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Factors Affecting Acceptance and Use of Educational Wikis: Using Technology Acceptance Model (3)

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Abstract

Background: Wikis are web-based tools and educational technologies that enable students and educators to access general and professional information and knowledge at the national and international levels.
Objectives: The aim of this study was to identify factors affecting acceptance and use of educational wikis by post-graduate students of University of Tabriz using Technology Acceptance Model 3 (TAM3).
Methods: This correlational study was conducted among 285 post-graduate students of University of Tabriz, who were selected through the random stratified sampling method during 2018 - 2019 academic year. For data collection, a researcher-made questionnaire with 32 items rated based on a 5-point Likert scale was used. Also, for data analysis, structural equation modeling (SEM) via smart PLS 3 and partial least squares (PLS) were used.
Results: The results indicated a positive correlation between wiki's characteristics (P = 0.001, beta = 0.50), performance expectancy (P = 0.001, beta = 0.285) and self-efficiency (P = 0.001, beta = 0.182) and students' behavioral intention. However, there was a negative correlation between effort expectancy (P = 0.001, beta = -0.241) and behavioral intention. We did not find a significant correlation between social influence, perceived playfulness and self-management learning variables and students' behavioral intention to use educational wikis.
Conclusions: In order to provide a more effective teaching-learning environment in higher education, the use of new technological tools such as educational wikis is necessary for university students in Iran to perform classroom activities.

Keywords: Educational Technology, Higher Education, Educational Wikis, Technology Acceptance Model, Post-Graduate Students

1. Background

Wikis are web-based tools that enable individuals to access general and professional information and knowledge at the national and international levels. Wikis have a number of advantages, such as enabling users to not be merely information consumers and helping them to contribute to content creation via group contributions. Wikis are mostly free and easy-to-use and do not require specific technical knowledge. In addition, teaching by these technologies creates new models of interaction between learners and instructors, and as a result, students' motivation for learning increases and teaching becomes more appealing (1).

These technologies also allow higher education students to communicate with their classmates and educators during an interactive learning process. It also helps graduate students to develop some practical skills essential in the age of electronic communications for research, writing, and lifelong learning (2).

The results of a previous study (3) demonstrated wikis' ability to engage students in collaborative activities without spatial constraints. Wikis are capable of exchanging and developing communication and culture across societies (4). Therefore, compared to other web-based tools like weblogs, wikis are capable of providing widespread communication among users of web-based technology (5).

Moreover, in higher education, wikis are considered as a powerful technological tool for creating and developing collaborative knowledge (6). However, optimal use of web-based educational technologies depends on learners and educators' acceptance as they may not use web-based educational resources unless they perceive them as credible and useful resources to meet their educational needs (7). As the impact of some factors such as wikis' characteristics and students' self-efficiency on students' behavioral intention to use this technology has not been investigated at Tabriz University, we sought to address the factors affect-

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ing the acceptance and use of educational wikis by post-graduate students of University of Tabriz using Technology Acceptance Model 3 (TAM3)

2. Methods

This correlational study was carried out using structural equation modeling (SEM). Compared to older methods such as multiple regression, SEM has gained popularity in recent years because of its higher flexibility and greater ability to control measurement errors and examine and test complex relations among various dependent, independent, exogenous and endogenous constructs in behavioral sciences studies (8). In the present study, the partial least squares (PLS) method has been used to test the measurement pattern and research hypotheses. The PLS method is known as a robust method of SEM because of its lower dependence on sample size and normal distribution of the residual and spatial measurement scales (9).

The study population comprised 2800 post-graduate students of University of Tabriz registered for the first semester of 2017 - 2018 academic year. A sample of 285 post-graduate students was selected through the random stratified sampling method. At first, 285 questionnaires were distributed, considering that some of them were incomplete or the respondents did not use Wikipedia, they were discarded. In the final analysis, 220 questionnaires were analyzed.

In order to measure the acceptance status and the use of educational wikis, a researcher-made questionnaire was employed based on the Wang et al.'s (10) mobile learning acceptance questionnaire. This questionnaire consists of 32 items rated based on a 5-point Likert scale (1 = very low to 5 = very high). The questionnaire measures the following eight components: performance expectancy (PE), effort expectancy (EE), social influence (SI), perceived playfulness (PP), self-management learning (SL), wiki characteristics (WC), self-efficacy (SE), and behavioral intention (BI) to accept and use educational wikis.

A PLS model is analyzed and interpreted in two stages. Stage 1 is to assess and refine the adequacy of the measurement model and stage 2 is to assess the structural model (11).

2.1. Assessment of Measurement Models

The assessment of measurement provides thorough testing of the reliability and validity of the scales used to measure the latent constructs and their observed variables and items (12).

2.1.1. Discriminant Validity

The goal of discriminant validity is to ensure that a construct measure is not simply a reflection of another construct (13). It tests the Heterotrait-Monotrait ratio of correlations (HTMT) criterion results (Table 1), the cross-loadings of each item in the constructs (Table 2) and the square roof of average variance extracted (AVE) estimated for all constructs (Table 3).

Table 1. The Heterotrait-Monotrait Ratio (HTMT)

	BI	EE	PP	PE	SE	SL	SI
EE	0.29						
PP	0.54	0.71					
PE	0.51	0.52	0.60				
SE	0.59	0.72	0.55	0.64			
SL	0.53	0.55	0.50	0.79	0.82		
SI	0.43	0.57	0.72	0.69	0.54	0.53	
WC	0.74	0.40	0.54	0.67	0.74	0.64	0.49

A. HTMT: The HTMT results showed that all the values were significantly different from 1, and the HTMT ratio of correlation in Table 1 indicates that all the values are under the threshold of .90, establishing the discriminant validity of the reflective constructs.

B. Cross-loadings: All the items of constructs were more highly on their respective constructs than others. Therefore, the discriminant validity of constructs was adequate (Table 2).

C. The Fornell-Larcker criterion: The square root of AVE in every latent variable should be more than other correlation values among the latent variables (14). The Fornell-Larcker criterion results are presented in Table 3.

2.1.2. Convergent Validity

This indicates that items that are indicators of a structure share a large proportion of variance (15) or the extent to which a measure correlates positively with alternative measures of the same construct.

A. Factor loadings were calculated to be more than .50 as proposed by Hair et al. (16). The results of factor loadings are demonstrated in Table 4. All the factor loadings were more than 0.50. The factor loadings ranged from 0.52 to 0.98.

B. Cronbach's alpha: The adequate values of Cronbach's alpha for internal consistency are between 0.70 and 0.95 (17). The results are represented in Table 4.

C. The composite reliability scores (ρc) for each construct should exceed 0.70 (18). The results are represented in Table 4.

Table 2. The Item Loadings and Cross-Loadings for the 32 Items

Item	Construct							
	BI	EE	PP	PE	SE	SL	SI	WC
BI1	0.95	0.30	0.49	0.47	0.58	0.46	0.35	0.73
BI2	0.97	0.26	0.47	0.44	0.51	0.46	0.35	0.63
BI3	0.97	0.22	0.46	0.46	0.50	0.47	0.39	0.69
EE1	0.28	0.86	0.66	0.43	0.51	0.45	0.48	0.36
EE2	0.23	0.91	0.57	0.39	0.56	0.42	0.39	0.31
EE3	0.23	0.89	0.49	0.42	0.57	0.41	0.39	0.32
EE4	0.19	0.85	0.44	0.39	0.54	0.39	0.44	0.28
EP1	0.44	0.45	0.83	0.35	0.31	0.32	0.44	0.41
EP2	0.38	0.52	0.88	0.44	0.42	0.37	0.49	0.35
EP3	0.45	0.45	0.84	0.40	0.32	0.32	0.47	0.42
EP4	0.36	0.70	0.78	0.52	0.54	0.41	0.59	0.43
PP1	0.34	0.35	0.45	0.82	0.43	0.49	0.48	0.46
PP2	0.36	0.32	0.39	0.76	0.39	0.49	0.50	0.53
PP3	0.42	0.31	0.39	0.84	0.38	0.62	0.45	0.47
PP4	0.43	0.48	0.42	0.88	0.59	0.60	0.42	0.54
PP5	0.39	0.43	0.46	0.81	0.51	0.64	0.48	0.47
SE1	0.39	0.49	0.31	0.39	0.77	0.54	0.35	0.42
SE2	0.34	0.55	0.32	0.41	0.80	0.57	0.27	0.42
SE3	0.55	0.51	0.45	0.50	0.88	0.57	0.46	0.65
SE4	0.49	0.51	0.41	0.52	0.82	0.54	0.36	0.65
SI1	0.27	0.45	0.47	0.39	0.36	0.26	0.87	0.35
SI2	0.31	0.42	0.48	0.40	0.39	0.28	0.91	0.34
SI3	0.35	0.40	0.54	0.46	0.35	0.31	0.89	0.32
SI4	0.26	0.30	0.41	0.60	0.36	0.55	0.51	0.32
SL1	0.42	0.41	0.38	0.70	0.56	0.79	0.46	0.56
SL2	0.43	0.40	0.38	0.58	0.54	0.90	0.31	0.46
SL3	0.39	0.29	0.30	0.50	0.47	0.86	0.27	0.42
SL4	0.33	0.48	0.32	0.48	0.68	0.74	0.35	0.40
WC1	0.53	0.35	0.41	0.54	0.64	0.54	0.40	0.88
WC2	0.56	0.35	0.43	0.52	0.60	0.53	0.35	0.90
WC3	0.64	0.32	0.42	0.56	0.59	0.48	0.38	0.90
WC4	0.77	0.32	0.46	0.53	0.59	0.48	0.35	0.90

Table 3. Fornell-Larcker Criterion Analysis for Checking Discriminant Validity

	BI	EE	PP	PE	SE	SL	SI	WC
BI	0.97							
EE	0.27	0.88						
PP	0.49	0.63	0.84					
PE	0.48	0.47	0.51	0.83				
SE	0.56	0.62	0.47	0.56	0.82			
SL	0.48	0.48	0.43	0.69	0.68	0.83		
SI	0.38	0.49	0.60	0.57	0.45	0.43	0.82	
WC	0.71	0.37	0.49	0.60	0.68	0.57	0.41	0.90

D. The AVE value for every construct should be above 0.50 (14). All the AVE constructs exceeded the 0.50 cut-off and ranged from 0.68 to 0.94 (Table 4).

3. Results

3.1. Assessment of the Structural Model

The structural model is used to determine the effects of linear regression in the endogenous constructs upon one another (12). PLS regression was used to test the hypotheses. PLS regression is a regression-based approach that probes the linear relationships between multiple independent variables and a single or multiple dependent variable (s). It differs from regular regression and relies on predetermined networks of relationships between constructs and between constructs and their measures (9, 11).

3.1.1. Measuring the Value of R^2

The squared correlation values of 0.67, 0.33 and 0.19 were considered to be substantial, moderate and weak, respectively (11). The R^2 value of latent endogenous construct (behavioral intention to use educational wiki), as shown in Table 5, was greater than .5 and the value is considered moderate to high.

3.1.2. Effect Size f^2

Measuring the impact of each predictor on the dependent construct is effect size (11). The effect of predictor is

Table 4. Summary of PLS Quality (Factor Loadings, Cronbach's Alpha, Composite Reliability and AVE)

Construct/Item	Factor Loadings	Cronbach's Alpha	ρc	AVE
Performance expectancy (PE)		0.88	0.91	0.68
PE1: I would find educational wiki useful in my learning.	0.83			
PE2: Using educational wiki enables me to accomplish learning activities more quickly.	0.88			
PE3: Using educational wiki increases my learning productivity.	0.85			
PE4: If I use educational wiki, I will increase my chances of getting a promotion.	0.79			
Effort expectancy (EE)		0.91	0.93	0.78
EE1: My interaction with educational wiki would be clear and understandable.	0.86			
EE2: It would be easy for me to become skillful at using educational wiki.	0.92			
EE3: It would be easy for me to become skillful at using educational wiki.	0.90			
EE4: Learning to operate educational wiki is easy for me.	0.86			
Social influence (SI)		0.81	0.89	0.68
SI1: People who influence my behavior will think that I should use educational wiki.	0.88			
SI2: People who are important to me will think that I should use educational wiki.	0.91			
SI3: The seniors in my organization have been helpful in the use of educational wiki.	0.89			
SI4: The seniors in my organization have been helpful in the use of educational wiki.	0.52			
Perceived playfulness (PP)		0.86	0.90	0.70
PP1: When using educational wiki, I will not realize the time elapsed.	0.82			
PP2: When using educational wiki, I will forget the work I must do.	0.77			
PP3: Using educational wiki will give enjoyment to me for my learning.	0.85			
PP4: Using educational wiki will stimulate my curiosity.	0.88			
PP5: Using educational wiki will lead to my exploration.	0.81			
Self-management of learning (SL)		0.84	0.90	0.68
SL1: When it comes to learning and studying, I am a self-directed person.	0.79			
SL2: In my studies, I am self-disciplined and find it easy to set aside reading and homework time.	0.90			
SL3: I am able to manage my study time effectively and easily complete assignments on time.	0.86			
SL4: In my studies, I set goals and have a high degree of initiative.	0.74			
Self-efficiency (SE)		0.85	0.89	0.68
SE1: I have required knowledge to use the educational wikis.	0.78			
SE2: I think it's easy to attain skills about how to use wikis.	0.81			
SE3: I think the wiki is appropriate source for what I want to do.	0.88			
SE4: All of educational services of wikis are easy to understand.	0.81			
Wikis' characteristics (WC)		0.92	0.94	0.81
WC1: I feel that information which provided by educational wikis is credible.	0.88			
WC2: I feel the educational wikis are updated.	0.91			
WC3: I feel that an expert team organizes and monitors educational wiki's information.	0.90			
WC4: I feel that wiki information meets my educational needs.	0.91			
Behavioral intention to use educational wiki (BI)		0.97	0.98	0.94
BI1: I intend to use educational wiki in the future.	0.95			
BI2: I predict I would use educational wiki in the future.	0.97			
BI3: I plan to use educational wiki in the future.	0.98			

Table 5. Quality Criteria (R Square, R Square Adjusted and F Square)

	R^2	R^2 Adj.	F^2	Effect
Behavioral intention to use educational wiki	0.57	0.55	-	Moderate to large
Performance expectancy -> behavioral intention to use educational wiki			0.085	Large
Effort expectancy -> behavioral intention to use educational wiki			0.058	Large
Social influence -> behavioral intention to use educational wiki			0.001	Small
Perceived playfulness -> behavioral intention to use educational wiki			0.001	Small
Self-management of learning -> behavioral intention to use educational wiki			0.007	Small
Self-efficiency -> behavioral intention to use educational wiki			0.025	Small
Wikis' characteristics -> behavioral intention to use educational wiki			0.253	Medium

large, medium and small at the structural level if f^2 is 0.35, 0.15 and 0.02, respectively (19). The results are shown in Table 5.

3.1.3. Model's Predictive Relevance or Stone-Giesser Q2

To assess the predictive relevance (Q^2) of the path model, the blind folding procedure was used (20). Values greater than 0 show that the model has predictive relevance for a definite endogenous construct (21). The Q^2 value of the behavioral intention to use educational wiki was 0.485, which could be interpreted as an acceptable and powerful value (Figure 1).

3.1.4. Path Coefficient (β Value) and T Statistics Value

In bootstrapping procedure, 500 sub-samples were performed to estimate the significance of path coefficients. Figure 2 and Table 6 present the values of the hypothesized path coefficient and the T statistics for the dependent and independent variables and each item and construct.

4. Discussion

The results of this study identified some influential factors affecting the university students' intention to use new technological tools, explicitly, educational wikis. According to the results, there is a positive correlation between performance expectancy of educational wikis and students' intention to use them. Performance expectancy demonstrates the evaluation of the system performance by users in terms of accessibility, operation speed and ease of interaction with the system and users' understanding of how much use of the system helps them to increase efficiency (22). This result is in line with the findings of previous studies (22-24).

The results of this study confirmed the correlation between effort expectancy and students' behavioral intention to use educational wikis. Effort expectancy indicates that when using the service, the user expects the service to be easy to use in terms of accessibility and understanding the content of the service (22), which has a significant effect on its acceptance and use. This result is in line with the findings of previous studies (24, 25).

The impact of society or social influence, often referred to as social norms, is in fact the perceived social pressure on a person to perform or not to perform a desired behavior (26, 27). According to Malhotra and Galletta (28), similarity is a social norm, which means that the individual accepts the society's effect on the basis that he wants to establish a satisfactory relation with a person or group or intends to maintain the existing relations. Social influence has a significant impact on behavioral intention to use a technology (29). The results of this study do not confirm the impact of social influence on intention to use educational wikis. This finding was contradictory to those of a previous study (30).

Playfulness is a very important factor in educating people in the virtual environment (31-33). Hwang and Lee found that users of internet services considered these services fun when they used these tools for entertainment and did not like purely text-based web pages (34). The results of this study showed that perceived playfulness does not affect students' intention to use educational wikis.

Regarding the importance of using new technologies in self-management learning, which includes personal characteristics and learning processes (35), Roessger et al. found that personal characteristics and personal responsibility can affect learners' perception of learning self-management (36). The participants in a previous study (37), who were preservice teachers, stated that online learning environments would increase their self-management learning. They believed that in online teaching, they have greater control over their own learning and can use various resources, which is in contrast with our results. Such an inconsistency in findings indicates that personal responsibility can play a useful role in terms of directing learning self-management.

The results of this study showed that self-efficacy has

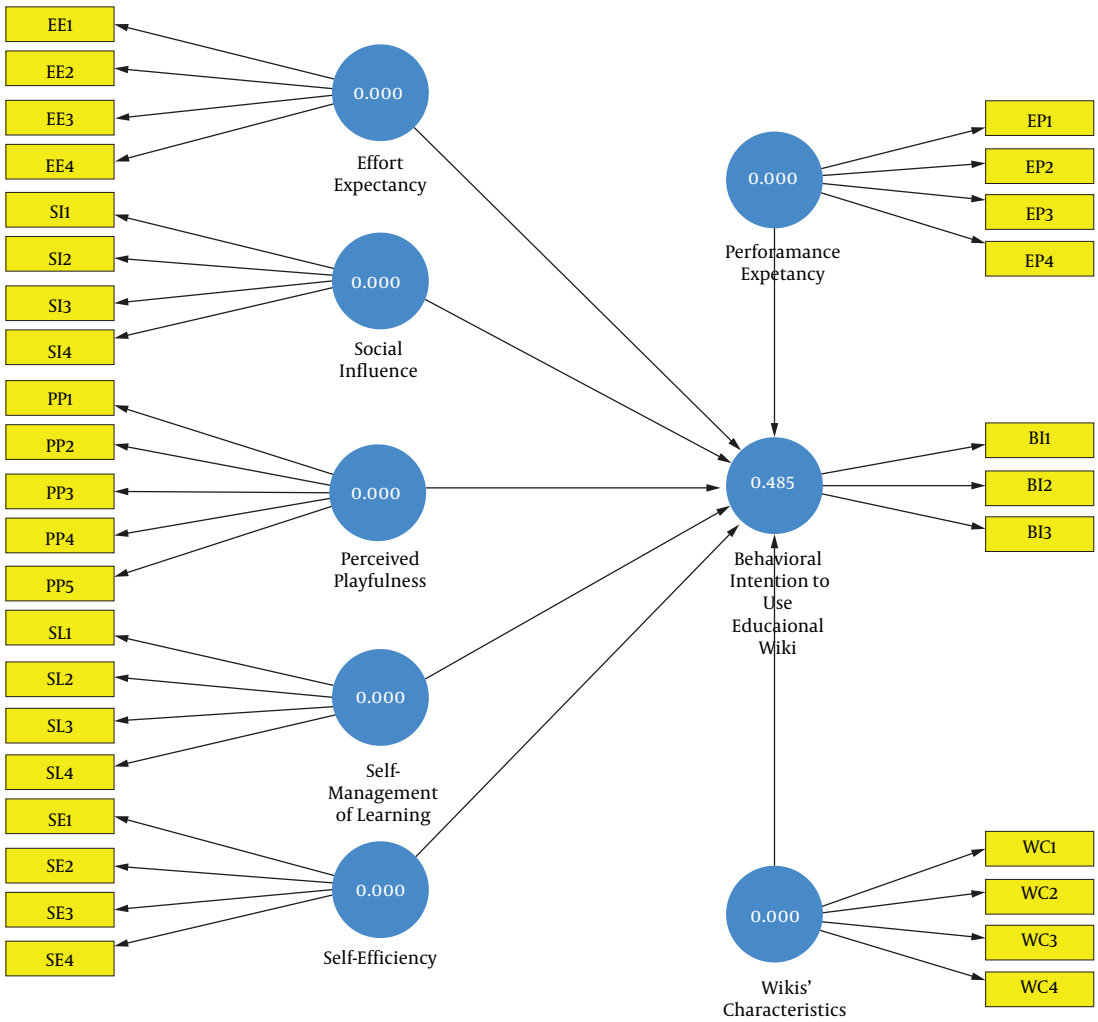

Figure 1. Predictive relevance of the model (Q^2) by cross validated redundancy approach

a positive effect on students' behavioral intention to use educational wikis. According to Bandura (38), self-efficacy means the certainty of having the abilities to organize and practice a workload to achieve a desired outcome. The results of this study are in congruence with the findings of previous studies on the positive correlation between self-efficiency and technology adoption (39, 40).

In addition to the findings mentioned above, the results revealed some suitable characteristics of educational wikis such as credibility and interactivity. It seems that these characteristics can play a positive role in encouraging students to use educational wikis.

According to our findings, post-graduate students at the University of Tabriz believe that the community such as their classmates and friends has no effect on motivating them to use wikis, which could be due to the fact that despite the high potential of educational wikis in creating group communication in classrooms, which can bring students together and create a scientific relation between them, at present, the use of educational wikis is not considered a priority in educational programs of Tabriz University. This has made students and staff unwilling to use the widely-used educational wiki in fulfilling their educational duties and commitments.

Furthermore, according to a previous study (41), students' familiarity with information and communications technology (ICT) provides them with more effective instruction and supports their achievement; thus, using ICT-based education by teachers will be useful for students' educational practice.

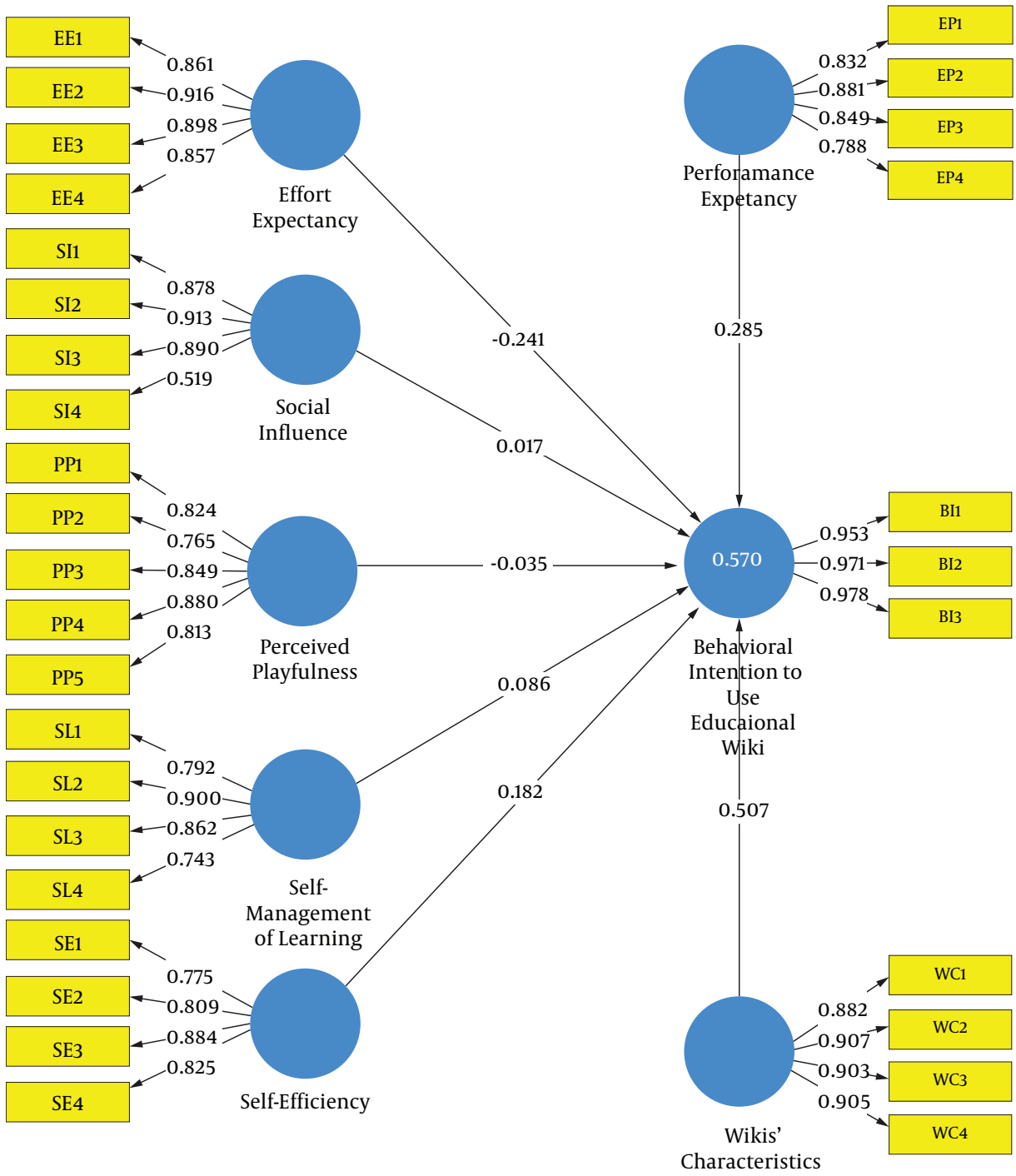

Figure 2. Path coefficient and T statistics value

Perhaps, if educational wikis were used in fulfilling classroom practices or conducting extensive research, as a community-based toolkit, it would have provided an attractive and interactive teaching-learning environment. In order to achieve this aim, it is suggested that the use of modern educational tools, including wikis, be considered

Table 6. Hypotheses, Beta, T Statistics and P values

Hypotheses	Beta	T Statistics	P Values	Decision
H1. Performance expectancy -> behavioral intention to use educational wiki	0.285	3.594	0.001	Positive association
H2. Effort expectancy -> behavioral intention to use educational wiki	-0.241	3.056	0.002	Negative association
H3. Social influence -> behavioral intention to use educational wiki	0.017	0.231	0.817	Not supported
H4. Perceived playfulness -> behavioral intention to use educational wiki	-0.035	0.468	0.640	Not supported
H5. Self-management of learning -> Behavioral intention to use educational wiki	0.086	10.143	0.254	Not supported
H6. Self-Efficiency -> behavioral intention to use educational wiki	0.182	20.031	0.043	Positive association
H7. Wikis' characteristics -> behavioral intention to use educational wiki	0.507	50.552	0.001	Positive association

as one of the top priorities of educational and research programs in Tabriz University. Also, University of Tabriz is suggested to hold workshops for new post-graduate students and new teaching staff at the beginning of every academic year.

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Footnotes

Authors' Contribution: Study design and concept: Faegheh Mohammadi and Firooz Mahmoodi. Analysis and interpretation of data: Firooz Mahmoodi. Drafting of the manuscript: Faegheh Mohammadi. Critical revision of the manuscript for important intellectual content: Faegheh Mohammadi. Statistical analysis: Firooz Mahmoodi.

Conflict of Interests: None declared.

Ethical Considerations: The proposal, the questionnaire, and the participant consent form were sent to the Deputy of Research Committee of the University of Tabriz. All participants were fully aware of the nature and confidentiality of the study and were told in advance that the information provided by them would be kept confidential. Entering the study was made possible for each participant by signing the consent form. Even those participants who were reluctant to submit the filled questionnaire were excluded from the study.

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References

1. Konieczny P. Rethinking Wikipedia for the classroom. *Contexts*. 2014;**13**(1):80–3.
2. Karasavvidis I. Wiki uses in higher education: Exploring barriers to successful implementation. *Interact Learn Env*. 2010;**18**(3):219–31. doi: 10.1080/10494820.2010.500514.
3. Inoue Y. *Cases on online and blended learning technologies in higher education: Concepts and practices*. Hershey, PA: Information Science Reference; 2010.
4. Notari M. How to use a Wiki in education:'Wiki based effective constructive learning'. *Proceedings of the 2006 International Symposium on Wikis*. ACM; 2006. p. 131–2.
5. Avci U, Askar P. The comparison of the opinions of the university students on the usage of blog and wiki for their courses. *J Educ Tech Soc*. 2012;**15**(2):194–205.
6. Sarrafzadeh M, Hazeri A, Alavi S. [Knowledge and use of web 2.0 by LIS academics in Iran]. *Iran J Inf Proces Manag*. 2012;**28**(1):21–38. Persian.
7. Hartig O, Zhao J. Publishing and consuming provenance metadata on the web of linked data. *Provenance and annotation of data and processes*. Berlin Heidelberg: Springer; 2010. p. 78–90.
8. Hooman HA. *[Structural equation modeling with Lisrel application]*. SAMT Publication; 2014. Persian.
9. Seyyed Abbaszadeh M, Amani Sari Baglou J, Khazri Azar H, Pashavi G. *[An introduction to structural equation modeling in PLS and its application in behavioral sciences]*. 2012. p. 126–39. Persian.
10. Wang YS, Wu MC, Wang HY. Investigating the determinants and age and gender differences in the acceptance of mobile learning. *Brit J Educ Technol*. 2009;**40**(1):92–118. doi: 10.1111/j.1467-8535.2007.00809.x.
11. Chin WW, Marcolin BL, Newsted PR. A partial least squares latent variable modeling approach for measuring interaction effects: Results from a monte carlo simulation study and an electronic-mail emotion/adoption study. *Inf Sys Res*. 2003;**14**(2):189–217. doi: 10.1287/isre.14.2.189.16018.
12. Wardrop JL, Loehlin JC. Latent variable models: An introduction to factor, path, and structural analysis. *J Educ Stat*. 1987;**12**(4):410. doi: 10.2307/1165058.
13. Peter JP, Churchill GA. Relationships among research design choices and psychometric properties of rating scales: A meta-analysis. *J Market Res*. 1986;**23**(1):1. doi: 10.2307/3151771.
14. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Market Res*. 1981;**18**(1):39. doi: 10.2307/3151312.
15. Gefen D, Straub D. A practical guide to factorial validity using PLS-graph: Tutorial and annotated example. *Commun Associat Inf Sys*. 2005;**16**. doi: 10.17705/1cais.01605.
16. Hair JF, Hauff S, Hult GTM, Richter NF, Ringle CM, Sarstedt M. *Partial least squares strukturgleichungsmodellierung*. Vahlen Franz GmbH; 2017. doi: 10.15358/9783800653614.
17. Nunnally JC, Bernstein IH. *Psychometric theory*. New York: McGraw-Hill; 1994.
18. Sánchez-Franco MJ, Martínez-López FJ, Martín-Velicia FA. Exploring the impact of individualism and uncertainty avoidance in Web-based electronic learning: An empirical analysis in European higher education. *Comput Educ*. 2009;**52**(3):588–98. doi: 10.1016/j.compedu.2008.11.006.

19. Davari A, Rezazadeh A. *[Structural equation modeling with PLS]*. Tehran: Jahade Deneshgahi; 2016. Persian.
20. Tenenhaus M, Vinzi VE, Chatelin YM, Lauro C. PLS path modeling. *Comput Stat Data An*. 2005;**48**(1):159–205. doi: 10.1016/j.csda.2004.03.005.
21. Hair JF, Hollingsworth CL, Randolph AB, Chong AYL. An updated and expanded assessment of PLS-SEM in information systems research. *Ind Manage Data Syst*. 2017;**117**(3):442–58. doi: 10.1108/imds-04-2016-0130.
22. Kang J. Mobile payment in Fintech environment: Trends, security challenges, and services. *Human Centric Comput Inf Sci*. 2018;**8**(1). doi: 10.1186/s13673-018-0155-4.
23. Khoshhal Koshalli H, Allahyari M, Chizari M, Masooleh Z. [Factors influencing on acceptance of digital library by faculty members of agricultural educational and research institutions in Guilan province]. *Iran J Agr Econ Dev Res*. 2014;**46**(2):335–56. Persian.
24. Yueh HP, Huang JY, Chang C. Exploring factors affecting students' continued Wiki use for individual and collaborative learning: An extended UTAUT perspective. *Australas J Educ Tec*. 2015;**31**(1). doi: 10.14742/ajet.170.
25. Wang YS, Shih YW. Why do people use information kiosks? A validation of the unified theory of acceptance and use of technology. *Gov Inform Q*. 2009;**26**(1):158–65. doi: 10.1016/j.giq.2008.07.001.
26. Mansourzadeh M, Mahmoodi F, Hamdollah H. [Investigating the effective factors on acceptance of ICT among students based on Technology Acceptance Model 3]. *Educ Strategy Med Sci*. 2016;**9**(5):357–70. Persian.
27. Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: Toward a unified view. *MIS Q*. 2003;**27**(3):425. doi: 10.2307/30036540.
28. Malhotra Y, Galletta DF. Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. *Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences 1999 Jan 5*. 1999. 14 p.
29. Venkatesh V, Brown SA. A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges. *MIS Q*. 2001;**25**(1):71. doi: 10.2307/3250959.
30. Kim SS, Malhotra NK. Predicting system usage from intention and past use: Scale issues in the predictors. *Decision Sci*. 2005;**36**(1):187–96. doi: 10.1111/j.1540-5915.2005.00070.x.
31. Balog A, Pribeanu C. The role of perceived enjoyment in the students' acceptance of an augmented reality teaching platform: A structural equation modelling approach. *Stud Inform Control*. 2010;**19**(3):319–30. doi: 10.24846/v19i3y201011.
32. Zabadi AMA, Shura M, Elsayed EA. Consumer attitudes toward SMS advertising among Jordanian users. *Int J Market Stud*. 2012;**4**(1). doi: 10.5539/ijms.v4n1p77.
33. Gardner C, Amoroso DL. Development of an instrument to measure the acceptance of Internet technology by consumers. *Proceedings of the 37th Annual Hawaii International Conference on System Sciences, 2004 Jan 5*. 2004. 10 pp p.
34. Hwang K, Lee E. The role of entertainment and external values in consumer's intention to use social network mobile. *Int P Econ Dev Res*. 2013;:;**63**:33–7. doi: 10.7763/ipedr.
35. Gu J. Understanding self-directed learning in the context of mobile web 2.0 – case study with workplace learners. *Interact Learn Env*. 2016;**24**(2):306–16. doi: 10.1080/10494820.2015.1113708.
36. Roessger KM, Eisentrout K, Hevel MS. Age and academic advising in community colleges: Examining the assumption of self-directed learning. *Community College J Res Pract*. 2018:1–14. doi: 10.1080/10668926.2018.1490669.
37. Comas-Quinn A. Learning to teach online or learning to become an online teacher: An exploration of teachers' experiences in a blended learning course. *ReCALL*. 2011;**23**(3):218–32. doi: 10.1017/s0958344011000152.
38. Bandura A. *Self-efficacy: The exercise of control*. New York: Freeman; 1997.
39. Hsu MH, Chiu CM. Internet self-efficacy and electronic service acceptance. *Decis Support Sys*. 2004;**38**(3):369–81. doi: 10.1016/j.dss.2003.08.001.
40. Galavandi H, Ahmadi F. Study of the role of individual, cultural, and organizational factors in acceptance of information technology among students of Urmia University. *Interdisc J Virtual Learn Med Sci*. 2017;**8**(1). doi: 10.5812/ijvlms.14950.
41. Fathi Vajargah K, Darvand S. Assessing and evaluating the effect of information and communication technology on improving teaching and learning levels among secondary school students: A case of Razi vocational school in Marivan. *Interdisc J Virtual Learn Med Sci*. 2018;**9**(1). doi: 10.5812/ijvlms.65358.