Auto Mechanic Students' Perceptions and Readiness toward Mobile Learning in Thailand

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Abstract—Access to quality education is now a huge challenge in Thailand with ever-increasing inequality between rural and urban populations. Existing teaching and learning facilities are no longer adequate. Mobile learning has been suggested as a sustainable and appropriate delivery mechanism to reduce this rural/urban education gap. Students are supplied with their own mobile device at no cost to learners or their families. Opportunities offered through mobile learning to auto mechanic education in Thailand were explored. Data from 384 auto mechanic students were collected and descriptive and multiple regression analyses were performed based on the unified theory of acceptance and use of technology 2 (UTAUT2) model. Results showed that performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation and personal innovativeness were positively related to behavioral intention to use mobile learning. Furthermore, effort expectancy, hedonic motivation and personal innovativeness were the most significant predictors of behavioral intention to use mobile learning. Auto mechanic students in Thailand had positive perceptions toward mobile learning and the effect of students' effort expectancy provided a better explanation for the adoption of mobile learning in auto mechanic education.

Keywords—Mobile learning, Technology Readiness, Auto mechanic education

1 Introduction

The automotive industry in Thailand has for several decades been a priority sector both supported and encouraged by the government. In 2015, the Thai Government released the Super-Cluster strategic initiative which was designed to link Thailand's industry cluster assets and strengthen the clusters by adding mission-critical elements to help businesses become more efficient and competitive. The automotive and parts cluster was targeted as a suitable industry [1]. Thailand has an adequate supply of low-skilled labor but the country faces an acute shortage of highly-skilled automotive engineers and cannot meet the needs of industry [2]. Although sufficient vocational training courses are provided by training schools in the greater Bangkok area, there is limited access to vocational education in rural areas, and also for disadvantaged groups. This continues to be a major issue throughout the country [3]. The education

system urgently requires the introduction of user-friendly training which can be delivered at a convenient time for students through appropriate modes of learning. This may take the form of mobile training, distance learning, strengthening training by master craftsmen and such other innovative modes of training delivery [4]. Using the readily available technology of e-communication, mobile learning can become more focused with increased and enhanced flexibility of access and learning opportunity [5].

Research has shown that technologies such as e-learning, and more recently mobile learning, may have the potential to facilitate teaching and learning modules that can positively address the problem of poor access to education suffered by people in rural areas [6]. Mobile learning can be viewed as an extension of e-learning but differs in the sense that it uses mobile devices rather than computers as the learning medium [7]. Mobile learning is considered by many as a modern and most appropriate delivery mechanism for educational information and a sustainable method of overcoming rural poverty [8].

To clearly highlight the knowledge gap which this study seeks to fill, the next section reviews some relevant studies that have been carried out in Thailand as well as in other parts of the world. Whilst older people have expectations and past experiences based on a history of learning with computers, younger people's lives have been shaped by mobile devices as a universal social phenomenon. This has evolved into opportunities to create, share, discuss, transform, store and distribute ideas, images, information, identities and opinions, and thus perhaps challenge the traditional concept of learning and education shaped by schools and teachers. These ideas, experiences and definitions of learning with mobile devices were therefore imported and given the particular background and context of the national educational situation in Thailand. Thus, this study will investigate the perception and influence factors on intention to use mobile learning of auto mechanic students.

The third section explains the theoretical underpinnings and data collection of the research and examines how the UTAUT2 model can be adapted to the Thai environment. The fourth section describes the results in detail, followed by a critical analysis and discussion of the findings. Conclusions are drawn, study limitations are noted and possibilities for further research are suggested in the final section.

2 Literature review

A number of studies have been conducted across the globe which reveal that mobile learning is potentially viable in addressing the various challenges of teaching and educational instruction. This section reviews some papers which utilize the unified theory of acceptance and use of the technology 2 (UTAUT2) model to explain factors that influence the acceptance and use of mobile learning in different and varied contexts.

2.1 Mobile Learning

Mobile learning is an emerging technology which represents a novel way to address a number of educational problems, especially in places where resources are inadequate. The concept involves the use of mobile technology, either alone or in combination with other information sources, to facilitate and enable education for teaching and learning purposes anywhere and anytime [9]. The use of mobile technology goes a long way toward overcoming the challenges that are facing the education sector and especially in developing countries. Mobile technology has been used to support learning in both virtual and physical environments [10]. One of the advantages of mobile learning is that it is affordable by the majority, even those who are low-income earners [11] as many already own a mobile device [12]. Numerous academics have discussed mobile learning models. Results have shown that the technological environment and infrastructure, needs, pedagogy, choices and expectation of the country were important to develop the appropriate mobile learning system [13-16]. Moreover, mobile learning is fast becoming recognized, accepted and considered as the next generation of distance learning and the best way to enhance learning and teaching outside the classroom [18-19]. Learner, teacher, content, technology and environment are the basic elements and core characteristics at the heart of mobile learning, with learners at the center of all these learning activities. Mobile learning should build on and develop learners' interests, experiences, expectations and needs [20]. Furthermore, regularity and standards such as education policy and market regulations also play a vital and important role [9]. However, many of these new extremely recent developments in mobile learning require changes in mindset and overall university strategy [21]. Mobile learning does not only require technology to succeed. The overall marketing approach must be adapted and tailored to a new way of thinking about and viewing the whole concept of education. This will involve a radical change to embrace a more enlightened techno-social ethic based on advanced technology development and engagement [22].

2.2 UTAUT2

This study is underpinned by a modified version of the UTAUT2 model as a powerful predicting framework [23]. The theory purports that seven constructs as performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value and habit influence the behavioral intention and usage behavior of individuals toward acceptance and use of technology in organizational contexts. Additionally, gender, age and user experience are included as moderating variables. Data from mobile internet consumers were collected as basic input for the UTAUT2 model.

There have been many variant applications of the UTAUT2 model, based on the application context. Price value in the original model focused on the cost associated with the purchase of devices and services. Therefore, since this study deals with mobile learning and many learners already own their own mobile device [12], the price value or cost of the model was removed and not considered. In addition, habit is de-

fined as the extent to which people tend to perform behaviors automatically because of learning that reflects and remembers the results of prior experiences. Therefore, this study focused on mobile learning as a new concept in auto mechanic education in Thailand. Personal innovativeness can be defined as a person's openness toward new technology systems, information or new experiences [24]. Therefore, this study renamed habit in the UTAUT2 model as personal innovativeness as shown in Figure 1.

A critical review of previous studies from a global perspective to the Thailand context revealed that most research was carried out at university level. However, past experience has shown that different affordances which include physical infrastructure such as electricity, internet connectivity, availability or shortage of computers, and other environmental or cultural factors affect the readiness of both acceptance and adoption of mobile learning [23, 25]. In other words, the situation in universities cannot be generalized to other categories of higher education institutions because of the different affordances of the student learners. Furthermore, the study focused on auto mechanic education. A shortage of industry-ready skilled workers presents one of the biggest challenges for the automotive industry which is one of the key growth areas in Thailand [26].

The wide use of mobile devices which was indicated in previous studies conducted in Thailand both suggested and provided that impetus for this study which forms part of an ongoing research to explore the viability of mobile learning in Thailand auto mechanic education, using a variation of the UTAUT2 model as the underpinning theory. The study determined the extent of perceptions and readiness of students in auto mechanic education in Thailand toward mobile learning using the constructs from the UTAUT2 model and was guided by the two research questions listed below:

RQ1: What are the perceptions of students toward mobile learning?

RQ2: To what extent does performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation and personal innovativeness influence students' intentions to use mobile learning in auto mechanic education?

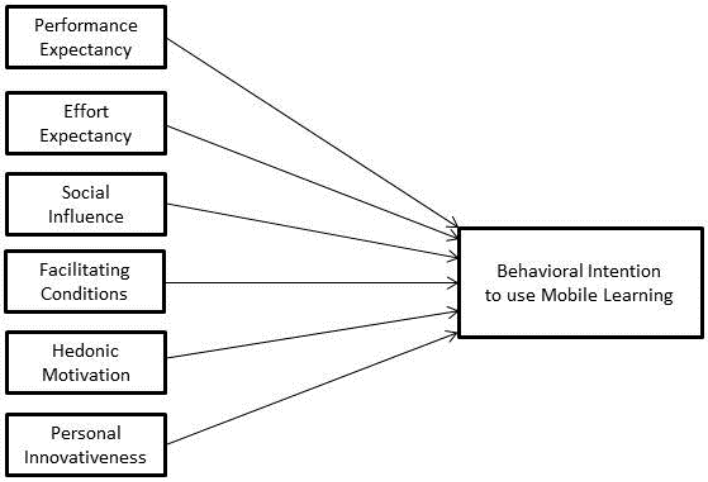

Fig. 1. Conceptual model

3 Methodology

3.1 Sampling and data collection

The survey followed a data collection technique widely used in studies predicting attitudes toward information technology [27]. The study was performed from August to November 2017. Participants included 384 auto mechanic students in Thailand who were selected using multistage sampling. Firstly, vocational colleges in Thailand as two groups of 12 public vocational colleges and 7 private vocational colleges were randomly selected. Secondly, a stratified proportionate sampling technique was used to estimate the number of students to include from each of the selected vocational colleges. This technique yielded 266 and 118 students from the public and private vocational colleges, respectively.

Based on the estimated study sample, 475 copies of the research instrument were administered to respondents face-to-face during classes. Participants were selected as volunteers as they could refuse to fill in the survey. A formal letter was sent to the Director of each of the selected vocational schools to request permission to conduct the survey. A copy of the questionnaire was enclosed so that they were aware of the data to be collected. Once the vocational schools received the documentation, they assigned a teacher to assist in the process of obtaining the data. Also, before completing the questionnaire, all students received research information and a contact email in class. Since the researcher strictly followed this formal method of data collection, the result was an excellent return rate of 80.84% (384).

3.2 Questionnaire

A questionnaire was used as the data collection instrument. This comprised two sections as demographic information and perceptions of the auto mechanic students of mobile learning. All questionnaire items were adopted from existing studies (for details of sources, see Appendix A). The questionnaire topics and questions had all undergone consultations with experts in the auto mechanic education field to ensure clarity and suitability of the content and format. A five-point Likert scale was used to capture the responses (ranging from 1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, and 5 Strongly agree). All questions in the questionnaire were written in the Thai language as this was the mother tongue of the participants. Pertinent demographic questions were also included in the survey.

3.3 Instruments

Instruments were taken from similar studies that intended to identify intention toward the adoption of mobile technology [28]. To determine the reliability of the instrument, specifically with regard to internal consistency, Cronbach's alpha was measured for the constructs and results are presented in Table 1. All of the constructs demonstrated Cronbach's alpha values above 0.7 and were deemed to be internally consistent.

Table 1. Reliability of scale used

Construct	Cronbach's Alpha	No. of Items
Performance Expectancy	.868	3
Effort Expectancy	.792	3
Social Influence	.785	3
Facilitating Conditions	.850	3
Hedonic Motivation	.845	6
Personal Innovativeness	.850	3
Behavioral Intention	.842	3

3.4 Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22. First, the perceptions of students were determined and then a regression analysis was used to ascertain the extent to which all factors (the constructs of the independent variables as performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation and personal innovativeness) contributed to the readiness of participants toward mobile learning (behavioral intention).

4 Results

4.1 Demographic information

The sample consisted of 384 participants, most were males (97.7%) with a small proportion of females (2.3%). Most participants were aged between 16 and 25 years (97.9%), followed by those aged between 26 and 35 years (1.8%). In terms of year of study, most respondents (59.1%) were in the first year followed by second year (40.9%). The majority of respondents (93.8%) owned only a smartphone, while 4.9% owned both a smartphone and a tablet and 1.3% did not own any smart devices. Furthermore, results showed that 52.9% of respondents used their mobile device for learning at their home, while 44% used mobile learning at their school and 3.1% used their mobile devices during travel (Table 2).

Table 2. Demographic (n = 384)

Construct		Number	Percent
Vocational college	Public	266	69.3%
	Private	118	30.7%
Gender	Male	375	97.7%
	Female	9	2.3%
Age	16-25	377	97.9%
	26-35	7	1.8%
Year of study	High vocational – 1st	227	59.1%

	High vocational – 2nd	157	40.9%
Smart device ownership	Smartphone only	360	93.8%
	Tablet only	0	0%
	Smartphone and tablet	19	4.9%
	No use	5	1.3%
Most used location	Home	203	52.9%
	School	169	44%
	During travel	12	3.1%

4.2 Perception of students toward mobile learning

Descriptive analysis was conducted to study the respondents' perceptions concerning the use of mobile learning. Results of the analysis are shown in Table 3.

In terms of mobile learning perceptions, respondents mostly agreed that they had intention to experiment with new information technologies. (mean=4.02). This finding indicated that contents in mobile learning were much more convenient to use (mean=3.97). However, some respondents were concerned about the ability of mobile devices to perform mobile learning (mean=3.94). In addition, some also agreed that mobile learning provided high levels of learning (mean=3.85). Furthermore, some respondents agreed that their colleges supported the use of mobile learning (mean=3.85) and they were provided with the resources necessary to use mobile learning systems (mean=3.85). Due to this, some respondents considered that mobile learning was very interesting (mean=3.86) and others suggested that mobile phones were not boring for learning (mean=3.27).

Table 3. Student Perceptions on Mobile learning

	Items	Mean	SD
1	I have intention to perform mobile learning	3.81	.935
2	I am going to positively utilize mobile learning	3.92	.874
3	I have continuing concern about mobile devices of information to perform mobile learning	3.94	.984
4	Mobile learning would improve my learning performance	3.79	.858
5	Mobile learning can improve efficiency of learning	3.69	.994
6	Mobile learning gives me high effects of learning	3.85	.978
7	It is easy to download and save learning contents with mobile devices	3.88	.995
8	It is easy to use menu of mobile devices and software	3.76	.878
9	It is easy to use mobile learning contents	3.97	.812
10	People who influence my behavior will think that I should use mobile learning	3.67	.981
11	The lecturers and other staff at my college will be helpful in the use of mobile learning	3.67	.916
12	In general, my college will support the use of mobile learning	3.85	1.005
13	I have the resources necessary to use the system.	3.67	.943
14	I have the knowledge necessary to use the system	3.66	.880

15	A specific person (or group) is available for assistance with system difficulties	3.66	.915
16	When using mobile learning, I will forget the work I must do.	3.74	.975
17	Using mobile learning will give enjoyment to me for my learning.	3.74	.953
18	Using mobile learning will lead to my exploration.	3.67	.892
19	I would find mobile phone very interesting to use	3.86	.926
20	I would find mobile phone boring to use for learning	3.27	1.105
21	I would find mobile phone exciting to use for learning	3.85	.862
22	I like to experiment with new information technologies.	4.02	.928
23	When I hear about a new information technology I look forward to examining it.	3.91	.960
24	Among my colleagues, I am usually the first to try out a new innovation in technology.	3.93	.937

4.3 Readiness and factors that influence intentions to use mobile learning

The process of ascertaining the extent to which the independent variables predicted the intentions of students to use mobile learning, the relationships between each independent variable and intentions to use mobile learning were ascertained and results are presented in Table 4.

Finding indicated that moderate positive relationships existed between performance expectancy and students' intentions to use mobile learning ($r = 0.649$, $n = 384$, $p < 0.001$), between social influence and behavioral intention ($r = 0.630$, $n = 384$, $p < 0.001$), between facilitating condition and behavioral intention ($r = 0.577$, $n = 384$, $p < 0.001$), between hedonic motivation and behavioral intention ($r = 0.666$, $n = 384$, $p < 0.001$), and between personal innovativeness and behavioral intention ($r = 0.661$, $n = 384$, $p < 0.001$). Interestingly, results indicated that a strong positive relationship existed between effort expectancy and intentions of students toward mobile learning ($r = 0.702$, $n = 384$, $p < 0.001$).

Table 4. Correlations

		PE	EE	SI	FC	HM	PI	BI
PE	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	384						
EE	Pearson Correlation	.759**	1					
	Sig. (2-tailed)	.000						
	N	384	384					
SI	Pearson Correlation	.589**	.633**	1				
	Sig. (2-tailed)	.000	.000					
	N	384	384	384				
FC	Pearson Correlation	.560**	.559**	.622**	1			
	Sig. (2-tailed)	.000	.000	.000				
	N	384	384	384	384			

HM	Pearson Correlation	.666**	.688**	.659**	.670**	1		
	Sig. (2-tailed)	.000	.000	.000	.000			
	N	384	384	384	384	384		
PI	Pearson Correlation	.666**	.682**	.633**	.529**	.607**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000		
	N	384	384	384	384	384	384	
BI	Pearson Correlation	.649**	.702**	.630**	.577**	.666**	.661**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	384	384	384	384	384	384	384

Results shown in Table 4 suggested that all six independent variables had positive relationships with intention. This implies that the level of student readiness in Thai vocational colleges toward mobile learning increases moderately the more they perceive that mobile learning is useful to them. Similarly, their level of readiness toward accepting mobile learning increases moderately the more they perceive that their friends and significant others support their use of mobile learning. The same situation unfolds the more students perceive the level of availability of facilitating conditions. In the same way, emotional motivations of mobile learning and individual attitudes concerning accepting the innovation have moderate positive relationships. On the other hand, level of readiness of students toward accepting mobile learning increases very strongly the more they perceive the ease of use. By implication, more favorable ease of use promotes stronger readiness of students.

This implies that the level of readiness of students increases more with an increase in effort expectancy, as compared to corresponding increases in performance expectancy, social influence, facilitating conditions, hedonic motivation and personal innovativeness.

Table 5 shows results of the regression analysis. This indicates the extent to which the six independent variables (performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation and personal innovativeness) influence the readiness of students toward accepting mobile learning.

Table 5. Regression Analysis

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**Collinearity Statistics**	
		B	***Std. Error***	***Beta***			***Tolerance***	***VIF***
1	(Constant)	1.071	.149		7.185	.000		
	EE	.729	.038	.702	19.240	.000	1.000	1.000
2	(Constant)	.406	.166		2.441	.015		
	EE	.481	.049	.463	9.825	.000	.526	1.900
	HM	.441	.060	.347	7.374	.000	.526	1.900
3	(Constant)	.218	.163		1.340	.181		
	EE	.339	.053	.326	6.417	.000	.415	2.409
	HM	.351	.059	.277	5.921	.000	.491	2.036

	PI	.269	.046	.271	5.836	.000	.499	2.005
4	(Constant)	.209	.161		1.299	.195		
	EE	.308	.053	.297	5.805	.000	.401	2.492
	HM	.285	.062	.224	4.571	.000	.435	2.300
	PI	.227	.048	.228	4.767	.000	.458	2.181
	SI	.145	.046	.149	3.143	.002	.464	2.156
5	(Constant)	.179	.161		1.116	.265		
	EE	.302	.053	.291	5.710	.000	.400	2.500
	HM	.235	.067	.185	3.536	.000	.378	2.642
	PI	.220	.048	.221	4.639	.000	.456	2.191
	SI	.120	.047	.124	2.522	.012	.433	2.307
	FC	.097	.047	.096	2.073	.039	.488	2.050

Facilitating Conditions. It can be inferred from Table 5 that facilitating conditions significantly predicted students' readiness toward mobile learning ($\beta = .096$, $p < .05$). This implies that for every unit increase in the level of availability of facilitating conditions, students' readiness toward accepting mobile learning also increases by 9.6% of the value of the standard deviation of behavioral intention. In other words, an increase in facilitating conditions causes a corresponding effect on behavioral intention.

Social Influence. Social influence significantly predicted students' readiness toward mobile learning ($\beta = .124$, $p < .05$). This implies that for every unit increase in an individual's belief that important others believe they should use mobile learning; students' readiness toward accepting mobile learning also increases by 12.4% of the value of the standard deviation of behavioral intention. In other words, an increase in social influence causes a corresponding effect on behavioral intention.

Personal Innovativeness. Personal innovativeness significantly predicted students' readiness toward mobile learning ($\beta = .221$, $p < .001$). This implies that for every unit increase in an individual's attitude concerning accepting the innovation, students' readiness toward accepting mobile learning also increases by 22.1% of the value of the standard deviation of behavioral intention. In other words, an increase in personal innovativeness causes a corresponding effect on behavioral intention.

Hedonic motivation. Hedonic motivation significantly predicted students' intention to use mobile learning ($\beta = .185$, $p < .001$). This implies that for every unit increase in the emotional motivations of mobile learning, students' readiness toward accepting mobile learning also increases by 18.5% of the value of the standard deviation of behavioral intention. In other words, an increase in hedonic motivation causes a corresponding effect on behavioral intention.

Effort Expectancy. Effort expectancy significantly predicted students' intention to use mobile learning ($\beta = .291$, $p < .001$). This implies that for every unit increase in the ease of use of mobile learning, students' readiness toward accepting mobile learning also increases by 29.1% of the value of the standard deviation of behavioral intention. In other words, an increase in effort expectancy causes a corresponding effect on behavioral intention.

5 Discussion

Results obtained aligned with the study objectives. A demographic analysis was presented in the first section and showed that 97.7% of auto mechanic students were male and most used only a smartphone (93.8%). The second section of the results answered the first research question and determined that the perceptions of students revealed significant agreement of all items estimated as the seven constructs. The third part of the results answered the second research question and ascertained the readiness of students toward mobile learning and factors that influenced students' intentions to use mobile learning. These results also corroborated the first section and revealed that all six independent variables were positively correlated with behavioral intention, providing an indication of students' readiness toward accepting mobile learning. Performance expectancy, social influence, facilitating conditions, hedonic motivation and personal innovativeness all had a moderate association with behavioral intention, whereas effort expectancy had a strong correlation with behavioral intention. This finding concurred with a survey of mobile learning acceptance for university students in Thailand, as pointed out in a previous study, which demonstrated that students had a good perception of mobile learning and perceived ease of use had a high level of acceptance [29].

Moreover, correlation analysis was used to confirm effort expectancy, personal innovativeness, hedonic motivation, social influence and facilitating conditions as all predictors of students' intentions toward accepting mobile learning, with effort expectancy the greatest predictor of intention. This finding agreed with results of a previous study confirming that individuals' intentions to use mobile learning will increase as new technology becomes compatible with their living requirements [30]. The findings indicated that performance expectancy did not significantly predict students' intentions to accept mobile learning. One possible explanation for this result is that mobile learning has not been utilized in these colleges; thus, students do not have experience of the benefits to be gained from mobile technology.

Additionally, the five constructs as effort expectancy, personal innovativeness, hedonic motivation, social influence and facilitating conditions explained 60.7% of the variance in behavioral intention to use mobile learning. However, variance in the students' intentions explained by the model was lower than the original UTAUT2 (74%). As pointed out earlier, this may be because mobile learning is still a new concept in vocational colleges in Thailand.

6 Conclusions

This study was designed to determine the perceptions of students toward mobile learning using the constructs based on the UTAUT2 model. Although mobile learning has not yet been widely implemented in vocational colleges in Thailand, results indicated that students were optimistic regarding its value and expressed their readiness to adopt this new and interesting concept. Effort expectancy is conducive to mobile learning. For this reason, students are keen to adopt mobile learning introduction in

vocational colleges. Results indicated that although mobile learning is not a panacea for the educational challenges facing Thailand, it is a promising way of increasing accessibility to learning. Additionally, the use of UTAUT2 enhanced our understanding of the factors that affect the intention to use mobile learning. Although only at the preliminary stage, this study offers some insight into the challenges facing students in vocational colleges in Thailand. However, results explained only 60.7% of the variance in behavioral intention. There may be other factors that account for the missing variance. Hence, a broader investigation into the intention to use mobile learning in vocational colleges in Thailand should be undertaken, with a view to ascertaining other additional factors that could account for the missing variance.

7 Appendix A

Construct	Item	
Behavioral Intention	I have intention to perform mobile learning	[31]
	I am going to positively utilize mobile learning	
	I have continuing concern about mobile devices of information to perform mobile learning	
Performance Expectancy	Mobile learning would improve my learning performance	
	Mobile learning can improve efficiency of learning	
	Mobile learning gives me high effects of learning	
Effort Expectancy	It is easy to download and save learning contents with mobile devices	
	It is easy to use menu of mobile devices and software	
	It is easy to use mobile learning contents	
Social Influence	People who influence my behavior will think that I should use mobile learning	[32]
	The lecturers and other staff at my college will be helpful in the use of mobile learning	
	In general, my college will support the use of mobile learning	
Facilitating Conditions	I have the resources necessary to use the system.	[33]
	I have the knowledge necessary to use the system	
	A specific person (or group) is available for assistance with system difficulties	
Hedonic Motivation	When using mobile learning, I will forget the work I must do.	[34] [35]
	Using mobile learning will give enjoyment to me for my learning.	
	Using mobile learning will lead to my exploration.	
	I would find mobile phone very interesting to use	
	I would find mobile phone boring to use for learning	
	I would find mobile phone exciting to use for learning	
Personal Innovativeness	I like to experiment with new information technologies.	[36]
	When I hear about a new information technology I look forward to examining it.	
	Among my colleagues, I am usually the first to try out a new innovation in technology.	

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