

Investigation of Relationship between Prospective Teachers' Learning Beliefs and State of Individual Innovativeness

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Abstract

Individual innovativeness is one of the most appreciated attributes of 21st-century skills which is needed in every field of daily life. Because of this appreciation, a lot of effort has been spent towards prompting individual innovativeness levels of both students and teachers in teaching and learning environments via innovative practices. Therefore, this study aimed to examine the relationship between prospective teachers' learning beliefs and their individual innovativeness state. In this study, the correlational survey method was used, and the sample of the study was comprised of 515 prospective teachers. The data of the study were collected via the 'Belief Scale towards Learning' and 'Individual Innovativeness Scale'. The data of this study were analysed using the SPSS program. Test of normality, descriptive statistics, correlational analysis and partial linear regression analysis were used to analyse the data. The results of the analysis showed that prospective teachers have a high level of constructivist and a moderate level of traditional learning beliefs while their individual innovativeness state was determined within the category of interrogators. In addition, prospective teachers' beliefs in constructivist learning were determined to be a significant predictor of their individual innovativeness state.

Keywords: Beliefs, constructivist learning, innovativeness, prospective teachers.

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1. Introduction

Today's world is witnessing a rapidly advancing and developing era in which the scientific knowledge predominates. The rapid change and development phenomenon pave the way for the creation of high-level technological and scientific innovations in today's world as well as increasing the need for new knowledge and technologies that will make human life much easier. This creates a global demand for innovation which has been increasingly valued and appreciated.

The future is waiting for us with the challenges that need to be overcome, such as globalisation and climate, technological and demographic changes. The fact that training the students to acquire the skills required for innovations and being innovative individuals is gaining importance day by day and is a vital necessity of the current period of time (Chell & Athayde, 2009). Innovativeness is defined as an eagerness to change which is a normally distributed personality structure (Hurt, Joseph & Cook, 1977) that is closely related to concepts, such as creativity, motivation, risk propensity, self-efficacy and leadership (Kilicer & Odabasi, 2010).

Scientists have always been interested in the fact that how the innovativeness develops as a personality structure among the individuals and why some individuals respond positively to innovation, while other individuals take a stand against them (Rogers, 2002). However, the most concrete work on this issue has been undertaken by Rogers who synthesised the views of researchers and the findings of the previous research studies regarding the topic of diffusion of innovations (Kinnunen, 1996). Rogers (2002) has proposed 'Diffusion of Innovation Theory' arguing that people may have different states of innovativeness according to their reaction to a new object or situation. In his theory, Rogers grouped people into five categories. These categories from more innovative to the more traditional one are as follows: innovators, early adopters, early majority, late majority and laggards. Roger also suggested that certain comparisons can be made based on these categories, which have been claimed to distribute relatively in the universe (Kaminski, 2011). The theory suggests that the individuals in each category have dominant characteristics that are thought to affect the tendency of individuals to accept or reject an innovation (Demir, 2006). In Rogers' theory, innovators are defined as individuals who can take risks, be open to different experiences and use social and different thinking skills. Early adopters are the models in practice who follow developments and inform individuals about innovations in a social group, while the early majority are those who prefer to avoid risks and focus on the profits of innovation. Although the late majority are attentive about innovations and expect other people to try these innovations, the laggards are those who are bound to traditions and tend to prefer successful innovations (Rogers, 2002). Rogers's theory stated that the categories of innovators and early adopters prefer direct experience with innovations, while the early majority, late majority and laggards prefer to take steps after having seen the advantages of innovations and getting feedback from the other people's experiences with the innovations (Parlar & Cansoy, 2017). This leads to the conclusion that Rogers' innovation categories in Diffusion of Innovation Theory are related to the learning phenomena as the learning also occurs by observing the performance of others or just experiencing it and getting instant feedback about his/her performance (Brunner, Schraw & Norby, 2011).

In the history of education, innovative initiatives have always existed and will continue to exist. In our world of advanced changes and developments, the solution to the existing problems does not mean that everything is completed. On the contrary, these changes and developments lead to new problems and a demand for training new generations equipped with innovative skills to solve these problems (Goatley & Johnston, 2013). As for individuals to be trained with an innovative point of view, there is a need for teachers who are the main stakeholder of the education process to digest the

innovativeness (Yorulmaz, Cokcaliskan & Onal, 2017). As a result, an advanced global innovation demand for teachers emerges, and an understanding that supports innovative practices in teacher education is becoming increasingly important (Tyunnikov, 2017). In response to this demand, some researchers in these institutions have tried to include innovative practices in teacher training and similar programs (Garcia, 2011; Redding, Twyman & Murphy, 2013; Patrick & Gentz, 2016; Tyunnikov, 2017; White, Baron, Klostermann & Duffy, 2016), while some other ones have focused on identifying innovativeness of teacher and prospective teachers to enhance the innovation levels in the light of findings (Abbak, 2018; Akdeniz & Kadi, 2016; Cox, 2009; Gkorezis, 2016; Kocasarac, 2018; Yilmaz, 2018). Unfortunately, having only the knowledge about the teachers' innovativeness state is insufficient as the existence of demand for the development of innovative, creative, collaborative and risk-taking individuals in the schools (Partnership for 21st Century Skills, 2010). To enhance these targeted skills in students, teachers should have consistent knowledge, skills and qualifications (Nessipbayeva, 2012, p. 150) that promote innovativeness. At that point, the factors contributing to the teachers' pedagogical choices play a vital role.

There are two types of sources that lead individuals to behave in the learning environment. These are called 'knowledge' and 'beliefs' (Lui & Bonner, 2016). Unlike knowledge, beliefs are deeply personal, rather than universal and defined as the state of individuals' accepting and adopting some ideas and opinions with no specific reasons and verifications (Pajares, 1992). Nespor (1987) mentioned that beliefs have more powerful effects and evaluative components than that of knowledge. Beliefs are typically independent of the knowledge-associated cognitions. Beliefs are coded into the individual's episodic memory as emotional trails following the various experiences: culture and training affect the individual's perceptions, interpretations and behaviours (Deryakulu, 2006). Beliefs can be observed in people's thoughts, judgments, opinions and behaviours (Tutar, 2015). Beliefs affect teachers' discourses outside the classroom and their behaviour within the classroom (Pajares, 1992). Ernest (1989) puts forward that teacher instructional practices have been highly shaped with his/her knowledge, attitudes and beliefs. These beliefs of teachers mostly stem from certain past experiences or episodes, and these certain past episodes or experiences keep up influencing teachers' interpreting and dealing way of upcoming events (Nespor, 1987).

Teachers also build their own beliefs about the nature of learning as a result of the education they have received, the culture they have lived and the experiences they have gained. These beliefs are much more influential in the teachers' pedagogical and curriculum decisions than the scientific research results (Thomson & Gregory, 2013). The role of beliefs on the teachers' pedagogical decisions arouses interest in the question of how the learning beliefs of the upcoming teachers affect their innovativeness. When the related literature examined, we found the general tendency of researchers is to define the individual innovativeness of the prospective teachers in terms of descriptive variances, such as gender, age and study field (Deniz, 2016; Korucu & Olpak, 2015; Noh, Hamzah & Abdullah, 2016; Yilmaz, Sogukcesme & Ayhan, 2014). Moreover, positive relationships were found between critical thinking skills and individual innovativeness state (Ozgun, 2013), Technological Pedagogical Content Knowledge (TPACK) competencies and individual innovativeness state (Cuhadar, Bulbul & Ilgaz, 2013), attitude towards learning and individual innovativeness state (Kaya & Gocen, 2014) and the need for cognition level and individual innovativeness state (Suer & Kinay, 2019). As seen from the research studies, a study handling the relationship between the individual innovativeness states of the prospective teachers has not been conducted yet. As the beliefs that prospective teachers acquire from the formal or informal environments about the nature of learning in the light of experiences are thought to guide their future teaching activities, it is thought that the relationship between the prospective teachers' individual innovativeness state and their beliefs towards learning is thought to

provide scientific and reliable information to the practitioners and teacher trainers in the formation of the necessary educational plans and activities. With this idea, the aim of the study is to determine the relationship between the prospective teachers' beliefs towards learning and their individual innovativeness state. Regarding the aim of the study, the following questions have been investigated:

- (1) What are the levels of prospective teachers' beliefs towards learning and their individual innovativeness state?
- (2) How is the distribution of prospective teachers' individual innovativeness state?
- (3) Is there a significant relationship between prospective teachers' beliefs towards learning and their individual innovativeness state?
- (4) Do the prospective teachers' constructivist learning beliefs significantly predict their individual innovativeness state?

2. Method

2.1. Research Design

This study aiming to investigate the relationship between the prospective teachers' beliefs towards learning and their individual innovativeness state was carried out on the basis of correlational survey design. The correlational study design is a scientific method used to estimate the variables and the degree of relationships between the variables (Christensen, Johnson & Turner, 2015).

2.2. Research Sample

The sample of the study included 515 randomly selected prospective teachers studying in one of the education faculties of a state university during the 2017–2018 academic year. Of these, 355 were (68.9%) female and 160 were (31.1%) male. The descriptive statistics of the sample were indicated in Table 1.

Table 1. The descriptive statistics related to sample

		<i>N</i>	%
Department	Preschool teachers	116	22.5
	Classroom teachers	91	17.7
	German language teachers	31	6.0
	English language teachers	23	4.5
	Turkish language teachers	47	9.1
	Turkish language and literature teachers	26	5.0
	Geography teachers	25	4.9
	History teachers	22	4.3
	Social Sciences teachers	27	5.2
	Mathematics for primary school	32	6.2
	Science teachers	40	7.8

	Mathematics teachers	19	3.7
	Chemistry teachers	16	3.1
Year	2. Year	139	27.0
	3. Year	213	41.4
	4. Year	163	31.7
Total	Total	515	100.0

2.3. Research Instrument and Procedure

In this study, the data were collected via the 'Belief Scale towards Learning (BSTL)' and 'Individual Innovativeness Scale (IIS)'.

Belief Scale Towards Learning: BSTL is a 5-point Likert scale developed by Bay et al. (2012). The scale is comprised of 34 items and those 4 dimensions are called 'Social Constructivism' (11 items), 'Traditional' (9 items), 'Cognitive Constructivism' (6 items) and 'Radical Constructivism' (8 items). The reliability (Cronbach's alpha coefficient) of the scale was determined to vary from 0.73 to 0.85 and the split-half reliability coefficient was determined to vary from 0.66 to 0.84 (Bay et al., 2012). In this study, reliability coefficients (Cronbach Alpha) of the BSTL were as follows: Cognitive Constructivism '0.74', Social Constructivism '0.83', Radical Constructivism '0.60', Traditional '0.72'.

Individual Innovativeness Scale: IIS is a 5-point Likert type scale developed by Hurt et al. (1977) and adapted to Turkish culture by Kilicer and Odabasi (2010). IIS is comprised of those four dimensions named 'Resistance to change', 'Opinion leadership', 'Openness to experiences' and 'Risk-taking' and 20 items. Of these, 12 items are positive and 8 are negative. Kilicer and Odabasi (2010) calculated the internal consistency coefficient of the whole scale as 0.82, and the test-retest reliability coefficient as 0.87. In the current study, the reliability (Cronbach Alpha coefficient) of the scale was found at 0.70.

2.4. Data Analysis

The data of this study were analysed with the help of the SPSS program. To determine the level of prospective teachers' beliefs towards traditional and constructivist learning, the mean and standard deviation values were calculated. The mean values based on learning beliefs were interpreted based on the following score ranges and levels. If the score ranges between 1.00 and 1.80, the level is accepted as 'very low', if the score ranges between 1.81 and 2.60, the level is accepted as 'low', if the score ranges between 2.61 and 3.40, the level is accepted as 'medium', if the score ranges between 3.41 and 4.20, the level is accepted as 'high' and if the score ranges between 4.21 and 5.00, the level is accepted as 'very high'.

For the scoring of the IIS as a whole, Kilicer and Odabasi (2010) suggested calculating in this way: first of all subtract total scores of negatives items from the total scores of the positive items then add 42 to the obtained score. After applying this formula, the score is explicated on the basis of the following score ranges and categories as illustrated in Table 2.

Table 2. Score ranges and innovativeness categories for explicating IIS

Score ranges	Innovativeness categories
80 and above	Innovator
69–80	Pioneer
57–68	Interrogator
46–56	Skeptic
46 and below	Traditionalist

In this study after applying the formula, the percentages and frequencies were calculated regarding the innovativeness categories of prospective teachers to determine what kind of distribution exists in prospective teachers' individual innovativeness states. Partial correlation coefficients were exerted in order to determine the relationship between prospective teachers' beliefs towards learning and their individual innovativeness state. A simple linear regression analysis technique was used in order to determine whether the prospective teachers' beliefs towards constructivist learning significantly predict their individual innovativeness state. Buyukozturk (2011) suggested interpreting the calculated correlation coefficient between 0.70 and 1.00 as high, between 0.30 and 0.70 as medium and between 0.00 and 0.30 as low.

Can (2013) mentions that to be able to use simple linear regression analysis, there should be two variables tested at least with equivalent scales. Of these two variables, generally one is called predictor and the other is predicted. The variables should show the normal distribution and a linear relationship. In line with this, in this study, the scores obtained from the predictor variable (constructivist learning beliefs) and the predicted variable (individual innovativeness) initially were tested in terms of the normal distribution; thus, skewness values were examined. According to Buyukozturk (2011), if the coefficient of skewness is within the ranges of +1 and -1, it can be interpreted that the scores do not show a significant deviation from the normal distribution. The analysis of the study showed those skewness coefficients of predictor and predicted variables were -0.802 and -0.144, respectively. Then, another method of determining normality for these variables, histogram graphs were plotted and examined. The histogram graphs of the predictor (independent) and predicted (dependent) variables were shown in Figure 1.

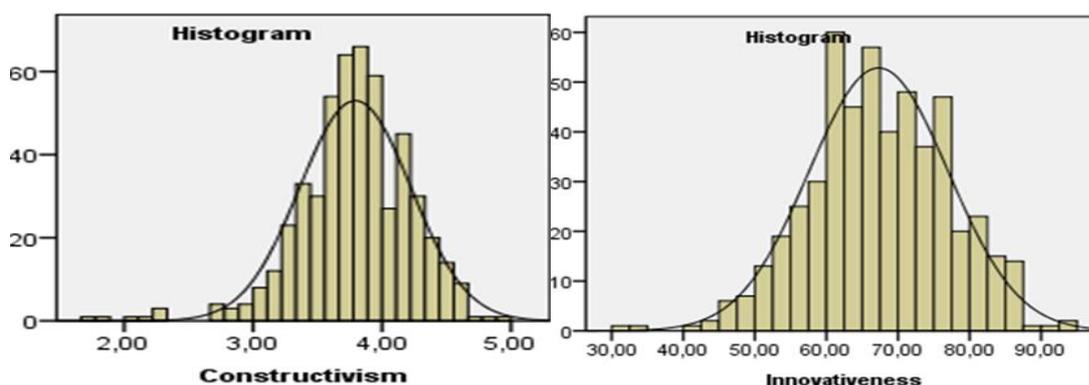


Figure 1. Histogram graphs for the scores of constructivist learning beliefs and individual innovativeness

When the skewness coefficients and histogram graphs of predictor and predicted variables were examined, constructivist learning belief scores and individual innovation scores can be said to show normal distribution. To determine whether there is a linear relationship between the predictor and the predicted variables, the scatter diagram is visually checked (Can, 2013). In this study, the scattering diagram was examined visually and a linear relationship was observed between the predictor and the predicted variables. In conclusion, the scores of these two variables were determined to be suitable for performing simple linear regression analysis.

3. Results

After the data showed normal distribution, sub-research questions were tested, respectively. For the first research question, descriptive statistics (mean and standard deviation) were calculated to determine prospective teachers' learning beliefs and their individual innovativeness state. The findings obtained are shown in Table 3.

Table 3. Descriptive statistics results regarding prospective teachers' learning beliefs and their individual innovativeness state

	<i>N</i>	<i>M</i>	<i>SD</i>	Level
Traditional	515	3.40	0.62	Medium
Cognitive constructivist	515	4.01	0.57	High
Social constructivist	515	4.10	0.55	High
Radical constructivist	515	3.19	0.56	Medium
Constructivist learning beliefs	515	3.79	0.43	High
Individual innovativeness	515	67.28	9.72	Interrogator

The analysis related to the first research question showed that prospective teachers' constructivist learning belief is high and the traditional learning belief is at a medium level. This shows that constructivist learning beliefs dominated the traditional one. As for the constructivist learning beliefs' sub-dimensions, the highest mean score is observed at the dimension of Social Constructivism. As for the innovativeness level, the prospective teachers are mostly in the Interrogator category. The distribution of prospective teachers regarding individual innovativeness states is shown in Table 4.

Table 4. Prospective teachers distribution of individual innovativeness state

<i>State</i>	<i>N</i>	<i>%</i>
Traditionalist	6	1.2
Skeptic	57	11.1
Interrogator	221	42.9
Pioneer	183	35.5
Innovator	48	9.3

It is seen that prospective teachers are determined to be mostly in the interrogator category (42.9%) then comes pioneer category (35.5%) but the least in the traditionalist category (1.2%). The relationship between prospective teachers' learning beliefs and individual innovativeness state is

tested by using the partial correlation analysis, and the findings are indicated in Table 5.

Table 5. The findings regarding partial correlation analysis

	Traditional	Constructivism
Individual Innovativeness	-0.128*	0.357*

According to Partial Correlation Analysis results, when the constructivist learning beliefs are fixed, the correlation between prospective teachers' traditional learning beliefs and individual innovativeness state is weak and inverse. When the traditional learning beliefs are fixed, the correlation between prospective teachers' constructivist learning beliefs and individual innovativeness state is positive and moderate. In order to estimate whether the prospective teachers' constructivist learning beliefs significantly predict their state of individual innovativeness, the technique of simple linear regression analysis was exerted and the findings obtained are shown in Table 6.

Table 6. The findings regarding simple linear regression analysis

Variable	<i>B</i>	Standard error	<i>B</i>	<i>t</i>	<i>p</i>
Fixed	38.429	3.579		10.737	0.000
Constructivist	7.609	0.938	0.337	8.114	0.000

$R = 0.337$, $R^2 = 0.112$, $F = 65.834$, $p = 0.000 < 0.05$.

The results of Simple Linear Regression Analysis show that prospective teachers' constructivist learning beliefs significantly predict their individual innovativeness state. In addition, about 11% of the variance regarding the individual innovativeness state of prospective teachers is explained by their constructivist learning beliefs.

5. Discussion and Conclusion

In this part of the study, the results and discussion are carried out. The findings related to the first research question shows that the prospective teachers' constructivist learning beliefs are higher than traditional learning beliefs. In line with this, prospective teachers have adopted constructivist learning beliefs, especially the social constructivist learning beliefs more than the traditional one. The fact that prospective teachers' beliefs towards the constructivist approach are higher than those for a traditional one which was supported by the current studies (Bay et al. 2014; Chan, Tan & Khoo, 2007; Kinay & Han, 2017; Kinay & Karataş, 2017). Another finding related to the first research question is the fact that individual innovativeness state of prospective teachers is in the interrogator category which is also in agreement with the results of other studies conducted in the literature and in these studies individual innovativeness state of prospective teachers found as an interrogator (Adiguzel, 2012; Cuhadar et al., 2013; Erdogan & Gunes, 2013; Kert & Tekdal, 2012; Korucu & Olpak, 2015; Ozgür, 2013; Suer & Kinay, 2019; Yorulmaz et al., 2017). Ozturk and Summak (2014) and Parlar and Cansoy (2017) found that teachers show a little above the medium individual innovativeness level which is called a category of interrogator in their studies. This indicates that the teacher candidates do not want to take risks by choosing to be careful about innovations rather than adopting the innovations immediately. However, innovations in the educational environment, especially technological tools and

the functioning of schools have an important influence on teaching processes and student learning. Therefore, the use of such technologies in schools and the willingness and openness to use these technologies are considered to be highly valuable and necessary in today's world (Hsieh, Yen & Kuan, 2014).

The findings related to the second research question indicate that prospective teachers' innovativeness category is mostly in the Interrogator and at least in the Traditionalist category. The fact that prospective teachers' being mostly in the category of interrogators among the individual innovativeness categories has been mentioned above to be in agreement with the research findings in the literature. The fact that prospective teachers' being at least a traditional category is also in line with results of other studies in the literature (Gunes, 2010; Ikiz & Asici, 2017; Suer & Kinay, 2019; Ozturk & Summak, 2014; Yilmaz, 2013). On the contrary, this finding suggests that, apart from a very small part, most of the prospective teachers do not show attitudes as being open to change and innovation, they are suspicious and abstaining from their social system (Rogers, 2002). This case is thought to be important for today's innovative approach to education. An innovative approach to education emphasises a pedagogy in which individuals' creative skills are tried to be developed through the activities similar to real life conditions. However, in the course of sustaining such innovative understandings in educational institutions, there may be some deficiencies stemming from the institutional tradition of the education (Johnsdottir, Page & Thorsteinsson, 2008). Hence, the fact that prospective teachers and teachers' keeping away from traditional attitudes and patterns is important for 21st-century skills in education.

The findings related to the third research question indicate a low and inverse relationship between prospective teachers' traditional learning beliefs and individual innovativeness state when constructivist learning beliefs of prospective teachers are controlled. Moreover, a positive and moderate level of significant relationship is observed between prospective teachers' constructivist learning beliefs and individual innovativeness state when the traditional learning beliefs of prospective teachers are controlled. The findings related to the fourth research question indicate that prospective teachers' constructivist learning beliefs significantly predict their individual innovativeness state. In line with this result, teaching and learning environments should be designed and oriented in line with the constructivist approach to enhance the teachers, prospective teachers, instructors and students' innovativeness state which is a demand for all the shareholders of 21st-century educational approach (Suer, 2019). The constructivism is based on progressive education philosophy. As a philosophy of education, progressivism came from pragmatist philosophy and opposed to ideas based on perennialism. According to progressive thought, the education should be a process through which individuals gain scientific methods and problem-solving skills required for democratic life. In progressive thought, schools are seen as places where the culture of the community is transferred to the next generations along with the cooperation and self-discipline skills as the reality continuously changes (Ornstein & Hunkins, 2014). For this reason, the fact that how individuals react and adapt themselves to this change is considered as an important factor in the learning process. In constructivist theory put forward by the progressive education, individuals make sense of the new knowledge and experiences by building them on their past knowledge and experiences. Individuals make sense of a new idea, situation, relationship or phenomenon encountered in school or out of the school by either using the principles and perceptions gained in the past or constructing new principles and perceptions that can explain them. However, in both cases, individuals' principles and perceptions affect their learning (Brooks & Brooks, 1999). In social constructivism, individuals' socio-cultural environment and their interaction with this environment are thought to have a determinant effect on

their learning (Fosnot, 1996 cited in Scholnik, Kol & Abarbanel, 2016). Because the nature of learners' interaction with the knowledgeable members of the community in the learning environment affects the learning, and it is not possible to learn and use the structures of the symbol systems without social interaction with knowledgeable members of the community (Kim, 2001). As for the innovativeness, it is also known to be affected by the life experiences of individuals and their interaction with others. In the theory of Diffusion of Innovation put forward by Rogers (2002), innovators and pioneers prefer to live direct experiences in the face of innovations while interrogators, skeptics and traditionalists prefer to adopt innovations after having observed experiences of others regarding their relative advantages. This can be interpreted as interacting with knowledgeable people who have already had an experience with the innovation previously plays a significant role in the process of adopting the innovations. As Rogers mentioned, the adoption of innovations is influenced by constructs, such as socioeconomic status, personal values and communication behaviours (Cheng, Kao & Lin, 2004). For this reason, the fact that prospective teachers' constructivist learning beliefs is a determinant variable that affects and predicts their individual innovativeness state can be said to be a result supported by the literature.

6. Recommendations

In line with the results obtained throughout the study, the following implications can be put forward:

- Prospective teachers should be confronted with more innovative and constructivist learning environments, activities and materials to enhance their innovativeness state.
- Prospective teachers' knowledge, beliefs, awareness and experiences regarding constructivist learning should be increased to enhance their innovativeness state.
- Correlational survey studies should be conducted to estimate the relationship between individual innovativeness states of prospective teachers with different variables. Furthermore, studies focused on environments in which teachers' innovative behaviours take place should be conducted to have a better understanding of the innovative behaviour of prospective teachers.

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