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Ömer Faruk Ursavaş, Ilknur Reisoglu,

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A structural equation modeling-based multi-group analysis

Ömer Faruk Ursavaş and Ilknur Reisoglu
Department of Computer Education and Instructional Technologies, Recep Tayyip Erdoğan University, Rize, Turkey

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Abstract

Purpose – The purpose of this paper is to explore the validity of extended technology acceptance model (TAM) in explaining pre-service teachers' Edmodo acceptance and the variation of variables related to TAM among pre-service teachers having different cognitive styles.

Design/methodology/approach – Structural equation modeling approach was used to analyze an extended TAM that represents the relationship between the eight constructs and cognitive style. Group Embedded Figures Test and technology acceptance measure were used as data collection tools. The study was conducted with 129 pre-service teachers.

Findings – The results indicate that perceived ease of use (PEU) influences behavioral intention (BI) to use Edmodo indirectly through attitude toward Edmodo use and perceived usefulness (PU). Technological complexity and facilitating conditions influence BI to use indirectly through PU and PEU, respectively. Thus, the extended TAM is a parsimonious model explaining 75, 72, and 82 percent of the endogenous variable (BI) for the whole sample, for the field dependent sample, and for the field independent sample, respectively.

Originality/value – This paper addresses to determine the BI of pre-service teachers regarding Edmodo, which is an innovative tool, based on cognitive styles.

Keywords Technology acceptance, Structural equation modelling, Cognitive style, Edmodo, Educational social networks, Improving classroom teaching

Paper type Research paper

1. Introduction

1.1 Educational social networks and Edmodo

Social networks are an integral part of the lives of students whose learning and communication platforms are digitalized rapidly. However, their shortage of certain features of learning management systems such as library, testing, questionnaire, scoring, and assigning prevents their more effective use in education. Therefore, the use of educational social networks such as Yammer, Edmodo, and Ning in educational environments becomes more widespread every passing day with their potentials to provide an opportunity for out-of-class interaction, minimize confidentiality and security problems (Thongmak, 2013), and help the effective use of time (Brady *et al.*, 2010). Edmodo draws more attention in comparison to other educational social networks with its features such as supporting the cooperative working of teachers and students in a secure environment (Giang and Minh, 2014; Trust, 2015); a user-friendly interface (Trust, 2013); compatibleness with devices having Android or iOS as an operating system (Gan *et al.*, 2015; Sanders, 2012) and easy membership and use in a lot of languages.

Edmodo allows making use of the power of social media in educational environments. It enables to send instructional materials about content such as video, images, text files, website links, announcements, and warning messages to a wide audience (Wallace, 2014). It provides teachers with an opportunity to communicate with students, organize activities, or assign tasks about the lesson to students whenever they want (Gan *et al.*, 2015). It contributes to the formation of a natural and warm interaction in the learning environment

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(Wallace, 2014) by allowing teachers to create communities of practice (Trust, 2015). With its interface similar to that of Facebook, it allows students to share information before and after the lesson (Gan *et al.*, 2015; Wallace, 2014) and provides them with a sense of responsibility (Martin *et al.*, 2015; Sanders, 2012). That in turn, increases acquisition of knowledge among students and enables them to reflect more during the lesson (Gan *et al.*, 2015). Thus, instructors can create positive interdependence on the basis of challenging group tasks and goals and individual and group accountability through respective controls and promotive interaction both face-to-face and online (Picciano, 2002). In addition, students can be equipped with the required interpersonal and small group skills that will enable them to achieve both project and team tasks (Gan *et al.*, 2015).

However, pre-service teachers must be informed of this system and its features and be willing to use educational social networks in their professional lives so that the use of the above-mentioned features of Edmodo in education becomes widespread. As a matter of fact, Mahdizadeh *et al.* (2008) report that the views of teachers about computer-supported/web-based learning environments considerably influence their technology use. Failure of these technologies can be attributed to the fact that they cannot gain acceptance and popularity among the target users (Rupak *et al.*, 2014). Apart from that, though there are many educational social networks that perform similar functions, teachers have difficulty in choosing the appropriate platform that will meet their needs (Wang and Yub, 2015). Therefore, the beliefs, experiences, and preferences of pre-service teachers concerning educational social networks, which can promote the learning of today's students who are called digital natives, are important. Actually, if the beliefs and attitudes of pre-service teachers concerning the use of Edmodo are determined in the pre-service period, the problems they may encounter in their professional lives may be reduced, and more effective solutions may be offered for the existing problems. In this regard, it is important to determine the acceptance and use of new technologies of this sort by pre-service teachers.

1.2 Cognitive style and technology acceptance

Research on the acceptance of new technologies deals with many variables related to individual differences including demographic variables, situational variables, personality variables, and cognitive variables. Sometimes, different people with the same beliefs may develop different attitudes, and different people with the same attitudes may develop different behavioral intentions (BI) (Lu *et al.*, 2001). Cognitive style is taken as a variable in the present study. Cognitive style has been studied in the context of organizational technology implementation, but its effects on technology acceptance by individuals have received little research attention (Chakraborty *et al.*, 2008). Researchers report that individuals having different cognitive styles may differ in terms of technology acceptance and adopt different approaches while making decisions (Guo *et al.*, 2010; Ma *et al.*, 2006; Saeed *et al.*, 2009). Though it is known that cognitive styles have been handled in different categories in literature, the most frequent classification used in instructional technology research is field dependent/field independent (Hong *et al.*, 2012; Witkin *et al.*, 1971a; Zhang, 2004). There are differences between field dependent and field independent individuals in terms of analytical thinking, capability to perform tasks autonomously, socialization, and need for guidance. Field dependent students tend to join in-group activities, be externally motivated, and need to get structured instructions from teachers while field independent individuals tend to use inductive strategy, focus on the whole rather than details (Zhang, 2004), obtain knowledge by themselves, and have high social communication skills (Witkin *et al.*, 1977).

1.3 Technology acceptance model (TAM)

At the present time, IS researchers still try to determine how user-related factors influence the acceptance and use of new technologies. Recently, some studies have been conducted to

determine pre-service teachers' technology acceptance and use (Kiraz and Ozdemir, 2006; Ma *et al.*, 2005; Ursavaş *et al.*, 2014). However, literature contains few studies focusing on TAM and cognitive style (Frias-Martinez *et al.*, 2008; Chakraborty *et al.*, 2008) and educational social network. In this regard, the present study aims to determine the BI of pre-service teachers regarding Edmodo, which is an innovative tool, based on cognitive styles. To this end, an attempt is made to answer the following research questions:

RQ1. What is the validity of extended TAM in explaining pre-service teachers' technology acceptance?

RQ2. How do variables related to TAM vary among pre-service teachers having different cognitive styles?

1.4 Research model and hypotheses

Many theoretical models have been used for investigating the factors influential on the use and acceptance of information technology so far. TAM is a theoretical framework that has been used for determining individuals' use of systems and has proved right in different fields. The original TAM proposes that perceived ease of use (PEU) and perceived usefulness (PU) influence users' BI toward accepting a new technology or a system (Lee *et al.*, 2012). Venkatesh and Bala (2008) argue that TAM is a developing model, and new and different studies about it will contribute to it. The present study, on the other hand, employs an extended TAM (Figure 1) in which relationships between the variables included in the models used in different samples and cultures beforehand are examined based on TAM (Ursavaş *et al.*, 2015).

As is seen in the Figure 1, BI is directly influenced by attitude toward Edmodo use (ATEU). PU has a direct and indirect influence on BI while PEU has an indirect influence on BI. PEU and PU influence ATEU jointly while PEU has a direct influence on PU. In addition, facilitating conditions (FC) were included in hypothesis based on their influence on PU and PEU; computer self-efficacy (CSE) was included in hypothesis based on its influence on PU, PEU, ATEU, and BI; subjective norm (SN) was included in hypothesis based on its influence on PU, ATEU, and BI; and technological complexity (TC) was included in hypothesis based on its influence on PEU and PU. In the following section, the variables included in the study are shortly described, and hypotheses are written. While the hypotheses are being

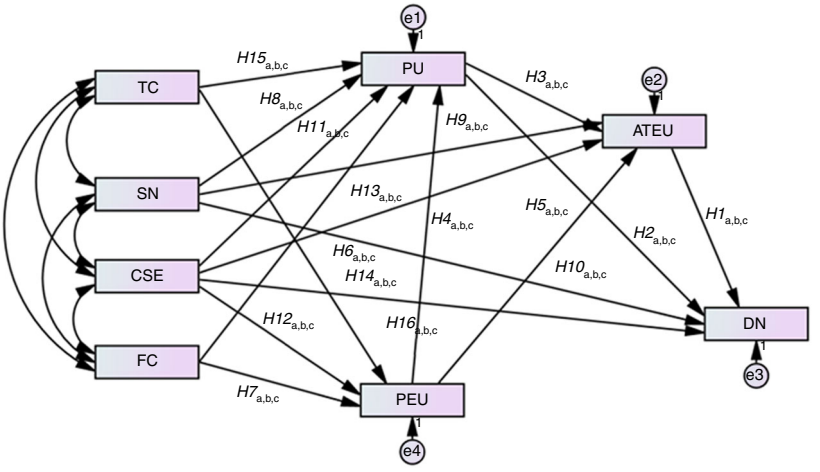

Figure 1.
Research model

evaluated, a, b, c are used to represent the whole sample, field dependent pre-service teachers, and field independent pre-service teachers.

TAM argues that PU and PEU are influential on the development of positive attitude and BI regarding new technologies (Carlos *et al.*, 2011; Choi and Chung, 2013; Davis, 1989). Here, BI is the measure of the likelihood of a person to display a given behavior (Ajzen and Fishbein, 1980). Attitude, on the other hand, is a positive or negative judgment of a person regarding a particular behavior he is to display (Fishbein and Ajzen, 1975). In this regard, the following hypothesis was formulated:

H1a,b,c. ATEU will have a significant influence on BI.

PU is the degree of perception of a person regarding the increase in his/her job performance when he uses a particular system (Davis, 1989, p. 320). It is reported in literature that PU has a positive influence on the use of social networks/educational social networks (Choi and Chung, 2013; Mazman and Usluel, 2010; Pinho and Soares, 2011). It is also stated that PU has a positive influence on the attitudes of individuals on social networks (Leng *et al.*, 2011). Thus, the following hypotheses were formulated:

H2a,b,c. PU will have a significant influence on BI.

H3a,b,c. PU will have a significant influence on ATEU.

PEU is the degree of perception of a person regarding not encountering any physical or mental difficulty while using a particular system (Davis, 1989). There are studies showing that PEU has an influence on PU (Pinho and Soares, 2011; Teo *et al.*, 2011; Teo and Ursavaş, 2012; Park *et al.*, 2012) and ATEU (Pinho and Soares, 2011; Terzis *et al.*, 2012; Escobar-Rodriguez and Monge-Lozano, 2012; Teo *et al.*, 2012). Accordingly, the following hypotheses were formulated:

H4a,b,c. PEU will have a significant influence on PU.

H5a,b,c. PU will have a significant influence on ATEU.

FC are defined as environmental factors influential on a person's effort, willingness, and intention to complete a task (Teo, 2009a). Therefore, the following hypotheses were formulated:

H6a,b,c. FC will have a significant influence on PU.

H7a,b,c. FC will have a significant influence on PEU.

SN is the belief of a person regarding the thoughts of relevant people about him performing or not performing a particular behavior (Ajzen and Fishbein, 1980). According to Venkatesh (2000), SN indirectly influences intention to use over PU when an individual displays the behavior of using a technology voluntarily. It is reported in literature that SN positively influences individuals' BI in social networks and is a significant predictor of PU (Choi and Chung, 2013; Leng *et al.*, 2011). In this sense, the following hypotheses were formulated:

H8a,b,c. SN will have a significant influence on PU.

H9a,b,c. FC will have a significant influence on ATEU.

H10a,b,c. FC will have a significant influence on BI.

CSE is the thought of an individual about his capacity to organize and successfully perform the activities that are needed to show a particular performance. Research shows that CSE has significant influences on PU, PEU, and BI (Venkatesh and Davis, 1996; Venkatesh, 2000). In this respect, the following hypotheses were formulated:

H11a,b,c. CSE will have a significant influence on PU.

H12a,b,c. CSE will have a significant influence on PEU.

H13a,b,c. CSE will have a significant influence on ATEU.

H14a,b,c. CSE will have a significant influence on BI.

TC is defined as degree of difficultness, complexness, and incomprehensibleness of a technology relative to other technologies or past experiences (Thompson *et al.*, 1991). Researchers indicate that the perceptions of individuals are influenced by the features of technology (Lee *et al.*, 2003), and TC has a close relationship with PU and PEU (Teo, 2009b). Therefore, the following hypotheses were formulated:

H15a,b,c. TC will have a significant influence on PU.

H16a,b,c. TC will have a significant influence on PEU.

2. Method

2.1 Research design

This study employed structural equation modeling (SEM) approach to analyze an extended TAM that represents the relationship between cognitive style and the eight constructs: BI, ATEU, PU, PEU, SN, CSE, TC, and FC. In addition, structural models were analyzed according to participants' cognitive styles. Analysis was made in two stages. The first stage involved analyzing demographic data and testing normality assumptions (mean, standard deviation, skewness, and kurtosis). In the second stage, data were analyzed using the SEM approach. SEM is a statistical approach for examining the causal relationships and testing the hypotheses between variables (Hoyle, 1995). In addition, a lot of goodness of fit statistics were calculated and reported in testing the research model. Moreover, the research model was subjected to model convergent validity and discriminant validity to test its validity.

Data concerning the demographic characteristics of participants and their responses to multiple items for each of the eight variables were collected through survey method. The relevancy of the research model that was used in the study was tested by using IBM SPSS® Amos™ 21. The following steps were taken to provide reliability and validity of the model: screening missing values and outliers, testing the assumption of multivariate and univariate normality, and establishing convergent and discriminant validity.

2.2 Participants

The participants of this study were 129 pre-service teachers attending Recep Tayyip Erdoğan University located in the North East of Turkey. Of 145 pre-service teachers, 129 responded (females = 37, males = 92) the questionnaire. The mean age of the sample was 19.03 years (SD = 1.32). The students were enrolled in the primary school education program. Of the participants, 65.1 percent were field dependent, and 34.9 percent were field independent. In total, 70 percent of the pre-service teachers used Edmodo for less than one hour in a day. Additionally, 48.8 percent of the participants accessed Edmodo via mobile devices. The response rate was approximately 89 percent.

2.3 Measures

A questionnaire instrument was designed for this study. It comprised three sections. The first section involved questions about the demographic characteristics of the participants. The second section contained Group Embedded Figures Test (GEFT) aimed at revealing the cognitive styles of the pre-service teachers. The third section included technology acceptance measure aimed at determining the acceptance and use of Edmodo among the participants.

2.3.1 GEFT. In this study, GEFT was used for determining the cognitive styles of the pre-service teachers. GEFT is test that is widely accepted and used for determining an

individual's cognitive style. Also psychometrical properties of the measure have been investigated in cross-cultural settings and accepted as quite reasonable (Altun and Cakan, 2006). Its original version was created by Witkin *et al.* (1971b). It was adapted to Turkish by Okman-Fişek (1979). It basically consists of three sections. The first section, which is not included in scoring, is composed of seven items. Both the second section and the third section are made up of nine items. 1 point is given for each correct answer. The maximum score that can be achieved by a person is 18. Individuals who get a score of not less than 10 are considered field independent while the others are considered field dependent.

2.3.2 Technology acceptance measure. The technology acceptance measure consists of 27 items under eight factors. The items were taken from the technology acceptance measure for teachers developed by Ursavaş *et al.* (2015). The factors in the measure are PU (four items), perceived ease of use (PEU; three items), attitude toward use (ATEU; four items), TC (TC; three items), self-efficacy (CSE; three items), SN (three items), FC (three items), and BI (four items). Each item was measured on a five-point Likert scale with 1 = strongly disagree and 5 = strongly agree.

2.4 Procedure and data collection

Edmodo was used for one semester (14 weeks) for students to follow the lessons online within the scope of the information and communication technologies course. Before start, seminary and documents about the features and use of Edmodo were given to the students. Later on, the content of each week was delivered to the students as electronic documents and videos via *Note* tool. The students were told to watch videos and have information about the content through their desktop and mobile devices before the lesson. In the classroom environment, assignments about the content were conveyed to the students via Assignment tool, and they were asked to perform them in the classroom environment. After such activities were carried out in the classroom environment, an attempt was made to determine the knowledge levels of the students via Quiz tool. The views of the students about the prepared content and the learning process were received via a poll. The students performing the tasks in the best way were rewarded via Award Badge tool. In addition, it was made sure that the students expressed their questions, thoughts, and feelings about the content and tasks to the teacher and their friends through chats and emoticons and made extra discussions. In the end, the participants were asked to fill in the TAM measure and demographic information questionnaire online and the cognitive style scale on paper on a voluntary basis. On average, each participant took 30 min to complete the questionnaire. All items in the question were answered, and there was no missing data.

3. Results

3.1 Descriptive statistics

Mean, standard deviation, skewness, and kurtosis values concerning the factors in the research model are presented in Table I. Mean was over 3.00 in all factors except for TC. All standard deviations were less than 1.00. In other words, the measurement scores of the groups were close to the mean scores. Furthermore, skewness and kurtosis indices were small and well within the recommended level of |3| and |10|, respectively (Kline, 2005).

3.2 Convergent and discriminant validity

Fornell and Larcker (1981) suggest a method that is composed of three phases in order to test the convergent validity regarding responses given to the items of a scale. These phases are: all indicator loadings should be significant and greater than 0.7; the total value of construct reliability (CR) and Cronbach's α should be greater than 0.7; and the average variance extracted (AVE) for each construct should be above 0.5. The factor loading

Construct	Item	Mean	SD	Skewness	Kurtosis
PU	4	3.996	0.742	−0.827	1.633
PEU	3	4.038	0.733	−0.521	0.142
ATEU	4	3.755	0.815	−0.312	−0.197
TC	3	2.816	0.924	0.037	−0.216
CSE	3	4.012	0.632	0.006	−0.593
SN	3	3.534	0.844	−0.187	−0.243
FC	3	3.795	0.742	−0.517	1.355
BI	4	3.505	0.909	−0.227	−0.210

Notes: PU, perceived usefulness; PEU, perceived ease of use; ATEU, attitude toward computer use; TC, technological complexity; CSE, computer self-efficacy; FC, facilitating conditions; SN, subjective norm; BI, behavioral intention

Table I. Descriptive statistics of the study constructs

(ranging from 0.692 to 0.937) results in Table III show that all items exceeded the recommended level of 0.7 except for FC_2. The CR values (ranging from 0.787 to 0.926) and Cronbach's values (ranging from 0.730 to 0.920) exceeded the generally accepted value of 0.70, and the AVE values (ranging from 0.553 to 0.805) exceeded the generally accepted value of 0.5. Thus, the factor loadings and CR, Cronbach's α, and AVE values show that all items met the three principles for convergent validity.

Discriminant validity determines the degree to which latent variables in a model are discriminated. Farrell (2010) defines it as the measure of the degree to which any factor of a measurement tool composed of four factors like A, B, C, and D is discriminated from others. The square root of the AVE values for the constructs should be greater than the variance of any of the inter-construct correlations. Correlation and AVE values belonging to each construct are showed in Table III. To say that there is discriminant validity, the values on the diagonals have to be greater than their own row and column values (Fornell and Larcker, 1981). The results show that the AVE value for each construct is greater than the coefficient of correlation of that construct with all the other constructs in the model. This suggests that all of the indicators demonstrated a satisfactory convergent and discriminant validity for this study (Tables II and III).

3.3 Model fit

As is seen in literature, a lot of goodness of fit indices are used in SEM research (Kline, 2005; Harrington, 2009). The goodness of fit indices concerning the research model were calculated via Amos 21 in the present study. In this study, all fit indices of the structured model were satisfactory as seen in the Table IV.

3.4 Hypothesis testing

Four endogenous variables were tested in the model. BI was found to be significantly determined by PU, ATEU, and CSE, which resulted in an R^2 of 0.39. This means that PU, ATEU, and CSE explained 39 percent of the variance in BI. The other three endogenous variables, ATEU, PU, and PEU, were explained by their determinants in the amounts of 47, 20, and 27 percent, respectively. Table V also shows the results of the hypothesis.

Overall, 16 out of 48 hypotheses were not supported by the data as seen in the Table V. According to the hypotheses, ATEU significantly influences BI for all groups (both groups, the field dependent group, and the field independent group) ($\beta = 0.488$, $p < 0.001$; $\beta = 0.507$, $p < 0.001$; $\beta = 0.440$, $p < 0.001$). The supported hypotheses are $H1_a$, $H1_b$, and $H1_c$,

	SE	UE	*t*-value	CR[a]	AVE[b]	Cronbach's α
Perceived usefulness (PU)						0.920
PU_1	0.828	1.000[c]	–	0.921	0.744	
PU_2	0.840	0.978	11.781			
PU_3	0.900	1.069	13.210			
PU_4	0.881	1.030	13.044			
Perceived ease of use (PEU)						0.880
PEU_1	0.841	1.000[c]	–	0.885	0.720	
PEU_2	0.937	1.057	13.806			
PEU_3	0.759	0.786	10.274			
Attitude toward computer use (ATEU)						0.870
ATEU_1	0.783	1.000[c]	–	0.861	0.610	
ATEU_2	0.760	1.166	9.275			
ATEU_3	0.866	1.141	10.978			
ATEU_4	0.706	1.102	8.503			
Behavioral intention (BI)						0.920
BI_1	0.782	1.000[c]	–	0.926	0.759	
BI_2	0.907	1.147	11.883			
BI_3	0.866	1.117	11.156			
BI_4	0.922	1.186	12.155			
Computer self-efficacy						0.730
CSE_1	0.824	1.000[c]	–	0.843	0.643	
CSE_2	0.735	0.855	6.479			
CSE_3	0.842	1.110	7.304			
Facilitating conditions						0.770
FC_1	0.805	1.000[c]	–	0.787	0.553	
FC_2	0.692	0.831	7.395			
FC_3	0.729	0.959	7.744			
Technological complexity						0.730
TC_1	0.891	1.000[c]	–	0.925	0.805	
TC_2	0.903	1.349	5.011			
TC_3	0.898	1.186	5.035			
Subjective norm						0.780
SN_1	0.770	1.000[c]	–	0.869	0.700	
SN_2	0.827	1.353	6.999			
SN_3	0.890	1.251	6.729			

Table II.
Results for the measurement model

Notes: UE, unstandardized estimate; SE, standardised estimate. UE and SE parameters were extracted with maximum likelihood estimation (MLE). [a]CR is composite reliability computed by $(\Sigma\lambda)^2/(\Sigma\lambda)^2+(\Sigma\eta)$; [b]AVE is average variance extracted computed by $(\Sigma\lambda^2)/(\Sigma\lambda^2)+(\Sigma\eta)$; [c]this value was fixed at 1.00 for model identification purposes

	PU	PEU	ATEU	BI	CSE	FC	TC	SN
PU	(0.862[a])							
PEU	0.596**	(0.848[a])						
ATEU	0.769**	0.649**	(0.927[a])					
BI	0.776*	0.585**	0.814**	(0.962[a])				
CSE	0.539**	0.609**	0.550**	0.580**	(0.918[a])			
FC	0.486**	0.366**	0.501**	0.519**	0.398**	(0.887[a])		
TC	−0.014	−0.129	−0.066	−0.049	−0.133	−0.088	(0.961[a])	
SN	0.493**	0.358**	0.510**	0.608**	0.445**	0.478**	0.334**	(0.932[a])

Table III.
Discriminant validity for the measurement model

Notes: [a]Diagonals in parentheses are square roots of the average variance extracted from observed variables (items); Off-diagonal are correlations between constructs. *$p < 0.05$, **$p < 0.01$

Fit Index	Recommended level of fit index	Whole sample	Field dependent	Field independent
χ^2	ns at $p < 0.05$	24.563 significant $p > 0.05$	232.5 significant $p > 0.05$	196.9 significant $p > 0.05$
χ^2/df	< 3	1.365	2.34	1.99
GFI	⩾0.90	0.977	0.92	0.90
NFI	⩾0.90	0.980	0.93	0.89
TLI	⩾0.90	0.973	0.95	0.93
SRMR	< 0.05	0.039	0.05	0.05
RMSEA	< 0.05 (good fit) < 0.08 (fair fit)	0.038 (0.000-0.072)	0.06 (0.05-0.07)	0.06 (0.05-0.08)
CFI	⩾0.90	0.994	0.95	0.94

Table IV. Fit indices for the research model

respectively. PU significantly influences BI ($\beta = 0.377$, $p < 0.001$; $\beta = 0.346$, $p < 0.05$; $\beta = 0.569$, $p < 0.001$) and ATEU ($\beta = 0.555$, $p < 0.001$; $\beta = 0.584$, $p < 0.001$; $\beta = 0.356$, $p < 0.001$) for all groups. The supported hypotheses are $H2_a$, $H2_b$, $H2_c$ and $H3_a$, $H3_b$, $H3_c$, respectively. PEU significantly influences PU ($\beta = 0.356$, $p < 0.001$; $\beta = 0.322$, $p < 0.001$; $\beta = 0.569$, $p < 0.001$) and ATEU ($\beta = 0.290$, $p < 0.001$; $\beta = 0.254$, $p < 0.01$; $\beta = 0.364$, $p < 0.05$). The supported hypotheses are $H3_a$, $H3_b$, $H3_c$ and $H4_a$, $H4_b$, $H4_c$, respectively. FC does not significantly influence PU and PEU for the field dependent group ($\beta = 0.084$, $p > 0.05$; $\beta = 0.093$, $p > 0.05$). Non-supported hypotheses are $H6_b$ and $H7_b$. However, it significantly influences PU and PEU for both groups and the field independent group ($\beta = 0.198$, $p < 0.01$; $\beta = 0.350$, $p < 0.05$; $\beta = 0.157$, $p < 0.05$; $\beta = 0.244$, $p < 0.05$). The supported hypotheses are $H6_a$, $H6_c$, $H7_a$ and $H7_c$, respectively. SN significantly influences PU, ATEU, and BI ($\beta = 0.198$, $p < 0.01$; $\beta = 0.261$, $p < 0.01$; $\beta = 0.134$, $p < 0.05$; $\beta = 0.167$, $p < 0.05$; $\beta = 0.216$, $p < 0.001$; $\beta = 0.197$, $p < 0.05$; $\beta = 0.265$, $p < 0.01$). The supported hypotheses are $H8_a$, $H8_c$, $H9_a$, $H9_b$, $H10_a$, $H10_b$, $H10_c$, respectively. However, SN does not significantly influence PU for the field dependent group ($\beta = 0.115$, $p > 0.05$) and ATEU for the field independent group ($\beta = 0.159$, $p > 0.05$). Non-supported hypotheses are $H8_b$ and $H9_c$. CSE does not significantly influence PU, ATEU, and BI ($\beta = 0.165$, $p > 0.05$; $\beta = -0.087$, $p > 0.05$; $\beta = 0.065$, $p > 0.05$; $\beta = -0.004$, $p > 0.05$; $\beta = 0.096$, $p > 0.05$; $\beta = 0.134$, $p > 0.05$; $\beta = 0.075$, $p > 0.01$). Non-supported hypotheses are $H11_a$, $H11_c$, $H13_a$, $H13_b$, $H13_c$, $H14_a$, $H14_b$, respectively. However, CSE significantly influences PU for the field dependent group ($\beta = 0.377$, $p < 0.01$), BI for the field independent group ($\beta = 0.206$, $p < 0.05$), and PEU for all groups (both groups, the field dependent group, and the field independent group) ($\beta = 0.622$, $p < 0.001$; $\beta = 0.703$, $p < 0.001$; $\beta = 0.455$, $p < 0.001$). The supported hypotheses are $H11_b$, $H12_a$, $H12_b$, $H12_c$, $H14_c$, respectively. Finally TC does not significantly influence PU and PEU ($\beta = -0.034$, $p > 0.05$; $\beta = -0.058$, $p > 0.05$; $\beta = 0.059$, $p > 0.05$; $\beta = -0.057$, $p > 0.05$; $\beta = 0.013$, $p > 0.05$). The supported hypotheses are $H15_a$, $H15_b$, $H15_c$, $H16_a$, $H16_b$, respectively. However, it significantly influences PEU for the independent group ($\beta = -0.222$, $p < 0.05$). As a result, hypothesis $H16_c$ is supported.

3.5 Path analysis

In path analysis, the path model has two types of effects. The first is the direct effect, and the second is the indirect effect. A total effect on a given variable is the sum of the respective direct and indirect effects. The effect sizes with values less than 0.1 are considered small; those with values less than 0.3 are considered medium; and values not less than 0.5 are considered large (Cohen, 1988). Table VI shows the standardized total effects, direct effects, and indirect effects associated with each of the eight variables. The results were evaluated

Hypothesis	Path	Path coefficient	*t*-value	Results
ATEU → BI	$H1_a$	0.488***	6.112	Supported
	$H1_b$	0.507***	5.031	Supported
	$H1_c$	0.440***	3.293	Supported
PU → BI	$H2_a$	0.355***	4.112	Supported
	$H2_b$	0.377***	3.326	Supported
	$H2_c$	0.346*	2.504	Supported
PU → ATEU	$H3_a$	0.569***	7.409	Supported
	$H3_b$	0.555***	5.374	Supported
	$H3_c$	0.584***	4.857	Supported
PEU → PU	$H4_a$	0.356***	4.343	Supported
	$H4_b$	0.322***	3.399	Supported
	$H4_c$	0.569***	3.700	Supported
PEU → ATEU	$H5_a$	0.290***	3.718	Supported
	$H5_b$	0.254**	2.650	Supported
	$H5_c$	0.364*	2.469	Supported
FC → PU	$H6_a$	0.198**	2.646	Supported
	$H6_b$	0.084	0.913	Not supported
	$H6_c$	0.350*	2.895	supported
FC → PEU	$H7_a$	0.157*	2.084	supported
	$H7_b$	0.093	0.353	Not supported
	$H7_c$	0.244*	2.416	supported
SN → PU	$H8_a$	0.198**	2.695	supported
	$H8_b$	0.115	1.220	Not supported
	$H8_c$	0.261**	2.263	supported
SN → ATEU	$H9_a$	0.134*	2.295	supported
	$H9_b$	0.167*	2.107	supported
	$H9_c$	0.159	1.618	Not supported
SN → BI	$H10_a$	0.216***	3.870	supported
	$H10_b$	0.197*	2.545	supported
	$H10_c$	0.265**	2.926	supported
CSE → PU	$H11_a$	0.165	1.593	Not supported
	$H11_b$	0.377**	2.669	supported
	$H11_c$	−0.087	−0.609	Not supported
CSE → PEU	$H12_a$	0.622***	7.021	supported
	$H12_b$	0.703***	5.645	supported
	$H12_c$	0.455***	3.923	supported
CSE → ATEU	$H13_a$	0.065	0.714	Not supported
	$H13_b$	−0.004	−0.032	Not supported
	$H13_c$	0.096	0.790	Not supported
CSE → BI	$H14_a$	0.134	1.691	Not supported
	$H14_b$	0.075	0.603	Not supported
	$H14_c$	0.206*	2.072	supported
TC → PU	$H15_a$	−0.034	−0.601	Not supported
	$H15_b$	−0.058	−0.907	Not supported
	$H15_c$	0.059	0.537	Not supported
TC → PEU	$H16_a$	−0.057	−1.021	Not supported
	$H16_b$	0.013	0.185	Not supported
	$H16_c$	−0.222*	−2.356	Supported

Notes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table V.
Hypothesis testing results

for the whole sample, the field dependent students, and the field independent students, respectively. The variable influencing BI most was found to be PU (total effect: 0.518, 0.533, and 0.509). This variable was influenced by PEU (total effect: 0.298, 0.286, and 0.371) and by ATEU (total effect: 0.438, 0.448, and 0.406). Among the four variables external to the

Table VI.
Direct, indirect, and total effects of the research model

Outcome	Determinant	Whole sample Standardised estimates			Field dependent Standardised estimates			Field independent Standardised estimates		
		Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Behavioral intention	PU	0.291	0.227	0.518	0.305	0.228	0.533	0.292	0.217	0.509
	PEU	–	0.298	0.298	–	0.286	0.286	–	0.371	0.371
	ATEU	0.438	–	0.438	0.448	–	0.448	0.406	–	0.406
	TC	–	–0.044	–0.044	–	–0.037	–0.037	–	–0.067	–0.067
	CSE	0.094	0.255	0.349	0.049	0.318	0.367	0.158	0.169	0.327
	FC	–	0.151	0.151	–	0.071	0.071	–	0.274	0.274
	SN	0.202	0.178	0.380	0.187	0.153	0.340	0.224	0.192	0.416
Attitude toward computer use	PU	0.519	–	0.519	0.509	–	0.509	0.534	–	0.534
	PEU	0.263	0.184	0.447	0.242	0.170	0.412	0.290	0.265	0.556
	TC	–	–0.054	–0.054	–	–0.033	–0.033	–	–0.114	–0.114
	CSE	0.050	0.313	0.363	–0.003	0.381	0.378	0.080	0.222	0.302
	FC	–	0.174	0.174	–	0.081	0.081	–	0.332	0.332
	SN	0.140	0.117	0.257	0.180	0.069	0.249	0.146	0.140	0.285
Perceived usefulness	PEU	0.354	–	0.354	0.335	–	0.335	0.497	–	0.497
	TC	–0.043	–0.025	–0.068	–0.078	0.006	–0.073	0.061	–0.131	–0.070
	CSE	0.141	0.190	0.331	0.305	0.183	0.489	–0.079	0.236	0.157
	FC	0.199	0.056	0.255	0.085	0.030	0.116	0.339	0.135	0.474
	SN	0.226	–	0.226	0.136	–	0.136	0.261	–	0.261
Perceived ease of use	TC	–0.072	–	–0.072	0.017	–	0.017	–0.264	–	–0.264
	CSE	0.537	–	0.537	0.548	–	0.548	0.475	–	0.475

TAM, SN and CSE had the strongest effect on BI. SN, with the total effects of 0.380, 0.340, and 0.416, had a large effect on BI. CSE, with the total effects of 0.349, 0.367, and 0.327, had a large effect on BI. TC (total effect: −0.044, −0.037, and −0.067) and FC (total effect: 0.151, 0.071, and 0.274) were seen to have small total effects on BI. Together, these seven determinants accounted for approximately 75, 72, and 82 percent of the variance in BI to use technology. PU and PEU turned out to be the most significant variables for ATEU. PU, with the total effects of 0.519, 0.509, and 0.534, had a large effect on BI. PEU, with the total effects of 0.447, 0.412, and 0.556, also had a large effect on BI. Apart from that, TC (total effect: −0.054, −0.033, and −0.114), CSE (total effect: 0.363, 0.373, and 0.302), SN (total effect: 0.257, 0.249, and 0.285), and finally FC (total effect: 0.174, 0.081, and 0.332) accounted for 66, 60, and 77 percent of the variance in ATEU, respectively. PEU and CSE turned out to be the most significant variables affecting PU (total effect: 0.354 and 0.331 for the whole sample; 0.335 and 0.489 for the field dependent students; and 0.497 and 0.157 for the field independent students). TC was found to have a small effect (total effect: −0.068,−0.073, and −0.070) while FC (total effect: 0.255, 0.116, and 0.474) and SN (total effect: 0.226, 0.136, and 0.261) were determined to have a medium effect. These five variables were able to explain 49, 48, and 64 percent of the variance in PU. For PEU, the most dominant determinant was CSE with a total effect of 0.537, 0.548, 0.475 corresponding to an entirely a direct effect. TC (total effect: −0.072, 0.017, −0.263) and FC (total effect: 0.159, 0.091, 0.271) were found to have a small effect. It was seen that these three variables explained 39, 35, and 55 percent of the variance in PEU.

4. Discussion and recommendations

This study aimed to explore the BI of pre-service teachers regarding the use of Edmodo based on their cognitive styles and to test the validity of an extended TAM. The study was carried out with 129 pre-service teachers. The data were collected through the GEFT and the technology acceptance measure. The obtained data were analyzed by use of structural equation model. Therefore, the results of this study should be evaluated within this scope.

The results indicate that the extended TAM is a parsimonious model explaining 75, 72, and 82 percent of the endogenous variable (BI) for the whole sample, the field dependent sample, and the field independent sample, respectively. It was seen that the field independent students had a higher level of intention to use Edmodo in comparison to the field dependent students. However, literature does not contain any clear statement that learning styles are influential on technology acceptance (Ma *et al.*, 2006; Saeed *et al.*, 2009; Wu and Liu, 2015). This may be because the employed technologies do not address a specific field or group (Thongmak, 2011). In the present study, cognitive style may have been effective in the determination of BI to use Edmodo, which is an educational platform (Chen and Macredie, 2002; Chou, 2001; McElroy *et al.*, 2007; Triantafillou *et al.*, 2003). The fact that Edmodo has an easy to use interface, makes students learn individually without the need for any guidance, and allows them to perform activities over the assigned tasks may have caused the field independent individuals, who are autonomous in the construction of their own cognitive structures, think in a task-oriented way, are capable of constructing themselves, and attach importance to details (Hall, 2000), to carry themselves one step further in the use of technology in comparison to other individuals. The fact that Edmodo allows information sharing between teachers and students and among students without any time and space limitation may have caused the field dependent individuals, who need external guidance to construct their cognitive structures, are responsive to criticisms and social relations, and have high external motivation, to come to the forefront more in developing social relations

(Chen and Macredie, 2002). For that reason, individual and cooperative learning activities that will meet the needs of field dependent and field independent individuals should be arranged during the use of Edmodo in learning environments.

PU was seen to have significant positive direct and indirect influences on BI and to be the most effective and dominant variable in the determination of BI. Its influence on the field dependent individuals was seen to be close to its influence on the field independent individuals. That implies that the use of Edmodo will bring benefit to an individual in his work and thus increase his intention to use technology. This may be because Edmodo provides students with flexible study time inside and outside the school and allows them to access the most up-to-date lesson contents, to work in group cooperatively, to be in a more social and interactive learning environment, and to create their own contents or make adjustments on contents based on their own competencies (Thongmak, 2011, 2013). In this regard, pre-service teachers should be informed of how Edmodo satisfies such needs of field dependent and field independent students as analytical thinking, capability to perform tasks autonomously, socialization, and guidance and be engaged in activities involving these needs.

PU was found to have an indirect influence on BI over ATEU. ATEU had the second largest influence on BI among the field dependent students and had the third largest influence on BI among the field independent students. The results obtained in this study are consistent with literature (Cheon *et al.*, 2012; Guo *et al.*, 2010; El-Gayar *et al.*, 2011; Pinho and Soares, 2011; Teo *et al.*, 2008, 2009, 2012; Teo, 2009b, 2010, 2011; Wu and Liu, 2015) and indicate that positive attitude has a positive direct influence on BI. As a matter of fact, Ajzen and Fishbein (1980) report that attitude toward an object influences intention and then behavior about such object (i.e. use of it). Recent research highlights that whether or not a user is voluntary to display the behavior of using should be taken into consideration in the exploration of the influence of attitude (Ursavaş, 2013; Nistor and Heymann, 2010; Lopez-Bonilla and Lopez-Bonilla, 2011).

Though research in literature has mostly focused on the indirect influence, rather than the direct influence of PEU on BI, the present study evaluated the total effect of PEU on intention and found out that it had the fifth largest effect on intention among the field independent students and had the fourth largest effect on intention among the field dependent students. PEU was seen to be the second most important variable in the prediction of BI (Davis *et al.*, 1989; Lee *et al.*, 2003; Mahdizadeh *et al.*, 2008; Thongmak, 2011). Research reports that PEU varies by the type of the technology used, the way it is offered, and the technology experience of the individual who is to use it (Davis, 1989; Thongmak, 2011). That reveals that the influence of PEU on BI does not guarantee that relevant technology will be used, rather it indicates that it is easy to use such technology. The research results demonstrate in terms of cognitive styles that the field independent individuals had higher values in comparison to the field dependent individuals in terms of both ease of use and attitude toward use. Previous research also reports that cognitive styles have significant direct influences on PEU (Chakraborty *et al.*, 2008; Saeed *et al.*, 2009.). That may have caused the field independent individuals, who are capable of organizing learning materials and internalizing knowledge, to find Edmodo, which allows its users to work on content in an organized way, easy. Informative guides about the use of Edmodo may be prepared for field dependent students, who need more guidance in the learning process, in future studies.

SN was seen to have a significant influence on the core constructs of the TAM: PU, PEU, and ATEU and BI. In terms of cognitive styles, SN had a higher influence on the BI, ATEU, and PU of the field independent individuals regarding the use of Edmodo. Similarly Chakraborty *et al.* (2008) indicated that SN has found direct and significant effect on

cognitive style. Literature contains some studies in which it is argued that SN is influential on individual's behavior (Riemenschneider *et al.*, 2003; Cheung *et al.*, 2002; Cheon *et al.*, 2012) and some studies in which it is argued that it has an insignificant influence on individual's behavior (Roberts and Henderson, 2000; Teo, 2011; Ma *et al.*, 2005). However, in the present study, use of Edmodo was presented to the pre-service teachers as a technology that supports their learning and is useful to them rather than as an obligation. That manifested itself in the fact that PU was found to be the most dominant variable influential on BI. ATEU had a higher influence on BI among the field independent students in comparison to the field dependent students, but just the contrary was true in the case of SN. That may be interpreted as follows: Field independent students are affected by people whose opinions they consider valuable and by their peers in forming their BI to a higher degree. However, it is reported in literature that the perceptions of field dependent individuals are easily affected by their environment (Chakraborty *et al.*, 2008) and they act based on instructions given by their superiors while field independent individuals depend on their own experiences (Frias-Martinez *et al.*, 2008). That implies that field independent individuals are affected by SN more when individuals are voluntary and are convinced of usefulness for learning. More positive results may be obtained in terms of SN if the above-mentioned measures are taken for PEU and PU for field dependent and field independent students.

The direct and indirect influences of CSE on BI were also determined. CSE was seen to have a medium positive influence on BI in total. The variable of CSE yielded similar results in the cases of ATEU, PU, and PEU. The obtained result is consistent with literature (Venkatesh and Davis, 1996; Amin, 2007; Reid and Levy, 2008; Teo *et al.*, 2012; Teo and Ursavaş, 2012), but indicates that the fact that an individual has self-efficacy regarding a technology does not necessarily mean that he will use it. In terms of cognitive styles, CSE had a higher influence on intention among the field dependent individuals in comparison to the field independent individuals. However, while the direct influence of CSE on intention was insignificant among the field dependent individuals, such influence was significant among the field dependent individuals. This is because though field dependent students do not have adequate CSE, they can complete the learning process successfully through instructions and exchange of ideas. The fact that the field independent individuals mostly preferred individual learning environments and did not need instructions during learning may have resulted from that they had adequate CSE regarding Edmodo.

FC were seen to have an insignificant influence on BI among the field dependent individuals and to have a significant influence on BI among the field independent individuals. That may imply that when field dependent individuals do not have knowledge of the use of Edmodo, they are not affected by the FC provided. The fact that such characteristics of field independent individuals as liking learning new things by their very nature and not needing direct instructions are supported by FC may be attributed to that they are competent in overcoming the problems they face. As a matter of fact, it is reported in literature that field dependent students are interested in learning subjects about which they have prior knowledge while field independent students are interested in learning new subjects (Witkin *et al.*, 1977).

TC was found to have an insignificant negative influence on BI among the field dependent individuals, but have a significant negative influence on BI among the field independent individuals. That shows that when it seems difficult to use a technology or learn how to use it, a big effort has to be made to make use of it, or it is a time-consuming technology. The fact that Edmodo has an interface similar to that of Facebook which is easy to understand and use (Balasubramaniana *et al.*, 2014) may have contributed to the formation of the BI of the field dependent individuals who are passive in learning environments and generally need external

support. The negative influence of TC on PU, which was found in this study, shows that pre-service teachers think that complex technologies are not very useful or will not improve their performance when they use them in their jobs.

New studies employ other cognitive style measures or GEFT in experimental design. The use of self-reports in this study may have resulted in the common method variance. Future research could employ a multi-trait multi-method matrix (Campbell and Fiske, 1959).

5. Conclusions

Based on the findings of this study, the following results were obtained:

- The extended TAM is a parsimonious model explaining 75, 72 and 82 percent of the endogenous variable (BI) for the whole sample, the field dependent sample, and the field independent sample, respectively.
- PU of Edmodo had significant positive direct and indirect influences on BI. PU had an indirect influence on BI over ATEU. The influence on the field dependent individuals was close to that on the field independent individuals.
- PEU of Edmodo was determined to be the second most important variable in the prediction of intention to use. It was seen to have the fifth largest influence on intention among the field independent students and the fourth largest influence on intention among the field dependent students.
- SN had a significant influence on the core constructs of the TAM: PU, PEU, ATEU, and BI technology. SN had a higher influence on the BI, ATEU, and usefulness perceptions of the field independent individuals regarding the use of Edmodo.
- CSE was seen to have a medium positive influence on BI in total. In terms of cognitive styles, CSE had a higher influence on intention among the field dependent individuals in comparison to the field independent individuals.
- FC were seen to have an insignificant influence on BI among the field dependent individuals and to have a significant influence on BI among the field independent individuals.
- TC had an insignificant negative influence on BI among the field dependent individuals, but had a significant negative influence on BI among the field independent individuals.

References

Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Upper Saddle River, NJ.

Altun, A. and Cakan, M. (2006), "Undergraduate students' academic achievement, field dependent/independent cognitive styles and attitude toward computers", *Educational Technology & Society*, Vol. 9 No. 1, pp. 289-297.

Amin, H. (2007), "An analysis of mobile credit card usage intentions", *Information Management & Computer Security*, Vol. 15 No. 4, pp. 260-269.

Balasubramaniana, K., Leena, V. and Fukey, L.N. (2014), "A study on 'student preference towards the use of Edmodo as a learning platform to create responsible learning environment'", *Procedia – Social and Behavioral Sciences*, Vol. 144 No. 1, pp. 416-422.

Brady, K.P., Holcomb, L.B. and Smith, B.V. (2010), "The use of alternative social networking sites in higher educational settings: a case study of the e-learning benefits of Ning in education", *Journal of Interactive Online Learning*, Vol. 9 No. 2, pp. 151-170.

Campbell, D.T. and Fiske, D.W. (1959), "Convergent and discriminant validation by the multitrait multimethod matrix", *Psychological Bulletin*, Vol. 56 No. 2, pp. 81-105.

Carlos, J., Pinho, M.R. and Soares, A.M. (2011), "Examining the technology acceptance model in the adoption of social networks", *Journal of Research in Interactive Marketing*, Vol. 5 Nos 2/3, pp. 116-129.

Chakraborty, I., Hu, P.J.H. and Cui, D. (2008), "Examining the effects of cognitive style in individuals' technology use decision making", *Decision Support Systems*, Vol. 45 No. 2, pp. 228-241.

Chen, S.Y. and Macredie, R.D. (2002), "Cognitive styles and hypermedia navigation development of a learning model", *Journal of the American Society for Information Science and Technology*, Vol. 53 No. 1, pp. 3-15.

Cheon, J., Lee, S., Crooks, S.M. and Song, J. (2012), "An investigation of mobile learning readiness in higher education based on the theory of planned behaviour", *Computers & Education*, Vol. 59 No. 3, pp. 1054-1064.

Cheung, C.M., Lee, M.K. and Chen, Z. (2002), "Using the internet as a learning medium: an exploration of gender difference in the adoption of FaBWeb", *IEEE Proceedings of the 35th Annual Hawaii International Conference on System Sciences, HICSS, January*, pp. 475-483.

Choi, G. and Chung, H. (2013), "Applying the technology acceptance model to social networking sites (SNS): Impact of subjective norm and social capital on the acceptance of SNS", *International Journal of Human-Computer Interaction*, Vol. 29 No. 10, pp. 619-628, doi: 10.1080/10447318.2012.756333.

Chou, H.-W. (2001), "Influences of cognitive style and training method on training effectiveness", *Computers & Education*, Vol. 37 No. 1, pp. 11-25.

Cohen, J. (1988), *Statistical Power Analysis for the Behavioral Sciences*, Erlbaum, Hillsdale, NJ.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-340.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989), "User acceptance of computer technology: a comparison of two theoretical models", *Management Science*, Vol. 35 No. 8, pp. 982-1003.

El-Gayar, O., Moran, M. and Hawkes, M. (2011), "Students' acceptance of tablet PCs and implications for educational institutions", *Educational Technology & Society*, Vol. 14 No. 2, pp. 58-70.

Escobar-Rodriguez, T. and Monge-Lozano, P. (2012), "The acceptance of moodle technology by business administration students", *Computers & Education*, Vol. 58 No. 4, pp. 1085-1093.

Farrell, A.M. (2010), "Insufficient discriminant validity: a comment on Bove, Pervan, Beatty, and Shiu (2009)", *Journal of Business Research*, Vol. 63 No. 3, pp. 324-327.

Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Addison-Wesley, Reading, MA.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.

Frias-Martinez, E., Chen, S. and Liu, X. (2008), "Investigation of behavior and perception of digital library users: a cognitive style perspective", *International Journal of Information Management*, Vol. 28 No. 5, pp. 355-365.

Gan, B., Menkhoff, T. and Smith, R. (2015), "Enhancing students' learning process through interactive digital media: new opportunities for collaborative learning", *Computers in Human Behavior*, Vol. 51 No. 2015, pp. 652-663.

Giang, T.N. and Minh, N.V. (2014), "Edmodo – a new and effectıve blended earning solution", paper presented at 2014 International Conference Leadership and Management for Sustainable Development, Ho Chi Minh City, pp. 1-6.

Guo, C., Shim, J.P. and Otondo, R. (2010), "Social network services in China: an integrated model of centrality, trust, and technology acceptance", *Journal of Global Information Technology Management*, Vol. 13 No. 2, pp. 76-99, doi: 10.1080/1097198X.2010.10856515.

Hall, J.K. (2000), "Field dependence-independence and computer-based instruction in geography", unpublished doctoral dissertation, Virginia Polytechnic Institute and State University, Blacksburg, VA.

Harrington, D. (2009), *Confirmatory Factor Analysis*, Oxford University Press, New York, NY.

Hong, J.-C., Hwang, M.-Y., Tam, K.-P., Lai, Y.-H. and Liu, L.-C. (2012), "Effects of cognitive style on digital jigsaw puzzle performance: a GridWare analysis", *Computers in Human Behavior*, Vol. 28 No. 3, pp. 920-928.

Hoyle, R.H. (1995), *Structural Equation Modeling: Concepts, Issues, and Applications*, Sage Publications, Thousand Oaks, CA.

Kiraz, E. and Ozdemir, D. (2006), "The relationship between educational ideologies and technology acceptance in pre-service teachers", *Educational Technology and Society*, Vol. 9 No. 2, pp. 152-165.

Kline, R.B. (2005), *Principles and Practice of Structural Equation Modeling*, 2nd ed., Guilford Press, New York, NY.

Lee, J.S., Cho, H., Gay, G., Davidson, B. and Ingraffea, A. (2003), "Technology acceptance and social networking in distance learning", *Educational Technology & Society*, Vol. 6 No. 2, pp. 50-61.

Lee, W., Xiong, L. and Huc, C. (2012), "The effect of Facebook users' arousal and valence on intention to go to the festival: applying an extension of the technology acceptance model", *International Journal of Hospitality Management*, Vol. 31, pp. 819-827.

Leng, G.S., Lada, S., Muhammad, M.Z., Ibrahim, A.A.H.A. and Amboala, T. (2011), "An exploration of social networking sites (SNS) adoption in Malaysia using technology acceptance model (TAM), theory of planned behavior (TPB) and intrinsic motivation", *Journal of Internet Banking and Commerce*, Vol. 16 No. 2, pp. 1-26.

López-Bonilla, L.M. and López-Bonilla, J.M. (2011), "The role of attitudes in the TAM: a theoretically unnecessary construct?", *British Journal of Educational Technology*, Vol. 42 No. 6, pp. 160-162.

Lu, H.P., Yu, H.J. and Lu, S.S. (2001), "The effects of cognitive style and model type on DSS acceptance: an empirical study", *European Journal of Operational Research*, Vol. 131 No. 3, pp. 649-663.

McElroy, J.C., Hendrickson, A.R., Townsend, A.M. and Samuel, S.M. (2007), "Dispositional factors in internet use: personality versus cognitive style", *MIS Quarterly*, Vol. 31 No. 4, pp. 809-820.

Ma, W.W.K., Andersson, R. and Streith, K.O. (2005), "Examining user acceptance of computer technology: an empirical study of student teachers", *Journal of Computer Assisted Learning*, Vol. 21 No. 6, pp. 387-395.

Ma, W.W.K., Li, P. and Clark, T.H. (2006), "Examining the cognitive style effects on the acceptance of online community weblog systems", *IEEE Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06), Vol. 6, January*, p. 135a.

Mahdizadeh, H., Biemans, H. and Mulder, M. (2008), "Determining factors of the use of e-learning environments by university teachers", *Computers & Education*, Vol. 51 No. 1, pp. 142-154.

Martin, E., Hernan-Losada, I. and Haya, P.A. (2015), "Comparing social factors affecting recommender decisions in online and educational social network", *New Review of Hypermedia and Multimedia*, Vol. 22 No. 1, pp. 6-26.

Mazman, S.G. and Usluel, Y.K. (2010), "Modeling educational usage of Facebook", *Computers & Education*, Vol. 55 No. 2, pp. 444-453.

Nistor, N. and Heymann, J.O. (2010), "Reconsidering the role of attitude in the TAM: an answer to Teo (2009)", *British Journal of Educational Technology*, Vol. 41 No. 6, pp. 142-145.

Okman-Fişek, G. (1979), *Saklı şekiller grup testi [The Group Embedded Figures Test]*, Boğaziçi Üniversitesi Yayınları, Istanbul.

Park, Y., Son, H. and Kim, C. (2012), "Investigating the determinants of construction professionals' acceptance of web-based training: an extension of the technology acceptance model", *Automation in Construction*, Vol. 22 No. 2012, pp. 377-386.

Picciano, A.G. (2002), "Beyond student perceptions: Issues of interaction, presence, and performance in an online course", *Journal of Asynchronous Learning Networks*, Vol. 6 No. 1, pp. 21-40.

Pinho, J.C.M.R. and Soares, A.M. (2011), "Examining the technology acceptance model in the adoption of social networks", *Journal of Research in Interactive Marketing*, Vol. 5 Nos 2/3, pp. 116-129.

Reid, M. and Levy, Y. (2008), "Integrating trust and computer self-efficacy with TAM: an empirical assessment of customers' acceptance of banking information systems (BIS) in Jamaica", *Journal of Internet Banking and Commerce*, Vol. 12 No. 3, pp. 1-17.

Riemenschneider, C.K., Harrison, D.A. and Mykytn, P.P.M. Jr (2003), "Understanding IT adoption decisions in small business: integrating current theories", *Information & Management*, Vol. 40 No. 4, pp. 269-285.

Roberts, P. and Henderson, R. (2000), "Information technology acceptance in a sample of government employees: a test of the technology acceptance model", *Interacting with Computers*, Vol. 12 No. 5, pp. 427-443.

Rupak, R., Greg, R., Jei, Y. and Ben, J. (2014), "Technology acceptance model (TAM) and social media usage: an empirical study on Facebook", *Journal of Enterprise Information Management*, Vol. 27 No. 1, pp. 6-30.

Saeed, N., Yang, Y. and Sinnappan, S. (2009), "Effects of cognitive style on user acceptance of blogs and podcasts", *IEEE 2009 Ninth IEEE International Conference on Advanced Learning Technologies, July*, pp. 293-297.

Sanders, K.S.S. (2012), "An examination of the academic networking site Edmodo on student engagement and responsible learning", doctoral dissertation, ProQuest Dissertations & Theses.

Teo, T. (2009a), "Evaluating the intention to use technology among student teachers: a structural equation modeling approach", *International Journal of Technology in Teaching and Learning*, Vol. 5 No. 2, pp. 106-118.

Teo, T. (2009b), "Modelling technology acceptance in education: a study of pre-service teachers", *Computers & Education*, Vol. 52 No. 2, pp. 302-312.

Teo, T. (2010), "Examining the influence of subjective norm and facilitating conditions on the intention to use technology among pre-service teachers: a structural equation modeling of an extended technology acceptance model", *The Asia-Pacific Education Researcher*, Vol. 11 No. 2, pp. 253-262.

Teo, T. (2011), "Factors influencing teachers' intention to use technology: model development and test", *Computers & Education*, Vol. 57 No. 4, pp. 2432-2440.

Teo, T. and Ursavaş, Ö.F. (2012), "Technology acceptance of pre-service teachers in Turkey: a cross-cultural model validation study", *International Journal of Instructional Media*, Vol. 39 No. 3, pp. 193-201.

Teo, T., Su-Luan, W. and Sing, C.C. (2008), "A cross-cultural examination of the intention to use technology between Singaporean and Malaysian pre-service teachers: an application of the technology acceptance model (TAM)", *Educational Technology & Society*, Vol. 11 No. 4, pp. 265-280.

Teo, T., Ursavaş, Ö.F. and Bahçekapılı, E. (2011), "Efficiency of the technology acceptance model to explain pre-service teachers' intention to use technology: a Turkish study", *Campus-Wide Information Systems*, Vol. 28 No. 2, pp. 93-101.

Teo, T., Ursavas, O.F. and Bahçekapili, E. (2012), "An assessment of pre-service teachers' technology acceptance in Turkey: a structural equation modeling approach", *The Asia-Pacific Education Researcher*, Vol. 21 No. 1, pp. 191-202.

Teo, T., Lee, C.B., Chai, C.S. and Wong, S.L. (2009), "Assessing the intention to use technology among pre-service teachers in Singapore and Malaysia: a multigroup invariance analysis of the technology acceptance model (TAM)", *Computers & Education*, Vol. 53 No. 3, pp. 1000-1009.

Terzis, V., Moridis, C.N. and Economides, A.A. (2012), "How student's personality traits affect computer based assessment acceptance: integrating BFI with CBAAM", *Computers in Human Behavior*, Vol. 28 No. 5, pp. 1985-1996.

Thompson, R.L., Higgins, C.A. and Howell, J.M. (1991), "Personal computing: toward a conceptual model of utilization", *MIS Quarterly*, Vol. 15 No. 1, pp. 124-143.

Thongmak, M. (2011), "Facebook© adoption as computer-mediated communication for university Students", *Proceedings of Americas Conference on Information Systems (AMCIS2011), Detroit, MI*.

Thongmak, M. (2013), "Social network system in classroom: antecedents of Edmodo © adoption", *Journal of e-Learning and Higher Education*, Vol. 2013 No. 1, pp. 1-15.

Triantafillou, E., Pomportsis, A. and Demetriadis, S. (2003), "The design and the formative evaluation of an adaptive educational system based on cognitive styles", *Computers & Education*, Vol. 41 No. 1, pp. 87-103.15

Trust, T. (2013), "Beyond school walls: teachers' use of professional learning networks to receive help on a global scale", *International Journal of Social Media and Interactive Learning Environments*, Vol. 1 No. 3, pp. 270-286.

Trust, T. (2015), "Deconstructing an online community of practice: teachers' actions in the Edmodomath subject community", *Journal of Digital Learning in Teacher Education*, Vol. 31 No. 2, pp. 73-81, doi: 10.1080/21532974.2015.1011293.

Ursavaş, Ö.F. (2013), "Reconsidering the role of attitude in the TAM: an answer to Teo (2009) and Nistor and Heymann (2010), and Lopez-Bonilla and Lopez-Bonilla (2011)", *British Journal of Educational Technology*, Vol. 44 No. 1, pp. 22-25.

Ursavaş, Ö.F., Şahin, S. and Mclroy, D. (2014), "Technology acceptance measure for teachers: T-TAM / Öğretmenler için teknoloji kabul ölçeği: Ö-TKÖ", *Journal of Theory and Practice in Education*, Vol. 10 No. 4, pp. 885-917.

Ursavaş, Ö.F., Bahçekapılı, T., Camadan, F. and İslamoğlu, H. (2015), "Teachers' behavioural intention to use ICT: a structural equation model approach", in Slykhuis, D. and Marks, G. (Eds), *Proceedings of Society for Information Technology & Teacher Education International Conference 2015*, Association for the Advancement of Computing in Education (AACE), Chesapeake, VA, pp. 2875-2880, available at: www.editlib.org/p/150400 (accessed August 22, 2015).

Venkatesh, V. (2000), "Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model", *Information Systems Research*, Vol. 11 No. 4, pp. 342-365.

Venkatesh, V. and Bala, H. (2008), "Technology acceptance model 3 and a research agenda on interventions", *Journal of Information Technology*, Vol. 39 No. 2, pp. 273-315.

Venkatesh, V. and Davis, F.D. (1996), "A model of the antecedents of perceived ease of use: development and test", *Decision Sciences*, Vol. 27 No. 3, pp. 451-481.

Wallace, A. (2014), "Social learning platforms and the flipped classroom", *International Journal of Information and Education Technology*, Vol. 4 No. 4, pp. 293-296.

Wang, X. and Yub, Y. (2015), "How individual characteristics influence people's evaluation towards information technology in different contexts", *Behaviour & Information Technology*, Vol. 34 No. 3, pp. 286-293.

Witkin, H.A., Oltman, P.K. and Karp, S.A. (1971a), *Manuel for Embedded Figures Test, Children's Embedded Figures Test and Group Embedded Figures Test*, Consulting Psychologists Press, Palo Alto, CA.

Witkin, H.A., Moore, C.A., Goodenough, D.R. and Cox, P.W. (1977), "Field dependent and field independent cognitive styles and their educational implications", *Review of Educational Research*, Vol. 47 No. 1, pp. 1-64.

Witkin, H.A., Oltman, P.K., Raskin, E. and Karp, S.A. (1971b), *Manual of the Embedded Figures Test*, Consulting Psychologists Press, Palo Alto, CA.

Wu, C. and Liu, C.F. (2015), "Acceptance of ICT-mediated teaching/learning systems for elementary school teachers: moderating effect of cognitive styles", *Education and Information Technologies*, Vol. 20 No. 2, pp. 381-401.

Zhang, L.-F. (2004), "Field-dependence/independence: cognitive style or perceptual ability? – validating against thinking styles and academic achievement", *Personality and Individual Differences*, Vol. 37 No. 6, pp. 1295-1311.

Corresponding author
Ömer Faruk Ursavaş can be contacted at: omer.ursavas@erdogan.edu.tr