F_{(4-374)}$=1.57, p>.05] mean scores do not differ significantly according to seniority. The level of influence of professional seniority duration on the participants' innovative teacher traits indicates η^2=0.57. Accordingly, the effect of professional seniority period on the teachers who are open to development and collaboration is moderate.

The Difference Status of Teachers' Scores from the Innovative Teacher Characteristics Scale According to Foreign Language Knowledge

One Way ANOVA analysis was conducted to compare the mean scores of the innovative teacher characteristics of the participants according to foreign language knowledge. The result of the analysis is given in Table 8.

Table 8: Teachers' ınnovative teacher characteristics according to foreign language results of one-way variance analysis on total score averages

Scale / Size	Source of variance	Squares total	sd	Squares average	F	Anova straight	Difference	Impact Size η^2
ITC Total	Intergroup	6656.65	2	3328.32				
	In-group	144166.51	370	389.64	8.54	0.000*	1 with 3	0.04
	Total	150823.16	372					
Teacher open to innovation	Intergroup	541.39	2	270.69				
	In-group	33722.30	348	96.90	2.79	0.063	-	-
	Total	34263.69	350					
Teacher open to information technologies	Intergroup	256.84	2	128.42				
	In-group	11950.98	343	34.84	3.69	0.026*	1 with 3	0.02
	Total	12207.82	345					
Teacher open to learning	Intergroup	87.69	2	43.85				
	In-group	3263.09	361	9.04	4.85	0.008*	1 with 2	0.59
	Total	3350.78	363					
Teacher open to development and collaboration.	Intergroup	900.70	2	450.35				
	In-group	6529.86	353	18.50	24.35	0.000*	1 with 2,3	0.93
	Total	7430.56	355					

*p <0.05 significant, Foreign language level: 1 = Basic, 2 = Intermediate, 3 = Advanced.

According to the results of the analysis, the mean scores of the teachers differ significantly according to the level of foreign language [$F_{(2-372)}$=8.54, p<.05]. In other words, teachers' innovative teacher characteristics change significantly depending on foreign language levels. This finding shows that foreign language level has an effect on teachers' innovative teacher characteristics. Scheffe post-hoc test was carried out to determine which groups the difference is between. According to the test results, the average score of teachers with basic foreign language levels ($\overline{X}$ = 226.51) is lower than the average scores of teachers with advanced foreign language knowledge ($\overline{X}$ = 37.61). It shows the level of influence of the level of foreign language knowledge on the innovative teacher characteristics of the participants η^2=0.04. Accordingly, the effect of the level of foreign language knowledge on the innovative teacher characteristics of the participants is moderate.

Considering the sub-dimensions, teacher open to information technologies [$F_{(2-345)}$=3.69, p<.05], teacher open to learning [$F_{(2-363)}$=4.85, p<.05] and teacher open to development and collaboration While the average scores of [$F_{(2-355)}$=24.35, p<.05] differ significantly according to the level of foreign language, the mean scores of teachers open to innovations do not differ significantly [$F_{(2-350)}$=2.79, p>.05]. Scheffe test was performed to understand between which groups the difference is. According to the test results, the average score of those with advanced foreign language levels ($\overline{X}$ = 53.38) is higher than the average score of those with basic foreign language levels ($\overline{X}$ = 51.12). For teachers who are open to learning, those who have intermediate levels of foreign language score ($\overline{X}$ = 26.42) are higher than those who have basic levels of foreign language ($\overline{X}$ = 25.39). For the teacher, who is open to development and collaboration, the average score of those with basic levels of foreign language ($\overline{X}$ = 20.74) is lower than those of both with advanced levels ($\overline{X}$ = 24.93) and with intermediate levels of foreign language ($\overline{X}$ = 21.80).

Considering the effect levels of the level of foreign language awareness on the innovative teacher characteristics sub-dimensions of the participants; There was a 'moderate' effect (η^2=0.02), for the teacher open to information technologies, a 'high' effect (η^2=0.59) for the teacher open to learning, and a 'high' level effect (η^2=0.93) for the teacher open to development and collaboration. Accordingly, the level of foreign language affects mostly teachers' openness to development and collaboration, secondly being open to learning, and finally, being open to information technologies, respectively.

The Differences of the Scores Obtained from the Innovative Teacher Characteristics Scale of the Teachers According to the Teachers' Branches

One Way ANOVA analysis was conducted to examine whether participants' innovative teacher characteristics vary according to their branches. The analysis result is given in Table 9. The branches of teachers, the Science and Mathematics Group (Biology, Physics, Chemistry. Mathematics, Information Technologies), Social Sciences Group (Geography, Religious Culture and Ethics, Philosophy, Guidance, History, Turkish Language and Literature, Visual Arts) and Foreign Language Group (German, Arabic, French, English and Spanish) are expressed.

Table 9: The Results of One-Way Variance Analysis on Total Score Averages for Innovative Teacher Characteristics Regarding Teachers' Branches

Scale / Size	Source of variance	Squares total	sd	Squares average	F	Anova straight	Difference	Impact Size η^2
ITC Total	Intergroup	5370.31	2	2685.16				
	In-group	139584.92	354	394.31	6.81	0.001*	1 ile 2,3	0.07
	Total	144955.23	356					
Teacher open to innovation	Intergroup	1169.68	2	584.84				
	In-group	32801.75	333	98.50	5.94	0.003*	2 ile 1,3	0.06
	Total	33971.43	335					
Teacher open to information technologies	Intergroup	244.46	2	122.23				
	In-group	11308.03	328	34.48	3.55	0.030*	1 ile 2	0.03
	Total	11552.49	330					
Teacher open to learning	Intergroup	27.14	2	13.57				
	In-group	3234.82	345	9.38	1.45	0.237	-	-
	Total	3261.95	347					
Teacher open to development and collaboration	Intergroup	701.25	2	350.63				
	In-group	6433.78	338	19.04	18.42	0.000*	1 ile 2,3	0.76
	Total	7135.04	340					

* $p<0.05$ meaningful

Branch: 1=Foreign Language Group, 2=Mathematics and Science Group, 3=Social Sciences Group

According to the analysis results, the average score of teachers varies significantly by branch [F(4-356)=6.81, p<.05]. In other words, teachers' innovative teacher characteristics vary significantly depending on their branches. This finding can also be interpreted as having an impact on teachers' innovative teacher characteristics. The Scheffe post-hoc test was performed to determine the groups in which the difference was between. According to the test result, the average score of foreign language teachers ($\overline{X}$ =238.75) is significantly higher than the score averages of the other two branch teachers. The branch variable is calculated as η2=0.07, which shows the level of impact of participants on innovative teacher characteristics. Accordingly, the impact of the branch on innovative teacher characteristics of the participants is high.

Regarding the subdimensions, the teacher open to innovation [$F_{(2-335)}$=5.94, p<.05], the teacher open to information technologies [$F_{(2-330)}$=3.55, p<.05] and the teacher open to development and collaboration [$F_{(2-340)}$=18.42, p<.05] score averages vary significantly by branch, while the score averages of the teacher open to learning do not differ significantly [$F_{(2-347)}$=1.45, p>.05]. The Scheffe test was performed to understand groups in which the difference was between. According to the test results, the teacher open to innovation ($\overline{X}$ =129.99) average scores of math-science group teachers are lower than both of social studies teachers ($\overline{X}$ =133.62) and of foreign language teachers ($\overline{X}$ =134.13). For the scores of teachers open to information technology, the average score of foreign language teachers ($\overline{X}$ =53.66) is higher than the average score ($\overline{X}$ =51.32) of math science teachers. For teachers open to development and co-operation, the average score of foreign language teachers ($\overline{X}$ =25.11) is higher than the average score ($\overline{X}$ =21.31) of social studies teachers.

When you look at the levels of impact of the branch on the subsize of innovative teacher characteristics of the participants; A moderate effect for the teacher open to learning (η^2=0.03), for the teacher open to information technologies (η^2=0.06) and for the teacher development and co-operation (η^2=0.76) has been found to have a high level of impact.

RESULTS AND DISCUSSION

Teachers' Innovative Teacher Characteristics Level Related Results and Discussion

According to the first conclusion reached as part of the study, teachers often see their situation as having innovative teacher characteristics. Teachers themselves can be found to be at the highest level in the fields of innovation, information technology, learning, development and cooperation. In the research conducted by Özbek (2014), teachers perceive their individual innovation at a high level. According to the results of the research carried out by Kılıç (2015), teachers are low-level innovators. Teachers' high-level innovation seems to have a positive impact on their professional development. Contrary to this research, Sahin İzmirli and Gürbüz (2017) reached the result that, nearly half of the teacher candidates were found to have low levels of innovation. The results of the research show that the level of innovation varies among teachers and teacher candidates. In the literature, there are various studies that link the high perception of self-sufficiency to teachers to being open to innovation in educational environments and agreeing to adapt them to easier classroom environments (Stein & Wang, 1988; Tschannen-Moran and Woolfolk-Hoy, 2001). The current study predicts that the general high degree of in-class status of participating teachers can positively affect the likelihood of following and in-class practices. However, although their view of themselves as innovative contributes to the acceptance and implementation of innovation by teachers in educational environments, it should be noted that there are many factors that enable any innovation to be adopted willingly by the teacher. Some of these factors are; knowledge, relevancy, desirability, effectiveness, reliability, applicability and adaptability (Hurst and Rust, 1990).

The Results and the Discussion of the Differences of the Teacher's Scores on the Innovative Teacher Characteristics Scale Depending on the Types of Institutions They Work at (Public-Private / Science-Social Sciences)

Innovation is essential for organizations (e.g. schools) to be functional, in other words, to effectively fulfill their activities (Koch, Binnewies & Dormann, 2015). It is also estimated that one of the parameters affecting academic output in schools is the innovation status of schools (Lubienski, 2003). There are studies suggesting that the innovation of any organization has a positive impact on the impact of that organization (Han, Kim & Srivastava, 1998; Hult, Hurley & Knight, 2004). Furthermore, teachers in schools with positive corporate culture have been suggested to be more entrepreneurial in experimenting with innovation (Petorson & Deal, 1998). School and teacher influence each other at the point of innovation. At this point, identifying the innovative characteristics of teachers according to school types will enable the institution to reveal what kind of impact the type of teacher has on innovative teacher characteristics. The score averages of innovative teacher characteristics factors of teachers vary significantly depending on the type of school (public/private). The fact that teachers work at Public-Private institutions affects their ability to have innovative teacher traits. Teachers working at private schools have higher points averages than public teachers' points averages. In terms of being open to innovation, information technologies, development and collaboration, teachers at private schools are better than teachers at public schools. For the factor of being open to innovation, teachers working at private schools have higher average scores than teachers working at public schools. Regards being open to information technology, teachers working at private schools have higher average scores than teachers working at public schools, In terms of being open to development and cooperation, teachers working at private schools have higher average scores than teachers working at public schools. The reason why teachers working at private schools have a high status of innovative teacher characteristics is that schools have good physical environments, they have innovative organizations and climates, and they have support for teachers being open to innovation, information technologies, learning, development and cooperation. Teachers' innovative teacher characteristics score averages do not differ significantly depending on the type of school (science/social sciences). There is no significant difference among the teachers who work at Public-Private science and social sciences high schools regarding the type of schools.

The Results and the Discussion on the Differences of Teachers' Scores on the Innovative Teacher Characteristics Scale Depending on Teachers' Gender

Teachers' innovative teacher characteristics score averages do not differ significantly depending on their gender. Being male or female, do not generally affect teachers' owning innovative teacher traits. When teachers' gender status is examined by subdimensions, teachers' being open to innovation varies significantly by gender, while being open to information technologies, being open to learning, being open to development and collaboration do not differ significantly according to gender. Only female teachers are more open to innovation than male teachers. The study by Korucu and Olpak (2015) found no significant difference between the genders and individual innovation characteristics of teacher candidates. In another study, being female or male did not affect teachers' levels of innovation (Demir Basaran and Keleş, 2015) The genders of teachers and teacher candidates do not show any differences in the levels of innovation. Other research results also support the results of this research.

The Results and the Discussion on the Differences of Teachers' Scores on the Innovative Teacher Characteristics Scale Depending on the Teachers' Education Levels

Teachers' scores of innovative teacher characteristics do not differ significantly according to their education level. Teachers' levels of having innovative teacher characteristics do not increase in congruent with their levels of education. Teachers have similar innovative teacher characteristics based on their levels of education. In other words, within the scope of sub-dimensions, teachers' education levels do not affect the situation of being open to innovation, information technologies, learning, development and cooperation.

The Results and the Discussion on the Differences of Teachers' Scores on the Innovative Teacher Characteristics Scale Depending on Seniorities of Teachers

Teachers' innovative teacher characteristics vary significantly depending on their seniority. Teachers with seniority between 6-10 years have fewer innovative teacher traits than teachers with seniority of 5 years or less, 11-15 years, 16-20 years, 21 years or more seniority. While the sub-dimension of being open to development and cooperation by seniority differs significantly, it does not differ significantly depending on the sub-dimensions of being open to innovation, information technologies and learning. In his research, Demir Başaran and Keleş (2015) concluded that teachers' seniority year is not a variable that affects the levels of innovation.

The Results and the Discussion on the Differences of Teachers' Scores on the Innovative Teacher Characteristics Scale Depending on Foreign Language

The teachers' having innovative teacher characteristics varies significantly depending on their levels of foreign language. According to the levels of foreign language, the innovative teacher characteristics of teachers vary significantly. In other words, the levels of foreign language of teachers affect their innovative teacher characteristics. Teachers have more innovative teacher traits as their foreign language levels increase. Teachers with basic foreign language levels have less innovative teacher characteristics than teachers with advanced foreign language knowledge. Teachers' openness to information technologies, learning, development and cooperation differs significantly depending on the levels of the foreign language, however, their being open to innovation does not differ significantly depending on the levels of the foreign language. In terms of being open to information technologies, the average score of teachers with basic foreign language levels is lower than teachers with advanced foreign language knowledge. In terms of being open to learning, the average score of teachers with intermediate foreign language levels is higher than teachers with basic level of foreign language knowledge. In terms of being open to development and co-operation, average score of teachers with basic levels of foreign language is lower than teachers with advanced foreign language knowledge. As a result, the status of teachers having innovative teacher characteristics varies depending on the level of foreign language knowledge. Teachers having advanced foreign language knowledge increase their level of having innovative teacher characteristics. The benefit and importance of knowing a foreign language is a fact that is agreed on. English can be used to sample the finding obtained in the study

more concretely. According to Nunan, "English is now unarguably the language of science and technology" (2003: 590). It can be said that teachers' first-hand acquisition of some information that supports and enhances innovative features such as new methods, teaching practices, pedagogical approaches, in the education field in general and their specific fields in particular, is directly related to foreign language information. In this respect, the positive-leaning relationship between teachers knowing a foreign language and having innovation traits is very meaningful.

The Results and the Discussion on the Differences of Teachers' Scores on the Innovative Teacher Characteristics Scale Depending on the Branches

Innovative teacher characteristics vary significantly in relation to branches. In other words, teachers' innovative teacher characteristics vary depending on their branches. So, the branches of teachers have impacts on their innovative teacher characteristics. Innovative teacher characteristics of foreign language group teachers are higher than social and science branch groups. While the sub-dimensions of being open to innovation, information technologies, development and collaboration differ significantly depending on branch groups, it does not differ significantly depending on the sub-dimension of being open to learning. The level of science and mathematics group teachers being open to innovation is lower than the social and literature group and foreign language group teachers. The level of openness of foreign language group teachers to information technology is higher than the teachers of the science and mathematics group. The level of development and cooperation of foreign language group teachers is higher than the teachers of the social sciences group. The research conducted by Kılıç (2015) concluded that there was no significant difference between teachers' levels of innovation and their branches. A study conducted on teacher candidates concluded that there was a significant difference between the departments where teacher candidates were trained and the levels of innovation (Bitkin, 2012).

REFERENCES

Adair, J. (2008). *Yenilikçi liderlik*. İstanbul: Babıali Kültür Yayıncılığı.

Altıntaş, G. & Yeşiltepe, M. (2016). Karşılaştırmalı öğretmen yetiştirme. *Batı Anadolu Eğitim Bilimleri Dergisi (BAED).* Özel Sayı: 225 – 250.

Aybat, B. (2016). *Öğretmen 2. 0,* İstanbul: Abaküs Yayınları,

Aziz. A. (2014). *Sosyal bilimlerde araştırma yöntemleri ve teknikleri*. Ankara: Nobel Akademik Yayıncılık.

Balkar, B. (2015). The relationships between organizational climate, innovative behavior and job performance of teachers. *International Online Journal of Educational Sciences*. 7 (2): 81-92

Baykara, T. (2014). *21.Yüzyılda teknoloji yenilik, inovasyon ve yönetimi*, Ankara: Nobel Akademi.

Birinci, Y. (2011). Patent Korumasının Yeniliklerin Yayılı Üzerindeki Etkileri. Yeniliklerin Yayılımı, Kuramsal ve Uygulamalı Tartışmalar, Ed. Yeloğlu, H. O. Ankara, Siyasal Kitabevi: 23-39.

Bitkin, A. (2012). *Öğretmen adaylarının bireysel yenilikçilik düzeyleri ile bilgi edinme becerileri arasındaki ilişki.* Yayınlanmamış Yüksek Lisans Tezi, Harran Üniversitesi Sosyal Bilimler Enstitüsü.Şanlıurfa.

Bitnn-Fn'edlander, N. Dreyfus, A. & Milgrom, Z. (2004). Type; of"‘teachers ın training‘": the reactions of primary school science teacher: when confronted with the task of ımplementing an ınnovation. *Teaching and Teacher Education,* 20: 607-619.

Çelikten, M. Şanal, M. & Yeni, Y. (2005). Öğretmenlik mesleği ve özellikleri. *Kayseri: Erciyes Üniversitesi, Sosyal Bilimler Enstitüsü Dergisi.*19(2): 207-237

Creswell, J. W. (2005). *Educational research: planning, conducting and evaluating quantitative and qualitative research.* Upper Saddle River, NJ: Pearson Prentice Hall.

Cumming, J. & Owen, C. (200l). Reforming schools through ınnovative teaching, australian college of education, enterprise and career eduention foundation and dusseldorf skills forum, ACE Canberra: 2-7. http: //files.eric.ed.gov/fulltext/ED456268.pdf [31.10.2017].

Demir Başaran, S. & Keleş S. (2015). Yenilikçi kimdir? öğretmenlerin yenilikçilik düzeylerinin incelenmesi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi.* 30(4): 106-118

Elçi, Ş. (2007). *İnovasyon: kalkınma ve rekabetin anahtarı.* İstanbul: Techopolis Group Yayınları.

Gkorezis, P. (2015). Principal empowering leadership and teacher ınnovative behavior: a moderated mediation model. *International Journal of Educational Management,* Vol. 30 Issue: 6, pp.1030-1044

Glor, E. (2001*). Some thoughts on definitions of innovation*. The Innovation Journal. http: //www.innovation.cc/discussion-papers/thoughts-innovation.htm [11.10.2017]

Goldsmith, R. E. & Foxall, G. R. (2003). *The measurement of ınnovativeness*. Ed. Shavinina, L.V. The International Handbook on Innovation, Elsevier Science Ltd: 321-329.

Gökbulut, B. (2016). *Bilişim Teknolojileri Rehber Öğretmenlerinin Teknoloji Koçluk Düzeylerinin Belirlenmesi*. Yayımlanmamış Doktora Tezi. Necmettin Erbakan Üniversitesi Eğitim Bilimleri Enstitüsü, Konya.

Güven, İ. (2001). Öğretmen yetiştirmenin uluslararası boyutu (UNESCO 45. Uluslararası Eğitim Kongresi). *Millî Eğitim Dergisi.* Sayı: 150. http: //dhgm.meb.gov.tr/yayimlar/dergiler/milli_egitim_dergisi/150/guven.htm#top [19.10.2017].

Hamarat, F. (2002). *Ilköğretim okulu yöneticilerinin aday öğretmenleri işbaşında yetiştirmedeki rolü ve yetiştirme uygulamaları.* Yayımlanmamış Yüksek Lisans Tezi, Ankara Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.

Han, J. K., Kim, N., & Srivastava, R. K. (1998). *Market orientation and organizational performance: ıs innovation a missing link?* The Journal of Marketing, 62(4): 30-45.

Hult, G. T. M., Hurley, R. F., & Knight, G. A. *2004. Innovativeness: ıts antecedents and ımpact on business performance*. Industrial Marketing Management, 33(5): 429-438.

Hurst, P. & Rust, V. D. (1990). *The quality of education and the working conditions of teachers.* In V. D. Rust & P. Dalin (Eds.), Teachers And Teaching in The Developing World (pp. 151-170). New York: Garland.

Karasar, N. (1998). *Sosyal bilimlerde araştırma yöntemleri.* Ankara: Seçkin Yayınları

Kaptan, S. (1995). *Bilimsel araştırma ve istatistik teknikleri*. Ankara: Bilim Yayınları.

Kılıç, İ.& Ural, A. (2013). *Bilimsel araştırma süreçi ve spss ile veri analizi*. Ankara: Detay yayıncılık

Kılıç, H. (2015). *Ilköğretim branş öğretmenlerinin bireysel yenilikçilik düzeyleri ve yaşam boyu öğrenme eğilimleri (Denizli İli Örneği)*. Yayınlanmamış Yüksek Lisans Tezi, Pamukkale Üniversitesi Eğitim Bilimleri Enstitüsü, Denizli.

Koch, A. R., Binnewies, C., & Dormann, C. (2015). *Motivating ınnovation in schools: school principals' work engagement as a motivator for schools' innovation*. European Journal of Work and Organizational Psychology, 24(4): 505-517.

Korucu. A.T. & Olpak, Y. Z. (2015). Öğretmen adaylarının bireysel yenilikçilik özelliklerinin farklı değişkenler açısından incelenmesi. *Eğitim Teknolojisi Kuram ve Uygulama Dergisi.* 5(1): 111-127

Kuran, K. (2002). *Öğretmenlik Mesleği (Niteliği ve Özellikleri). Öğretmenlik Mesleğine Giriş.* Ed. Türkoğlu, A. Konya: Mikro Basım Yayım Dağıtım: 243-278.

Kurtuluş, M. F. (2012). *Eğitimde inovasyon: öğretmen ve öğrencilerin inovasyona bakışı ve yeterliliğinin sorgulanması.* Yayınlanmamış Yüksek Lisans Tezi. Gebze Yüksek Teknoloji Enstitüsü, Sosyal Bilimler Enstitüsü, Kocaeli.

Lubienski, C. (2003). Innovation in education markets: theory and evidence on the impact of competition and choice in charter schools. *American Educational Research Journal*, 40(2): 395-443.

Nunan, D. (2003). The impact of english as a global language on educational policies and practices in the asia-pacific region. *TESOL Quarterly*, 37(4): 589-613.

Orhan, D. Kurt, A.A. Ozan, Ş. Som Vural, S. & Türkan, F. (2014). Ulusal eğitim teknolojisi standartlarına genel bir bakış. *Karaelmas Journal of Educational Sciences* 2: 65-79

Özbek, A. (2014). *Öğretmenlerin yenilikçilik düzeylerinin tpab yeterlikleri üzerindeki etkisinin incelenmesi.* Yayımlanmamış Yüksek Lisans Tezi.Necmettin Erbakan Üniversitesi Eğitim Bilimleri Enstitüsü.Konya.

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

Peterson, K. & Deal, T. (1998). How leaders ınfluence the culture of schools. *Educational Leadership*, 56(1): 28-30.

Ritchhart, R. (2004). Creative teaching in the shadow of the standards. *Independent School.* 63: 32–40.

Rogers, M. E. (2003). *Diffusion of ınnovations (Fifth Edition).* Free Press, New York.

Stein, M. K., & Wang, M. C. (1988). Teacher development and school improvement: the process of teacher change. *Teaching and Teacher Education*, 4: 171–187.

Şahin. İzmirli, Ö. & Gürbüz, O. (2017). Öğretmen adaylarının bireysel yenilikçilik durumları ve problem çözme becerileri arasındaki ilişkinin incelenmesi: (Çanakkale Onsekiz Mart Üniversitesi Örneği). *SDU International Journal of Educational Studies*. 4 (1): 29-43.

Şen, Ş. H. (2013). *Eğitim açısından toplumsal değişim ve yenileşme*. Eğitim Bilimine Giriş. Ed. Karip, E. Ankara: PegemA Yayınevi: 164-179

Shavinina, L.V. (2013). *The routledge ınternational handbook of ınnovation education*. New York: Routledge USA

Shi, J. (2012), Influence of passion on ınnovative behavior: an empirical examination in peoples republic of china. *African Journal of Business Management,* 6(30): 8889-8896.

Temizkan, M. (2014*). Eğitimde yenilikçi yaklaşımlar: robot uygulamaları,* Yayımlanmamış Yayınlanmamış Yüksek Lisans *Tezi*, Gazi Üniversitesi Eğitim Bilimler Enstitüsü,Ankara.

Thurlings, M. Evers, A.T. & Vermeulen, M. (2015). Toward a model of explaining teachers' ınnovative behavior: a literature review. *Review of Educational Research*. 85 (3): 430–471.

Top, S. (2008). *İşletmelerde yenilik ve yaratıcılık yönetimi.* İstanbul: Beta Basım Yayım Dağıtım A.Ş.

Tschannen-Moran, M. & Woolfolk-Hoy, A. (2001) Teacher efficacy: capturing an elusive concept. *Teaching and Teacher Education,* 17: 783-805

Turgut, E. & Begenirbaş, M. (2016). Yenilikçi iklimin ve sosyal sermayenin bilgi paylaşımı ve yenilikçi davranışa etkisi. *The Journal of Defense Sciences*.15(1): 113-147.

Üre, Ö. (2002). *21.Yüzyıl Öğretmeni. Eğitime Yeni Bakışlar-1*.ed. Sünbül, A. M. Konya: Mikro Basım Yayım Dağıtım: 1-5.

Van Der Heijdena, H.R.M.A, Geldensa, J. J. M. Beijaardb, D. & Popeijusa, H.L. (2015). Characteristics of teachers as change agents. *Teachers And Teaching*: Theory And Practice.2(6): 1-22.

Villalba, E. (2007). The relationship between education and ınnovation, jrc scientific and technical reports, https: //ec.europa.eu/epale/en/resource-centre/content/relationship-between-education-and-innovation-evidence-european-indicators.[02.01.2017].