FACTOR AFFECTING ICT-BASED LEARNING IN HIGHER EDUCATION IN PHNOM PENH, CAMBODIA

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ABSTRACT

The purpose of this study was to examine the factors affecting the adoption of ICT-based learning of students in higher education in Phnom Penh, Cambodia. The conceptual framework was developed from previous studies which includes facilitating conditions, self-efficacy, perceived ease of use, performance expectancy, effort expectancy, behavioral intention and use behavior. The quantitative method was applied to distribute a questionnaire to 527 respondents. The multistage sampling technique was conducted in nonprobability sampling, using judgmental sampling to select undergraduate students in three private universities, quota sampling to calculate the sample size of each group, and convenience sampling to distribute a questionnaire online and offline. Before collecting data, Item-Objective Congruence Index (IOC) and Cronbach's Alpha were employed to validate constructs. Confirmatory Factor Analysis (CFA) was used to verify convergent and discriminant validity, and goodness of fit indices. Structural Equation Model (SEM) was carried out to test the relationship among variables. The findings showed that performance expectancy and effort expectancy significantly affected behavioral intention, and behavioral intention positively affected use behavior. However, the results contradicted that facilitating condition, self-efficacy, and perceived ease of use were not significant on behavioral intention. Government, educators and practitioners are recommended to encourage significant factors to increase ICT-based learning adoption and learning efficiency of students by clearly communicating the benefits of system usage, improving system to be user-friendly and promoting the usage of the system more effectively to increase the level of system adoption among students.

Introduction

The globalization of higher education institutions (HEIs) has become a principal (Hong, 2018). This agenda has been endorsed by the World Conference on Higher Education (WCHE) to improve a quality of education system and reduce an inequality among developed and developing countries. In Cambodia, international standard has remarkably influenced local higher education. Since the end of civil war in the 1990s, Royal Government of Cambodia

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has been restoring society, economy and education of the country, benchmarking with other developing countries. The government has focused to develop its citizens for the country's reconstruction and to upkeep with regional and global economic standard (Tan, 2007). The vision of the higher education in Cambodia is "to build a higher standard of higher education system that can develop talents with excellent knowledge, skills and moral values to succeed in work and life, especially in the era of digitalization and knowledge-based society" The education development goal of Cambodia is "to develop a good governance system and higher education mechanisms to ensure that students can access the quality education programs in responding to the needs of socio-economic development and labor market" (MoEYS, 2014, p. 3). The statistical data showed that higher education's enrollment of students in Cambodia between 2009 and 2013 has raised to 207,000 and scholarships were awarded to 4,200 students (MoEYS, 2014).

Information and Communication Technology (ICT) is a fundamental term for information technology (IT), which refers to communication technologies, including the internet, wireless networks, smart phones, computers, software, videoconferencing, social networking, and other media applications and services, allowing users to access, retrieve, store, transmit, and manipulate information in a digital form. The usage of ICT in higher education institutions represents a new form of education and has become an integral part of global education transformation. It refers to the process of improving and developing education facilitated by the widespread usage of information and communication technology i.e., e-learning (Blurton, 1999).

This study aims to investigate determinants of ICT-based learning's adoption of students in higher education in Phnom Penh, Cambodia

which includes facilitating conditions, self-efficacy, perceived ease of use, performance expectancy, effort expectancy, behavioral intention and use behavior.

Literature Review and Hypotheses

Facilitating conditions

Facilitating conditions refer to the degree to which a person perceives that the organizational and technical infrastructure are available to support the use of the system (Venkatesh, Morris, Davis, & Davis, 2003). Several studies (Chang, 2012; Chau & Hu, 2002) found that facilitating conditions significantly affect the utilization of technology. Users expect to access information or tools that can help them to adopt the technology successfully (Venkatesh et al., 2003; Zhou, Jindal-Snape, Topping, & Todman, 2008). Venkatesh, Brown, and Bala (2013) argued that there is a positive association between facilitating conditions and behavioral intention in the technology's usage. Venkatesh and Bala (2008) elaborated that facilitating conditions are related to the belief of individuals in organization's resources and technical support that can facilitate the use of a system. Thus, the following hypothesis is set:

H1: Facilitating conditions has a significant impact on behavioral intention.

Self-efficacy

Self-efficacy represents an inspiration of individuals to execute behaviors (Agarwal & Sambamurthy, 2000). Self-efficacy is described as one's capability to use the technology to achieve a task (Alenezi, Abdul Malek, & Veloo, 2010; Johnson, Burke, Brinkman, & Wade, 2017; Venkatesh & Morris, 2000). Compeau and Higgins (1995) characterized self-efficacy as person's confidence to adopt personal computers and smart phone. The higher level of self-efficacy represents the higher level of intention to use a technology

(Hatlevik, Throndsen, Loi, & Gudmundsdottir, 2018). Ajzen (1991) viewed self-efficacy as a self-evaluation on one's capacity to conduct an action. Many studies also found that self-efficacy impacts intention to use ICT (Ariff, Yeow, Zakuan, Jusoh, & Bahari, 2012). Therefore, this research suggests that self-efficacy significantly effects behavioral intention as stated in the following hypothesis:

H2: Self efficacy has a significant impact on behavioral intention.

Perceived ease of use

Davis (1989) identified perceived ease of use as the simpleness of the technology that can enable individuals to use it. Venkatesh (2000) pointed that perceived ease of use is a key indicator of the technology acceptance model (TAM). In educational technology context, an individual's intention to use e-learning is positively affected by the ease of use, which means the system requires less physical and mental effort of using it (Chen & Tseng, 2012; Mohammadi, 2015). Perceived of use is characterized as the degree to which an individual expects to have no problem of using a technology (Changchit, 2014). Many researchers have investigated perceived ease of use in various form of technology, for example, web-based business (Pavlou, 2003), e-learning (Chui, Hsieh, Kao, & Lee, 2007), personal computer (Doll & Torkzadeh, 1988) and have confirmed the positive association between perceived ease of use and behavioral intention. Hence, this study considers that perceived of use has a significant effect on behavioral intention as indicated in the following hypothesis:

H3: Perceived ease of use has a significant impact on behavioral intention.

Performance expectancy

Performance expectancy has gained widely attention from many researchers to examine the technology adoption (Venkatesh et al., 2003; Derntl, Neumann, Griffiths, & Oberhuemer, 2011; Khayati & Zouaoui, 2013). Rogers and & Singhal (2003) postulated that performance expectancy is a viable construct used in the unified theory of acceptance and use of technology (UTAUT) model to determine the adoption of information system. Performance expectancy is explained as an individual who believes that the use of technology would benefit him or her to accomplish tasks (Venkatesh et al., 2003). Cheok and Wong (2015) investigated that performance expectancy is a key influencer of e-learning adoption in higher education. The number of research proved that performance expectancy positively impacts behavioral intention (Dulle & Minishi-Majanja, 2011; Mtebe & Raisamo, 2014; Venkatesh et al., 2003). Hence, the following hypothesis is set:

H4: Performance expectancy has a significant impact on behavioral intention.

Effort expectancy

According to Venkatesh et al. (2003), effort expectancy is defined as the degree of ease related with the system usage. Effort expectancy is also one of the key constructs in UTAUT model. In this study, effort expectancy is described as the level of simplicity associated with the use of e-learning among university's students. Effort expectancy has a significant impact on behavioral intention, investigating by many scholars (Bandyopadhyay & Fraccastoro, 2007; Liebenberg, Benade, & Ellis, 2018; Jairak, Praneetpolgrang, & Mekhabunchakij, 2009; Nassuora, 2012; Venkatesh et al., 2003). Giesing (2003) proved that effort expectancy significantly impacts intention to use of the technology. The theoretical relationship is derived to determine a hypothesis:

H5: Effort expectancy has a significant impact on behavioral intention.

Behavioral intention

Behavioral intention is a predictor of actual use behavior of new technology (Liébana-Cabanillas, de Luna, & Ríos, 2017). It is defined as a willingness of an individual to use a provided technology. Furthermore, behavioral intention is an essential concept and widely applied as a main construct in various technology adoption theories, which includes TAM by Davis (1989), UTAUT by Venkatesh et al., (2003), and theory of reasoned action (TRA) by Ajzen (1991). Likewise, Ajzen and Fishbein (1975) conceptualized behavioral intention as the probability of users to perform a certain behavioral action. Many researchers supported that behavioral intention critically affects use behavior (Ajzen, 1991; Saha, 2009; Kim, Shin, & Lee, 2009). Consequently, H6 is formulated as:

H6: Behavioral intention has a significant impact on use behavior.

Use behavior

Use behavior is generalized as an intensity or frequency of users to use information technology (Liébana-Cabanillas et al., 2017). Use behavior depends on the users' impression on the system. The system is more likely to be accepted if users are interested and confident that the technology can offer them some advantages or benefits. A usage behavior is conceptualized as a behavior in which users finally interact with the technology (Venkatesh et al., 2003). Numerous studies considered that behavioral intention and attitude toward use are moderators between other determinants and use behavior (Chen, 2011).

Research Methods and Materials

Research framework

The research framework is developed from previous theoretical studies which associates with the technology adoption in higher education. This study aims to examine the factors, which include facilitating condition (FC), performance expectancy (PE), perceived ease of use (PEOU), self-efficacy (SE), and effort expectancy (EE) that significantly impacting behavioral intention (BI). In addition, researchers also investigate a relationship between behavioral intention and use behavior (UB). The conceptual framework of this study is shown in Figure 1.
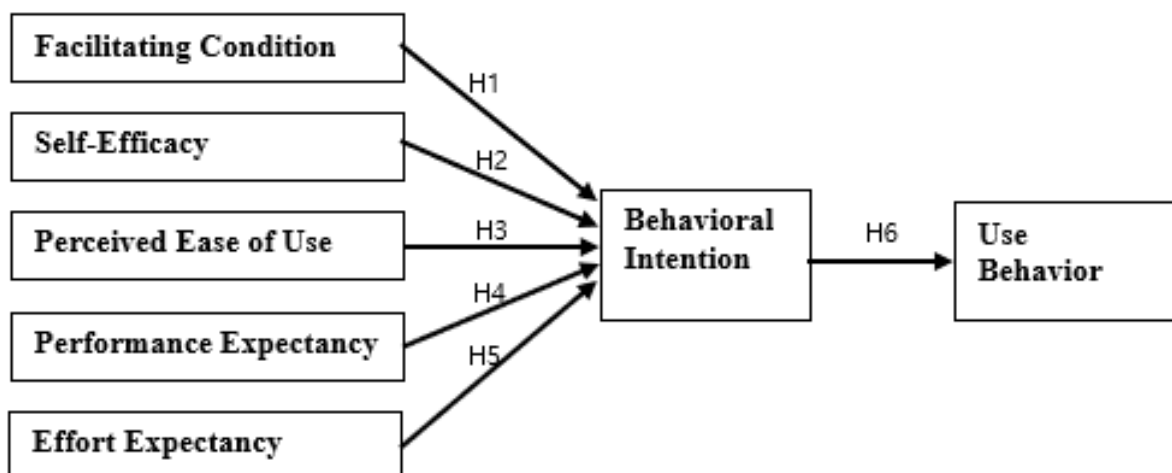

Figure 1 Conceptual framework

Methodology

This research used quantitative method by distributing questionnaire via offline and online channels. Research instruments were composed with screening questions, measuring items used Five-points Likert scale, ranging from strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1) and demographic information. Before collecting data, this study applied Item-Objective Congruence Index (IOC) validity test, using three experts to verify constructs. Later, Cronbach's Alpha (CA) reliability test was used to measure items among 50 respondents as pilot study. The IOC results were passed at the value above 0.6, and all items were reserved at the CA's value higher than 0.7.

Data collection was carried out with the distribution of questionnaire to 527 respondents. Researchers analyzed the data by SPSS 26 and AMOS 26.0. Afterwards, Confirmatory Factor Analysis (CFA) was conducted to test the convergent which was verified by fitness model test and discriminant validity that showed greater value than the correlation between constructs (Hair, Black, Babin, & Anderson, 2010) to confirm the quality of the questionnaire used for collecting data. The measurement model fits the overall test with given data to ensure the accuracy and reliability of the model. Finally, Structural Equation Modeling (SEM) was used to examine the association among variables.

Population and sample size

The target population used in this study were undergraduate students of business administration and arts of humanity, who have been experiencing ICT-based learning method from three private universities in Phnom Penh, Cambodia. A-priori Sample Size Calculator for Structural Equation Models of Soper (n.d.) was used to calculate minimum sample size which was recommended at 425. After 580 responses were screened, the usable data for this study were 527.

Sampling technique

The multistage sampling technique, using nonprobability sampling, was applied in this study. Firstly, the judgmental sampling was used to select undergraduate students of business administration and arts of humanity, who have been experiencing ICT-based learning method from three private universities in Phnom Penh. Secondly, the quota sampling was employed to calculate sample size from each group as illustrated in Table 1. Finally, researchers applied convenience sampling method to collect the data during February to May 2021 via online by using telegram messenger application and offline by using paper-based questionnaire.

Table 1 Sample size by universities in Phnom Penh

Universities	Percentage	Sample size
Western University (Phnom Penh campus)	68%	358
Royal University of Phnom Penh	12%	64
Acleda Institute of Business	20%	105
Total	100%	527

Results and Discussion

Demographic factor

The demographic profile of 527 respondents is summarized in this section. The number of female respondents is the 373 (70,7%), and the number of male respondents is 154 (29.3%) Most of the respondents are 4th year students (Senior), which represent 269 (51.1%) of total respondents, followed by 3rd year students (Junior) which account for 33.1% (174), 2nd year students (Sophomore) which account for 3% (16), and 68 (12.9%) are 1st year students (Freshman). For the city of residence, 81.9% of the respondents live in Phnom Penh, and 18.1% live outside the province as shown in Table 2.

Table 2 The results of demographic information

Demographic profile data (N = 527)		Frequency	Percentage
Gender	Male	154	29.3%
	Female	373	70.7%
University rank	Freshmen	68	12.9%
	Sophomores	16	3.0%
	Juniors	174	33.1%
	Seniors	269	51.1%
Citi of residence	Live in Phnom Penh	432	81.9%
	Live Outside Phnom Penh	95	18.1%

Confirmatory factor analysis

Confirmatory Factor Analysis (CFA) is a statistical technique, which enables consistency testing of data (Bollen, 1989). Factor loading, Composite Reliability (CR), and Average Variance Extracted (AVE) can be examined by CFA. Factor loading is required to be higher than 0.5 and p-value is lower than 0.05. In addition, Fornell and Larcker (1981) suggested that Composite Reliability must be greater than 0.7 and the Average Variance Extracted must be higher than 0.5 (Hair et al., 2010). However, Lam (2012) stated that AVE is acceptable at the value less than 0.5 if CR is higher than 0.6. as demonstrated in Table 3. Table 4 showed that the values of discriminant validity were greater than the correlation between constructs (Hair et al., 2010) which confirms the quality of the questionnaire used for collecting data. Additionally, the results of Table 3, 4 and 5 also confirm the construct validity were validated as the convergent and discriminant validities.

Table 3 Confirmatory factor analysis results, composite reliability (CR) and average variance extracted (AVE)

Variables	Sources of questionnaires (measurement indicator)	No. items	Cronbach's Alpha	Factor loading	CR	AVE
Facilitating condition	Arif (2017)	5	.800	0.659-0.673	0.774	0.409
Self-efficacy	Sharma (2019)	4	.684	0.513-0.685	0.685	0.355
Perceived ease of use	Sharma (2019)	3	.781	0.685-0.713	0.758	0.511
Performance expectancy	Badwelan (2016)	5	.845	0.700-0.810	0.857	0.546
Effort expectancy	Kolog (2015)	4	.733	0.594-0.780	0.804	0.509
Behavioral intention	Maldonado, Khan, Moon, and Rho (2010)	5	.856	0.733-0.831	0.875	0.585
Use behavior	Maldonado et al. (2010)	3	.828	0.611-0.997	0.905	0.767

Table 4 Discriminant validity

Constructs	FC	SE	PEU	EE	BI	UB	PE
FC	**0.787**						
SE	0.766	**0.796**					
PEU	0.600	0.683	**0.715**				
EE	0.656	0.662	0.679	**0.714**			
BI	0.489	0.543	0.555	0.674	**0.765**		
UB	0.064	0.102	0.131	0.128	0.117	**0.876**	
PE	0.624	0.633	0.621	0.607	0.763	0.116	**0.739**

<u>Remark</u> FC: Facilitating condition, PE: Performance expectancy, SE: Self-efficacy, PEU: Perceived ease of use, EE: Effort expectancy, BI: Behavioral intention, UB: Use behavior

From Table 5, the acceptable values can determine the goodness of fit which include CMIN/ DF = 2.029, GFI = 0.915, AGFI = 0.893, CFI = 0.956, TLI = 0.948, NFI = 0.918 and RMSEA = 0.044. Hence, the results are acceptable and in harmony of with empirical data.

Table 5 Goodness of fit for confirmatory factor analysis (CFA)

Index	Acceptable values	Values
CMIN/ DF	< 3.00 (Hair et al., 2010)	2.029
GFI	≥ 0.80 (Filippini, Forza, & Vinelli,1998; Greenspoon & Saklofske, 1998)	0.915
AGFI	≥ 0.80 (Filippini et al., 1998)	0.893
CFI	≥ 0.90 (Byrne, 2013)	0.956
TLI	≥ 0.90 (Vandenberg & Scarpello, 1994)	0.948
NFI	> 0.90 (Arbuckle, 1995)	0.918
RMSEA	< 0.08 (MacCallum, Browne, & Sugawara, 1996)	0.044

Structural equation model (SEM)

Structural Equation Modeling is a multivariate statistical concept that verifies the association between variables in a model and covers measurement falsity in the structure coefficient (Hair et al., 2010; Mackenzie, 2001). After the modification of SEM model, the results show the overall model fit, which include CMIN/ DF = 2.403, GFI = 0.906, AGFI = 0.881, CFI = 0.940, TLI = 0.930, NFI = 0.903 and RMSEA = 0.052 as shown in Table 6.

Table 6 Goodness of fit for structural equation model (SEM)

Index	Acceptable values	Values
CMIN/ DF	< 3.00 (Hair et al., 2010)	2.403
GFI	≥ 0.80 (Filippini et al.,1998; Greenspoon & Saklofske (1998)	0.906
AGFI	≥ 0.80 (Filippini et al., 1998)	0.881
CFI	≥ 0.90 (Byrne, 2013)	0.940
TLI	≥ 0.90 (Vandenberg & Scarpello, 1994)	0.930
NFI	> 0.90 (Arbuckle, 1995)	0.903
RMSEA	< 0.08 (MacCallum et al., 1996)	0.052

Research hypothesis testing

Form Table 7, this study reveals the result of SEM in this study. H1 showed no support in a relationship between facilitating conditions and behavioral intention with standard coefficient value of 0.097 (t-value = 1.041). This result contradicts with numerous research (Chang, 2012; Chau & Hu, 2002; Venkatesh et al., 2003; Zhou et al., 2008) who confirmed that facilitating conditions has positive effect on behavioral intention. Therefore, facilitating conditions were not significant on behavioral intention.

The standard coefficient value of H2 was 0.169 (t-value = 0.150), presenting no support relationship between self-efficacy and behavioral Intention. This result aligns with many studies that self-efficacy significantly

impacts intention to use ICT (Ariff et al., 2012) Thus, self-efficacy had no significant impact on behavioral intention.

H3 has the standard coefficient value of 0.153 (t-value = -1.349), which means the structural pathway between perceived ease of use and behavioral intention was not supported. It was opposed by previous literatures (Chen & Tseng, 2012; Mohammadi, 2015; Changchit, 2014; Pavlou, 2003; Chui et al., 2007; Doll & Torkzadeh, 1988) that the perceived ease of use can enhance the intention of learners to use ICT-based learning. Hence, perceived ease of use showed no significant impact on behavioral intention.

Nevertheless, results of the structural model analysis showed that performance expectancy positively affects behavioral intention, which supports H4 in this study, with a standard coefficient value of 0.085 (t-value = 5.129). Supported by many studies (Venkatesh et al., 2003; Derntl et al., 2011; Khayati & Zouaoui, 2013; Dulle & Minishi-Majanja, 2011; Mtebe & Raisamo, 2014), it is assumed that learners are encouraged to use ICT-based learning by beliefs in the benefit of the system that would help them to achieve tasks. As a result,

performance expectancy significantly impacted behavioral intention.

H5 has a standard coefficient value of 0.085 (t-value = 6.967), which can be posted that effort expectancy significantly affects behavioral intention of ICT bases learning. It can be further explained the effortless of using the system can stimulate the intention to use the system, which was confirmed by many scholars (Bandyopadhyay & Fraccastoro, 2007; Liebenberg et al., 2018; Jairak et al., 2009; Nassuora, 2012; Venkatesh et al., 2003; Giesing, 2003). Consequently, effort expectancy had a significant impact on behavioral intention.

Regarding H6, the positive relationship of behavioral intention and use behavior was found with the standard coefficient value of 0.72 (t-value = 2.769). This result signifies that behavioral intention significantly effects actual use behavior of new technology, reported by many researchers (Liébana-Cabanillas et al., 2017; Ajzen, 1991; Saha, 2009; Kim et al., 2009). So, behavioral intention is confirmed that it had a significant impact on use behavior.

Table 7 Hypothesis and the structural equation model analysis

Hypothesis	Paths	Standardized path coefficient	T-value > 1.98	Test results
H1	Facilitating condition behavioral intention	0.097	1.041	Not supported
H2	Self-efficacy behavioral intention	0.169	0.150	Not supported
H3	Perceived ease of use behavioral intention	0.153	-1.349	Not supported
H4	Performance expectancy behavioral intention	0.085	5.129	Supported
H5	Effort expectancy behavioral intention	0.085	6.967	Supported
H6	Behavioral intention use behavior	0.072	2.769	Supported

Conclusion, Recommendation and Limitation

Conclusion

The globalization of higher education institutions (HEIs) has been developed rapidly in the digital era. Hence, ICT-based learning has been expanded in Cambodia and worldwide. This study responded the research questions that performance expectancy and effort expectancy significantly affected behavioral intention. Nevertheless, the results opposed with many studies that facilitating condition, self-efficacy, and perceived ease of use did not significantly impact behavioral intention. The quantitative method and nonprobability sampling were used in this study. The multistage sampling technique was applied. Firstly, judgmental sampling was conducted to select undergraduate students of business administration and arts of humanity who have been experiencing ICT-based learning method from three private universities in Phnom Penh. Next, quota sampling was carried out to calculate a sample size of each group. Finally, online and offline questionnaire were distributed, using convenience sampling method. The conceptual framework was constructed from previous theories which includes facilitating conditions, self-efficacy, perceived eased of use, performance expectancy, effort expectancy, behavioral intention, and use behavior. The preliminary analysis was tested with IOC validity and CA reliability. The data was collected and analyzed by Confirmatory Factor Analysis (CFA), including convergent and discriminant validity, and goodness of fit indices. Structural Equation Modeling (SEM) was employed to examine relationships between variables. The results report that there are no association between facilitating condition, self-efficacy, perceived ease of use and behavioral intention. However, performance expectancy and effort expectancy were found to have a significant impact on behavioral intention. Additionally, behavioral intention positively effects use behavior of ICT-based learning among university's student in Phnom Penh, Cambodia

Recommendation and application

Per the results of this study, recommendations are provided to government, educators and practitioners to develop factors that strongly effect ICT-based learning adoption to elevate student's learning efficiency. Firstly, performance expectancy can be enhanced by the development of technological tools for ICT-based learning that offers benefits for users to arouse them to use the system. Secondly, effort expectancy can be a consideration of a user whether the system is user-friendly and effortless or not. Thirdly, use behavior is affected by behavioral intention, backing up with factors that can stimulate users to adopt ICT-based learning. Therefore, universities should design ICT-based learning to be easy, accessible, and convenient, and provide effective communications to promote the adoption of this technology.

Limitation for application

The study is limited to undergraduate students in three private universities in Phnom Penh, Cambodia. The different geographic and demographic background potentially produce different findings.

Recommendation for further study

Other variables can be added, considering TAM and UTAUT model such as perceived usefulness and social influence. Furthermore, the qualitative method, which includes interview and focus group, should be further explored for deeper understanding and insights.

References

Agarwal, R., Sambamurthy, V., & Stair, R. M. (2000). The evolving relationship between general and specific computer self-efficacy: An empirical assessment. *Information Systems Research, 11*(4), 418-430.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological Bulletin, 82*(2), 261.

Alenezi, A., Abdul Malek, A. K., & Veloo, A. (2010). An empirical investigation into the role of enjoyment, computer anxiety, computer self-efficacy and internet experience in influencing the students' intention to use e-learning: A case study from Saudi Arabian government universities. *Turkish Online Journal of Educational Technology, 9,* 22-34.

Arbuckle, J. J. (1995). *AMOS user's guide.* Chicago, IL: SmallWaters.

Arif, M. (2017). Corporate social responsibility and loyalty: Intervening influence of customer satisfaction and trust. *Cogent Business & Management, 4*(1), 1-10. Retrieved from DOI: 10.1080/23311975.2017.1396655

Ariff, M. S. M., Yeow, S. M., Zakuan, N., Jusoh, A., & Bahari, A. Z. (2012). The effects of computer self-efficacy and technology acceptance model on behavioral intention in internet banking systems. *Procedia-Social and Behavioral Sciences, 57,* 448-452.

Badwelan, A. (2016). Towards acceptance M-learning approach in higher education in Saudi Arabia. *International Journal of Business and Management, 11*(8), 12.

Bandyopadhyay, K., & Fraccastoro, K. A. (2007). The effect of culture on user acceptance of information technology. *Communications of the Association for Information Systems, 19*(1), 23.

Blurton, C. (1999). *New directions of ICT-use in education. UNESCO.* Retrieved from http://www.unesco.org/education/educprog/lwf/dl/edict.pdf

Bollen, K. A. (1989). A new incremental fit index for general structural equation models. *Sociological Methods & Research, 17*(3), 303-316.

Byrne, B. M. (2013). *Structural equation modeling with Mplus: Basic concepts, applications, and programming.* Retrieved from https://doi.org/10.4324/ 9780203807644

Chang, A. (2012). UTAUT and UTAUT 2: A review and agenda for future research. *The Winners, 13*(2), 10-114.

Changchit, C. (2014). Students' perceptions of cloud computing. *Issues in Information Systems, 15*(1), 312-322.

Chau, P. Y., & Hu, P. J. (2002). Examining a model of information technology acceptance by individual professionals: An exploratory study. *Journal of Management Information Systems, 18*(4), 191-229.

Chen, H. R., & Tseng, H. F. (2012). Factors that influence acceptance of web-based e-learning systems for the in-service education of junior high school teachers in Taiwan. *Evaluation and Program Planning, 35*(3), 398-406.

Chen, J. L. (2011). The effects of education compatibility and technological expectancy on e-learning acceptance. *Computers and Education, 57*(2), 1501-1511.

Cheok, M. L., & Wong, S. L. (2015). Predictors of e-learning satisfaction in teaching and learning for school teachers: A literature review. *International Journal of Instruction, 8*(1), 75-90.

Chui, H., Hsieh, Y., Kao, Y., & Lee, M. (2007). The determinants of email receivers' disseminating behaviors on the internet. *Journal of Advertising Research–JAR, 47*. Retrieved from https://doi.org/10.2501/S00218499070 70547.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19*(2), 189-211.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly, 13*(3), 319-339.

Derntl, M., Neumann, S., Griffiths, D., & Oberhuemer, P. (2011). The conceptual structure of IMS learning design does not impede its use for authoring. *IEEE Transactions on Learning Technologies, 5*(1), 74-86.

Doll, W. J., & Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS Quarterly, 12*(2), 259-274.

Dulle, F. W., & Minishi-Majanja, M. K. (2011). The suitability of the Unified theory of acceptance and use of technology (UTAUT) model in open access adoption studies. *Information Development, 27*(1), 32-45.

Filippini, R., Forza, C., & Vinelli, A. (1998). Trade-off and compatibility between performance: Definitions and empirical evidence. *International Journal of Production Research, 36*(12), 3379-3406.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Giesing, I. (2003). *User perceptions related to identification through biometrics within electronic business*. Master thesis, University of Pretoria, GiesPretoria, South Africa.

Greenspoon, P. J., & Saklofske, D. H. (1998). Confirmatory factor analysis of the multidimensional students' life satisfaction scale. *Personality and Individual Differences, 25*(5), 965-971.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). New York: Prentice Hall

Hatlevik, O. E., Throndsen, I., Loi, M., & Gudmundsdottir, G. B. (2018). Students' ICT self-efficacy and computer and information literacy: Determinants and relationships. *Computers & Education, 118,* 107-119.

Hong, M. (2018). A comparative study of the internationalization of higher education policy in Australia and China (2008-2015). *Studies in Higher Education, 45,* 1-12. Retrieved from https://doi.org/10.1080/03075079.2018.155 3154

Jairak, K., & Praneetpolgrang, P., & Mekhabunchakij, K. (2009). An acceptance of mobile learning for higher education students in Thailand. In *The Sixth International Conference on eLearning for Knowledge-Based Society, 17*(18), 361-368.

Johnson, C., Burke, C., Brinkman, S., & Wade, T. (2017). A randomized controlled evaluation of a secondary school mindfulness program for early adolescents: Do we have the recipe right yet? *Behaviour Research and Therapy, 99,* 37-46.

Khayati, S., & Zouaoui, S. K. (2013). Perceived usefulness and use of information technology: The moderating influences of the dependence of a subcontractor towards his contractor. *Journal of Knowledge Management, Economics and Information Technology, 3*(6), 68-77.

Kim, G., Shin, B., & Lee, H. G. (2009). Understanding dynamics between initial trust and usage intentions of mobile banking. *Information Systems Journal, 19*(3), 283-311.

Lam, L. W. (2012). Impact of competitiveness on salespeople's commitment and performance. *Journal of Business Research, 65*(9), 1328-1334.

Liébana-Cabanillas, F., de Luna, I., & Ríos, F. (2017). Intention to use new mobile payment systems: A comparative analysis of SMS and NFC payments. *Economic Research-Ekonomska Istraživanja, 30,* 892-910. Retrieved from https://doi.org/10.1080/1331677X.2017.1305784

Liebenberg, J., Benade, T., & Ellis, S. (2018). Acceptance of ICT: Applicability of the unified theory of acceptance and use of technology (UTAUT) to South African students. *The African Journal of Information Systems, 10*(3), 1.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*(2), 130.

MacKenzie, S. B. (2001). Opportunities for improving consumer research through latent variable structural equation modeling. *Journal of Consumer Research, 28*(1), 159-166.

Maldonado, U. P. T., Khan, G. F., Moon, J., & Rho, J. J. (2010). E-learning motivation and educational portal acceptance in developing countries. *Online Information Review, 35*(1), 66-85.

MoEYS. (2014). *Policy and strategies on information and communication technology in education in Cambodia.* Retrieved from https://www.moeys.gov.kh/index.php/en/policies-and-strategies/ict-in-education-cambodia.html

Mohammadi, H. (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Computers in Human Behavior, 45,* 359-374.

Mtebe, J. S., & Raisamo, R. (2014). Investigating perceived barriers to the use of open educational resources in higher education in Tanzania. *International Review of Research in Open and Distributed Learning, 15*(2), 43-66.

Nassuora, A. B. (2012). Students' acceptance of mobile learning for higher education in Saudi Arabia. *American Academic & Scholarly Research Journal, 4*(2), 24-30.

Pavlou, P. A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce, 7*(3), 101-134.

Rogers, E. M., & Singhal, A. (2003). Empowerment and communication: Lessons learned from organizing for social change. *Annals of the International Communication Association, 27*(1), 67-85.

Saha, G. C. (2009). Service quality, satisfaction, and behavioral intentions: A study of low-cost airline carriers in Thailand. *Managing Service Quality, 19*(3), 350-372.

Sharma, L. (2019). Teachers' motivation to adopt technology in higher education. Journal of Applied Research in Higher Education, 12(4), 673-692. Retrieved from https://doi.org/10.1108/ JARHE-07-2018-0156

Soper, D. S. (n.d.). *A-priori sample size calculator for structural equation models [Software].* Retrieved from http://www.danielsoper. com/statcalc

Tan, C. (2007). Education reforms in Cambodia: Issues and concerns. *Educational Research for Policy and Practice, 6*(1), 15-24.

Vandenberg, R. J., & Scarpello, V. (1994). A longitudinal assessment of the determinant relationship between employee commitments to the occupation and the organization. *Journal of Organizational Behavior, 15*(6), 535-547.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research, 11*(4), 342-365.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences, 39*(2), 273-315.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24,* 115-139.

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly, 37*(1), 21-54.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27,* 425-478.

Zhou, Y., Jindal-Snape, D., Topping, K., & Todman, J. (2008) Theoretical models of culture shock and adaptation in international students in higher education. *Studies in Higher Education, 33*(1), 63-75. Retrieved from https://doi.org/ 10.1080/03075070701794833