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Exploring the Perceived Barriers to Innovativeness: Views of Turkish Pre-Service Teachers as Technology Leaders *

Yenilikçiliğin Önündeki Engellerin Araştırılması: Türkiye'deki Teknoloji Lideri Öğretmen Adaylarının Görüşleri

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ABSTRACT: In the new millennium, the value of innovation increases in global scale and innovation is regarded as the key to development and a pivotal element of making a difference. With the significant increase in the number of technological innovations in recent years, resulting in shorter times for adoption of innovations, individual innovativeness became a necessity, thus giving responsibility to educators generally. This research was conducted with the intent of the detection of perceived barriers to innovativeness by pre-service teachers as technology leaders. The research was conducted with 777 fourth-grade students studying in the Computer Education and Instructional Technologies (CEIT) departments of 26 public universities in Turkey. As a result of the research, it was found out that pre-service teachers see institutional factors as the greatest barrier to innovativeness and regard the process of learning in educational institutions as more of a barrier than technological infrastructure and corporation culture.

Keywords: innovativeness, barriers, adopter groups, higher education

ÖZ: İçinde bulunduğumuz yüzyılda, yenilik kavramının küresel anlamdaki değeri giderek artmaktadır. Buna paralel olarak yenilikçilik artık gelişmenin anahtarı ve fark yaratmanın olmazsa olmazı olarak görülmektedir. Özellikle son yıllarda üretilen yenilik miktarındaki hızlı artışla birlikte yeniliklere verilmesi gereken tepki süresinin kısalması, bireysel anlamdaki yenilikçiliğin gerekliliğini daha da hissedilir kılmıştır. Yenilikçi bireylere duyulan bu gereksinim, genel anlamda eğitimcilere önemli sorumluluklar yüklemektedir. Araştırma, teknoloji lideri konumundaki Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) öğretmen adaylarının yenilikçiliğin önünde engel olarak algıladıkları durumların belirlenmesi amacıyla gerçekleştirilmiştir. Araştırma, Türkiye genelindeki 26 üniversitenin BÖTE bölümünde öğrenim gören 777 dördüncü sınıf öğrencisiyle yürütülmüştür. Araştırma sonucunda, öğretmen adaylarının en çok kurumsal boyuttaki durumları yenilikçiliğe ilişkin engel olarak gördüğü ve eğitim kurumlarındaki öğretim sürecinin niteliğiyle ilgili durumları teknolojik altyapı ve kurum kültürüne göre daha çok engel olarak algıladığı belirlenmiştir.

Anahtar sözcükler: yenilikçilik, engel, yenilikçilik kategorileri, yüksek eğitim

1. INTRODUCTION

Innovation, which is one of the subjects that has been studied and considered for more than a century, has increased--and continues to increase--in importance in the current century. Among the most important reasons for this are the developments in technology and the changes created in social life through the reflection of these developments. Particularly the structures of societies and individual characteristics have been exposed to change parallel to technological developments. With the shift from an agricultural to industrial society, and from an industrial society to an information society, not only the subjects that were beforehand regarded as crucial in economic matters but also the definitions, structure and quality of jobs have changed. Furthermore, the *'innovation'* feature of information has increased its value beyond comprehension. This social change has caused a shift in the types of skills that individuals need to have. Skills such as critical thinking, problem solving, communication, cooperation, reliability, fast access to information and effective use of technology and innovativeness, which were also crucial in past, are now regarded

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as indispensable skills in the innovative world of the twenty-first century (Partnership for 21st Century Skills, 2010). Parallel to the increase of information in the scientific society of the twenty-first century, the number of innovations has increased by decade and the reaction time to given innovations has decreased. This situation has made it necessary for individuals to possess the characteristics of innovativeness. While innovativeness was before an important factor in making difference, it is now a must for making a difference.

1.1. Innovativeness

Innovativeness, which is another concept considered together with the concept of innovation in the current century in matters of being first overall, is generally defined as *'to be innovative'* (Oxford Dictionaries, 2011). Innovativeness--which includes reactions to innovations (Goldsmith & Foxall, 2003), willingness to change (Braak, 2001), willingness to or try new things (Hurt, Joseph & Cook, 1977) and a relatively early adoption of innovation (Rogers, 1995), and which is measured after the decision to adapt to innovation (Agarwal & Prasad, 1998)--both covers *'the reaction to what's new'* and *'being on the side of innovation'*. The concept of innovativeness, which is generated by the reactions to innovation and change, can be considered from individual (personal innovativeness), institutional (organizational innovativeness) or social (innovativeness of nations) aspects. Whether the innovativeness is derived from the individual, institutional or social aspects, their common point is that reactions are positive toward innovations and, as a result, there is a faster and more eager adoption of innovations that results in the ability to make difference.

Starting with the different reactions that individuals gave to new things and interpersonal differences that were addressed in this study, it is shown that individual innovativeness is conceptualized in three different aspects. These are behavioral, global personality trait and domain-specific personality approaches (Goldsmith & Foxall, 2003). The way that each approach deals with innovation shapes how innovativeness can be measured. According to the behavioral aspect, innovativeness deals with the adoption or lack of adoption of an innovation, and innovativeness is defined according to its adoption time (Rogers, 1995). According to that, and by taking stock of the purchase or use of an innovation, individuals are classified as innovators and not innovators. Goldsmith and his colleague (2003) stated that global personality trait aspect accepts innovativeness as a trait of personality. In this approach, innovativeness is shaped by cognitive structures of the individual and individual characteristics created by behavior. Positive and negative reactions that the person shows to new and different things represent how innovative the individual is according to general personality traits. According to this, the degree of personality traits such as the ability to take risks, the tendency toward adoption, tolerance, willingness, and being open to new experiences show the level of innovativeness of the individual. Finally, the domain-specific personality trait aspect evaluates innovativeness in a similar way to the general personality trait. In this aspect, however, the innovation differs according to domains created by product categories such as food and beverage, clothing, electronics and decoration, not the innovation in general terms. According to this aspect, an individual may be innovative in a specific product group but not in another group (Goldsmith & Foxall, 2003).

Innovativeness is either determined by individuals in social systems adopting innovations at different rates or by taking stock of the reactions of the individual toward innovation; individuals are evaluated on a two-sided scale and defined as innovators or laggards. Innovativeness categories identified as a result of diffusion research (Beal & Bohlen, 1956; Rogers, 1958; Rogers, 1995; Rogers & Beal, 1958; Ryan & Gross, 1943) were determined to be composed of individuals with similar socio-economic characteristics, communicational behaviors and personality variables (Beal & Bohlen, 1956; Casey, Bloom & Moan, 1994; Fill, 1995;

Geoghegan, 1995; Greenhalgh, Robert & Bate, 2008; Rogers, 1958; Rogers, 1959; Rogers, 1963; Rogers, 1995; Rogers & Beal, 1958; Ryan & Gross, 1943). These innovativeness categories are Innovators, Early Adopters, Early Majority, Late Majority and Laggards, given in Figure 1.

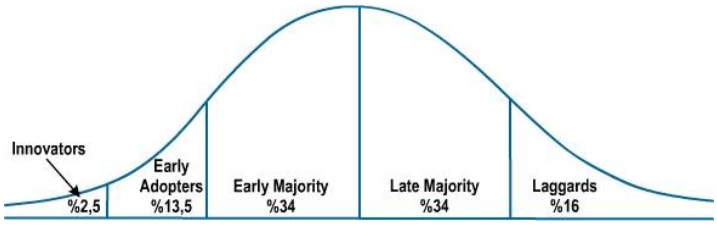

Figure 1. Adopter categorization on the basis of innovativeness (Rogers, 1995, p.262)

These categories, which Rogers (1958) put forward and explained in the *'Diffusion of Innovation'* model, have been accepted by diffusion researchers in different domains. Although behavioral aspects grounded on the rate of adoption of innovation benefited from the creation of these categories, by putting forward the dominant traits that each category has, innovativeness can be evaluated by the personality trait aspect (Goldsmith & Foxall, 2003). It is now seen that Rogers' classification is used in works made in different domains, when innovativeness categories are considered.

When studies on innovativeness are examined, it is seen that the studies started in early 1900s and increased after 1960s. Today, innovation and innovativeness, parallel especially to technological developments, are among the top research subjects in a number of fields including particularly the field of business. In studies carried out within the context of innovativeness, innovativeness and the adopter groups have been examined not as a general personality trait but with respect to the time of adopting the innovation (in behavioral aspect). Therefore, studies conducted mostly focused on the perceived characteristics of innovation (Aşkar & Usluel Koçak, 2002a; Brahier, 2006; Compeau, Meister & Cristopher, 2007; Könings, Gruwel & Merrienboer, 2007; Moore & Benbasat, 1991; Rosen, 2004), the innovation-decision process (Aşkar & Usluel Koçak, 2002b; Aşkar & Usluel Koçak, 2003), adopter groups (Demirsoy, 2005; Esen, 2002; Hsua, Lub & Hsuc, 2007; Rogers & Beal, 1958; Rogers, 1958; Timucin, 2009) and the process of the diffusion of innovations (Beal & Boehlen, 1956; Özaygen, 2004; Şahin & Thompson, 2006). There is a limited number of studies investigating innovativeness as a general personality trait (Adıgüzel, 2011; Çoklar, 2012; Hurt et al., 1977; Kert & Tekdal, 2012; Pallister & Foxall, 1998; Simonson, 2000).

1.2. Barriers to Innovativeness

When the literature is evaluated, it is shown that when innovativeness considers individual dimensions, there are some factors that are barriers to being innovative (Andrews, 2007; Couger, 1994; Entsminger, 1995; Greene, 1997; Hannan, 2005; Lin, 1998; Loewe & Dominiquini, 2006; Noone, 2000; Odabaşı, 2007; Ong, Wan & Chng, 2003; Rogers, 1995; Tiwari & Buse, 2007; Wejnert, 2002). Personality traits generate the foundation of innovativeness and, on top of that, innovativeness develops through education or within the institution where it serves and is shaped according to social traits. Thus, when barriers to innovativeness are considered in the person during the shaping of innovativeness, these barriers can be ordered as individual, institutional or social, or from inside to outside.

A negative perception of innovation emerges in the individual among some factors related with innovativeness (Lin, 1998). Also, the less information, communication and empathy the individual has, the greater his negative attitude toward innovation and change (Rogers, 1995).

Age, education level, socio-economic level and past experiences (Greene, 1997; Wejnert, 2002), lack of time and economic possibilities, fear of taking risks (Andrews, 2007), lack of awareness of innovation, feelings of disappointment, suspicious and skeptical attitudes, pessimism, stress, fear of failure, mental confusion, impatience and lack of time management (Entsminger, 1995) are reported as other individual barriers to innovativeness.

Among the institutional barriers are the structure of the institution the individual is in and its attitude toward the individual (Loewe & Dominiquini, 2006). Corporate culture, the environment it provides for new ideas to develop and prosper, institutional support (Greene, 1997; Hannan, 2005) and quality of the administrators are important factors affecting innovativeness. Similarly, higher education boards' lack of source and infrastructure, the incompatibility of educational programs with innovativeness, the lack of quality instructors and a traditional approach in education all affect the innovativeness of the individual negatively. In particular, the higher education boards' move away from innovativeness is reported as another factor affecting innovativeness (Noone, 2000; Odabaşı, 2007).

Finally, norms and social structure of the society are the most prominent social barriers to innovativeness (Ong, et al., 2003). Also, factors such as social culture, family structure, geographical location, political situation, institutionalization level of the institution, existence of institutions at a global level and communication structure of the society at global level are seen as other barriers in social means, due to the fact that they affect the change of individual innovativeness (Wejnert, 2002).

When studies reported in related literature regarding the barriers to innovativeness are examined, it is seen that these studies mostly focused on technological innovations. All these studies investigated the barriers to the adoption or use of technological innovations (Çelik, 2006; Kopcha, 2012; Kuşkaya Mumcu, 2004; Noone, 2000; Ong et al., 2003; Özaygen, 2004; Rosen, 2004). There is no research conducted to define innovativeness as a general personality trait and to examine the barriers to innovativeness.

As a consequence, innovativeness traits that transform alongside the changing social structure such as critical thinking, problem solving, communicating, collaborating, risk taking, openness to chance, experience and innovation are seen as indispensable traits in the innovative world of the twenty-first century (Partnership for 21st Century Skills, 2010). Absence of education cannot be considered where there is personal change. Thus, education and innovativeness affect each other mutually and look to each other for input; education shapes innovativeness and supports its development, while innovativeness increases the quality of education. The fact that teachers play a crucial role in shaping the next generations, as well as the need for innovative instructors, has put crucial responsibilities on educators generally. Higher education systems are constantly updated to meet the needs of the society parallel to technological innovations. For this reason, the higher education department of Computer Education and Instructional Technologies (CEIT) was founded in 1998 in Turkey to meet the needs of the society especially in line with technological innovations (Republic of Turkey Council of Higher Education [YÖK], 1998). Thus, the department of Computer Education and Information Technologies (CEIT) generally aims at training technology leaders necessary for the society and educational institutions. CEIT graduates whose mission covers a wide range of duties from teaching technology to leading the spread of technology (Ministry of National Education [MEB], 2007) work in the field of education both in public and private institution. CEIT graduates play an important role in the process of introducing young members of the society to technological innovations at early ages. In this context, research was conducted toward the detection of perceived barriers to innovativeness by the pre-service teachers as technology leaders. To realize these purposes, the following research questions are asked:

1. What are the perceptions of pre-service teachers on barriers to innovativeness?
2. Are there any significant differences in the level of pre-service teachers' perceptions on barriers to innovativeness related to (a) gender, and (b) monthly family income?

2. METHOD

2.1. Participants

The target population of the present study was the senior students attending CEIT departments of universities in Turkey in the Spring Term of the academic year of 2008-2009. CEIT graduates whose mission covers a wide range of duties from teaching technology to leading the spread of technology work in the field of education. Also, CEIT graduates play an important role in the process of introducing young members of the society to technological innovations at early ages in Turkey. For these reasons, CEIT departments were selected as a target population. According to the data provided by the Student Selection and Placement Center (ÖSYM) of the Turkish Higher Education Council, 1149 students from a total of 28 universities began to study in CEIT departments in 2006, and they were expected to be senior students in their departments in 2009 (Student Selection and Placement Center [ÖSYM], 2006). All of these 1149 students were involved in the scope of the study, and 777 students (68%) from 26 universities responded to the questionnaire. Table 1 presents the demographic information about the participants.

Table 1: Demographic Backgrounds of the Participants

		Frequency (f)	Percent (%)	Cumulative Percent (%)
Gender	Female	287	36.9	36.9
	Male	490	63.1	100.0
Monthly family income	0-650 ₺	87	11.2	11.2
	651-1300 ₺	349	44.9	56.1
	1301-1950 ₺	221	28.4	84.5
	1951-2600 ₺	62	8.0	92.5
	2601 ₺ and above	45	5.8	98.3
	Missing	13	1.7	100.0
Adopter groups	Laggards	10	1.3	1.3
	Late Majority	79	10.2	11.5
	Early Majority	328	42.2	53.7
	Early Adopters	293	37.7	91.4
	Innovators	67	8.6	100.0

₺=Turkish Lira; 1₺=0.6545$ (Indicative Exchange rates Announced on April 26, 2011 by the Central Bank of Turkey)

As seen in Table 1, the majority of participants were male and had a relatively low monthly family income and a moderate level of innovativeness.

2.2. Instruments

In order to gather the research data, the early form of Turkish Adapted Version of Individual Innovativeness Scale and Barriers to Innovativeness Questionnaire, which was developed by the researchers, was used.

2.2.1. Turkish adapted version of individual innovativeness scale

This scale, originally published in English as the *'Innovativeness Scale (IS)'*, was developed in 1977 by Hurt et al. The scale, made up of 20 5-point Likert-type items, was used to measure the innovativeness levels of the individuals in terms of their general personal traits and to categorize individuals as laggards, late majority, early majority, early adopters and innovators. The lowest score was 14, and the highest was 94 (Hurt et al., 1977). Its adaptation into Turkish was made by Kılıçer and Odabaşı (2010). The adaptation study of the scale was carried out with 343 undergraduate students of 12 teacher-training programs at one of the most populated state universities in Turkey in the academic year of 2008-2009. As a result of this adaptation, the scale was made up of four factors (Resistance to change, Risk-taking, Openness to experience and Opinion-leading); the total explained variance of these four factors was 52.521%; the structures of the factors were valid; and the Turkish-version was efficient in distinguishing individuals in terms of individual aspects being measured. The reliability coefficient of Cronbach's Alpha corresponding to the Turkish-version was found to be .82, and the test-retest reliability coefficient was found to be .87. For this reason, early form of Turkish adapted version of innovativeness scale was used to categorize pre-service teachers as laggards, late majority, early majority, early adopters and innovators.

2.2.2. Barriers to innovativeness questionnaire

This questionnaire, developed by the researchers, comprised two parts. The first part included questions directed to determine the demographic backgrounds of the participants; the second part was made up of five-point Likert-type items to determine the barriers perceived by the pre-service teachers regarding innovativeness. In the process of developing the questionnaire, the related literature was reviewed, and the barriers mentioned in the literature were examined (Andrews, 2007; Cougher, 1994; Entsminger, 1995; Greene, 1997; Hannan, 2005; Lin, 1998; Loewe & Dominiquini, 2006; Noone, 2000; Odabaşı, 2007; Ong, et al., 2003; Rogers, 1995; Tiwari & Buse, 2007; Wejnert, 2002). Following this, a range of focus group discussions related to the validity of the barriers determined were held. The participants of the focus group discussions were chosen with the maximum variation sampling method. A total of six participants -two instructors and three postgraduate students and one graduate from the CEIT department took part in the focus group discussions. The data collected via the focus group discussions were analyzed with content analysis. For the credibility of the data obtained via content analysis, peer debriefing was used as suggested by Erlandson, Harris, Skipper & Allen (1993). In peer debriefing, a meeting for evaluation was made with a professional outside the field, and studies from data collection to analysis of the data were re-evaluated in line with the feedback provided by the professional. As a result of the analysis of the data, 22 sub-themes that generated the range of the questionnaire were determined, and 42 draft items were prepared related to these themes. For content validity, ten field experts were asked for their views about the draft items. In line with their views, two items were excluded from the questionnaire due to the fact that their content was similar. Furthermore, in order to evaluate the comprehensibility and appropriateness of the items, a preliminary study was conducted. In this preliminary study, the draft questionnaire was applied to five students who were senior students in CEIT departments, and they were asked what each item meant. In this way, the data related to the content validity were collected, and the comprehensibility and appropriateness of the items were evaluated. As a result of the questionnaire, 40 five-point Likert-type items related to three main barrier dimensions (individual barriers: 10 items; institutional barriers: 23 items; and social barriers: 7 items) were included in the questionnaire. The Likert-type items ranged from *'Completely Agree=5'* to *'Completely Disagree=1'*. The Cronbach's Alpha reliability of the items was calculated as .91.

2.3. Data Analysis

The analysis of the data helped examine whether the data were distributed normally and were homogeneous. According to the test results, the distribution of the responses related to the barriers to innovativeness was found to be homogeneous. While determining the innovativeness categories in which the pre-service teachers were involved, the evaluation scores found in the original form of the Turkish Version of Individual Innovativeness Scale were used (Hurt et al., 1977).

The means, percentages and frequencies regarding the pre-service teachers' levels of agreement on the barriers to innovativeness were calculated. For the evaluation of the means obtained, the evaluation scores were used. As the individuals' levels of agreement on the barriers to innovativeness ranged from 1 to 5, the mean of the barriers to innovativeness was divided into five evaluation levels. The evaluation levels were determined with the class interval formula (h-l)/n. In this formula, *'h'* is the highest possible average; *'l'* is the lowest possible average; and *'n'* is the perception level (number of classes). Moreover, .01 was added to each subsequent lower limit in order to prevent the intervals from overlapping each other (Levin, Fox & Forde, 2010). According to this, if the calculated mean was between 1.00-1.80, it was considered that the participant completely disagreed; if the mean was between 1.81-2.60, the participant disagreed; if the mean was between 2.61-3.40, the participant was hesitant to agree; if the mean was between 3.41-4.20, the participant agreed; and if the mean was between 4.21-5.00, the participant completely agreed with the related items.

Also, in terms of each innovativeness category, the levels of agreement on the barriers to innovativeness were compared with cross tables. For the interpretation of the results obtained via the statistical calculations, the significance level was accepted as .05.

3. RESULTS

3.1. Perceptions on Barriers to Innovativeness

The pre-service teachers' levels of agreement on the 40 barriers given were evaluated, and descriptive statistics such as frequency, percentage and means are given in Table 2.

Table 2: Descriptive Statistics for Barriers Categories

Barrier Categories	Completely Disagree		Disagree		Undecided		Agree		Completely Agree		N	$\overline{X}$
	f	%	f	%	f	%	f	%	f	%		
Institutional Barriers	269	1.5	1505	8.5	4170	23.5	8042	45.3	3768	21.2	777	3.76
Social Barriers	206	3.8	686	12.7	1399	25.9	2167	40.1	950	17.6	777	3.55
Individual Barriers	352	4.5	1108	14.4	1942	25.2	3074	39.9	1233	16.0	777	3.48

As seen in Table 2, the pre-service teachers perceived all of the listed items as barriers to innovativeness. The pre-service teachers stated that they considered the items at the institutional level as the greatest barriers to innovativeness. It was also determined that they considered the items on social and individual levels as subsequent barriers to innovativeness, respectively. The pre-service teachers participating in the study reported that they agreed on all the barriers (43.03%) or completely agreed on the barriers (19.28%). According to this, it was seen that the majority of the participants perceived the listed items as barriers to innovativeness.

When the items under the barrier categories were examined, it was found out that the pre-service teachers considered *'Being unable to access information in an efficient way due to lack of foreign language'* ($\overline{X}$=3.80), *'Individuals' avoidance of taking risks'* ($\overline{X}$=3.75), and *'High level of costs'* ($\overline{X}$=3.73) as the greatest individual barriers to innovativeness. *'Religious values of the individual'* ($\overline{X}$=2.59), *'The fear of being refused by the society'* ($\overline{X}$=3.23) and *'Reluctance of the individual for change'* ($\overline{X}$=3.38) were among those that the individuals least considered as barriers to innovativeness.

It was also revealed that the pre-service teachers considered *'Educational institutions' inability to plan sufficient activities that support innovativeness'* ($\overline{X}$=3.94), *'Exams or tasks failing to support creativity'* ($\overline{X}$=3.93), and *'Lack of courses supporting innovativeness'* ($\overline{X}$=3.91) as the greatest institutional barriers to innovativeness. However, it was seen that *'Avoiding involving students in projects organized in educational institutions'* ($\overline{X}$=3.53), *'Instructors leaving students alone with problems'* ($\overline{X}$=3.55), and *'Institutional culture closed to change'* ($\overline{X}$=3.58) were least regarded by the pre-services teachers as institutional barriers to innovativeness.

It was also found out that the pre-service teachers considered *'Insufficient national education policies'* ($\overline{X}$=3.80), *'Insufficient cooperation between institutions'* ($\overline{X}$=3.76), and *'Social environments failing to support innovativeness'* ($\overline{X}$=3.66) as the greatest social barriers to innovativeness. However, it was seen that *'Family structures failing to support innovativeness'* ($\overline{X}$=3.20), *'Social values preventing innovativeness'* ($\overline{X}$=3.35), and *'Rapid change in technology'* ($\overline{X}$=3.47) are least frequently regarded by the participants as social barriers to innovativeness.

Perception levels of the pre-service teachers were evaluated separately in terms of innovativeness categories (adopter groups). For the evaluation of each adopter group, agreement on the barriers was listed from the highest to the lowest. As a result, the barriers to innovativeness with the highest and the lowest priorities were determined for each adopter group by examining the three barriers with the highest and the lowest agreement level as given in Table 3 and 4.

Table 3: Results of the High Priority Barriers to Innovativeness in terms of Adopter Groups

Items	Barrier Category	Innovators		Early Adopters		Early Majority		Late Majority		Laggards	
		$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*
Educational institutions' inability to plan sufficient activities that support innovativeness	Institutional	4.24	1	4.04	1	3.91	2	3.47	20	3.90	2
Absence of different lectures providing creativeness	Institutional	4.24	2	3.99	2	3.86	6	3.51	15	3.70	10
Absence of democratic environment supportive to free thinking	Institutional	4.15	3	3.94	9	3.87	5	3.52	13	3.30	29
Limitedness of technological tools in educational	Institutional	4.04	8	3.98	3	3.83	9	3.51	14	3.00	37

Items	Barrier Category	Innovators		Early Adopters		Early Majority		Late Majority		Laggards	
		$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*
institutions											
Exams or tasks failing to support creativity	Institutional	4.06	7	3.98	4	3.93	1	3.66	2	3.80	6
Insufficiency of the technological infrastructure of educational institutions	Institutional	3.94	14	3.97	5	3.88	3	3.45	22	3.40	25
Instructors' not being able to guide students in innovativeness	Institutional	4.04	10	3.96	6	3.88	4	3.67	1	3.50	22
Instructional process capable of developing high order thinking skills	Institutional	4.11	4	3.90	11	3.81	10	3.64	3	3.60	15
Individuals' avoidance of taking risks	Individual	3.69	27	3.77	20	3.77	16	3.61	6	4.20	1
Ignorance of the individual toward innovativeness	Individual	3.27	36	3.52	34	3.52	32	3.21	37	3.80	3

*Rank= Level of ordering as a result of the ordering of the levels of agreement on the barriers mentioned from the highest to the lowest

As seen in Table 3, among the pre-service teachers, *'Educational institutions' inability to plan sufficient activities that support innovativeness'* was considered as a barrier to innovativeness with a high priority among Innovators and Early adopters; the Early Majority listed the high-priority barrier as *'Exams and tasks failing to support creativity'*; the Late Majority considered the barrier to be *'Instructors unable to guide students in innovativeness'*; and Laggards found *'Individuals' avoidance of taking risks'* as a barrier to innovativeness with the highest priority.

Considering the high-priority barriers related to innovativeness, it was seen that institutional factors were the primary barriers to innovativeness in terms of innovators, Early Adopters, the Early Majority and the Late Majority, and that for Laggards, it is the individual factors that were seen as the primary barriers to innovativeness. It was also found out that the institutional barriers with high priority as regarded by the adopters groups were related to the innovative quality of the instructional process, the innovative visions of the administrators and the practical application of this vision.

From the view of the adopter groups, innovators had the highest level of perception regarding the barriers listed when compared with the participants of the other categories. Early Adopters and the Early Majority considered the technological infrastructure of educational institutions as barriers with higher priority than did other groups, while Laggards attributed lower priority to the same barriers than did the other groups. Finally, only Laggards regarded individual factors as barriers to innovativeness with high priority.

Table 4: Results of the Low Priority Barriers to Innovativeness in terms of Adopter Groups

Items	Barrier Category	Innovators		Early Adopters		Early Majority		Late Majority		Laggards	
		$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*	$\overline{X}$	Rank*
Religious values of the individual'	Individual	2.50	40	2.65	40	2.52	40	2.68	40	3.20	31
Reluctance of the individual for chance	Individual	3.01	39	3.38	37	3.41	36	3.49	17	3.60	16
The fear of being refused by the society	Individual	3.04	38	3.24	38	3.29	37	3.09	39	3.50	19
Family structures failing to support innovativeness	Social	3.18	37	3.21	39	3.21	39	3.18	38	3.00	39
Social values preventing innovativeness	Social	3.55	31	3.43	35	3.26	38	3.24	36	3.50	31
Insufficiency of instructor exchange programs	Institutional	3.85	18	3.75	22	3.58	28	3.48	19	3.00	40
Insufficiency of technical support given by the institution	Institutional	4.04	9	3.82	16	3.73	20	3.38	28	3.00	38

*Rank= Level of ordering as a result of the ordering of the levels of agreement on the barriers mentioned from the highest to the lowest

When the barriers to innovativeness regarded with low priority were examined, as seen in Table 4, it was seen that Innovators, Early Adopters, the Early Majority and the Late Majority regarded *'Religious values of the individual'* and Laggards regarded *'Insufficiency of instructor exchange programs'* as barriers to innovativeness with low priority.

Considering the barriers perceived as low priority, it was found out that innovators regarded individual barriers as barriers to innovation with low priority, yet for Early Adopters, the Early Majority and the Late Majority, it was a social barrier and for Laggards it was an institutional barrier. It was also seen that those social barriers that adopter groups regarded as barriers to innovativeness with low priority included family structure and social values, failing to support innovativeness and the fear of refusal by the society.

When the barriers regarded as low priority were examined, it was seen that *'Insufficiency of technical support given by the institution'* increase as one moves from Innovators to Laggards, while *'Reluctance of the individual for change'* decreases in priority from Innovators to Laggards. *'Family structures failing to support innovativeness'* was regarded as one of the barriers with low priority for all adopter groups and *'Religious values of the individual'* was regarded as the barrier with the lowest priority by all the categories except Laggards.

In analyzing the adopter groups, Innovators had the highest and the lowest levels of agreement on the listed barriers as compared to the other groups. Early Adopters, the Early Majority and the Late Majority regarded social factors as barriers to innovativeness with a lower priority than the other categories. Finally, only the Laggards regarded institutional factors as barriers to innovativeness with a low priority. Also, the Laggards regarded religious values of an individual's belief system as mid-level barriers to innovativeness than did the other groups.

3.2. Investigation of Perceptions in terms of Demographic Variables

In order to put forth the perception levels of the pre-service teachers in more detail, whether there were any significant differences between perceptions of barriers to innovativeness and demographic variables was examined. Due to the higher income levels of innovative individuals (Beal & Bohlen, 1956) as well as due to the negative relationship between the cost of the innovations and the adoption of these innovations (Hsua et al., 2007), the relationship between perceived barriers to innovativeness and monthly family income was analyzed. Also, as the innovativeness was examined as a trait of personality, the relationship between the perception of barriers to innovativeness and gender was tested. The findings obtained as a result of this analysis are given in Table 5.

For these purposes, an independent sample t-test was applied to determine whether there was any significant difference in the pre-service teachers' perceptions of barriers to innovativeness with respect to gender, and the results obtained are presented in Table 5.

Table 6: Results of t-test in terms of Gender

Gender	N	$\overline{X}$	Sd	*t*	df	*p*<	η^2
Female	287	3.73	0.44	3.713	775	.001	
Male	490	3.61	0.45				

As seen in Table 5, it was found out that the levels of perceptions of barriers to innovativeness differed significantly between male and female participants ($t(775)=3.713$, $p<.05$, $\eta^2=.13$) in that the female participants were more likely to regard the mentioned items as barriers than did males.

Also when the levels of perceptions of the participants of barriers to innovativeness were examined, it was seen that the female participants had a higher level of agreement than did the male participants. However, it was also found out that at the highest extreme (*'Educational institutions' inability to plan sufficient activities that support innovativeness* ($\overline{X}_{female}=4.06$ - $\overline{X}_{male}=3.88$)', *'Exams or tasks failing to support creativity* ($\overline{X}_{female}=4.03$ - $\overline{X}_{male}=3.87$)*'* and *'Instructors' inability to guide students about innovativeness* ($\overline{X}_{female}=4.00$ - $\overline{X}_{male}=3.84$)*'*) and at the lowest extreme (*'Religious values of the individual'* ($\overline{X}_{female}=2.62$ - $\overline{X}_{male}=2.58$)*', 'Family structures failing to support innovativeness of the individual'* ($\overline{X}_{female}=3.33$ - $\overline{X}_{male}=3.12$)*'* and *'The fear of being refused by the society* ($\overline{X}_{female}=3.35$ - $\overline{X}_{male}=3.16$)*'*), the perception levels were the same; thus, the female and male participants regarded similar factors as barriers with high and low priority.

One way-ANOVA was used to determine if there was any significant difference in the pre-service teachers' perceptions of barriers to innovativeness in terms of monthly family income. As a result of the analysis, it was determined that there was no significant difference between the perception levels of barriers to innovativeness with respect to monthly family income ($F(4-759)=0.779$, $p>.05$).

4. DISCUSSION

In the light of the findings obtained in the study, the majority of the 777 pre-service teachers were found to regard all of the listed items in individual, institutional and social dimensions as barriers to innovativeness. The participants were also found to see the barriers at the institutional level as main barriers to innovativeness and to see the factors at the individual

level as the least-influential barriers to innovativeness. In addition, all the ten items that the participants considered as barriers to innovativeness were the barriers at the institutional level. According to this, it could be stated that pre-service teachers rank factors that are derived from their home institutions, from the society and finally from themselves as barriers to innovativeness. The following items are those which the participants regarded as barriers to innovativeness in different dimensions (individual, institutional and social):

- being unable to access current information effectively due to language barriers;
- educational institutions unable to plan sufficient activities that support innovativeness;
- insufficiency of national education policies.

Considering the individual barriers that are regarded with high priority, the cost of innovations (income), the uncertainty associated with innovations (risk taking) and being unable to access current information (lack of information) are shown to be listed in order of priority. This finding is consistent with the findings that the financial potentials are influential on individuals' preferences of innovation (Özaygen, 2004); that resistance to change due to failure in risk-taking is one of the most important perceived barriers to innovativeness (Noone, 2000); and that there is a relationship between the individual' level of knowledge and innovativeness (Ong et al., 2003). Depending on the findings obtained, it could be stated that pre-service teachers find problems in terms of keeping up with the current innovations and informational, affective and financial problems as the most important individual barriers. However it is noticeable that pre-service teachers who participated in the study regarded insufficiency of foreign language knowledge as a more of a barrier than financial insufficiency. Thus, it can be understood that with the development of Internet technologies and technological changes in our life, any kind of information about current innovations is accessible through the Internet without taking risks or having to make a purchase. With the development of Internet technology, individuals can thus follow innovations without buying them and can have virtual experiences with them. In short, in our current society, the Internet is not in itself enough to have an innovation, but it does allow accessing all kinds of information about that innovation. Considering that the languages that most Internet users worldwide speak are English, Chinese, Spanish, Japanese, Portuguese, German, Arabic, French, Russian and Korean (82.20%) -and English comes first with 27.30% of users (Internet Word Stats, 2010) -it could be stated that the greatest barriers to effective access to information for Turkish students is inefficiency of language.

In addition to this, it is seen that the participants considered the religious values of an individual as an individual barrier with low priority. According to this, it could be understood that the belief system of an individual is not seen as a barrier to innovativeness. However, individuals' belief systems could be regarded as a barrier, though this perception is in the minority (26.60%, f=205).

Considering the institutional barriers with high priority barriers, it could be said that the small quantity and poor quality of activities that are supportive of innovativeness was regarded by the participants as the most important institutional barriers. Thus, it could be stated that taking active roles in tasks and lectures was regarded by participants as the most important factor in developing innovativeness and creativity. Also, it could be said that creativity and critical thinking during education are considered more important than other dimensions (infrastructure, schedule, instructor, corporate culture and administration) in terms of innovativeness. Nonetheless, it could be said that the participants regarded the point of view of the administration/administrators about innovativeness as a barrier that has the least importance. Çelik (2006) states that institutional factors such as lack of institutional culture, motivation, leadership and administrative structure of institutions influence innovativeness. Thus, it could be

stated that students think the administration/administrators should take a more active role in developing innovativeness/creativity.

As another remarkable result, though it is reported in studies conducted that lack of equipment and infrastructure is among the factors influencing innovativeness and the application of innovations (Çelik, 2006; Kuşkaya Mumcu, 2004), participants see the insufficiency of the technological infrastructure and its inability to be updated as a barrier to innovativeness with a lower priority than others. Thus, it could be stated that creativity and critical thinking are thought to be more important than is technological infrastructure in terms of innovativeness, and the development of these features has a more important effect in the education process. This situation has made it obvious that it is necessary to focus more on the instructional process after thanks to satisfactory investments on educational technologies especially in developing countries such as Turkey, as Bo & Ye-mei (2010) suggest. In addition, due to the fact that innovativeness is one of the most important factors in technology use (Rosen, 2004), it should be remembered that the innovation-focused instruction to be given to pre-service teachers will contribute to the process of technology integration in their professional lives.

Considering the social barriers that are perceived to have high priority, it could be said that the participants regarded the policies related to education and the cooperation between institutions as the most important factors, rather than the norms and values of culture. Thus, it could be stated that the identification of valid targets by institutions and making the right decisions to achieve them, as well as institutional cooperation in increasing the quality of education, are considered important by pre-service teachers. When barriers to innovativeness were examined in terms of adopter groups, the following results were obtained:

- Laggards view religious values as mid-level barriers to innovativeness;
- Laggards view factors in the individual dimension as barriers to innovativeness with high priority, while they see factors in the institutional dimension as barriers with low priority;
- Innovators see factors in the institutional dimension as barriers to innovativeness with high priority, while they see factors in the individual dimension as barriers with low priority;
- Innovators have the highest and lowest perception levels;
- Early Adopters, the Early Majority and the Late Majority see the factors in the institutional dimension as barriers to innovation with high priority, while they see factors in the social dimension as barriers with low priority;
- Early Adopters and the Early Majority see factors related to the technological infrastructure of educational institutions as barriers to innovativeness with higher priority, as Zayim, Yıldırım & Saka (2006) suggest;
- For all adopter groups, institutional barriers that are regarded with high priority are the innovative quality of the education process, as Couger (1994), Noone (2000), and Odabaşı (2007) argue, and the innovative vision of the administrators, as Greene (1997), Hannan (2005), and Loewe & Dominiquini (2006) suggest;
- Social barriers related to innovativeness with a low priority for all adopter groups are family structure, social values and social acceptance.

When the findings obtained are examined, it is seen that when proceeding from the most positive category (Innovators) to the most negative category (Laggards), factors in the institutional dimension are regarded with a lower priority, and factors in the individual dimension are regarded with a higher priority. Items of *'Reluctance of the individual for change'* and *'Individuals' avoidance of taking risks'* are seen to increase gradually when moving from

Innovators to Laggards. This result are consistent with the characteristics of adopter groups as stated by Beal & Bohlen (1956), Rogers (1963), Casey et al. (1994), Geoghegan (1995), and Rogers (1995).

Greenhalgh et al. (2008) pointed out that the need for support in technological innovations is negligible among Innovators, while it is great among Laggards. Conversely, as a result of the study, the item of *'Insufficiency of technical support given by the institution'* is seen to be regarded as a low-level barrier, decreasing gradually from Innovators to Laggards. It can be understood that the most important reason for this may derive from the fact that the most negative categories perceive technological support in terms of innovativeness as a lower barrier than other factors.

When perceptions of pre-service teachers regarding barriers to innovativeness are examined in terms of demographic variables, despite the fact that the number of the female participants was lower than one-third of the number of male participants, it was found out that there were significant differences between the perception levels of the male and female participants regarding the barriers to innovativeness. Depending on this finding, it could be stated that the female participants perceived the items as barriers more than did the male participants. Although Hsua and his colleagues (2007) state that there is a negative relationship between the adoption and cost of innovations, it was found out that there was no significant difference between the perception levels of barriers to innovativeness in terms of monthly family income. This result does not support the finding of another study conducted by Wejnert (2002) and Andrews (2007), who stated that socio-economic level and lack of financial opportunity are barriers to innovativeness. According to the result obtained, in terms of the socio-economic level, it could be said that there were no significant differences in the perception levels of barriers to innovativeness among the participants.

5. CONCLUSIONS

The pre-service teachers who participated in the study agreed on all of the barriers to innovativeness. The participants primarily regarded institutional factors, then individual and social factors, as barriers. This result once again puts forth the relationship of the concept of innovativeness with education. For adopter groups, moving from Laggards to Innovators, institutional factors are regarded as the main barriers to innovativeness. The participants' levels of perceptions of the barriers to innovativeness demonstrated significant differences in terms of gender, while it did not reveal any difference in terms of monthly family income. As a result of the study, it was seen that monthly family income does not create a significant difference in perceiving the barriers of innovativeness, while it caused significant differences in terms of gender. Today, Turkey should avoid focusing on equipment in educational investments and produce projects that will help introduce individuals to the culture of innovativeness at earlier ages both in higher education and in primary and secondary education by adopting innovative educational policies. The following suggestions are put forward to train pre-service teachers in higher education:

- First, by increasing course variety, the capacity of pre-service teachers producing innovative and creative ideas, and their ability to guide technology must be supported;
- Instructional progress must be constructed in a way to support high-order thinking skills, free thinking and creativity and activities, and exams supportive of those features must be prepared;
- Technological infrastructure of universities must be improved, and technological tool variability must be increased;

- Corporate culture with a vision of innovativeness must be formed in universities, and administrators must be role models for pre-service teachers in terms of innovativeness;
- Universities must allow pre-service teachers to meet new innovations by carrying out activities and directing attention to innovations;
- Pre-service teachers must be encouraged for innovativeness, and their fear of making mistakes must be reduced.

Considering the relationship between innovativeness and the university features, determining innovativeness profiles of administrators, instructors and pre-service teachers, as well as barriers to innovativeness, are examples of comparative further research projects suggested by the researchers.

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Uzun Özet

21. yüzyılın bilim toplumunda bireylerin sahip olması gereken özellikler önemli ölçüde değişmiş ve dönüşüme uğramıştır. Eleştirel düşünme, problem çözme, iletişim kurma, işbirliği yapabilme, gereksinim duyulan bilgiye güvenilir bir şekilde ve hızla ulaşma, teknolojiyi etkili kullanabilme ve yenilikçilik gibi özellikler 21. yüzyılın yenilikçi dünyasında artık vazgeçilemez özellikler olarak görülmektedir (Partnership for 21st Century Skills, 2010). Ayrıca artan bilgi miktarına paralel olarak on yıllık dönemler içerisinde ortaya çıkan yeniliklerin sayısındaki artış, yeniliklere karşı verilmesi gereken tepki süresi kısalmıştır. Bu durum, bireylerin yenilikçilik özelliği sergileme gerekliliğini daha da önemli kılmıştır. Eskiden yenilikçilik fark yaratmada rol oynayan önemli bir etken iken, günümüzde yenilikçilik artık fark yaratmanın olmazsa olmazı olmuştur.

Yenilikçiliğin bu kadar değer kazandığı günümüz toplumunda yenilikçiliğin önünde engel olarak algılanan durumların incelenmesi, yenilikçilik kültürünün doğru ve planlı bir biçimde oluşturulmasına yardımcı olacaktır. Yenilikçilik kültürünün oluşturulmasında eğitimcilerin payı ve sorumluluğu yadsınamayacak bir gerçektir. Özellikle genç yaştaki bireylere yenilikçilik kültürünün aşılanmasında eğitimcilere önemli görevler düşmektedir. Teknolojinin öğretiminden teknolojinin yayılmasına liderlik etmeye kadar geniş bir görev tanımı bulunan Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) bölümü, eğitim kurumlarının ve toplumun gereksinim duyduğu genel anlamda teknoloji liderlerini yetiştirmeyi amaçlamaktadır. Bu bağlamda, yakın gelecekte birer eğitimci olacak öğretmen adaylarının yenilikçilik önündeki algılarının belirlenmesi son derece yararlı olacaktır. Bu araştırmada, Türkiye'de teknoloji lideri olarak görülen BÖTE bölümü öğretmen adaylarının yenilikçiliğe ilişkin engel olarak algıladıkları durumlar ve demografik değişkenler açısından engellere bakış açıları incelenmiştir.

Betimsel ve ilişkisel tarama yöntemine göre desenlenen bu çalışmanın hedef kitlesini 2008–2009 öğretim yılı bahar döneminde Türkiye genelindeki üniversitelerin BÖTE bölümünde öğrenim gören dördüncü sınıf öğrencileri oluşturmaktadır. Öğrenci Seçme ve Yerleştirme Merkezi (ÖSYM)'den alınan verilere göre belirtilen dönemde 28 üniversitede toplam 1149 öğrenci BÖTE bölümünün son sınıfında öğrenim görmektedir (ÖSYM, 2006). Çalışmaya bütün öğrenciler dahil edilmiştir. Ancak iki üniversiteden geri dönüş olmamış ve veri toplama aracını 26 üniversiteden toplam 777 öğrenci yanıtlamıştır. Çalışmanın geri dönüş oranı 68%'dir.

Çalışmanın amaçları doğrultusunda verilerin toplanması için Kılıçer ve Odabaşı (2010) tarafından Türkçeye uyarlanan Bireysel Yenilikçilik Ölçeği'nin ilk versiyonundan ve araştırmacılar tarafından geliştirilen Yenilikçiliğin Önündeki Engeller Anketi'nden yararlanılmıştır. Bireysel Yenilikçilik Ölçeği'nin Türkçeye uyarlanma çalışması, Türkiye'de önde gelen bir devlet üniversitesinde bulunan 12 öğretmenlik programında 2008-2009 öğretim yılında öğrenim görmekte olan 343 üniversite öğrencisi üzerinde gerçekleştirilmiştir. Türkçeye uyarlanan Bireysel Yenilikçilik Ölçeği, beşli Likert şeklinde 20 maddeden oluşmakta, bireylerin genel kişilik özelliği anlamında yenilikçilik düzeyini ölçmek ve bireyleri yenilikçilik açısından kategorize edebilmek amacıyla kullanılmaktadır. Uyarlama çalışması sonucunda ölçeğin dört fartörlü bir yapı sergilediği, açıklanan toplam varyansının %52,5 olduğu ve faktör yapılarının geçerli olduğu belirlenmiştir. Ayrıca ölçeğin Türkçe formuna ait Cronbach's Alpha güvenirlik katsayısı .82, test-tekrar test güvenirlik katsayısı .87 olarak belirlenmiştir. Araştırmacılar tarafından geliştirilen Yenilikçiliğin Önündeki Engeller Anketi ise, öğretmen adaylarının yenilikçiliğin önündeki engellere yönelik görüşlerini belirlemek için hazırlanmış beşli Likert şeklinde 40 ifade bulunmaktadır. Anketin geliştirilmesi sürecinde öncelikle alanyazında belirtilen engeller incelenmiş, daha sonra ise belirlenen engellerin kapsam geçerliğine ilişkin odak grup görüşmesi yapılmıştır. İçerik analiziyle çözümlemesi yapılan odak grup görüşmesi verileri doğrultusunda taslak maddeler hazırlanmıştır. Hazırlanan taslak maddeler geçerlilik için on kişilik uzman gruba sunulmuş ve uzmanlardan gelen görüşler doğrultusunda maddelere son şekli verilmiştir. Geliştirme süreci sonucunda üç ana engel boyutuna ait beşli Likert şeklinde 40 madde (bireysel engeller 10 madde, kurumsal engeller 23 madde ve toplumsal engeller 7 madde) ankete dahil edilmiştir. Beşli Likert şeklindeki ifadeler "Kesinlikle Katılıyorum=5" ile "Kesinlikle Katılmıyorum=1" şeklinde derecelendirilmektedir. Maddelerin iç tutarlılığına ait Cronbach's Alpha güvenirlik katsayısı .91 olarak hesaplanmıştır.

Araştırma sonucunda BÖTE bölümü öğretmen adayları yenilikçiliğe ilişkin bireysel, kurumsal ve toplumsal engel olarak sıralanan durumların tamamına yönelik olumlu görüş bildirmiştir. Öğretmen adaylarının engel boyutları içerisinde en çok kurumsal boyuttaki durumları yenilikçiliğe ilişkin engel olarak gördükleri belirlenmiştir. Daha sonra ise sırasıyla toplumsal ve bireysel boyuttaki durumları yenilikçiliğe

ilişkin engel olarak algıladıkları belirlenmiştir. Buna ek olarak, katılımcıların yenilikçiliğe ilişkin yüksek öncelikli engel olarak gördükleri ilk on durumun tamamı kurumsal boyuttaki engellerdir. Buna göre, öğretmen adaylarının öncelikli olarak eğitim gördükleri kurumdan, daha sonra ait oldukları toplumdan ve son olarak kendilerinden kaynaklı durumları yenilikçiliğe ilişkin engeller olarak gördükleri söylenebilir. Öğretmen adaylarının yenilikçiliğin önünde en çok engel olarak algıladıkları durumların; kurumsal engeller içerisinde "Eğitim kurumları tarafından yenilikçiliği destekleyici yeterli etkinliklerin planlanamaması", toplumsal engeller içerisinde "Ulusal eğitim politikalarının yetersizliği" ve bireysel engeller içerisinde ise "Yabancı dil yetersizliği nedeniyle güncel bilgiye etkili bir şekilde ulaşılamaması" olduğu belirlenmiştir. En az engel olarak algılanan durular ise; kurumsal engeller içerisinde "Eğitim kurumlarında gerçekleştirilen projelerde öğrencilere görev verilmemesi", toplumsal engeller içerisinde "Aile yapısının yenilikçiliği desteklememesi", bireysel engeller içerisinde ise "Bireyin sahip olduğu dini değerleri" dir.

Araştırmada, yaratıcılığı ve yenilikçiliği destekleyici etkinliklerin yeterli sayı ve nitelikte olmamasının yenilikçiliğe ilişkin kurumsal düzeyde yüksek öncelikli algılanan engeller olduğu söylenebilir. Bu durum, araştırmanın katılımcıları tarafından, eğitim kurumlarında gerçekleştirilen etkinliklerde, derslerde ve ödevlerde aktif bir şekilde rol almanın, yenilikçiliğin ve yaratıcılığın gelişmesindeki en önemli unsur olarak algılandığı şeklinde yorumlanabilir. Ayrıca araştırmanın katılımcıları tarafından öğretim sürecinde yaratıcılığın ve eleştirel düşünmenin yenilikçilik açısından diğer boyutlardan (altyapı, ders programı, öğretim elemanı, kurum kültürü ve yönetim) daha önemli görüldüğü söylenebilir. Buna karşın katılımcıların, eğitim kurumlarındaki yönetimin/yöneticilerin yenilikçiliğe bakışlarını, yenilikçiliğe ilişkin en düşük öneme sahip engel olarak algıladıkları söylenebilir. Bu durum, eğitim kurumlarındaki yönetimin/yöneticilerin, öğrenim gören öğrenciler tarafından yenilikçiliğin ve yaratıcılığın gelişmesinde aktif rol almaları gerektiği, buna karşın yeterince rol alamadıkları olarak görüldüğü şeklinde yorumlanabilir.

Yenilikçilik kategorileri açısından yenilikçiliğe ilişkin yüksek öncelikli algılanan engellere bakıldığında Yenilikçi, Öncü, Sorgulayıcı ve Kuşkucu kategorileri açısından kurumsal engellerin, buna karşın Gelenekçi kategorisi açısından ise bireysel engellerin yenilikçiliğe ilişkin yüksek öncelikli engeller olduğu belirlenmiştir. Yenilikçiliğe ilişkin düşük öncelikli algılanan engellere bakıldığında ise Yenilikçi kategorisi açısından bireysel engellerin, Öncü, Sorgulayıcı ve Kuşkucu kategorileri açısından toplumsal engellerin ve Gelenekçi kategorisi açısından ise kurumsal engellerin yenilikçiliğe ilişkin düşük öncelikli engeller olarak algılandığı belirlenmiştir. Buna göre; tüm yenilikçilik kategorileri açısından yenilikçiliğe ilişkin yüksek öncelikli olarak algılanan kurumsal engeller; öğretim sürecinin yenilikçi niteliği ve yöneticilerin yenilikçi vizyonu ile ilgilidir. Ayrıca tüm yenilikçilik kategorileri açısından yenilikçiliğe ilişkin düşük öncelikli olarak algılanan toplumsal engeller; aile yapısı, toplumsal değerler ve toplumsal kabul ile ilgilidir.

Öğretmen adaylarının yenilikçiliğe ilişkin engellere katılma düzeyleri demografik değişkenler açısından incelendiğinde, katılımcıların cinsiyetleri ile yenilikçiliğe ilişkin engellere katılma düzeyleri arasında anlamlı farklılığın bulunduğu, buna karşın öğretmen adaylarının yenilikçiliğe ilişkin engellere katılma düzeylerinde ailelerinin aylık gelirleri açısından anlamlı bir farklılık bulunmadığı belirlenmiştir.

Sonuç olarak araştırmaya katılan öğretmen adaylarının yenilikçiliğe ilişkin en çok kurumsal boyuttaki durumları, daha sonra ise sırasıyla bireysel ve toplumsal boyuttaki durumları engel olarak algılamaları, yenilikçilik kavramının eğitimle ilişkisini önemli ölçüde ortaya koymaktadır. Ayrıca yenilikçiliğin önünde engel olarak algılanan durumların ailelerin aylık gelirleri açısından farklılık göstermemesi ve eğitim kurumlarındaki teknolojik altyapının yetersizliğini ve güncellenememesini öğretim sürecine göre yenilikçiliğin önünde daha düşük düzeyde engel olarak görülmesi teknolojiye sahip olmanın yenilikçilik için ön koşul olmadığını göstermektedir. Son olarak düşük düzeyde de olsa bireyin sahip olduğu inanç sistemi yenilikçiliğe ilişkin engel olarak algılanmaktadır. Araştırmanın sonuçları ışığında araştırmacılar tarafından yüksek öğretimde öğretmen yetiştirmeye yönelik geliştirilen öneriler şunlardır:

- Yüksek öğretim kurumlarındaki ders çeşitliliği arttırılarak öğretmen adaylarının yaratıcı ve yenilikçi fikirler üretebilme kapasiteleri arttırılmalı ve teknoloji kullanımları desteklenmelidir,
- Öğretim süreci demokratik, üst düzey düşünme becerilerini, özgür düşünmeyi ve yaratıcılığı destekleyecek biçimde yapılandırılmalı ve bu özellikleri destekleyici etkinlikler ve sınavlar hazırlanmalıdır,

- Yüksek öğretim kurumlarının teknoloji altyapısı güçlendirilmeli ve teknolojik araçların çeşitliliği arttırılmalıdır,
- Yüksek öğretim kurumlarında yenilikçilik vizyonuna sahip kurum kültürü oluşturulmalı ve yöneticiler yenilikçilik açısından öğretmen adaylarına rol modeli olmalıdır,
- Yüksek öğretim kurumları gerçekleştirilecek etkinliklerle öğretmen adaylarının yeniliklerle tanışmalarına olanak sağlamalı ve onların ilgisi yeniliklere yönlendirilmelidir,
- Öğretmen adayları yenilikçilik konusunda cesaretlendirilerek yanlış yapma endişeleri azaltılmalıdır.

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