

User acceptance of social learning systems in higher education: an application of the extended Technology Acceptance Model

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ABSTRACT

This study aims to explore the users' behaviour and acceptance of social media for learning in higher educational institutions with the help of the extended Technology Acceptance Model (TAM). TAM has been extended to investigate how ethical and security awareness of users affect the actual usage of social learning applications. For this purpose, a survey was conducted and the Structural Equation Model approach was utilised to investigate the direct and indirect causal relationships among the constructs in the research model. Interestingly, the findings from the analysis reveal that, except 'ease of use', TAM's core and external constructs are significant predictors of actual behaviour towards using social media for learning.

KEYWORDS

Social media; learning; TAM; security; ethics; awareness

Introduction

Social media applications provide the foundation for various forms of applications, such as collaborative content (e.g. Wikipedia), social networking (e.g. Facebook, Twitter, LinkedIn) and multimedia content (e.g. YouTube and Flickr), thus bringing about new opportunities for learning outside established educational environments (Redecker, Ala-Mutka, & Punie, 2010).

Ala-Mutka (2010) stated that social media enables 'informal learning incidents' at any time, and valuable knowledge can be developed with different perspectives as a result of interaction and contribution of many users in a 'transparent' and 'open' manner. For social media users, informal learning occurs voluntarily, in a personalised manner within a social framework, based on the interests of the user, and provides a basis and desire for the continuation of learning (Bull et al., 2008). Through interaction with other users, informal learning provides different viewpoints, which prompts a broader way of thinking. Yet, this form of learning is not recognised formally since the learning process through social media lacks any formal curriculum, assessment or structure (Sie et al., 2013).

With the growing popularity of learning through social networking sites (SNS), predicting and explaining the user acceptance of such applications becomes important for development, validation and evaluation of the social learning systems. Davis's (1989) Technology Acceptance Model (TAM) provides a conceptual theory to model users' acceptance and adoption of an information technology. The model is traditionally based on five components: perceived ease of use (PEU), perceived usefulness (PU), attitude towards use (ATU), behavioural intention (BI) and actual use (AU). For further details about TAM, the readers are referred to the original paper of Davis (1989). In previous research, the

TAM has proven to be a widely established and powerful tool to measure the user acceptance of new technology. In addition, the inclusion of external variables in the model, such as socio-demographic factors, awareness, self-efficacy, prior experience also influences the user's attitude towards the new technology (Lee, Hsieh, & Chen, 2013; Taherdoost, Jalaliyoon, Namayandeh, Forghani, & Zamani, 2011).

TAM has not been extensively conducted to test the acceptance of e-learning systems in social media environments. One of the few studies that have utilised TAM to evaluate their learning systems include Lee et al. (2013), in which the TAM model has been applied to examine employees' attitudes towards e-learning systems in organisations. In addition, Lee and Lehto (2013) have used an extension of TAM for user acceptance of YouTube for procedural learning, while Chen, Hsu, Chang, and Huang (2012) have applied TAM to evaluate the user's satisfaction of their proposed learning companion recommendation system on Facebook.

In his work, Tess (2013) summarises the existing research on the role of social media in universities, and concludes that most of the research is about the effectiveness of social media, but that there are only a few empirical studies in this area. Overall, the previous studies assess e-learning or online learning systems, but only a handful has endeavoured to analyse social learning systems. Having said so, the present study aims to predict and explain the user acceptance of using social media for learning in higher educational institutions with the help of an extension of TAM. Here, two external variables, ethical awareness and security awareness (SA), have been incorporated into TAM which have not been examined in previous research with regards to social learning systems. The results of the study can be utilised for the development, validation and evaluation of the SNS incorporated in learning activities.

Hypotheses development

The variables included in the research model (Figure 1) are the standard TAM constructs: PEU, PU, ATU, BI and AU, along side selected external variables, SA and Ethics Awareness (EA).

The development of SNS has introduced a new way of communication, naturally affecting the learning activities of individuals and reducing the impact of geographical constraints. However, it has been noted by Sykes, Venkatesh, and Gosain (2009) that limited attention has been devoted to the study of social networks in relation to technology. This view has also been supported by Moqbel (2012), claiming that several studies have been conducted on social networking, though rarely touching on the user acceptance of social media for different purposes. On the other hand, it is observed from Lee, Cho, Gay, Davidson, and Ingraffea (2003) that the use of different media for communication may bring about differences in terms of social influence, proposing further research in this respect. Against this backdrop, we developed the following hypotheses.

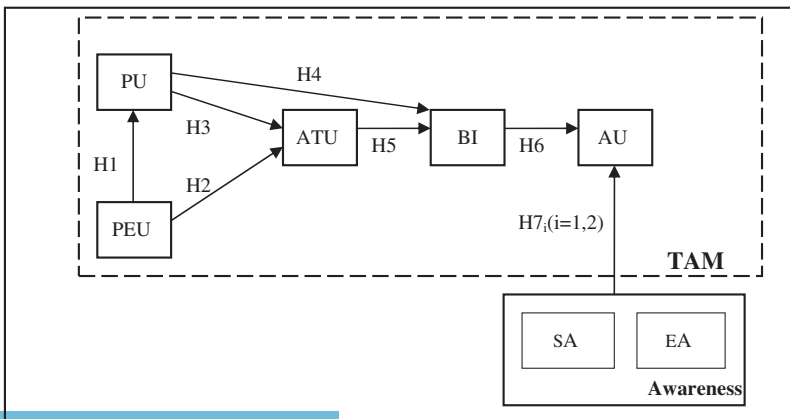


Figure 1. Conceptual research model.
 Note: Boxes represent the constructs. The causal effects are given by arrows connecting boxes.

H1: PEU significantly influences PU regarding using SNS for learning activities.

H2: PEU significantly influences the ATU regarding using SNS for learning activities.

H3: PU significantly influences the ATU regarding using SNS for learning activities.

H4: PU significantly influences BI regarding using SNS for learning activities.

H5: ATU significantly influences BI regarding using SNS for learning activities.

H6: BI significantly influences AU regarding using SNS for learning activities.

User's awareness of information security has been reported to be weak which is a factor in 80% of major security failures caused by behaviour of information systems users (Boujettif & Yongge, 2010). According to Adams and Blanford (2003), many of the security breaches are directly related to users and security in SNS has not yet been studied to a sufficient degree to produce an accurate modelling of behaviour (Dwyer, Hiltz, & Passerini, 2007). Therefore, among the primary aims of this study is investigating the nature and level of the impact concerning SA on using social media for learning and, consequently, the following hypothesis is postulated.

H7₁: SNS SA significantly influences AU regarding using SNS for learning activities.

Computer ethics is one of the foremost areas of concern in the cyber era (Taherdoost et al., 2011), and ethical concerns appear to be one of the disadvantages in the use of SNS for educational purposes (Holotescu & Grosseck, 2012). Therefore, understanding the factors that influence individuals' ethical and intentional behaviours to use information technology is the key element in the decision-making process (Taherdoost et al., 2011). While social interactions are critical in understanding the behaviour of individuals, the relationship between social networks and understanding of ethics has not been explored on a large scale (Guo, Wang, & Leskovec, 2011). Taherdoost et al. (2011) also supports this view by indicating that further research is needed within the area of information system ethics and their effectiveness. Against this backdrop, the following hypothesis is postulated.

H7₂: SNS EA significantly influences AU regarding using SNS for learning activities.

Research instrument and data

In this study, the data were obtained by means of a questionnaire containing 18 research questions grouped under 7 constructs according to TAM, inquiring the data given in Table 1. The questionnaire also included additional items for descriptive purposes, such as gender (male, female) and age (<30, 31–40, 41–50 and > 50).

The sample was limited to groups of students and faculty members from universities since these groups are believed to possess a higher level of awareness on the issues of learning compared to others. The data were collected during the second International Engineering Education Conference and from various faculty members and university students elsewhere. A total of 142 completed survey questionnaires were obtained.

The data were collected using a five-point Likert Scale (5 = strongly agree, 4 = agree, 3 = average, 2 = disagree, 1 = strongly disagree) for each item (Table 1).

The Cronbach's alpha was calculated to be .833. This indicates that all the items in the test exhibit high reliability and measure the same concept. The internal reliabilities of multi-item constructs given in the last column of Table 1 also exhibit adequate reliability. For establishing content validity, the items and their corresponding constructs were adapted from prior studies and modified according to the context of the present study.

Results

Descriptive results

According to the descriptive results (Table 2), of the males in the sample, 69.69% reported an average and higher level of awareness on SNS and, surprisingly, this percentage for females was higher with

Table 1. List of constructs and corresponding items.

Empirical category	Construct	Item	Construct reliability
TAM	Perceived ease of use (PEU)	Do you think that it is easy for you to learn to use SNS for your learning activities?	.665
		Do you think that you never face problems using SNS for learning activities?	
	Perceived usefulness (PU)	Do you think using SNS for learning activities improves your work?	.888
		Do you think using SNS for learning improves your productivity?	
		Do you think using SNS for learning activities meets your requirements?	
	Attitude towards using (ATU)	Do you think you are positive towards using SNS for learning purposes?	.925
Do you think SNS is convenient for you for learning purposes?			
Do you think SNS is beneficial for you in learning activities?			
Behavioural intention to use (BI)	Do you intend to use SNS for learning in the future?	.914	
	Do you intend to use SNS for learning purposes on a regular basis?		
Actual usage (AU)	Do you currently use SNS for learning purposes?	.698	
	Do you use ICT for learning purposes?		
External	Security awareness (SA)	In general, are you familiar with SNS security issues?	.864
		Are you familiar with SNS security issues for learning purposes?	
	Ethical awareness (EA)	Are you aware of security issues in online learning?	.842
		In general, are you familiar with SNS ethical issues?	
	Are you familiar with SNS ethical issues for learning purposes?		
		Are you familiar with ethical issues in online learning?	

83.72%. The χ^2 test result does not indicate a significant difference for gender in this respect ($\chi^2 = 2.858$; $DF = 3$; p -value = .414). The faculty and students were almost equally distributed in this study (40% and 47% respectively), who were mainly from engineering faculties. Although not significant ($\chi^2 = 6.039$; $DF = 6$; p -value = .419), surprisingly, the students (72.5%) were observed to have higher awareness on social media learning issues than the faculty (67.3%).

Most of the respondents reported the use of social media for learning at an average level or higher (63%). The distribution of this type of SNS usage was found significant ($\chi^2 = 9.998$; $DF = 4$; P -value = .040) in terms of gender; however, the difference is not significant in terms of age ($\chi^2 = 17.820$; $DF = 16$; P -value = .335).

Regarding SNS security, the awareness levels were almost equal in terms of gender; 62% of the males reported their awareness level to be higher than average, whereas this figure was observed to be 60.46% for females. For the SNS ethics awareness higher than the average, females seem to be more sensitive than males since the corresponding percentages are 74.42 and 64.64%, respectively.

It should be noted that age and gender are negatively correlated ($r = -.256$), meaning that female respondents are generally younger than males. Age also appears to be negatively correlated with actual use of social learning ($r = -.268$) and, as expected, younger respondents tend to use social media for learning more than older ones.

Test results

The tests for the model fit indicated a good fit since the χ^2/df ratio was found to be 2.806 ($\chi^2 = 19.08$; $df = 10$; p -value = .0392). This view is also supported by Root Mean Square Error of Approximation (RMSEA = .081). Table 3 shows the results of the hypothesis test and path coefficients of the proposed structural research model, which also indicate the direct influences of the predictor upon the predicted latent constructs.

Table 2. Descriptive statistics.

Variable	Number	%
<i>Gender</i>	142	100
Male	99	70
Female	43	30
Unknown	–	–
<i>Age</i>	142	100
<30	80	56
31–40	26	18
41–50	24	17
>50	12	9
<i>Position</i>	142	100
Faculty	55	40
Student	66	47
Both	12	8
Unknown	7	5
<i>SNS usage for learning</i>	142	100
Very often	29	20
Often	29	20
Average	32	23
Less	26	18
Very less	25	18
Unknown	1	1
<i>Awareness level on SNS security</i>	142	100
Very high	34	24
High	54	38
Average	37	26
Low	9	6
Very low	4	3
Unknown	4	3
<i>Awareness level on SNS ethics</i>	142	100
Very high	41	29
High	55	38
Average	34	24
Low	7	5
Very low	1	1
Unknown	4	3

Table 3. Test results.

Hypothesis	Path	Path coeff.	t-value	p-value	Results
H1	PEU → PU	2.18	5.276	.41	Not supported
H2	PEU → ATU	1.45	3.303	.43	Not supported
H3	PU → ATU	.78	9.442	.08	Supported**
H4	PU → BI	.07	4.245	.01	Supported*
H5	ATU → BI	.09	6.282	.01	Supported*
H6	BI → AU	.49	7.463	.06	Supported**
H7 ₁	SA → AU	–0.02	–0.172	.09	Supported**
H7 ₂	EA → AU	.19	2.167	.08	Supported**

* $p < .01$; ** $p < .1$.

The results show that PEU does not have any influence on PU and ATU. ATU was found to be predicted by PU. ATU has a significant effect on BI, which influences AU significantly. The resulting correlation coefficient r is .324, which concludes that PU, ATU and BI explain .324 per cent of the variance in AU. The endogenous variables, PU, ATU and BI had their variances explained by their determinants in the amount of 16.8, 52.2 and 57.1%, respectively. According to the results, PU has a direct effect on ATU and an indirect one on AU through ATU and BI. All these conclude that except H1 and H2, the remaining hypotheses are accepted at either .10 or .01% significance levels. In other words, except PEU, the other standard TAM constructs are capable of predicting the use of SNS for learning purposes. Additionally, security and ethical awareness also have significant impact on using social media for learning.

The significant total indirect effect of PU on AU was observed as .12 ($.78 \times .09 + .05$) (Al-Gahtani, 2011). Although PEU is not significantly related with ATU, it has an indirect path and the total effect of PEU on ATU is 3.15 ($1.45 + 2.18 \times .78$).

Discussion

Our results indicate that if the user believes that the social learning system is useful to learn a certain topic, he/she tends to have a more positive attitude to use the system and his/her intention to use the SNS will increase. This means, as the perceived level of usefulness increases, its usage also increases proportionally. Our result is in line with the notion that individuals are more influenced by the usefulness of the products instead of its ease of use (Gefen & Straub, 2000). The positive relationship between PU and PEU in our model (path_coefficient = 2.18) may be regarded as that users are likely to view a given technology as more useful only if they thought using it would require less effort. The authors believe that the results depend on the type of activities being performed through social networking, such as online communication and education, since the former has a lower quality uncertainty that governs them, while the latter requires extensive personal interaction with the activity (Ramayah & Ignatius, 2005). In other words, although the nature of the technology under study is hedonic (Moqbel, 2012), its usage for education gives the preference to increasing task performance rather than enjoyment and pleasure.

Surprisingly, our findings indicate that neither PU nor ATU is directly influenced by PEU. Our findings are consistent with Lee and Lehto (2013), who declared that PEU has no effect on PU or BI, suggesting that the ease of use of a technology for learning is not imperative in predicting the intention of potential users. A plausible supporting explanation is that with the current technology, the usability of the social learning systems is so advanced that the user's attitude or belief that the system will be useful is not affected by how easy the system is to use. In contrast, our result is in conflict with Lee et al. (2013), who state that if the system is easy to use, the users will think that the system will be more useful and, consequently, their attitude towards it will be more positive. The most obvious reason for the difference between the results may be based on the nature of samples. The present study uses a sample of students and faculty members in higher education institutions, who are normally expected to have a high technical background and do not exhibit any serious difficulty in using new technologies. On the other hand, Lee et al. (2003) used a non-random sample of employees from the industry, who possess different levels of IT experience.

ATU was found to predict BI, and in turn, BI was found to influence AU. These findings are in parallel with the results of recent studies (Lee et al., 2013). They generally state that the attitude of the users directly affects the intention to use the system, which also predicts the actual usage. With a direct relationship between attitude and intention towards actual use, PU is found to be the most significant factor affecting the respondents' intentions to use SNS for learning. Here, it may be speculated that the capabilities of social media sites appeal to individuals involved in higher education as enjoyable, thus feeling more inclined to use them (Duggan, Hess, Morgan, Kim, & Wilson, 2001). In addition, most students are likely to have a favourable attitude toward the Internet to share information, and this attitude probably stimulates social media technology for educational purposes (Duggan et al., 2001).

Previous literature reports many findings regarding the relationship between individuals' awareness and understanding of information security from different perspectives. To start with, Humaidi and Balakrishnan (2012) investigated the influence of SA with regards to systems' security on users' behaviour and concluded that not only the SA, but also the security technology influence user's behaviour. According to Taherdoost et al. (2011), through awareness and knowledge, individuals can develop an attitude toward computer security, in which case the transitions into the future will be much smoother. On the other hand, Aliyu, Abdallah, Lasisi, Diyar, and Zeki (2010) conducted a survey among IT and education undergraduate students and reported the significance of awareness in shaping the actual behaviour. Their study also reveals that there are satisfactory levels of awareness among the students surveyed with slightly higher level of awareness among IT students, most likely due to the security course they have taken. However, the nature of the relationship between SA and actual

usage changes from one study to another. In the present study, the path coefficient from SA to actual use (coeff. = $-.02$) indicates an adverse influence in our study. This means, if the user is aware of the security risks of using a social learning system, he/she is more likely to distrust it and as such refrain from using it. A contradictory finding was reported by Aliyu et al. (2010) that IT students were found to be more aware of Internet security, but largely ignored this knowledge and were more engaged in illegal Internet practices when compared with education students. A possible explanation for the diversity in findings may be based on the study by Dinev, Jahyun, Qing, and Kichan (2006), who believe that user behaviour and, hence, design for effective information security policies, practices, and technologies may vary depending on the factors such as culture and environment. The study by Govani and Pashley (2005) may also be used to explain the conflict between these findings. They state that the actual behaviour towards social media may change according to socio-demographic factors, which is also related to the impact of awareness level on actual behaviour. All these may be the indication of the fact that humans are the critical link in the information security chain (Humaidi & Balakrishnan, 2012) and therefore hackers pay more attention to human factors than do security designers (Adams & Blanford, 2003).

Our findings reveal that ethics awareness has a significant positive influence on the actual use of SNS for learning purposes. Most of the recent literature support the significance of the impact of ethical awareness on actual behaviour in using IT and social media from different perspectives (Taherdoost et al., 2011). Considering the developing countries, Taherdoost et al. (2011) reported the ethical awareness to be identified by the users' attitudes, actions and 'sense of right and wrong' when using the SNS. However, there are also conflicting evidences in the prior literature. For instance, Glass and Wood (1996) reported that the application of ethical decision-making models has not provided significant results. According to Goles et al. (2008), the effect of awareness depends on the type of the work place, reporting evidence that awareness of the law causes a less favourable evaluation of unethical behaviour in the school setting, but has little effect at home or in the working environment. Aliyu et al. (2010), revealed that students with higher IT background are more aware of Internet ethics, but ignore this knowledge and are more engaged in unethical activities. One explanation for contradictory results may be based on the study of Calluzzo and Cante (2004), that individuals have misconceptions about what represents ethical and unethical behaviours in the use of information technology and systems. Additionally, the perception of level of ethical awareness may change depending on various factors such as sociodemography, environment, etc. (Brey, 2000).

Conclusion

In this study, the conceptual predictive model TAM was extended to include important awareness factors including EA and SA. The findings show significance of direct and indirect effects of PU, ATU, BI, EA and SA towards the actual usage of SNS for learning. This means, except for the PEU, extended TAM is in favour of social learning usage.

One of the main implications of this study is that social learning is widely accepted and used by students and faculty. Therefore, the integration of such systems into formal educational settings could increase motivation, performance and success among students in their courses. Social media can be incorporated into courses in higher education by creating safe communities where students and instructors are able to share learning materials, communicate, collaborate, assist in solving problems, send announcements to the whole class, etc. The students can feel more comfortable to participate and communicate in such open platforms when compared to the regular classroom environments, thereby improving their motivation and learning. Therefore, the utilisation of SNS should be encouraged by the university administration by showing the faculty various ways to safely integrate social media into their courses, as well as demonstrating its advantages.

Yet, before taking on this challenge, both students and the faculty should be informed about the ethical and security issues involved in using SNS. More importantly, social learning systems should

evolve to minimise security risks and advise the users about ethical conduct. All in all, it can be concluded that if certain steps are taken, namely minimising security risks and raising ethical awareness, the actual usage of social media for learning purposes is more likely to increase.

Universities provide environments, where students and faculty have different levels of awareness on issues of social learning media usage (Calluzzo & Cante, 2004). Therefore, the social media should be studied from different perspectives considering factors, such as culture and sociodemographics, providing the opportunity for learning how certain traits and demographic factors impact social media use in education. Additional studies comparing SNS cultures and technical functionalities may be valuable additions to the literature. Furthermore, users from different sections of the society with different levels of awareness concerning social learning systems could be analysed to deduce a more generalised assessment of social media systems for learning.

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