International Journal of Engineering & Technology, 7 (3.7) (2018) 104-108

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Interaction Behavior on Edmodo in Biology: Integrating UTAUT Model

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Abstract

Integration of Edmodo, a social network educational platform allows educators-students to communicate, being in real-time discussion and collaborate in a significant approach. Edmodo yet, is still not dominant in Malaysia educational practices. The purpose of this research is to determine the students' interaction behavior in learning by addition of Edmodo as subsidiary tool in Biology using Unified Theory of Acceptance and Use of Technology (UTAUT) as theoretical framework. Sample of study consists of 74 undergraduate students who were registered in Biology code. Self-access learning module was given to the samples for 2 consecutive weeks during early semester followed by the questionnaire at the end of semester. Data has been collected using a 5 point Likert scale with the element of main construct in UTAUT. Pearson correlation and linear regression were performed to analyze the data. It was found that performance expectancy and effort expectancy exhibited positive significant effect on interaction behavior towards Edmodo, while social influence and facilitating conditions had no significant effect. .

Keywords: *Edmodo, Social Network, Biology Education, UTAUT*

1. Introduction

Social network applications have been well adapted as priority tool to interact, share resources and thoughts. Indeed, it offers educational collaboration services among users. It is proven those social networking increase students' learning skills in cognitive and social interaction [1]. Social networking also introduced informal education, an effective tool in teaching method that provides user friendly features for socializing, sharing and generating content and ideas [2]. The social network in classroom may give strong influence on students' interaction behavior principally perceived intention, consideration towards other's expression and thinking. The most influential social network as subsidiary tool in education field is Facebook; however it lacks of privacy, countless unrelated advertising and not suitable for classroom. Edmodo is an educational social network created in 2008 that specially designed to help educators and students to communicate and collaborate each other in secured learning environment [3]. This authentic educational platform in Edmodo is free, simple and reachable thousand miles away for all members. It also enables educators who are in the similar course to communicate among them, share resources and exchange opinions. Students may participate in discussion, post the appropriate questions digitally, respond to the turnaround time quizzes and submit paperless assignments.
Educators in 21st century strive to build a conducive learning environment, in the same time considering the content matter without disregarding students' attention and interest [4]. Utilization of Edmodo perhaps changes the mode of teaching and learning in both educators and students. Regardless of numerous advantages provided by social network for education and learning purposes [5-6], , it is important to take into consideration of students' perspective on the social networking as subsidiary tool specifically in traditional Biology classroom. Definitely, students' view may contribute to the successful classroom management and modernize teaching and learning pedagogical approaches. This study was conducted to discover students' interaction behavior towards Edmodo (educational social network platform) to ensure the acceptance and adoption of new style Biology educational environment according to the Unified Theory of Acceptance and Use of Technology theoretical framework.

2. UTAUT and Formulated Problem

Theoretical Framework

The unified theory of acceptance and use of technology (UTAUT) mergers eight influential social psychology and sociology models and theories; the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behavior (TPB), the combination of TAM and TBP (CTAM-TPB), the Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT) to better clarify the empirical studies of diverse behavior to use and usage intention of innovative information technologies. This model has incorporated in four essential constructs and act as the main determining factors of behavior intention namely; performance expectancy, effort expectancy, social influence, and

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facilitating conditions. Next to these four constructs, there are four sub-constructs that act as moderators between main determining factors and behavior to use or usage intention; age, gender, experience and voluntariness of use [7]. Figure 1 represents the research model adapted from UTAUT.

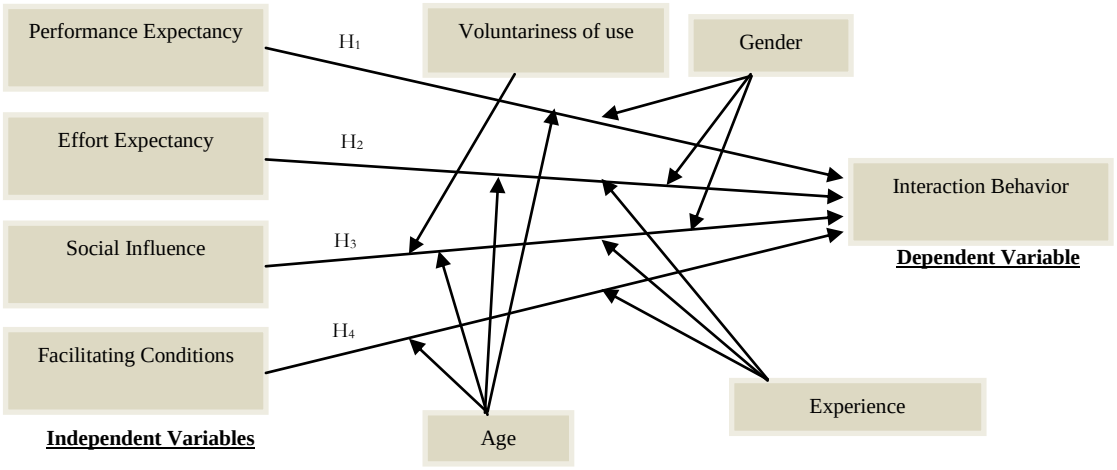


Figure 1. Research model of UTAUT

Formulated Problem and Hypotheses

Performance expectancy is the students' faith that using Edmodo application will strengthen and improve understanding and learning in Biology through hybridization with traditional classroom. Students would expect that embedding social networking in current classroom assist them improving their performance and achievement as well as actively engagement in this subject. Within the scope of Edmodo acceptancy among students in Biology, performance expectancy can be defined as students' perception level of using this particular application (Edmodo) will help them enhance their academic performance. According to this construct, there were five root components of influencing intention; perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations. Earlier studies shown that the relationship between social network and intention to use was always to be positive correlated [8-9] and students considered Edmodo as an effective subsidiary tool for learning environment [10-11]. Therefore, the first proposed hypothesis was that:

> *H_1: Performance expectancy will be positively correlated to the interaction behavior in acceptance of Edmodo as subsidiary tool in Biology classroom.*

Effort expectancy is students' belief level Edmodo accessibility during learning Biology. This construct is generally emphasized on the level of ease of using the application for the new users. It contains three root components that fit to the concept of effort expectancy; perceived ease of use, complexity and ease of use. Students neither having knowledge nor experiences on Edmodo at the beginning of implementation. Concerning of this situation, user friendly and easy to use [12-13] system are important part on Edmodo interface or otherwise it becomes the largest obstacle and decrease the degree of adoption and interaction towards Edmodo. The second independent variable was hypothesized by:

> *H_2: Effort expectancy will be positively correlated to the interaction behavior in acceptance of Edmodo as subsidiary tool in Biology classroom.*

Social influence describes the magnitude of students see the belief of important people around them to use or not to use Edmodo in learning Biology. It contains three root components; subjective norm, social factors and image. While facilitating conditions can be defined as the level of students' faith that they were supported in a particular organization and existed technical structure. It comprises three major root constructs; perceived behavioral control, facilitating conditions and compatibility. Social influence and facilitating conditions may directly correlate to the behavior and contains limited control over the students' perceive the other beliefs and strong support system increased the use of Edmodo as shown in previous study [14]. Thus, the third and fourth hypotheses were:

> *H_3: Social influence will be positively correlated to the interaction behavior in acceptance of Edmodo as subsidiary tool in Biology classroom.*
>
> *H_4: Facilitating conditions will be positively correlated to the interaction behavior in acceptance of Edmodo as subsidiary tool in Biology classroom.*

Experimental Details

Sample Population and Sample Size: This is a cross-sectional study and it was conducted among 74 students who were enrolled in an undergraduate Biology code in Diploma of Sciences program at Universiti Teknologi MARA, Perak Branch, Tapah Campus, Perak, Malaysia during second semester academic year of 2016 to 2017, over a period of six months. A stratified sampling was done during this study.

Research Framework: The theoretical framework used for the investigation of interaction behavior among students on Edmodo was based on UTAUT. Four independent variables were included; performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC) in order to fully represent the dependent variable; interaction behavior (IB). However, since the use of Edmodo is not on a voluntary basis, experience and voluntariness were excluded from the model. We also eliminated age and gender due to most of participants was at the same age and the number of male participants was below than 30. A sample size of at least 30 or more is needed to produce an approximately normal distribution of mean sampling distributions [15]. In this research study, the term of 'interaction behavior' was used to replace the original term of 'behavior intention', however the meaning and concept of behavior intention was remain the same.

Research Instrumentation and Procedure: Edmodo was used as a subsidiary tool to the traditional Biology classrooms. This study undertook on the following procedures:

1) At the beginning of the semester, participants were exposed to the Biology syllabus and self-access learning module through face-to-face method for 2 consecutiveweeks. The aim of this module is to provide an exposure to students the element that will be integrated in their syllabus.

2) Classes were continued by blend up the traditional classroom and Edmodo educational platform. Participants were asked to register the online Edmodo class and were informed to

create profile and sign in as 'student'. Edmodo educational platform was applied after the traditional face-to-face teaching was done, at any time during or after classes throughout semester for twelve weeks. All learning resources were uploaded into the Edmodo in order to facilitate retrieval of information. They were enquired to complete discussion, assignments or quizzes in each week and counted as their meeting components. Participants were also encouraged to use communication tools through chat function to enhance their interaction with others and educators.

3) Data collection was begun at the end of semester; during the final week of traditional lecture. Questionnaires were adapted from the Venkatesh[7] for the element of PE, EE, SI and FC with some modifications in order to emphasize the criteria needed in the study. The questionnaire was design in dual language (English and Malay) for better understanding by the participants while preserving the original meaning of each question. 10 pre survey questionnaires were sent to the selected 10 participants to enhance the validity of question items. The question items were divided into two part; a) 4 items for demographic information, and b) 25 items to infer the dependent variables based on UTAUT model. All items in questionnaire had to be rated on a 5-point Likert scale ranging from "strongly disagree (1)" to "strongly agree (5)" except for demographic information. This scale was used as scoring responses by participants for quantitative data analysis.

Data Analysis: Data entry and statistical analysis of question items was conducted using Statistical Package for Social Sciences (SPSS) version 21.0 (SPSS Inc. Chicago, USA). Prior to the data analysis of question items, a reliability of the scales for each construct was assessed by Cronbach's coefficient alpha test. It is required to evaluate the question items consistency or stability of the proposed theoretical model. A value of Cronbach's coefficient alpha (Cronbach α) more than 0.7 was considered high internal reliability [16]. The descriptive statistics was calculated and correlation between independent variables and dependent variable were calculated using Pearson's correlation coefficient and Regression analysis. A *p*-value less than 0.05 was considered statistically significant.

3. Findings

Demographic data and their usage intention were embedded in the question items to gain some basic information on the enrolled participants and data were analyzed by descriptive statistics; frequency and percentage. The sample consisted of 74 students with 15 male students (20.27%) and 59 female students (79.73%) at the age between 18 and 21 years old (100%). Figure 2 represents 62.16% of them used mobile phone, 32.43% used personal notebook computer while 5.41% used personal desktop computer to access Edmodo. Majority of participant were accessed to Edmodo once in a week (41.89%), 27.03% of them visiting the site 2 or 3 days in a week, 20.27% for every two weeks and 10.81% for others. Descriptive statistics were also showed most of them (55.41%) spent less than one hour visiting Edmodo in a week, 20.27 % spent one to 3 hours, 2.70% spent one to two hours and 1.35% others.

In order to understand the IB of participants towards Edmodo educational platform and then expressing the actual intention of Edmodo as subsidiary tool for Biology, the questionnaire was used as an instrument to examine the framework of this research study. Tables 1 depicts the reliability results measured by Cronbach α and mean scales of each variable that were used throughout this study. Items consistencies of all variables were scored greater than 0.70 as recommended. These high scores indicate the instrument were satisfied to be used and attained a good level of reliability.

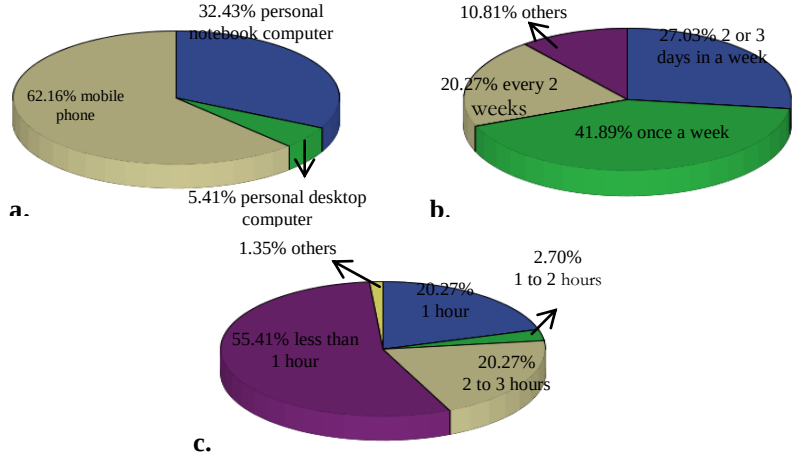


Figure 2. a. Devices used to access Edmodo; b. Frequency accessing Edmodo; c. Time spent for surfing Edmodo

Table 1. Reliability analyses and mean scales

Construct Variables	Question Items	Cronbach α Scores	Mean (SD)
Performance Expectancy	PE^1	0.880	4.15 (0.81)
	PE^2		3.73 (0.93)
	PE^3		3.72 (0.73)
	PE^4		3.89 (0.77)
	PE^5		3.80 (0.84)
	PE^6		4.11 (0.90)
	PE^7		3.66 (0.86)
Effort Expectancy	EE^1	0.856	4.07 (0.76)
	EE^2		4.07 (0.82)
	EE^3		4.39 (0.83)
	EE^4		4.01 (0.80)
	EE^5		4.34 (0.86)
Social Influence	SI^1	0.809	3.80 (0.89)
	SI^2		4.08 (0.72)
	SI^3		3.61 (0.90)
Facilitating Conditions	FC^1	0.765	3.96 (0.82)
	FC^2		3.61 (1.06)

	FC[3]		3.76 (0.98)
Interaction Behavior	IB[1]	0.760	3.84 (0.92)
	IB[2]		4.14 (0.69)

[1-7] numbering of the question items

Pearson correlation was conducted between independent variables (PE, EE, SI and FC) and dependent variable (IB). Table 2 represents the analysis results among these variables. PE, EE, SI and FC were found to have positively significant effect to the IB, the p-value was less than 0.01 and 0.05 on the FC. There were positive correlation between PE, EE, SI, FC and IB. Based on the Pearson correlation results, the PE and EE showed strong relationship to the IB while SI and FC revealed a weak relationship with IB.

Table 2. Results of correlation analysis

Construct Variables	**Correlation**	
	***Pearson Correlation**	***p*-value**
Performance Expectancy	0.64	< 0.01
Effort Expectancy	0.64	< 0.01
Social Influence	0.35	< 0.01
Facilitating Conditions	0.23	0.05

p-value <0.05

The predictive power of independent variables for dependent variable was determined using linear regression analysis. Tolerance and variance inflation factor (VIF) were calculated to examine the collinearity among independent variables. Tolerance and VIF of all independent variables were scored greater than 0.2 and less than 10 as recommended [17]. As shown in the Table 3, the R square of 0.464 indicates PE, EE, SI and FC accounts 46.4% variation in the IB. PE and EE were found to have significant supported prediction relationship to the IB with p-value less than 0.01 and 0.02 respectively. Table 4 presents the results of the tested hypotheses and based on the analyses, H_1 and H_2 were accepted while H_3 and H_4 were rejected.

Table 3. Results of linear regression analysis predicting IB

IB	**B**	**β**	***t***	***p*-value**
Constant	0.74		1.51	0.14
1-Performance Expectancy	0.48	0.42	2.70	< 0.01
2-Effort Expectancy	0.45	0.36	2.51	0.02
3-Social Influence	-0.07	-0.06	-0.56	0.58
4-Facilitating Conditions	-0.05	-0.06	-0.59	0.56

n = 74, R = 0.681, R2 = 0.464, F = 14.934, *p*-value <0.05

Table 4. Results of hypotheses tested

Proposed Hypothesis	**Results**
H_1: Performance expectancy will be positively correlated to the interaction behavior in acceptance of Edmodo.	Accepted
H_2: Effort expectancy will be positively correlated to the interaction behavior in acceptance of Edmodo.	Accepted
H_3: Social influence will be positively correlated to the interaction behavior in acceptance of Edmodo.	Rejected
H_4: Facilitating conditions will be positively correlated to the interaction behavior in acceptance of Edmodo.	Rejected

4. Discussion

The fundamental purpose of this study was to elucidate the elements contributed to the interaction behavior towards acceptance and adoption of Edmodo as subsidiary tool in learning Biology among university students in Malaysia. Hereto, UTAUT was chosen as theoretical context and interaction behavior was expressed in four approaches; performance expectancy, effort expectancy, social influence and facilitating conditions. As the results, H_1 and H_2 were accepted while H_3 and H_4 were rejected. The participants agreed that PE and EE will promote the IB on Edmodo educational platform.

PE is the strongest and most important variable that influences the acceptance and adoption of Edmodo. The Pearson correlation and regression analysis showed that there were statistically significant positive relationship between PE and IB. The mutual positive relationship between these variables signifies that students believe using Edmodo improves their performance in Biology. This is an indicator whereby students with higher PE accept, intent and committed to use Edmodo more than those with lower expectation. Similar to this study, PE was found to be positively influenced 1030 young social network users in Africa to adopt social network [18]. More than 90% of their participants were less than 28 years old and indeed this study was 100% participated by younger users. They portrayed younger user as -more technology ready- and -sensitive to new trends-. On the other hand, some works stated PE had significant influence on intention to use social network such as blog as an educational platform. The platform encourages students to be actively participated and engaged in learning as discussion can be extended at any time after or beyond traditional classroom without limitations [19-21]. The findings of this study are in alignment with previous study as well, with the used of another framework as their research model; the Technology Acceptance Model (TAM). Perceived usefulness, a variable similar to PE was found significantly contributed to the prediction of intention to use Edmodo in classroom [22]. The result is justifiable for the reason that students aim to adopt new technology if they expect this medium would increase academic performances. In traditional classroom, students-educators meeting were happened only in a short period of time per weekly thus limiting the discussion session among students-educators. Integrating Edmodo in return produces more discussion time over the entire week. It is worth noting that social network has been used by students for utility, collecting information, problem solving, meeting new and right people and seeking help regarding assignments from group and communities [23].

EE was the second variables that influence the acceptance and adoption of Edmodo in learning Biology. With the acceptance of H_2, there were statistically significant positive relationship between EE and IB presented in correlation and regression analysis. This finding is consistent with researchers examining EE on acceptance of social network; the Facebook [24], and general social network sites such as Friendster and Myspace [25] in educational setting. They used perceived ease of use (a variable parallel to the EE and it is another strong variable in TAM framework), and positive relationship denotes that students have the intention to use Edmodo because it is easy to use, user friendly application and the site is manageable. In studies involving e-learning system such as

Smartschool in Malaysia's school [26], EE were found to be significant impact to the users. In terms of practicing handling the software, the actual use of any kind of software was ensured by the simple instruction to access and understanding on resolving difficulties experienced during the usage. Therefore students getting work done effectively due to the less effort and quick access to resources needed.

Two variables were not statistically significant in regression analysis; SI and FC. Although Person correlation showed a significant relationship between independent variables and dependent variable, the strength of the correlations were reported to be weak. Throughout the semester, some of the students reluctant to use Edmodo as subsidiary tool in learning Biology. This implies the lack of awareness among them on the advantages provided by Edmodo or they were not influenced by the educators, seniors and peers to keep on track with Edmodo. Referring to the demographic results, majority of students only spent less than one hour surfing Edmodo per weekly. It is suggest that developing countries such as in Perak, Malaysia by which the technology diffusion and responsiveness is in moderately to low, students need to be influenced and motivated by educators, family, peers, group, communities or even authorities to adopt and use Edmodo educational platform. Similarly in FC result and previous study [27], the lack of significant relationship to the IB suggests that availability of all resources does not necessarily scrutinize the interaction behavior of students towards the adoption of Edmodo.

5 Conclusion

Some limitations exist during the work. The participants in this study were insufficient and limited to the undergraduate students from single university in a north region of Malaysia. Thus there is a need to increase the sample size and duplicate in order to examine the validity of results. In future study, there is a need to test the sub-constructs such as age, gender, voluntariness and experience whether those mentioned factors are significant in learning Biology at university. The results of this study offer a preliminary work for integrating social network as subsidiary tool in learning Biology. This study strongly supports the performance and effort expectancy of the use of UTAUT theoretical model while social influence and facilitating conditions did not supported. To summarize, students expect to interact with social network due to its efficacy in increasing their performance in learning (PE) and the surfing site is easy to use (EE).

Acknowledgment

This study was funded by Academic & Research Assimilation (ARAS) grant (600-IRMI/DANA 5/3/ARAS (0072/2016)) Universiti Teknologi MARA, Malaysia.

References

[1] Iahad, N. A., Mirabolghasemi, M., & Huspi, S. H. (2012, June). A blended community of inquiry approach: The usage of social network as a support for course management system. In Computer & Information Science (ICCIS), 2012 International Conference on (Vol. 1 pp. 180-183). IEEE.

[2] Seaman, J., & Tinti-Kane, H. (2013). Social media for teaching and learning. UK: Pearson Learning Systems.

[3] Carlson, G., & Raphael, R. (2015). Let's Get Social: The Educator's Guide to Edmodo. International Society for Technology in Education.Giambastiani, B.M.S. (2007) Evoluzione idrologica ed idrogeologica della pineta di San Vitale (Ravenna). Ph.D. Thesis, Bologna University, Bologna.

[4] Kim, S. H., & Choi, S. Y. (2016). Exploring the Influences of Global Learning Using Web Technologies on 21st Century Skills and Global Learning Attitudes. Advanced Science and Technology Letters, 126, 135-139.

[5] Kim, J. K., & Yan, L. N. (2014). The Relationship among learner characteristics on academic satisfaction and academic achievement in SNS learning environment. Advanced Science and Technology Letters, 47, 227-231.

[6] Tzikopoulos, A., Sotiriou, S., Liefländer, A., & Bogner, F. X. (2011). METASCHOOL: Training Teachers in the Use of Educational Portals. Advanced Science Letters, 4(11-12), 3375-3381.

[7] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

[8] Teo, T. (2016). Modelling Facebook usage among university students in Thailand: the role of emotional attachment in an extended technology acceptance model. Interactive Learning Environments, 24(4), 745-757.

[9] McArthur, J. A., & Bostedo-Conway, K. (2012). Exploring the relationship between student-instructor interaction on Twitter and student perceptions of teacher behaviors. International Journal of Teaching and Learning in Higher Education, 24(3), 286-292.

[10] Enriquez, M. A. S. (2014, March). Students' Perceptions on the Effectiveness of the Use of Edmodo as a Supplementary Tool for Learning. In DLSU Research Congress, De La Salle University, Manila, Philippines.

[11] Uzun, E. (2015). Students' Attitude Towards Edmodo as a Supplementary Tool for Higher Education. Mersin University, 78-83.

[12] Balasubramanian, K., Jaykumar, V., & 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, 144, 416-422.

[13] Kongchan, C. (2008). How a non-digital native teacher makes use of Edmodo. In 5th Intenational Conference ICT for language learning.

[14] Eckhardt, A., Laumer, S., & Weitzel, T. (2009). Who influences whom? Analyzing workplace referents' social influence on IT adoption and non-adoption. Journal of Information Technology, 24(1), 11-24.

[15] Chang, H.-J., Huang, K.-C. & Wu, C.-H. (2006). Determination of sample size in using central limit theorem for weibull distribution. International journal of information and management sciences. 17 (3), p.31-46.

[16] Santos, J. R. A. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. Journal of extension, 37(2), 1-5.

[17] O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. Quality & Quantity, 41(5), 673-690.

[18] Kaba, B., & Touré, B. (2014). Understanding information and communication technology behavioral intention to use: Applying the UTAUT model to social networking site adoption by young people in a least developed country. Journal of the Association for Information Science and Technology, 65(8), 1662-1674.

[19] Chen, C., Wu, J., & Yang, S. C. (2008). Accelerating the use of weblogs as an alternative method to deliver case-based learning. International Journal on ELearning, 7(2), 331.

[20] Pardamean, B., & Susanto, M. (2012). Assessing user acceptance toward blog technology using the UTAUT model. International journal of mathematics and computers in simulation, 1(6), 203-212.

[21] Khechine, H., Lakhal, S., Pascot, D., & Bytha, A. (2014). UTAUT model for blended learning: The role of gender and age in the intention to use webinars. Interdisciplinary Journal of E-Learning and Learning Objects, 10(1), 33-52.

[22] Thongmak, M. (2013). Social network system in classroom: antecedents of Edmodo© adoption. Journal of e-Learning and Higher Education, 2013(1), 1-15.

[23] Bolar, K. P. (2009). Motives behind the use of social networking sites: an empirical study. IUP Journal of Management Research, 8(1), 75.

[24] Mazman, S. G., & Usluel, Y. K. (2010). Modeling educational usage of Facebook. Computers & Education, 55(2), 444-453.

[25] Sledgianowski, D., & Kulviwat, S. (2008). Social network sites: antecedents of user adoption and usage. AMCIS 2008 Proceedings, 83.

[26] Wei, L. M., Piaw, C. Y., Kannan, S., & Moulod, S. A. (2016). Relationship between Teacher ICT Competency and Teacher Acceptance and Use of School Management System (SMS). Malaysian Online Journal of Educational Technology, 4(4), 36-52.

[27] Paola Torres Maldonado, U., Feroz Khan, G., Moon, J., & Jeung Rho, J. (2011). E-learning motivation and educational portal acceptance in developing countries. Online Information Review, 35(1), 66-85.