THE DETERMINANT OF STUDENT'S INTENTION TO USE MOBILE LEARNING

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Abstract

Utilization of mobile devices (smartphones and tablets) in the field of learning continues to grow, include in the higher education learning. The purpose of this study was to investigate the factors that influence the student's intention to use mobile learning with the Technology Acceptance Model (TAM) approach. The sample was Economic Education students of Semarang State University who have taken courses learning development. Extended-TAM by Huang et al. (2007); & Zhu et al., (2012) have been used to collect the data. Data analysis used path analysis to test hypothesis and analysis data. The result showed that the students have good ability to use their mobile gadget for learning purposes. In the extended-TAM frame, two primer factors (perceived usefulness and perceived ease to use) have positive effect to attitude toward using and

behavioral intention to use. Other result showed external factors (perceived mobility value, perceived social interaction value and prior experience) proven have positive effect to perceived usefulness. Perceived enjoyment have significant relationship with perceived to use and attitude toward using.

Keywords

Mobile Learning, Extended-Tam, Behavioral Intention to Use, Perceived Usefulness, Perceived Ease To Use, Attitude Toward Using

1. Introduction

Utilization of mobile devices (smartphones & tablets) in the field of learning continues to grow, include in the higher education learning. Liu (2011) stated due to the continued expansion and increased reliability of broadband wireless network, mobile devices nowadays can be used to transmit text, voice, video and animated images at anyplace and anytime. These help to create a new mechanism for training and learning, which is termed as mobile learning (or m-learning). Mobile learning is emerging as one of the solutions to the challenges faced by education. Mehdipour & Zerehkafi, (2013) explained that mobile learning in classrooms often has students working interdependently, in groups, or individually to solve problems, to work on projects, to meet individual needs, and to allow for student voice and choice. With access to so much content anytime and anywhere, there are plenty of opportunities for formal and informal learning, both inside and outside the classroom. Prajapati dan Patel (2014) stated that along with the popularity of mobile technology applications, mobile learning (m-learning) presents to be a new perspective in helping students to acquire education knowledge and skill.

A number of studies indicated that there are many challenges impeding users'acceptance of mobile learning technology. First, it is suggested that availability of mobile technology per se does not guarantee the use of technology. Second, there are a number of possible technical restrictions that impede the use of mobile learning. Third, unlike conventional classroom-based learning, the use of mobile learning presents a new option instead of a compulsory responsibility. Fourth, recent years have seen a number of mobile learning phenomenon's that are not well explained. (Liu, 2011). Keegan (2005:3) argued one of the causes of acceptance mobile learning

is that it uses devices; which citizens are used to carrying everywhere with them, which they regard as friendly and personal devices, which are cheap and easy to use, which they use constantly in all walks of life and in a variety of different settings, except education. In other word, Prajapati & Patel (2014) argued the determinants of students' adoption to use mobile learning are functionalities, user as a consumer, social effect, self-management learning, and experiential learning.

Liu (2011) mentioned the most dominant adoption theories in the field are the Innovation Diffusion Theory (IDT), the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Task Technology Fit Theory (TTFT). Lee et al. (2002) used original TAM to explain the factors affecting the use of the mobile internet services in Korea. Among the antecedents of perceived usefulness and perceived ease of use, social influence and self-efficacy were shown to be most significant. It was also found that a positive attitude leads to the actual use of the mobile Internet services.

In general, students' acceptance is determined by their attitudes and the usefulness they perceived, where Attitude is more influential than Perceived Usefulness. Meanwhile, Attitude is explained by three factors, Perceived Usefulness, Perceived Ease of Use, and Perceived Enjoyment, and the most influential factor for Attitude is Perceived Usefulness. Perceived Usefulness is explained by two external variables, Perceived Mobility Value and Perceived Output Quality; meanwhile Perceived Ease of Use has a slight influence on Perceived Usefulness. Perceived Enjoyment has a direct and positive causal relationship with Perceived Ease of Use (Zhu et al., 2012).

The purpose of this study was to investigate the factors that influence the student's intention to use mobile learning with the Technology Acceptance Model (TAM) approach. The sample was Economic Education students of Semarang State University who have taken courses learning development. Extended-TAM by Huang et al. (2007); & Zhu et al. (2012) have been used to collect the data. Data analysis used path analysis to test hypothesis and analysis data.

2. Theoretical Review

2.1. Mobile Learning Concept

Mehdipour & Zerehkafi, (2013) stated the term M-Learning or "Mobile Learning", has

different meanings for different communities, that refer to a subset of E-Learning, educational technology and distance education, that focuses on learning across contexts and learning with mobile devices. Mobile learning has many different definitions and is known by any different names, like M-Learning, U-Learning, personalized learning, learning while mobile, ubiquitous learning, anytime/anywhere learning, and handheld learning. O'Malley et al. (2003) stated mobile learning refers to any learning that takes place when the location of the learner is not fixed, or the process of learning is enhanced by using mobile devices and technologies.

Georgiev et al. (2004) view the relationship as nested. He states that m-learning is a subset of e-learning, and e-learning is a subset of distance learning. Part of the researchers in this field thinks that mobile learning has to be wireless network connected. Georgiev et al. (2004) suggests that the concept of mobile learning should involve the learning experience of anywhere, anytime and not always using cables to connect.

Figure 1: *Perspective of learning paradigms*

There are also a lot of advantages of mobile learning (Behera, 2013); increased mobility; time-saving; environmental-friendly; interactive; Use of relatively inexpensive everyday technologies; Better opportunities to acquire skills at one's own pace; Good support for preferred modes of interaction; Catering for interests beyond what is provided in class, through access to additional content such as podcasts or free learning materials (e.g. Open Learn); Handheld devices are often an everyday part of business, so learning can contribute directly to enhancing employability, life skills and work practices; Opportunities for learners to give immediate feedback on their learning experience; Better assessment and diagnosis of learning problems as they occur; Psychological support for those at risk of dropping out, through social networks or

personal guidance from a mentor; Learning materials can become accessible to a larger audience, through podcasts, mobile applications, blogs and e-books, which are seen by potential students; Catering for disadvantaged social groups for whom mobile learning presents an opportunity to improve their life chances, etc.

2.2. Extended Technology Acceptance Model (TAM)

In another TAM extension study, Huang, Lin & Chuang (2007) use two crucial factors that affect Perceived Usefulness and Perceived Ease of Use respectively: Perceived Mobility Value and Perceived Enjoyment. The authors explored students' perception in two universities in Taiwan and they applied TAM and built hypotheses to test the correlations within the model (Figure 2). Two major factors derived from their results are the main contribution to the mobile learning in higher education area.
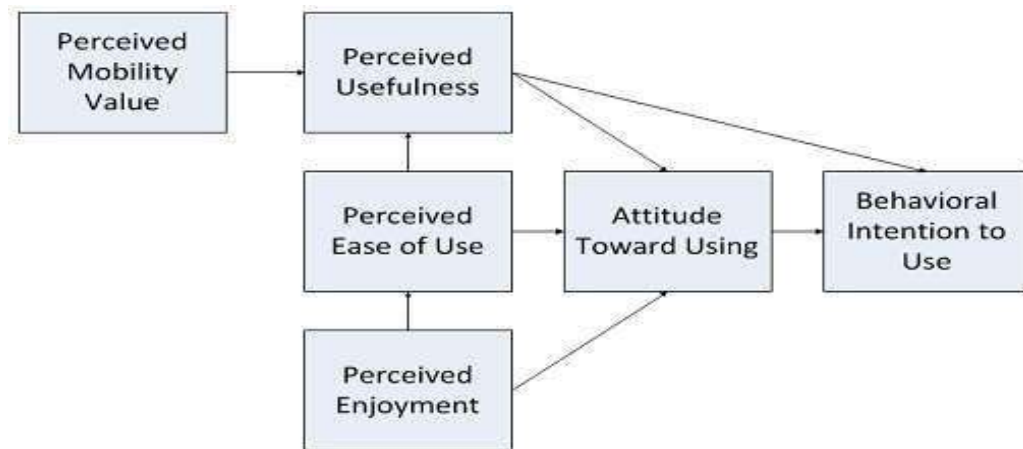

Figure 2: *Extended TAM for user behavior of mobile learning (Huang, Lin & Chuang, 2007)*

2.3 Theoretical Framework and Hypothesis

Prajapati & Patel (2014) argued the determinants of students' adoption to use mobile learning are functionalities, user as a consumer, social effect, self-management learning, and experiential learning. Recent research conducted by Pollara & Broussard (2011), which focuses on summarizing students' perceptions on mobile learning, claims that consideration of student perceptions of mobile learning was originally suggested by prior researchers as an area in the future research of mobile learning. TAM (Davis, 1989) consists of several factors with casual relationships among them. Perceived Usefulness and Perceived Ease of Use have direct effects

on Attitude. There is also a relationship between Perceived Ease of Use and Perceived Usefulness, reflecting that PEOU is a predictor of PU. Finally, Behavioral Intention is determined by Attitude and Perceived Usefulness.

Zhu et al. (2012) showed the determinant of behavioral intention to use mobile learning by using Technology Accepted Model (TAM). Perceived Usefulness has direct influences on Attitude and Behavior Intention, while Perceived Ease of Use has direct effects on Attitude. Perceived Usefulness and Perceived Ease of Use mainly decide student's acceptance of mobile learning. Three external variables, namely Perceived Mobility Value, Perceived Output Quality, and Perceived Enjoyment, proved to have significant but indirect influences on student's acceptance of mobile learning. The results indicate that the higher the degrees of these external variables, the more the students are willing to adopt mobile learning. While students are considering if they are going to adopt mobile learning, they may first reflect on their subjective views of mobile learning. And these subjective views are mainly decided by the external variables, Perceived Mobility Value, Perceived Output Quality, and Perceived Enjoyment.

Roostika (2012) also confirmed many of previous studies which identified that perceived value has significant influence on adoption intentions. Usefulness is considered as the most dimensions contributing to perceived value in this study. Al Ammary et al. (2014) showed that Perceived Mobility Value and Perceived Ease to Use positively affect Perceived Usefulness, Perceived Enjoyment positively affect Perceived Ease to Use, Perceived Ease to Use and Perceived Usefulness positively affect Behavioral Intention.

In this regards, we suggest the following hypotheses:

- Perceived Mobility Value will positively affect Perceived Usefulness.
- Perceived Social Interaction Value will positively affect Perceived Usefulness.
- Prior Experience for Educational Purposes will positively affect Perceived Usefulness.
- Perceived Ease of Use will positively affect Perceived Usefulness.
- Perceived Enjoyment will positively affect Perceived Ease of Use.
- Perceived Enjoyment will positively affect Attitude toward Using.
- Perceived Ease of Use will positively affect Attitude toward Using.
- Perceived Usefulness will positively affect Attitude toward Using.

- Perceived Usefulness will positively affect Behavioral Intention to Use.

- Attitude toward Using will positively affect Behavioral Intention to Use.

3. Research Methodology

3.1. Population and Sample

The population in this research is students in the Department of Economics Education Faculty of Economics Semarang State University consisting of three (3) majors. Those are Education Office Administration, Accounting Education, and Cooperative Education. The sampling technique used was purposive sampling by using students who have taken courses development of learning (learning evaluation, learning strategies, learning planning and curriculum review). This criterion is based on the idea that students who become the object of the research has had an understanding, knowledge, and experience reasonably sufficient regarding the utilization of mobile devices in learning activities. The data that is obtained and can be processed in this research is as much as 219 units with response rate of 68, 44%.

3.2. Variable and Definition

The variable of the research and its definition are as follows;

- Perceived mobility value (PMV), illustrates the students' awareness of mobility value during their studies of mobile learning.

- Perceived social interaction value (PSIV), indicates the strength of student's belief that using mobile learning because of social interaction value.

- Prior experience for educational purposes (PEFEP), indicates the previous experience of learning or studying by using mobile devices.

- Perceived enjoyment (PE), indicates that student would be entertained and feel enjoyed during their using of mobile devices as a learning tool.

- Perceived usefulness (PU), illustrates the strength of student's belief that using mobile learning will enhance his or her learning performance and experience.

- Perceived ease of use (PEOU), illustrates the strength of student's belief that using mobile learning would not require a lot of effort mentally.

- Attitude toward using (ATU), illustrates the strength of student's feeling of favorableness or favorableness toward using mobile learning.

- Behavioral intention to use (BIU) indicates the strength of student's willingness to use mobile learning.

3.3. Data Collection

The data in this study is primary data obtained from students (research sample) using questionnaire. The questionnaire used is those which have been developed by Huang et al. (2007) and Zhu et al. (2012) as extended-TAM, i.e. a TAM model of Davis that has been adapted to the learning activities. However, there is a single variable that is not use, i.e. Perceived Output Quality (POQ) because it is consider as irrelevant to the condition of the object of the research. Questionnaire research used 5 liker scales for measuring the research variables.

3.4. Data Analysis

Data analysis will be done is an analysis of descriptive statistics and inferential statistics. Analysis of descriptive statistics (mean, minimum, maximum, standard deviation) is intended to describe the ownership of mobile devices and its utilization in learning activities by students of Economics Education Faculty of Economics Semarang State University. Inferential statistics analysis is used to analyze the factors which influence students' intention in utilizing mobile learning. Path analysis is selected to test the hypotheses that have been proposed by using SPSS Analysis tool. Path diagram that was developed in this study is shown in the picture below:
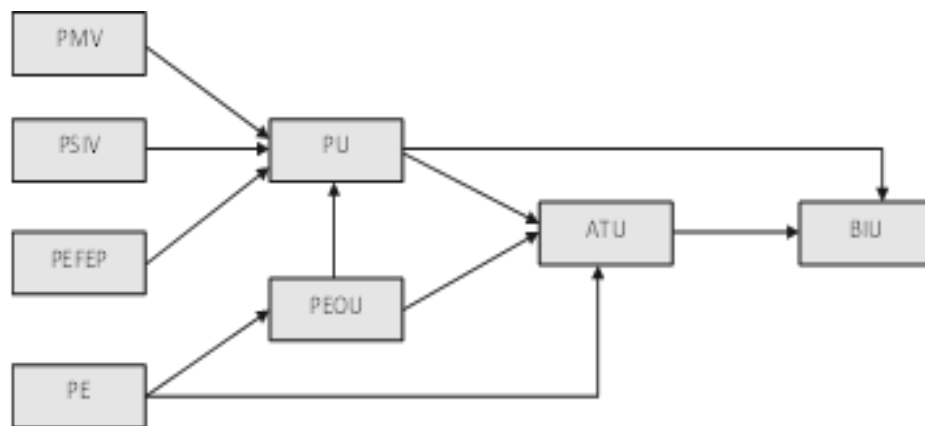

Figure 3: *Path Diagram of Research*

The regression models of this research as follow.

- PU = PMV + PSIV + PEFEP + PEOU

- PEOU = PE

- ATU = PE + PEOU + PU

- BIU = PU + ATU

4. Result and Discussion

4.1. Descriptive Statistics

(Figure 4) shows the descriptive statistics of the variables. The questionnaire used in this variable PU, 4 items for variable PEOU, 3 items for variable ATU, and 3 items for variable BITU. The questionnaires were filled in by using the 5 likert scale.

Variables	Mean	Max	Min	Standard Deviation
Perceived mobility value (PMV)	16,00	20,00	4,00	2,5383
Perceived social interaction value (PSIV)	11,04	15,00	3,00	1,9405
Prior experience for educational purposes (PEFEP)	60,06	96,00	15,00	7,7722
Perceived enjoyment (PE)	7,81	10,00	2,00	1,6496
Perceived usefulness (PU)	12,45	15,00	3,00	1,9493
Perceived ease of use (PEOU)	16,60	20,00	4,00	2,2558
Attitude toward using (ATU)	12,56	15,00	3,00	1,8231
Behavioral intention to use (BIU)	11,91	15,00	3,00	1,8374

Figure 4: *Descriptive Statistics*

4.2. Result of Hypotheses Testing

Model 1 shows the relationship of PMV, PSIV, PEFEP, and PEOU to PU. Figure 5 showed that Adjusted R Square of this model is 0,607. And Figure 5 shows the coefficient of regression model. All of sig. is 0,000 < 0,005. It described that PMV, PSIV, PEFEP, and PEOU positively affect PU. In other word, H1, H2, H3, and H4 are accepted.

Figure 5: *Model Summary and Coefficients of Model 1*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.587ª	.344	.341	1.83481

a. Predictors: (Constant), PE

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	10.336	.600		17.231	.000
	PE	.803	.075	.587	10.679	.000

a. Dependent Variable: PEOU

Model 2 shows the relationship of PE to PEOU. Figure 6 showed that Adjusted R Square of this model is 0,341 and the coefficient of regression model. PE has sig. 0,000 < 0,005. It means that PE positively affects PEOU. So, H5 is accepted.

Figure 6: *Model Summary and Coefficients of Model 2*

Model 3 illustrated the relationship of PE, PEOU and PU to ATU. Figure 7 showed that Adjusted R Square of this model is 0,634 and the coefficient of regression model. All of sig. is 0,000 < 0,005. It means that PE, PEOU and PU positively affect PU. In other word, H6, H7, and H8 are accepted. PE has the biggest relationship to ATU because of its coefficient.

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2.471	.566		4.368	.000
	PE	.390	.058	.353	6.738	.000
	PEOU	.191	.051	.237	3.753	.000
	PU	.311	.058	.332	5.330	.000

a. Dependent Variable: ATU

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.799ª	.639	.634	1.10576

a. Predictors: (Constant), PU, PE, PEOU

Figure 7: *Model Summary and Coefficients of Model 3*

The last model illustrates the relationship of PU and ATU to BIEU. (Figure 8) shows that Adjusted R Square of this model is 0,487 and the coefficient of regression model. The sig. value of PU is 0,004 < 0,005 and the sig. value of ATU is 0,000 < 0,005. It means that PU and ATU positively affect BIEU. So, H9 and H10 are accepted. PU has bigger effect than ATU. The coefficient of ATU is 0,547 and PU is 0,191.

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2.660	.649		4.099	.000
	PU	.191	.065	.203	2.950	.004
	ATU	.547	.069	.543	7.909	.000

a. Dependent Variable: BIEU

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701ª	.492	.487	1.31885

a. Predictors: (Constant), ATU, PU

Figure 8: *Model Summary and Coefficients of Model 4*

(Figure 9) illustrates the results of hypotheses testing. All of hypotheses are accepted.

Model	Adj. R^2	Sig.	Hypothesis Result
PU = PMV + PSIV + PEFEP + PEOU	0,607		
PMV		0,000 **	H1: accepted
PSIV		0,031 **	H2: accepted
PEFEP		0.039 **	H3: accepted
PEOU		0,000 **	H4: accepted
PEOU = PE	0,341		
PE		0,000 **	H5: accepted
ATU = PE + PEOU + PU	0,634		
PE		0,000 **	H6: accepted
PEOU		0,000 **	H7: accepted
PU		0,000 **	H8: accepted
BIEU = PU + ATU	0,487		
PU		0,004 **	H9: accepted
ATU		0,000 **	H10: accepted

Notes: ** $p < 0,005$

Figure 9: *Results of Hypothesis Test*

5. Discussion

The use of mobile devices for students in order to support learning activities is a must at the moment. This means that students can acquire a wide range of learning resources by leveraging existing features on the smartphone or tablet. Thus, students would be helpful and feel the different comfort. In addition, many applications in current smartphones can support students' learning, android-based as well as ios or mobile operating system. And this research investigated willingness of students' intention to use mobile device support in learning activities.

The students of Economic Education Semarang State already have a smartphone that can support learning. Many of them have more than 1 smartphone with a different brand. And overall student can operate their smartphone for learning activities, such as use calculator feature, send and receive e-mail, find learning resources through browsing, and many more. However, there are two statement points that is still unfamiliar for them. Those are the ability to control personal computer on a regular basis using the Smartphones and download the interesting podcast. This is due to the features of a smartphone they have does not have an ability to control the PC or device. And the respondents are still unfamiliar with podcasts and have yet to feel the benefits.

The findings in this research is that all hypotheses (eight hypotheses) proposed are accepted. Determinants of Perceived Usefulness can be proven. Perceived Mobility Value, Perceived Social Interaction Value, Prior Experience for Educational Purposes, and Perceived Ease of Use has proven to give a positive influence against Perceived Usefulness. Student beliefs that mobile learning has a high benefit in supporting the success of the study are influenced by their beliefs over the values of mobility, social interaction, and previous experience in using mobile devices. Students have high mobility and love to interact with their peers so mobile learning is the best solution for them in the learning process. Students also have beliefs that the use of mobile learning is easy. These convictions which also cause students have more faith that mobile learning is really beneficial for their studies.

The results of this research successfully prove that extended-TAM proposed by Huang et al., (2007) and Zhu et al. (2012) support the findings of Roostika (2012), Cheng (2014), and Al Ammary et al. (2014). Mehdipour & Zerehkafi (2013) argued that mobile learning encourage students to work independently in group or individually to solve problems, work on project, meet

individual needs, and give students' voice and choice.

The study results also showed that Perceived Usefulness and Perceived Ease of Use have a positive effect against Attitude to Use. While Perceived Usefulness gives positive effect toward Behavioral Intention to Use. Students who have a belief that mobile learning can provide benefits will encourage them to have a strong willingness to use mobile learning in the future. Next they will take action to be utilize their mobile devices to support their studies. That is, if a student has no confidence on the advantage of mobile learning, then they will be reluctant to use it and will try to avoid it. Students will calculate the beneficial of utilizing mobile learning that is not cheap for them.

Student's view that the use of mobile learning is easy also greatly affected their willingness and intention. If they consider it easy to use, it will develop a positive attitude and will eventually do real action to utilize mobile learning. The ease of mobile learning usage is greatly affect students' intention .This research also managed to prove the concept of TAM and extended-TAM developed by Davis (1989), Huang et al. (2007) and Zhu et al. (2012). Zhu et al. (2012) found that Perceived Usefulness has direct influences on Attitude and Behavior Intention, while Perceived Ease of Use has direct effects on Attitude. Perceived Usefulness and Perceived Ease of Use mainly decide for a student's acceptance of mobile learning. Roostika (2012) also argued that Perceived Usefulness and Perceived Ease of Use are key determinants of the user perception of M-learning. This study also supported the study conducted by Cheng (2014) who argued that Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment can play essential roles in affecting learners' intention to use m-learning.

6. Conclusion

The result showed that the students have good ability to use their mobile gadget for learning purposes. In the extended-TAM frame, two primer factors (perceived usefulness and perceived ease to use) positively affect attitude toward using and behavioral intention to use. And external factors (perceived mobility value, perceived social interaction value and prior experience for educational purposes) positively affect perceived usefulness. Other result showed that perceived enjoyment have significant relationship with perceived to use and attitude toward

using. So, this study had proven extended-TAM that developed by Huang et al. (2007) and Zhu et al. (2012).

References

Behera, Santosh Kumar. (2013). E- And M-Learning: A Comparative Study. International Journal on New Trends in Education and Their Implications, 4 (3), 65-78.

Brown, H.T. (2005). Towards a model for m-learning in Africa. International Journal on E-Learning, 4 (3), 299-315.

Cheng, Yung-Ming. (2014). Exploring The Intention To Use Mobile Learning: The Moderating Role Of Personal Innovativeness. Journal of Systems and Information Technology, 16 (1), 40-61.

Cheong, Je Ho and Myeong-Cheol Park. (2005). Mobile internet acceptance in Korea. Internet Research, 15 (2), 125-140.

Geddes, S.J. (2004). Mobile learning in the 21st Century: Benefit for Learners. Knowledge Tree e-journal: An e-journal of Flexible Learning in VET, 30 (3), 214-218.

Georgiev, T., Geirgieva, E., & Smrikarov, A. (2004). M-learning: A New Stage of E-Learning. In proceedings of International conference on computer systems and technologies, Rousse, Bulgaria. Retrieved from http://ecet.ecs.ru.acad.bg/cst04/Docs/sIV/428.pdf.

Huang, Jen-Hung, Yu-Ru Lin, and Shu-Ting Chuang. (2007). Elucidating User Behavior of Mobile Learning (A Perspective Of The Extended Technology Acceptance Model). The Electronic Library, 25 (5), 585-598.

Keegan, D. (2005, October 25-28). The Incorporation of Mobile Learning into Mainstream Education and Training. Proceedings of mLearn2005- 4th World Conference on http://www.mlearn.org.za/CD/papers/keegan1.pdf

Lee, Won Jun, Tae Ung Kim, and Jay-Young Chung. (2002). User Acceptance of The Mobile
Internet.   Retrieved May 26, 2015 from
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.20.573&rep=rep1&type=pdf.

Lee, Y. C. (2008). The role of perceived resources in online learning adoption. Computers
and Education Journal, 50 (4), 1423-1438.

Liu, Yong. (2011). Solving the Puzzle of Mobile Learning Adoption. TUCS (Turky Centre for
Computer Science) Dissertation No 134, May 2011.

Mehdipour, Yousef and Hamideh Zerehkafi. (2013). Mobile Learning for Education: Benefits
and Challenges. International Journal of Computational Engineering Research, 3 (6), 93-
101.

O'Malley, C., Vavoula, G., Glew, J. P., Taylor, J., & Sharples, M. (2005). Guidelines for
Learning/Teaching/Tutoring in a Mobile Environment. Retrieved 25 May, 2015, from
http://www.mobilearn.org/download/results/public_deliverables/MOBIlearn_D4.1_Final.
pdf

Pollara, P. (2011). Mobile Learning In Higher Education:A Glimpse And A Comparison Of
Student And Faculty Readiness, Attitudes And Perceptions.

Pollara, P. and Broussard, K. K. (2011). Student Perceptions of Mobile Learning: A Review of
Current Research. Society for Information Technology & Teacher Education
International Conference.

Prajapati, Manoj and Jayesh M. Patel. (2014). The Factors Influencing in Mobile Learning
Adoption: A Literature Review. International Journal of Application or Innovation in
Engineering & Management (IJAIEM), 3 (9), 133-138.

Quinn, C. (2000). mLearning: Mobile, Wireless, In-Your-Pocket Learning. Retrieved 25 May, 2015, from http://www.linezine.com/2.1/features/cqmmwiyp.htmm.

Rauniar, Rupak, Greg Rawski, Jei Yang, and Ben Johnson. (2014). Technology acceptance model (TAM) and social media usage: an empirical study on Facebook. Journal of Enterprise Information Management, 27 (1), 6-30.

Roostika, Ratna. (2012). Mobile Internet Acceptance among University Students: A Value-based Adoption Model. International Journal of Research in Management & Technology (IJRMT), 2 (1), 21-28.

Sharma, S.K. & Kitchens, F.L. (2004). Web Services Architecture for m-learning. Electronic Journal for e-Learning), 2 (1), 203-216.