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Analyzing of relationship between teachers' individual innovativeness levels and their tpack self-efficacies[1]

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Abstract
Individual characteristics of people such as approach to technology, knowledge level and perceptions come into prominence. Rogers is classified individuals in five different categories (innovators, early adaptors, early majority, late majority, laggards) in terms of their innovation characteristics and states them as individual innovativeness. Having an individual innovativeness level is a factor which not only may influence people's skills concerning use of technology but also may influence teachers' technological integration level in the class. This study aims to determine the effect of teachers' individual innovativeness level on technological integration process. In line with this purpose, TPACK self-efficacies scale and individual innovativeness scale have been applied to 421 teachers employed in Turkey in 2013-2014 education years. Teachers' individual innovativeness levels, TPACK skill conditions and predictive power level of individual innovativeness on TPACK skills have been researched. As a result of this research, it has been understood that a great majority of teachers consider themselves as early majority and early adaptors as well as being advanced level in terms of TPACK skills. In addition it has been concluded that there is a positive and important relationship between individual innovativeness and TPACK, while individual innovativeness becomes an important predictor of TPACK skills.

Keywords: TPACK; individual innovativeness; technology integration; ICTs; teachers.

Introduction

In parallel with developments in technological instruments, countries make investment in Information and Communication Technologies (ICT) and effort to increase the use of these technologies in educating environments. This subject is addressed in the frame of integration of technology into education environment. But technological investments that are generally made for the incorporation of new technologies in school curricula at the present time cause to question the integration concept. Technological integration is a concept that requires much more activity than technology included in educating environment after purchased (ISTE, 2002). It is necessary, from technical support to students' adaptation process, to perform a large number of planning during integration process. One of important issues to be planned is teachers' education (Inan & Lowther, 2010).

Teachers, who are an important component of technological integration, have a determinant position in the class as leaders of using of technology. The teachers take the most responsibility to

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cause to be adopted the technology to students and managers in the class and to ensure that technology may effectively be used in the education (Lee & Reigeluth, 1994). When considered from this point of view, usage level of technology in the class may become different according to teachers' perspective. Although teachers have similar education level and facilities in using of technology, their knowledge, skills and behaviors related to using of technology may be different. One of important concepts leading to this difference is their individual innovativeness levels. Individual innovativeness is a concept developed by Everett M. Rogers and it states that each individual in the society may adopt a developing technology in the different levels (Rogers, 2003). Therefore it is assumed that individual innovativeness is an important factor becoming effective on technological integration and this effect is researched based upon Technological Pedagogical Content Knowledge (TPACK) integration model established by Koehler and Mishra (2005).

Technology integration and TPACK as a technology integration model

A great many researches about integration of technology into course have been fulfilled and integration of technology has been defined by researchers in different ways. Hew and Brush (2007) state that integration of technology means to use software and internet through Desktop Computer, laptop and tablet computer in the schools for educational purposes. While Spazak (2013) defines integration of technology as a means used to increase student's learning level, to understand better the content of course and to improve top level thinking skills and James (2009) brings teacher into the forefront in integration of technology and defines the integration of technology as a process where teachers may include technology easily and flexibly in their education practices to support their learning targets. It is possible to say that common point of definitions related to integration of technology is effectively to benefit from technologies in carrying out students' learning skills in order to increase their learning levels. In accordance with this purpose different integration of technology models have been developed; these may be exemplified as Five-Stage Model for Computer Technology Integration developed by Toledo (2005) and Systemic Planning Model for ICT Integration developed by Wang and Woo (2007) and E-capacity Model developed by Vanderlinde and Van Braak (2010). One of these models is Technological Pedagogical Content Knowledge (TPACK) developed by Koehler and Mishra (2005).

In general one of the most important properties distinguishing TPACK model from others model is that: this model approaches to integration of technology in terms of teachers' knowledge, skills and self- efficacies. In this scope TPACK is a model developed based upon Shulman's (1986) opinion About Pedagogical Content Knowledge (PCK) and is defined in such a way that teachers put into practice effective education by means of making use of technology (Koehler and Mishra, 2009: 60). TPACK is expressed as a knowledge that requires integration of technology into education curricula by teachers instead of sophisticated and fixed teacher's knowledge. TPACK framework consists of interaction of technology, pedagogical knowledge and content knowledge that combine three main aspects of knowledge. As a result of overlapping of these knowledge contents; Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK) and Technological Pedagogical Content Knowledge emerge, which are four new content knowledge through which teachers carry out the teaching activities thanks to technology (Figure 1).

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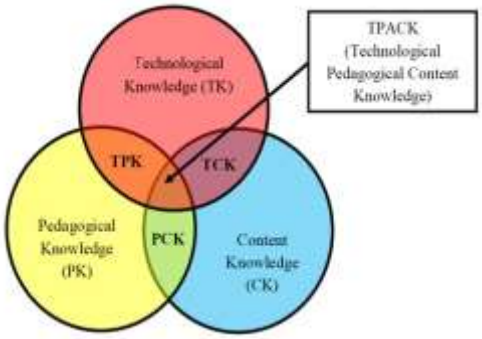

Figure 1. The Structure of TPACK Model and Its Components (Koehler and Mishra, 2009)

Graham (2011) has summarized the components included in TPACK model in Figure 1 here in below (Table 1).

Table 1
Brief description of constructs in the `TPACK framework from Mishra and Koehler (2006).

Construct	Description
PK	"Pedagogical knowledge (PK) is deep knowledge about the processes and practices or methods of teaching and learning and how it encompasses, among other things, overall educational purposes, values, and aims. This is a generic form of knowledge that is involved in all issues of student learning, classroom management, lesson plan development and implementation. It includes knowledge about techniques or methods to be used in the classroom; the nature of the target audience; and strategies for evaluating student understanding." (p. 1026–1027)
CK	"Content knowledge (CK) is knowledge about the actual subject matter that is to be learned or taught.. including knowledge of central facts, concepts, theories, and procedures within a given field; knowledge of explanatory frameworks that organize and connect ideas; and knowledge of the rules of evidence and proof (Shulman, 1986)." (p. 1026)
TK	"In the case of digital technologies, this includes knowledge of operating systems and computer hardware, and the ability to use standard sets of software tools such as word processors, spreadsheets, browsers, and e-mail. TK includes knowledge of how to install and remove peripheral devices, install and remove software programs, and create and archive documents." (p. 1027)
PCK	"PCK exists at the intersection of content and pedagogy. Thus, it goes beyond a simple consideration of content and pedagogy in isolation from one another. PCK represents the blending of content and pedagogy into an understanding of how particular aspects of subject matter are organized, adapted, and represented for instruction." (p. 1021)
TPK	"TPK is knowledge of the existence, components, and capabilities of various technologies as they are used in teaching and learning settings, and conversely, knowing how teaching might change as the result of using particular technologies." (p. 1028)
TCK	"TCK is knowledge about the manner in which technology and content are reciprocally related. Although technology constrains the kinds of representation possible, newer technologies often afford newer and more varied representation and greater flexibility in navigating across these representations." (p. 1028)
TPACK	"TPACK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones." (p. 1029)

TPACK model has a more comprehensive structure and meaning than simply adding the use of technology to current education process and content area (Koehler & Mishra, 2005). Technological Pedagogical Content Knowledge, in general, is defined as a combined knowledge area needed to integrate technology into teaching a specific content and subject matter (Schmidt, 2009; Koehler & Mishra, 2005). This knowledge includes the using of technology effectively and productively to enhance the effect and nature of teaching in all teaching process from planning to assessment with purpose of teaching a specific content.

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Individual innovativeness and its effect on TPACK

Rogers gave inspiration to a number of studies regarding innovation and individual innovativeness (Gillard, Bailey & Nolan, 2008; Jackson, Yi & Park, 2010; Janssen, Van De Vliert & West, 2004; Kilicer & Odabasi, 2010; Yuan & Woodman, 2010). Rogers defines innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003). Individual innovativeness is defined as developing, adopting or implementing an innovation (Yuan & Woodman, 2010). Rogers (2003) states that in individual innovativeness theory, there is always new information within the social system and that this new information is processed by adopters.

In the process of adaptation, adopters act upon their perceptions regarding the characteristics of the innovation. Although there are a number of contextual factors, some findings are influential on adopters' decisions regarding adaptation to innovation. In other words, individuals are likely to have certain perceptions regarding a new technology that they have met in their social environments. These perceptions are quite important in terms of innovativeness. It is seen that individuals have different degrees of adaptation to innovation. In general, the population distribution of adaptation to innovation is expected to have almost normal distribution (Jackson, Yi & Park, 2010).

However, Rogers (2003) states that there is no normal distribution due to different determiners such as resistance to technology and material dimension regarding the innovation distribution; that in a society, there are not many innovative individuals; and that there is a bell-shaped distribution (Figure 2).

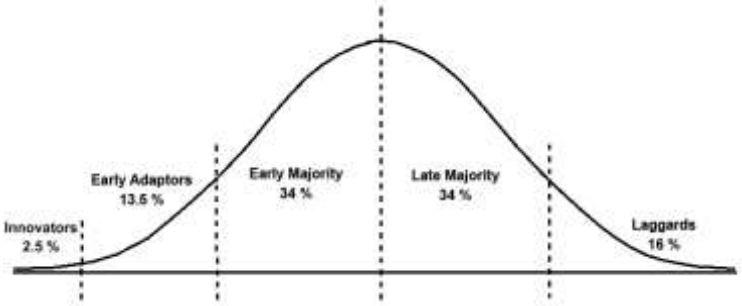

Figure 2. Categories of adopters' individual innovativeness (Rogers, 2003)

Rogers (2003) stated that in the society, people demonstrate different responses to innovation depending on their personality traits (Figure 2). Accordingly, among all the individuals in a society, only 2.5% of them are in the category of innovative, 13.5% of them are in the category of early adaptors, 34% of them are in the category of early majority, 34% of them are in the category of late majority and 16% of them are in the category of laggards. Rogers (2003) explains the characteristics of people in this group as follows;

•Innovators- the risk takers willing to take the initiative and time to try something new (What is it?)

•Early Adopters - tend to be respected group leaders, the individuals essential to adoption by whole group. (What problem will it potentially solve?)

•Early Majority - the careful, safe, deliberate individuals unwilling to risk time or other resources. (What problem will it solve now?)

•Late Majority - those suspect of or resistant to change. Hard to move without significant influence. (Does it work?)

•Laggards - these are those who are consistent or even adamant in resisting change. Pressure needed to force change. (Do I have to use this thing?)

On the other hand, individual innovativeness is a factor that may affect TPACK. Integration of technology is expressed as a sophisticated and slow-going process which is influenced by more than one variables (Inan & Lowther, 2010; Karaca, 2011: 2). Karaca (2011) argues that factors such

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as teachers' professional experience, their computer use times, technological abilities, behaviors and opinions about technology as well as absence of time have directly or indirectly effects on integration of technology. Also Robinson (2003) emphasizes that individual' personal characteristics such as their behaviors, perceptions and information levels related with technology become effective on integration of technology. In the similar way, Roblyer (2006) specifies that teachers' personal properties regarding using of technology is an important factor effecting the integration of technology into education environments.

In this scope, also it may be said that TPACK, a technology integration model focused on teacher particularly, is impressed by teachers' personal properties regarding using of technology (knowledge, skill, behavior etc.). Teachers' individual innovativeness levels are considered and researched as an important factor to influence their TK (Technological Knowledge) self- efficacies, accordingly their TPACK self- efficacies.

Research purpose

Purpose of this research is to determine the relationship between teachers' individual innovativeness levels and their Technological Pedagogical Content Knowledge (TPACK) self-efficacies. In accordance with this purpose, various responses are sought for the following sub purposes:

1- What are the individual innovativeness levels and TPACK self-efficacies of teachers?

2-Are teachers' individual innovativeness levels an indicator of their TPACK self-efficacies?

3-Do TPACK self-efficacies of teachers having different individual innovativeness levels become different?

Methodology

Research model

This research is to intend the examination of relationship between teachers' TPACK self-efficacy levels and their individual innovativeness levels and it is a quantitative research designed in correlation model. This model has the following meaning: "the pairs of scores are then correlated, and the resulting correlation coefficient indicates the degree of relationship between the variables" (Fraenkel, Wallen & Hyun, 2012). Correlation model used to determine the correlation between different variables in educational and social research (Fraenkel, Wallen & Hyun, 2012; McMillan & Schumacher, 2006) and is one of the most commonly-applied models in the literature (Cohen et al., 2003).

Population and sampling

The population for this research consists of primary and secondary teachers serving in Konya Province of Turkey 2013-2014 training-education year. Because of magnitude of sampling, sampling has been carried out by method called as stratified random sampling. Stratified random sampling technique was used to select the sample. Stratified random sampling is a sampling type through which each of different units consisting of population is represented and specific number of participators is selected by simple random sampling method (McMillan & Schumacher, 2006). In this scope primary and secondary education levels have been considered as a stratum, data has been received from 421 teachers. Demographic information belonging to teachers participated in the research is indicated in Table 2.

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Table 2
Demographic information belonging to teachers participated in the research

		n	%
Type of school	Primary	245	58.2
	Secondary	176	41.8
Gender	Female	228	54.2
	Male	193	45.8
Professional seniority	Less than 5	36	8.6
	Between 6-10	71	16.9
	Between 11-15	125	29.7
	Between 16-20	105	24.9
	21 and above	84	20.0
Total		**421**	**100**

When examined table 2, it may be seen that 421 teachers are included in this study and their distribution based on their majors is as follows: 245 (52.8 %) from Primary School Teaching, 176 (41.2 %) from Elementary School Teaching. On the other hand, when analyzed distribution according to gender it is seen that 228 (54.2 %) teacher candidates are female and 193 (45.8 %) teacher candidates are male. When considered from this point of view, it may be stated that number and rate of distribution according to majors and genders are close each other. On the other hand it is been determined that most of teachers has professional seniority between 11-15 (29.7 %) and 16 -20 (24.9 %). Total number of teachers working 10 years and below is specified as 107 (25.5 %). With regard to professional seniority which is 21 years and above, 84 teachers (20 %) has expressed that they worked during year's corresponding to this professional seniority.

Data collection tools

As the data collection tools in the study, two different data collection tools were used.

TPACK efficacy scale

In order to determine teachers' TPACK self-efficacies, "Techno Pedaogogical Education Efficacy Scale" developed by Kabakci Yurdakul, Odabasi, Kilicer, Coklar, Birinci and Kurt (2012) has been used. In this scale there are 33 articles and four factors called as design, application, ethics and specialization. For the whole scale Cronbach's alpha coefficient has been found to be α=.95. Cronbach's alpha coefficient of factors constituting the scale has been computed between α=.85 and .92 values. Also test replicate coefficient of the scale has been found to be α=.80 (Kabakci Yurdakul, et all., 2012).

Individual Innovativeness Scale

In this research Individual Innovativeness Scale developed based on Roger's individual innovativeness theory by Hurt, Joseph and Cook (1977) and adapted into Turkish by Kilicer and Odabasi (2010) has been used to measure the teachers' individual innovativeness levels. This scale consists of 20 items in total and of four factors called as resistance to change, opinion leading, openness to experience and risk taking. The internal validity for the scale was found to be α=0.82.

Data collection and analysis

Data has been examined by researcher and data which is not convenient for the analysis (7 questionnaire forms) has been excluded from this research.

When data is entered into computer, a scoring system has been carried out as indicated in the following line: "1- I absolutely disagree ", "2- I disagree ", "3- I am indecisive ", "4- I agree" and "5- I exactly agree" for articles in Individual Innovativeness Scale. For scoring of all scale, a

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scoring system developed by Kilicer and Odabasi (2010) and specified in the following line to give point for scale articles has been applied: Individual Innovativeness score = 42 + (total of scores of articles 1, 2, 3, 5, 8, 9, 11, 12, 14, 16, 18. and19) - (total of scores of articles 4, 6, 7, 10, 13, 15, 17. and 20). For assessment, criteria concerning assessment indicated by Kilicer and Odabasi (2010) have been taken into consideration. Accordingly teachers with a score of 46 and below have been classified as "Laggards", with a score between 47 and 56 as "Late Majorities", with a score between 57 and 68 as "Early Majority", with a score between 69 and 80 as "Early Adopters", with a score of 80 and above as " Innovators" according to total scale score. Results of scoring are explained as indicated in the following line: " 5-I can easily achieve ", "2- I can achieve", "3- I can partly achieve ", "4-I cannot achieve " and "5- I cannot absolutely achieve". In evaluating data obtained from the scale, assesment criteria for arithmetic mean score 1- 2,33 range as "*Low Level",* 2,34-3,67 range as "*Meidum Level"* and 3,68-5,00 range as"*Advanced Level"* has been computed (Kabakci Yurdakul, 2011).

In analyzing data and determining teachers' TPACK self-efficacies and individual innovativeness conditions; descriptive statistics have been used. A structural equation model has been developed to determine the effect of individual innovativeness levels on TPACK self-efficacy level. In this scope, path analysis method has been used, which is a structural equation modeling type. Path analysis is a test method through which researcher theoretically plans this modeling and researcher tests whether obtained data verifies the model planned by him / her or not in accordance with this plan (Kline, 2005). In the scope of this research, predictive power of individual innovativeness consisting of resistance to change, opinion leading, openness to experience and risk taking factors on Technological Pedagogical Content Knowledge controlled by TPACK-Deep scale has been analyzed. Structural regression analysis with maximum likelihood estimation used in structural equation models has been used (Arbuckle, 2009). In order to determine conformity of the model, the most preffered fit indexes such as (Arbuckle, 2009; Aricak, 2009; Byrne, 2001; Kelloway, 1998) Chi-square Goodness of Fit ($\chi 2/sd$), Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI) and Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) have been used. For structural equation modeling established, AMOS 16.0 (Analysis of Moment Structures) program has been used. Significance level in the whole statistical transactions has been taken as 0.01.

On the other hand one-way analysis of variance (ANOVA) technique has been applied to determine the difference of teachers' TPACK self-efficacies compared to individual innovativeness levels. Tukey HSD, one post hoc test, has been used to determine that in which groups there are differences. Also results of Levene test have been used in order to have information about whether groups are homogenously distributed or not and because of $p>.05$ it has been confirmed that groups are homogenous. Except structural equlity modeling, SPSS 17.0 (Statistical Package for the Social Sciences) package program has been used in analyzing all data and statistical analyses and significance level has been taken as .05.

Findings

Findings obtained from this research where effects of teachers' individual innovativeness levels on their TPACK self-efficacies are researched are indicated below in topics:

Teachers' individual innovativeness levels

In the scope of this research, data related with 421 teachers' individual innovativeness level have been analyzed and obtained findings are shown in Table 3.

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Table 3.
Distributions of teachers according to their individual innovativeness levels

	Innovativeness Level	n	%
1	Innovators	49	11.6
2	Early Adopters	157	37.3
3	Early Majority	167	39.7
4	Late Majority	48	11.4
5	Laggards	0	0
Total		421	100

As can be seen in table 3, most of teachers deem themselves as Individual Innovativeness at Early Majority (167 teachers- 39.7 %) level and Early Adopters (157 teacher- 37.3) level. Contrary to this, 11.6 (49 teachers) and 11.4 % (48 teachers) of teachers deem themselves as Innovators and Late Majority respectively. Any teachers did not express himself / herself as Laggards.

Teachers' TPACK self-efficacies

Another issue researched in accordance with sub purposes is teachers' TPACK self-efficacies. Responses for relevant scale given by teachers participated in this research have been analyzed and findings obtained are shown in Table 4.

Table 4
Teachers' TPACK self-efficacies

TPACK Efficacy Level	Male (n=193)		Female (n=228)		General (n=421)	
	$\overline{X}$	sd	$\overline{X}$	sd	$\overline{X}$	sd
Design	3.94	.598	3.82	.584	3.87	.593
Application	4.00	.566	3.84	.567	3.91	.572
Ethics	4.01	.589	4.05	.637	4.03	.615
Specialization	3.65	.703	3.40	.762	3.51	.745
TPACK in General	*3.93*	*.529*	*3.81*	*.530*	*3.86*	*.533*

Teachers' average scores related with their TPACK Self-Efficacies are indicated in table 4. According to results of the analysis, it may be stated that teachers deem their TPACK self-efficacies in general to be sufficient at advanced level ($\overline{X}$=3.86). When examined in terms of sub dimensions, it has been determined that teachers deem themselves in medium level (3.67> $\overline{X}$ ≥2.34) only in specialization area and they further deem themselves sufficient at advanced level ($\overline{X}$ >3.68) in all other dimensions. When examined sub dimensions regarding TPACK education efficacy, it has been seen that the highest average score belongs to ethics factor ($\overline{X}$=4.03) and the lowest average score belongs to specialization factor ($\overline{X}$=3.51). Teachers' TPACK education efficacies according to their average scores may be arrayed in the form of ethics, application, design and specialization.

Teachers' individual innovativeness levels as an indicator of their TPACK self –efficacy levels

In accordance with sub purposes of this research, relationship between Structural Equation Model –SEM and two variables has been analyzed to determine that whether teachers' individual

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innovativeness levels is an indicator of their TPACK self –efficacy levels or not. Total eight sub dimensions constituting the scales are latent variables and these variables are exogenous (predictor/independent) variables structurally. On the other hand, individual innovativeness and TPACK predicting the scale is an endogenous (outcome/dependent). Established structural equation model is seen in Figure 3.

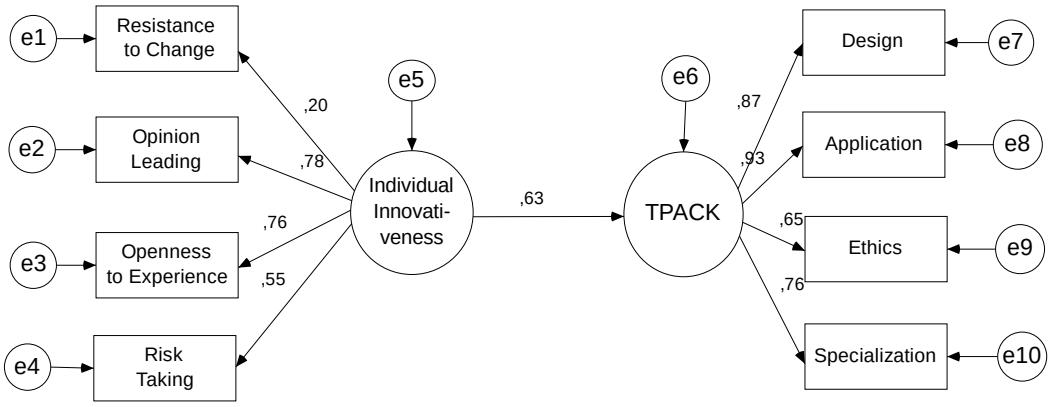

Figure 3 Teachers' individual innovativeness levels as a determinant of their TPACK self –efficacy levels

Firstly fit indexes related with established SEM model have been controlled. To determine the compliance of model, the most preferred fit indexes have been controlled. Ideal value range, acceptable value range and fit index values belonging to the model are given in Table 5.

Table 5
Fit index values for structural equation model and values obtained from this model (n=421)

Fit Index	Excellent Fit Range	Acceptable Fit Range	Fit Value Belonging To Model
(χ2/sd)	≤3	≤5	3.641
CFI	≥0.97	0.95 – 0.96	0.966
TLI	≥0.95	0.94 – 0.90	0.949
NFI	≥0.95	0.94 – 0.90	0.953
RMSEA	≤0.05	0.06 – 0.08	0.079

χ^2 value that is first value obtained related with compliance of model shows that model is compatible (χ2= 69.183; sd=19; p<.01). Also χ2/sd equals 3.751 and it is in an acceptable range. It also proves that established model is acceptable. But in the scope of this research comparative fit indexes have been examined separately. All fit indexes examined in this scope (CFI=0.966; TLI=0.949; NFI=0.953 and RMSEA=0.079) point out that this model is acceptable. That is to say, model created to prove that teachers' individual innovativeness levels are an important determinant of TPACK self-efficacies are verified.

β symbol showing the value between TPACK self-efficacies and each factor has been reviewed to determine teachers' TPACK self-efficacy level by their individual innovativeness levels (Figure 3). For this purpose relationship between individual innovativeness and TPACK self-efficacies has been examined and it has been understood that individual innovativeness is an important predictor of TPACK self-efficacy (β=.63; p<0.01). In other words when teachers' individual innovativeness scores increase at the rate of a standard deviation, their TPACK self-efficacy average scores increase .63 score. This finding put forward that individual innovativeness is an important predictor of TPACK self-efficacy. Therefore this result may be construed that TPACK self-efficacies of those expressing himself/herself as Innovator or Early Adopter in terms of individual innovativeness is more than those expressing himself/herself as Laggards or Late Majority.

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The effect of individual innovativeness on TPACK self-efficacy level

In accordance with model indicated and verified in Figure 3, it has been determined that teachers' individual innovativeness levels is an important predictor of TPACK self-efficacy levels. But relationship between individual innovativeness levels having been gained in line with subsequent sub purposes and TPACK and efficiency scores in its sub dimensions has been reviewed and results thereof have been indicated in Table 6.

Table 6.
Descriptive statistics teachers' TPACK self-efficacy levels according to their individual innovativeness levels

	Individual Innovativeness Level	n	$\overline{X}$	Sd
TPACK Self-Efficacy	A- Innovator	49	4.26	.512
	B- Early Adopter	157	4.02	.474
	C- Early Majority	167	3.75	.473
	D- Late Majority	48	3.35	.416

When Table 6 is analyzed and arithmetic average values are considered, it has been understood that teachers' TPACK average scores are impressed by individual innovativeness levels. But data has been examined by one-way analysis of variance to determine that whether this difference causes to a meaningful difference among these different groups or not and results thereof have been given in Table 7.

Table 7.
Results of analysis concerning relationship between individual innovativeness scores and TPACK efficiency scores

Source of Variance	Sum of Squares	df	Mean Square	F	p (p<0.05)	Significant Difference
Between Groups	26.146	3	8.715	39.005	.001*	A-B, A-C, A-D, B-C, B-D, C-D
Within Groups	93.177	417	.223			
Total	119.324	420				

When analyzed Table 7, it has been seen that teachers' TPACK average values are impressed by their individual innovativeness values [$F_{(3-417)=}39.005$, $p<.05$]. Tukey HSD, a post hoc test, and groups have been compared to determine the difference among groups.

As can be seen in Table 7, all of teachers' individual innovativeness types are an important determinant on TPACK self-efficacies. In other words a teacher having an individual innovativeness in innovator ($\overline{X}=4.26$) level has more TPACK self-efficacy than all other teachers in Early Adaptor ($\overline{X}=4.02$), Early Majority ($\overline{X}=3.75$) and Late Majority ($\overline{X}=3.35$) level. In similar way a teacher having Early Adaptor level ($\overline{X}=4.02$) has less TPACK self-efficacy than only teacher in innovator ($\overline{X}=4.26$) level and but has more TPACK self-efficacy than individual in Early Majority ($\overline{X}=3.75$) and Late Majority ($\overline{X}=3.35$) level. High-level relationship obtained from developed structural equation model shows itself in the whole of TPACK self-efficacies.

Results and Conclusions

Nowadays diffusion of ICT technologies and introducing into the market of new products influence the education environment as it is in every field and as a result of these developments students, managers and families become in expectation in relation to using of these technologies (Bulut, 2012). By force of digital era methods and techniques regarding teaching have been discovered and teachers undertake very important responsibilities on the subject of their applicable

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(Albion, Jamieson-Proctor & Finger, 2010; Hew & Brush, 2007). Teachers may be taken the technology in class environment in accordance with many factors such as their opportunities, behaviors and usage level. An important factor identifying teachers' personal characteristics such as having a technology, behavior and use capability is their individual innovativeness level (Kilicer, 2011). Therefore while some teachers become enthusiastic about adopting innovations created by new technologies and accommodate them, some teachers put up resistance to change and innovation. This circumstance causes to raise the assumption showing that there is a relationship between integration of technology and individual innovativeness. Based on this assumption, in this research relationship between TPACK education competencies which is integration model bringing teacher into the forefront and individual innovativeness level has been analyzed. In this scope, TPACK education competencies and individual innovativeness levels of 421 teachers serving in primary and secondary school have been examined and the following results have been obtained.

According to results of this research, most of teachers deem themselves as Early Majority (39.7 %) and Early Adopters (37.3 %) in terms of individual innovativeness and remain of teachers create Innovators (11.6 %) and Late Majorities (11.4 %) group and no teacher deem himself / herself in Laggards group. Based on these findings it may be stated that primary and secondary school teachers deem themselves in high efficiency level in terms of individual innovativeness. In the similar way, it is specified in a study in which individual innovativeness profile of teacher candidates in computer department is researched by Kilicer (2011) that teacher candidates take place most in Early Majorities (42.2%) and less Laggards (1.3%) category It is reached the conclusion that teachers deem themselves as advanced efficient in terms TPACK education efficiency level. Contrary to this, according to Bulut (2012) while TPACK levels of primary education mathematics teacher candidates are a little above average, Albion and others (2010) prove that teacher candidates deem themselves inefficient or limited efficiency about integration of BIT with teaching applications. This result is important because it shows that there are different results between teachers with whom the research was made and teacher candidates with whom researches in literature was carried out. Why teachers find themselves efficient in terms of TPACK may arise from their teaching experiences. In sub dimensions of TPACK self-efficiencies, it is proved that while teachers deem themselves to be advanced efficient in ethics, application and design sub dimensions respectively, they deem themselves to be in medium level efficient in specialization dimension. In a research carried out with teacher candidates by Kabakci Yurdakul (2011), similar results have been obtained. Teacher candidates find themselves efficient in medium level in specialization dimension and in advanced level in TPACK scale and other sub dimensions (respectively design, application and ethics). Considering of both the teachers and the candidate teachers themselves as of lower (medium) level of efficiency in specialization sub dimension compared to other sub dimensions can be an indicator of the fact that a certain level has been attained in the TPACK meaning, however expertise level has not yet been attained, in other words, sufficient TPACK application could not be made. When sub dimension sorting difference between teachers and teacher candidates is looked at, while teachers' sensitivity to importance of ethics principles draw attention, it is seen that students give a great importance to design compared to all other dimensions.

Relationship between individual innovativeness and TPACK self-efficacies creates another important result of this research. In the scope of this research, TPACK self-efficacies have been examined in every category of individual innovativeness and it has been understood that individual innovativeness is an important TPACK predictor. That is to say, innovator teachers' TPACK self-efficacies from Early Adaptor, Early Adopter teachers' TPACK self-efficacies from Early Majority and Early Majority teachers' TPACK self-efficacies from Late Majority is more advanced level. Starting from this, it is possible to express that there is a positive relationship between individual innovativeness and TPACK self-efficacy. Results of the research show parallelism with finding of Cuhadar and others

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(2013) that there is a positive and medium level relationship between individual innovativeness, TPACK and its sub dimensions. On the other hand, Mutlu Bayraktar (2012) has examined teachers' technology integration conditions and individual innovativeness conditions through Web 2.0 instruments and stated that innovator, Early Adaptor and Early Majority teachers use more effectively Web 2.0 instruments compared to Late Majority and Laggards. The technological innovativeness levels of teachers that use computer(s) in education are rather high compared to those that do not use computer(s) (Van Braak, 2001). This situation may be explained that innovator teachers adopt themselves to changes more quickly and easily (Kilicer, 2011). Inan and Lowther (2010) have specified that the most important reason in succeeding in this by the teachers that are successful in integration of technology in education originates from their computer sufficiency(ies) being high. Based on these results it may be said that individual innovativeness levels of teachers who make benefit of technology have been impressed by this situation.

In accordance with important relation between individual innovativeness and TPACK self-efficiency obtained from results of this research, it may be proposed to be given education to increase teacher's individual innovativeness. Possible increase in teachers' individual innovativeness will directly influence the TPAC self-efficacies. Accordingly educations covering subjects about how technology is followed, what technology follow-up gain and how you may lead to your colleagues may be given to teachers to increase their individual innovativeness levels. It may be stated in the light of these findings that this education to be taken by teachers may influence their integration process in the class.

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