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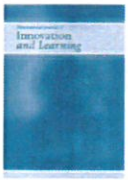

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The role of social media in collective learning

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Abstract: In the first decade of the 21st century, e-learning has become one of the key factors in the revolution of learning process. E-learning combines modern interactive learning methods with knowledge management methods that provide better evaluation of knowledge. Social media, as one of ICT tools, has brought revolutionary new ways of interacting, participating, cooperating and collaborating which involve users generating content and connecting with people through a 'many-to-many', rather than the traditional 'one-to-many', communication approach. However, collective learning using social media among higher institution students has not been given much attention especially within a Malaysian context. Therefore, the main purpose of this study is to investigate the acceptance of social media in learning among higher institution students. Data from 359 students were collected from both science and technology and social science clusters at Universiti Teknologi MARA (UiTM). Data was analysed using SmartPLS. The result showed that all antecedents of technology acceptance which included performance expectancy, effort expectancy and facilitating condition have positive significant effect on collective learning except social influence.

Keywords: collective learning; effort expectancy; social influence; facilitating conditions; performance expectancy; social media.

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1 Introduction

In the first decade of the 21st century, e-learning has become one of the key factors in the revolution of learning process. E-learning combines modern interactive learning methods and knowledge management methods that provide better evaluation of knowledge. Today, ICT has a significant effect on teaching and learning process. The presence of ICT in education has contributed significant changes in the learning process. One of the benefits of using ICT is e-learning which involves acquisition, generation and transfer of knowledge.

In addition, social media has brought revolutionary new ways of interacting, participating, cooperating and collaborating which involve users generating content and connecting with people through a 'many-to-many', rather than the traditional 'one-to-many' communication approach. JISC (2010) defined social media as innovative online tools designed to enhance communication and collaboration. Cook (2008, p.7) described social media as "the way in which content (particularly news and opinions) has become democratised by the internet and the role people now play not only in consuming information and conveying it to others, but also creating and sharing content with them."

Social media is becoming an integral part of everyday life for communicating and sharing information. It is mainly free and easy to use; therefore, it can provide learners a relatively quick and low cost method of connecting with sources of information. This is especially beneficial to students who may not have financial support or technical expertise required for technical solutions (Dyerson et al., 2009; Kaplan and Haenlein, 2010; Zeiller and Schauer, 2011; Stockdale et al., 2012) as it provides short-term and tangible value in any new endeavours (Mehrtens et al., 2001; Stockdale et al., 2012). However, to ensure that social media is used effectively, students must have a clear plan

indicating how it will be used and what it will be used for. Without this, students cannot determine its usefulness or effectiveness.

There were several previous studies conducted in the field of education using social media application, including application in graduate level coursework (Chen et al., 2010; Meyer, 2010; Carroll et al., 2011; Bennett et al., 2012; Wang et al., 2012; Everson et al., 2013; Piotrowski, 2015). However, the adoption of social media in collective learning (CL) in the context of Universiti Teknologi MARA (UiTM) students has not been given serious attention even though UiTM has introduced many learning tools to encourage students' learning activities. Thus, the objectives of this study are to investigate the effect of technology acceptance antecedents of social media adoption on CL and to examine the most influential factor that influences CL.

2 Literature review

2.1 Antecedents of technology acceptance of social media

Technology acceptance model (TAM) developed by Davis et al. (1989) was an adaptation of theory of reasoned action (TRA) introduced by Fishbein and Ajzen (1975). However, TAM excluded social influence (SI) which was found in social explanation in the use of technology in TRA. TRA was later expanded by Mathieson (1991) and Ajzen (1991) with the inclusion of control belief and perceived behavioural constructs. The expansion led to the construct of theory of planned behaviour (TPB).

Even though TAM excluded subjective norms found in TRA and TPB, TAM added two new constructs which were perceived usefulness and perceived ease of use. These two constructs are the belief that influences attitude towards the intention of use (Jeng and Tzeng, 2012). TAM bridges a link between technology acceptance and utilisation of behaviour. Several researchers such as Lee (2006) and Bajaj and Nidumolu (1998) have validated TAM across the information technology acceptance.

Venkatesh and Davis (2000) extended TAM into TAM2 with the purpose to measure the dimensions of SI. They found that people incorporated SI into their usefulness perception and identification to gain social status and improve job performance. Venkatesh et al. (2003) formulated unified theory of acceptance and use of technology (UTAUT) based on eight previous models TRA, TAM, motivational model (MM), TPB, combined technology acceptance model and theory of planned behaviour (C-TAM-TPB), model of PC utilisation (MPCU), innovation diffusion theory (IDT) and social cognitive theory (SCT) (Kacaleva et al., 2015). UTAUT has become a useful tool that managers need to apply in order to evaluate the probability of success while introducing a new technology that helps in understanding the factors for its acceptance, in order to undertake more active interventions (such as training or marketing) targeted at users who may be less prone to adopt and use new systems (Venkatesh et al., 2003). The theory considers four key factors which are performance expectancy (PE), effort expectancy (EE), SI and facilitating conditions (FCs) (Venkatesh et al., 2003).

2.1.1 Performance expectancy

PE is defined as the belief that using the system will benefit him or her in improving job performance (Venkatesh and Davis, 2000). PE can be measured by three factors;

perceived usefulness, extrinsic motivation and job fit. Perceived usefulness is a belief that using a system will improve learning process (Davis, 1989). Extrinsic motivation motivates users in performing activities because it is perceived as an instrument in achieving outcomes that are distinct from the activity itself, such as improved learning process (Teo et al., 1999). Job fit is defined as how the system can enhance individual's learning process (Thompson et al., 1991).

There are several studies conducted before showing that PE is the most influential factor on users' behaviour intention to use an information system. The study on costing/management system (Lee, 2009) found that PE has a positive direct effect on change agents' behavioural intention. In mobile internet banking, Yu (2012) showed that performance had a strong influence and significantly affected the consumers' intention to adopt mobile banking. A similar finding was obtained in a study of internet marketing among communities in Malaysia and South Korea (Khong et al., 2013).

2.1.2 Effort expectancy

EE is the level of ease in using a system or a technology (Venkatesh et al., 2003, 2012). It indicates the degree of ease in using a system or a technology can influence the consumers' behavioural intention (Adam et al., 2016). EE is critical in the introduction of a new system or a new technology. According to Orlikowski (1992), the process of implementing a new technology can fail if technology designers do not take EE into consideration. The construct of EE can be captured by three factors namely perceived ease of use, complexity and ease of use. Perceived ease of use is the degree of belief by using a system would be free of effort (Venkatesh et al., 2003). The concept of complexity is the degree to which a technology usage is difficult to understand (Goodhue and Thompson, 1995). Ease of use is defined as the degree of difficulty and easiness in using a system or a technology by specified users to achieved specific goals with effectiveness, efficiency and satisfaction within a specific context of use (Moore and Benbasat, 1991).

Study has shown that EE significantly influenced behavioural intention (Hamdan et al., 2012). However, the study of Im et al. (2011) found that EE had a greater impact in developed countries because its people have easier access in the use of a particular technology.

2.1.3 Social influence

SI is defined by Venkatesh et al. (2012) as a degree to which an individual's perception of other people's trust to use a system or a technology. It is the way an individual or other people that give some importance to them whether it does or does not reflect to their behaviour (Fishbein and Ajzen, 1975). In the context of this study, SI is the degree to which students consider their lecturers' belief, parents' belief and even colleagues' belief that they should use social media in learning.

A study done by Wang and Shih (2009) on the use of information kiosk among respondents from different demographic background in Taiwan found that SI has a positive impact on the use of information kiosk. However, the results showed that age did not moderate the relationship between SI and the intention to use information kiosk among the respondents.

2.1.4 Facilitating conditions

FC represents the degree of consumers trust that infrastructure of the organisation and its technical aspects can support the use a system (Venkatesh et al., 2012). In this context of study, FCs are seen as the level where students are confident that the university as organisational context has provided the infrastructure and the tools that can be used for learning. Facilitating involves how student's access cost of using the system and availability to use the system (Pan and Jordan-Marsh, 2010). A study done by Escobar-Rodrigues and Carvajal-Trujillo (2014) showed that FCs have a significant impact on the online purchase of cheap flight tickets. This shows that consumers need support resources to facilitate their access to the relevant websites. Students also need those facilities in learning so that they can navigate several resources to search relevant information.

2.2 Collective learning

CL is an interactive process where knowledge is accumulated from different individual or channels (Cotic-Svetina et al., 2008) through interactive mechanisms based on shared rules, norms, organisations, and procedures (Capello and Faggian, 2005). Therefore, knowledge creation can take place when several collocated individuals undertake similar and related activities (Malmberg and Maskell, 2006).

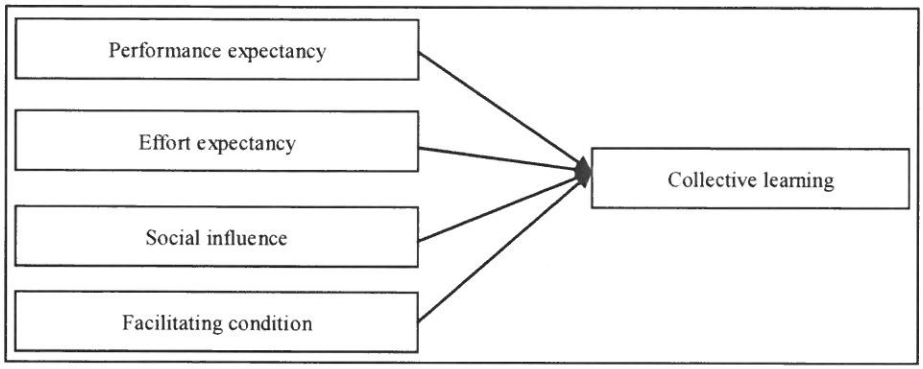
Learning as a collective process is learning through interactive and communicative action creating synergy (Granberg and Ohlsson, 2005). Thus, CL brings about shared knowledge and understanding concerning something that is not previously known or understood among the interacting agents. It is also usually referred to as resulting in a common capacity for action and competence, and as such, part of an organisational learning cycle (Dixon, 1994). CL has been conceptualised as a conversation which is both face-to-face (Kleinsmann and Valkenburg, 2005) and, more recently, at a distance as well (Sense, 2005). In earlier pedagogic work-life research, CL appeared as a process occurring in face-to-face meetings in rather stable contexts; for example, childcare, the exercise of public authority, and car industry. It is described as proceeding in teams or other groups whose limited number of constituent members are established and known (Mittendorff et al., 2006)

CL can be seen from usage effects of social media. The related usage effects include learning satisfaction and self-perceived usage effects (Liao et al., 2015). However, continued usage intention does not measure the usage effect and the effect of CL in this context. It is more on the intention to continuously use the system.

Learning satisfaction is based on the feelings of users after using a system (McKinney et al., 2002), while other scholars claim that satisfaction should be defined as the extent to which the users believe that a system meets their needs; thus, it is determined by user perceptions rather than the technical quality of the system itself (Ives et al., 1983). Self-perceived usage effects are defined as the learner's post-usage evaluation of the social media. If a learner has high perceived ease of use, usefulness, and playfulness with regard to social media, they will have a better learning attitude as well as better self-perceived usage effects (Liao et al., 2015).

Figure 1 shows the research framework of the study. PE, EE, SI and FC are the antecedents of technology acceptance of social media. Those antecedents become the independent variables while CL becomes a dependent variable.

Figure 1 Research framework



3 Hypotheses

The hypotheses from the above discussion are:

H1 PE of technology acceptance has a positive influence on CL.

H2 EE of technology acceptance has a positive influence on CL.

H3 SI of technology acceptance has a positive influence on CL.

H4 FC of technology acceptance has positive influence on CL.

4 Research methodology

The most appropriate methodology for this study is survey. The instrument used for collecting the research data is questionnaire. A corresponding five Likert scale was deployed (1 for 'strongly disagree'; 2 for 'disagree'; 3 for 'neither agree nor disagree', 4 for 'agree', 5 for 'strongly agree'). The instrument to measure the four antecedents of technology acceptance of social media was adopted from the study conducted by Kacaleva et al. (2015). According to Liao et al. (2015), CL can be measured through the usage effect of social media on CL. The indicators of the usage effect are learning satisfaction, self-perceived usage effects and continued usage intention. Therefore, the instrument to measure CL developed by Liao et al. (2015) was adopted and modified in this study.

Prior to the data collection, the questionnaire underwent a pilot study with 50 respondents to test the reliability of the questionnaire. The recorded Cronbach alpha (0.943) for all variables employing multi-items were well above 0.6 which suggested that the questionnaire was reliably sound (George and Mallery, 2003; Kline, 2011). The finalised questionnaire was distributed to 359 students at UiTM. Using SmartPLS-SEM version 3.0, the responses of these 359 students were analysed to assess the reliability of the measurements. The reliability value of 0.945 was above 0.6 as suggested by George and Mallery (2003) and Kline (2011). Therefore, the reliability of the questionnaire was not a concern.

4.1 Data analysis method

This study used the partial least square (PLS) technique to analyse data by utilising the SmartPLS 3.0 software for validating measurements and testing the hypotheses. The PLS approach was applied to estimate the causal models (Ramayah et al., 2018). The evaluation of the measurement model was based on the assessment of internal consistency (composite reliability – CR), convergent validity (average variance extracted – AVE), and discriminant validity. The values of CR and AVE to test the reliability and validity of the constructs revealed that the values were greater than 0.5 for all the constructs; thus, construct reliability and convergent validity were achieved and explained. The discriminant validity for each measure was calculated. Finally, in the second stage, the paths between the constructs in the models were estimated.

4.2 Sampling and data collection

The sample of the study was graduating degree students from UiTM main campus which represented both science and technology (S&T) cluster and social science (SS) cluster. They were randomly selected. Researchers used a-priori sample size calculator for structural equation models software to identify an appropriate sample size (Soper, 2017). The identified minimum sample size was 200 respondents. A total of 400 questionnaires were distributed to UiTM students. However, only 359 questionnaires were returned. Those students were divided into two groups; 150 S&T students and 209 SS students. The period of data collection was two months. The data were analysed using PLS (SmartPLS3.2.7). This study will firstly develop and assess the measurement model followed by the development and assessment of the structural model.

4.3 Assessment of normality

Data analysis was executed using structural equation modelling (SEM) in which it required the observed data to be normally distributed. To meet this requirement, univariate normality and multivariate normality were assessed using several procedures. According to the rule of thumb, variable is reasonably close to normal if the values of skewness and kurtosis are (± 3). The skewness and kurtosis requirements fulfilled the benchmark values.

5 Findings

Table 1 shows that majority of the respondents were female which constituted 56.5% while male with 43.5%. The respondents were selected from SS, and S&T clusters. The researchers used quota sampling technique for sampling. The respondents from the SS cluster constituted 62.7% while S&T cluster constituted 37.3%. The study showed that most of the students used social media through smartphone (95%), laptop (56.3%) and desktop (17.8%). Majority of the respondents spent more than two hours (65.2%) using social media while only 14.5% used social media of less than one hour. About 68.8% of the students used social media at the university, 53.8% used it at home and only 7.8% used social media at cyber café.

Table 1 Demographic description table

Demographic description		*Frequency (%)*
Gender	Male	43.50
	Female	56.50
Cluster	Social sciences	62.70
	Science and technology	37.30
Device	Desktop	17.80
	Laptop	56.30
	Smartphone	95.00
	Tablet	8.60
	Others	0.80
Location	University	68.80
	Home	53.80
	Office	8.90
	Cyber café	7.80
	Fast food restaurant	22.30
	Others	23.40
Duration	Less than 1 hour	14.50
	1 hour–2 hours	20.30
	2 hours–4 hours	30.10
	More than four hours	35.10

The multicollinearity of items was also assessed. Some items may be redundant due to high multicollinearity. To detect multicollinearity, researchers can examine the variance inflation factor (VIF). Examining the VIF is a frequently used means of detecting multicollinearity, Diamantopoulos and Siguaw (2006) suggested a more conservative criterion of VIF at 3.3. Table 2 shows that all VIF values are less than 3.3, indicating that multicollinearity is not severe.

Table 2 Multicollinearity test

	VIF
Effort expectancy (EE)	1.654
Facilitating condition (FC)	1.245
Performance expectancy (PE)	1.980
Social influence (SI)	1.350

5.1 Validity assessment

Validity is assessed in terms of convergent validity and discriminant validity. Convergent validity is the extent to which the scale correlates positively with other measures of the same constructs (Malhotra, 2002). Convergent validity can be evaluated by examining the loading (≥ 0.5), AVE (≥ 0.5) and CR (≥ 0.7) (Kaynak, 2003; Kim, 2010). Each item's coefficient on its underlying construct was observed. A test of each item's coefficient was

used to assess convergent validity. All values fulfilled the required standard, indicating high convergence validity (Table 3).

Table 3 Loading, CR and AVE

	Loading	*C.R.*	*AVE*
CL	0.934	0.944	0.629
EE	0.881	0.927	0.809
FC	0.796	0.879	0.708
PE	0.875	0.908	0.666
SI	0.873	0.912	0.723

Besides assessing convergent validity, the study also evaluated discriminant validity. Discriminant validity can be evaluated by examining Fornell-Larcker criterion (Fornell and Larcker, 1981) and heterotrait-monotrait (HTMT) ratio (Henseler et al., 2015). Fornell and Larcker (1981) suggested examining whether the square root of the AVE for each construct is greater than the correlation between the constructs. There are two ways of using the HTMT to assess discriminant validity:

1 as a criterion

2 as a statistical test.

Firstly, using the HTMT as a criterion involves comparing it to a predefined threshold. If the value of the HTMT is higher than this threshold, one can conclude that there is a lack of discriminant validity. Some authors suggested a threshold of 0.85 (Clark and Watson, 1995; Kline, 2011), whereas others proposed a value of 0.90 (Gold et al., 2011; Teo et al., 2008). Table 4 and Table 5 show that discriminant validity fulfilled the threshold.

Table 4 Fornell and Lacker

	CL	*EE*	*FC*	*PE*	*SI*
CL	0.793				
EE	0.616	0.900			
FC	0.432	0.395	0.842		
PE	0.640	0.604	0.395	0.816	
SI	0.267	0.332	0.164	0.506	0.850

Table 5 HTMT ratio

	CL	*EE*	*FC*	*PE*	*SI*
CL					
EE	0.675				
FC	0.487	0.455			
PE	0.682	0.666	0.456		
SI	0.288	0.391	0.245	0.603	

The study was conducted on 359 students of UiTM and the result showed the influence of all technology acceptance determinants on CL except SI. The squared multiple

correlation (R^2) value for the relationship between determinants of technology acceptance and CL was 0.516 ($\beta = 0.516$, $p < 0.01$), suggesting that 51.6% of the variance in CL can be explained by the combination of PE, EE and FC. Hence, all hypotheses, H1, H2 and H4, were supported except H3. Table 6 shows that the most influential determinant of technology acceptance is PE ($\beta = 0.43$, $p < 0.01$).

Table 6 Hypotheses testing

		β	*S.E.*	*t value*	*Confidence interval*		*Decision*
					LL	*UL*	
H1	PE -> CL	0.43	0.07	6.044	0.26	0.55	Supported
H2	EE -> CL	0.33	0.06	5.815	0.21	0.43	Supported
H3	SI -> CL	–0.08	0.05	1.688	–0.18	0.01	Unsupported
H4	FC -> CL	0.15	0.05	2.910	0.06	0.24	Supported

6 Conclusions

The result shows that a university has to provide sufficient ICT infrastructure so that students can use social media for learning. This is because students will spend most of the time accessing internet in the campus compared to cyber café. The data shows that majority of the students will spend more than two hours of their time every day for accessing online information. This means that students spend their time learning in virtual classes more than face-to-face classes. However, most of the people surrounding students still have low awareness on social media as an emerging tool of learning. This can be seen in the data analysis that showed the means of SI from friends, family and lecturers were below 5.0 which explained why there was insignificant influence of society on social media in learning. A further research should be carried out qualitatively to identify the factors behind this phenomenon.

This study still has few limitations. The first limitation is the sample in this study is only from one university. The respondents are only students from UiTM. Consequently, the result of analysis cannot be generalised. Since the sample does not represent the whole population of higher learning institutions in Malaysia, it might lead to an inaccurate analysis of the effect of SI on social media. Future study should be done in all public universities nationwide in order to get an accurate analysis.

As a conclusion, this study shows that students spend most their time in accessing social media at a university. Therefore, a university should have sufficient ICT infrastructure for its students so that the process of long life learning can be fruitful. Social media should be viewed as an emergent tool for teaching and learning in the age of information technology.

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