

**Students' Readiness and Perceptions towards Mobile Learning and their  
Acceptance in Adopting Mobile Learning Platform as Learning Tool and  
Communication Tool**

**SOH PEALING**

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*Specially dedicate to my beloved family*

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## ABSTRACT

Mobile Learning is the current technology that has become more and more popular nowadays. Mobile Learning is a type of learning across contexts and learning using small, portable and wireless computing devices like PDA (Personal Digital Assistance) and smart phone. The purpose of this research is to collect data from postgraduates about Mobile Learning and to develop a local context mobile accessible learning webpage. The first stage survey is to investigate the readiness and perceptions of postgraduates towards the Mobile Learning. This quantitative method was constructed by using a set of questionnaire which involves 63 respondents from Educational Technology Course, Faculty of Education. Results indicated that most of the postgraduates are ready to use mobile device especially in searching information through the online browser (mean value= 4.43). Besides that, results also showed that they have a positive perceptions towards Mobile Learning especially when they agree that learners can get the latest information through it (mean value= 4.44). A Mobile Learning environment (Mobile Moodle) which is connected with Learning Management System (LMS) was developed based on the postgraduates' preferred activities. Second stage survey which is Mixed-Method survey was carried out to examine the postgraduates' acceptance in adopting mobile learning as an additional learning tool and communication tool. A set of questionnaires and interview sheet were used in collecting data. The research's results had signified that the acceptance among postgraduates are high especially on the benefit of Mobile Learning which allows learner to access lecture materials anywhere and anytime (mean value= 5.00). In addition, results also indicated that postgraduates prefer to carry out communication with lecturer by using Mobile Learning environment (mean value= 4.71). Lastly, referring to Technology Acceptance Model (TAM) the research results showed that Mobile Learning environment's usefulness (mean value= 4.08) and the ease of use (mean value= 4.06) are the main concerns considered by postgraduates.

## ABSTRAK

Pembelajaran mobile merupakan teknologi terkini yang semakin populer. Kecanggihan alat pemudah alih dan kemudahan internet telah membolehkan pembelajaran berlaku dimana-mana dan sebarang waktu sahaja. Tujuan kajian ini adalah untuk mengumpul data daripada pelajar tentang pembelajaran mobile dan membangunkan satu sistem untuk kegunaan pembelajaran mobile . Kajian ini mengandungi dua peringkat. Peringkat pertama bertujuan mengumpulkan data tentang kesediaan dan persepsi pelajar terhadap pembelajaran mobile. Satu set soal selidik telah digunakan dalam kajian ini. Seramai 63 pasca siswazah dari fakulti pendidikan yang mengikuti kursus Teknologi Pendidikan telah dipilih secara rawak untuk menjawab soal selidik. Analisis menunjukkan kebanyakan pasca siswazah bersedia dalam menggunakan alat pemudah alih dalam mencari informasi menerusi internet (nilai min= 4.43). Data juga menunjukkan bahawa pasca siswazah mempunyai persepsi yang positif terhadap pembelajaran mobile (nilai min= 4.44). Satu laman web yang bernama *Mobile Moodle* telah dibangunkan berdasarkan aktiviti dan ciri-ciri kesukaan pengguna. Kajian peringkat kedua adalah bertujuan mengkaji tahap penerimaan pasca siswazah terhadap pembelajaran mobile dari segi sebagai alat pembelajaran tambahan and alat komunikasi. Hasil kajian menunjukkan bahawa tahap penerimaan pembelajaran secara mobile adalah tinggi di kalangan pasca siswazah. Pembelajaran mobile membawa kebaikan dimana pengguna sistem boleh mendapat bahan pembelajaran di mana-man dan bila-bila sahaja (nilai min= 5.00). Data juga menunjukkan pasca siswazah suka berkomunikasi dengan tutor atau pensyarah (nilai min=4.71). Akhirnya, kajian ini juga mendapati bahawa kegunaan (*Usefulness*) (nilai mean= 4.08) dan kesenangan (*Ease of Use*) (nilai min= 4.6) daripada Model Penerimaan Teknologi (*Technology Acceptance Model*) bagi sesuatu sistem adalah merupakan faktor pengguna menerima dan menggunakan sistem pembelajaran secara mobile.

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## LIST OF ABBREVIATIONS

A	-	Agree
CMS	-	Course Management System
ICT	-	Information and Communication Technologies
ID	-	Instructional Design
LMS	-	Learning Management System
M	-	Mean
MILO	-	Mobile Interactive Learning Object
MLE	-	Mobile Learning Engine
MSC	-	Multimedia Super Corridor
D	-	Disagree
PC	-	Personal Computer
PDA	-	Personal Digital Assistance
PHD	-	Philosophy of Doctoral
PDF	-	Portable Document Format
SA	-	Strongly Agree
SD	-	Storngly Disagree
Sd	-	Standard Deviation
SLA	-	Slightly Agree
SMS	-	Short Message Service
SPSS	-	Statistical Program for Social Science
TAM	-	Technology Acceptance Model
UteM	-	Universiti Teknikal Malaysia Melaka
WAP	-	Wireless Application Protocol

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

The rapid development of information and communication technologies (ICT) during the past two decades has placed new demands on expertise, and also leading to increase the use of information technology (IT) especially for instruction and learning process. The development of technology enables our country growing approach the flexibility in education field and hence meets the country's drive to fulfil Vision 2020.

Our education curriculum had transformed and enhanced by the use of new media as tools. E-learning was introduced in Malaysia higher institutions since year 1998. The rapid growth of web-based technologies and the high usage of the internet had made teaching and learning via the internet more viable (Chai and Poh, 2009). E-learning provides the learning opportunities anytime and anywhere by using the interactive network technology and computers in computer lab to deliver the learning materials to learner. E-learning actually integrates all forms of online instructions using electronic devices.

Almost all the higher education institutions promote the life-long learning and the distance education. Distance education takes place when a teacher and students are separated by physical distance and usually technology is used for bridge the instructional gap. Technology supports on teaching and learning enable the flexible delivery of education anytime and anywhere. Hence, many universities in Malaysia

provided an E-learning portal for a teaching medium purposely for long distance education and off-campus programs (Khalid, 2006; Chai and Poh, 2009).

The E-learning environment also provides students a place for interaction electronically with each other or with instructor in some activities like forum, discussion board, email and chat rooms. This way of learning enable learner to express their idea or their new finding information from internet (Brandl, 2005; Bajahzer et al., 2008). Moodle (Modular Object Oriented Dynamic Learning Environment) is an open source Learning Management System (LMS) which is the number four famous product for E-learning. Moodle is confirmed able to increase student confidence before exam by connecting individual course together and sharing materials with each other. Besides that, it allows teacher to provide and share document, graded assignment, quizzes within this quality online course.

The earlier E-learning is restricted to computer lab's computer and cabled internet services. However, since 2000, the advance in information technology and computing had provided another learning concept by using the portable PCs like notebook with wireless LANs. But now, education is being transformed by the use of wireless mobile technologies into Mobile Learning where this flexible method is unbounded by space and time.

## **1.2 Background of Problems**

The rapid development of mobile devices in the information age matches with the trend where the information can be achieved at fingertips and independency of time and location. Mobile Learning (M-Learning) is emerging to be the next generation of E-learning.

*“State of the internet..... Mobile will be bigger than Desktop Internet in 5 years”*

(Morgan, 2010)

Morgan (2010) believes that more users will be likely to connect to internet via mobile devices than desktop devices within 5 years. Hence, researcher should start to explore the potential in mobile device and using the advantages of mobile device in creating a portable and affordable learning for all learners.

Actually, Mobile Learning is a part of learning technologies which combine mobile technologies and E-learning, it delivers E-learning materials and provide learning environment on mobile devices such as mobile phone, PDA (Personal Digital Assistant) and other devices (Mariam and John, 2008). Mobile Learning can offer small and consumable learning contents which can be delivered through wireless network to all mobile devices (Saipunidzam et al., 2010).

Nowadays, the use of mobile phones and handheld device among students in western country has dramatically increased. Mobile technologies offer capabilities that can support SMS based system and some advance mobile wireless device can support web based system. There have been a number of systems developed by western country where the mobile device is used in supporting the classroom interaction between teacher and learner. One example is the computer science program at the University of Minnesota, Duluth where it had already picked the pocket PC platform to support two functions: reference materials and exercises for students. Students can use the device as portable textbooks and easily offering information usually contained within bulkier, more expensive book forms (Alexander, 2004).

According to New Media Consortium and Educase (2006), teachers in higher education in the United Kingdom have made use of SMS (Short Messaging Service) as prompts for course requirements, polling classes and pop quizzes with some universities experimenting with phone exams where the users' voice print identifies them as the test taker. Similarly, mobile phones used as support mechanisms to remind students about assignment submissions and course enrolments (Gayeski, 2007; Herrington, 2007).

The Mobile Learning in Malaysia is still consider new trend and not yet widely used in higher education. In Malaysia, LTT Global Communication which is a private company at Petaling Jaya establishes its own business product which is based on mobile E-learning English language. LTT Global Communication has built up a case for using mobile phone in education where they applied it in teaching and learning English language. This product's name is *SMS-ME-ENGLISH*, which work over SMS and students will receive text messages that can help them in learning the language. This application can be classified as a learning application for adult learners (Kashminder, 2007; Poon and Koo, 2008).

Another mobile application produced by Universiti Teknikal Malaysia Melaka (UTeM) is Mobile Learning Notes for SPM Sejarah "Islam Di Asia Tenggara". This learning application needs to be installed in mobile device and it enables learning everywhere because mobile phones are carried by anyone everywhere (Abd Wahab, 2008). Besides that, UTeM also produced another Mobile Learning application which enables 8-10 years old children learn mathematics using mobile phone. The content of the project is to teach the student on how to memorise the times table using accelerated learning techniques (Hashim, 2008).

M-learning advances than E-learning in term of accessing learning content anytime and anywhere. The Learning Management System (LMS) used for E-learning will become better if integrated with mobile service for mobile device. Moodle is one of the Open Source Software (OSS) which almost free to download, to use, modify and even distribute under the terms of licence. This free open software was widely adopted by universities and educational institution for E-learning purpose. Teachers can provide and share documents, quizzes, discussion forums to students (Dougiamas, 2007; Bajahzer et al., 2008). According to a research done by Houser and Kinjo (2005) the Moodle usually designed for large screen desktop and laptop is perfectly used by learner. But a lightweight version of Moodle with small screen has not yet been developed for helping students access to learning materials in lecture classes.

Meisenberger and Nischelwitzer (2004) stated that traditional E-learning with their Personal Computer (PC), notebook or laptop cannot give a real independency of time and space because it is hard for everyone to bring their notebook or their Personal Computer (PC) with them all the time. The real independency in time and location according to Sharples et al. (2005) is that the process of learning is regardless of time (whenever) and place (wherever) where a learner can access to his learning materials.

Besides the independency problem, nowadays many universities are implementing some technologies that allow students to access learning course materials on wireless devices. But most of the learning materials or lectures note can be accessed by using E-learning methods. Mode of delivery should shift to M-learning (Georgieva and Trifonova, 2006). He also stated that students' usage of E-learning will increase their interest to M-learning. Hence, Mobile Learning applications together with learning platforms are required so that student has a chance to access learning course by using mobile device.

Although learner can access for their own necessary information or interact with their lecturer by using laptop computer or desktop computer; a small, handy, always with the user and able to connect to internet mobile device will replace those immobile devices. For now, not all the activities and teaching materials used in E-learning system are suitable for mobile delivery. There still lack of some online learning platforms for mobile device user since the percentages of mobile device holder become higher and higher.

One of the advantages of E-learning is students are able to communicate with their instructors and each other, access learning materials and submit assignments using the power of internet (Paulus, 2009).). Interactivity and communication between lecturer and students in a classroom are very important. The learning process is achieved when there are a lot of active involvements between students and their lecturer (Krause & Effelsberg, 2003; E Costa et al., 2008). Actually, lecturer-student contact in and out of the classroom is very important in building student's motivation and involvement in class. But, sometime because of time constraints,

some lecturers do not encourage interaction between students and lecturer. Besides that, some students feel shy to ask question in front of a large audience and cause the communication fail to occur.

There are many advantages of applying Mobile Learning in higher education and more and more universities start to implement the new technology. A research was done by Jacob and Issac (2007) on students' perception on Mobile Learning in higher education campus. The finding shows that majority of student support that wireless networks increase the flexibility of accessing to resources in learning by using palmtop, mobile phones and PDAs.

Besides that, another advantage of Mobile Learning is it can be a new educational tool. Douglas et al. (2008) carried out a survey about the effectiveness of *HotLava* Software's Learning Mobile Author in improving learning outcome. The finding shows that this mobile phone application can make a significant in students learning outcome and hence can be used as one new learning tool in education.

Because of the advantages of Mobile Learning, more and more research has been carried out on the effectiveness and acceptance level of Mobile Learning among students. Research done by Joseph and Maria (2007) is a survey on the students and faculty's readiness for Mobile Learning. A total of 94% of students indicated their readiness for Mobile Learning because all of them own a cell phone or smart phone. About 60% of faculty also affirmed their readiness for Mobile Learning. Researchers also stated that faculty can implement Mobile Learning in their online course by adding or making more learning content and information in the form of easily accessible by using mobile phones.

There are many benefits of plugging mobile technology into E-learning system as potential for increasing productivity within the scope of the new M-learning paradigm (Wierzbicki 2002; Poon and Koo 2008). The educational field changes its paradigm from teacher-centered learning to learner-centered learning under informatics world. However, what are the perceptions among local university's

students toward Mobile Learning? Are they ready to use their mobile devices for a space and time unbounded learning? Mobile Learning is a unique and special approach and hence a movement toward mobile age is a need.

### **1.3 Statement of Problems**

The emergence of Mobile Learning is not to replace the E-learning method, but act as another learning method which is used to improve learners' learning experience. The Mobile Learning scenario is still 'young' especially in the developing country like Malaysia. Learners still carry out their learning when there is a computer or laptop and internet service. They fail to learn at any time and everywhere they are. Mobile Learning can bring many benefits and thus there is a need to develop a Mobile Learning environment with Mobile Learning materials. Mobile Learning situation can firstly be implemented in local university and hence provides a higher level of support for learner to adopt the usage of mobile device as an additional learning tool and communication tool.

E-learning system can integrate into regular curriculum by using LMS and provide a communication platform between instructor and learner. Now, mobile can access to LMS like Moodle and provide extra special such as portability, social interactivity, context sensitivity and individuality. But the adoption of LMS by using mobile devices is still new and not much developed by instructor for learning purpose. Hence, there is a need to expand the capabilities of Moodle so that it can be served as Mobile Learning platform which can support online interactive learning and various activities.

This project aims to collect data about the readiness and perceptions of postgraduates in Higher Public Learning Institution (IPTA) toward the concept of Mobile Learning. Besides that, an online Mobile Learning environment or called as mobile Moodle will be developed in order to provide a series of learning materials to be accessed by mobile devices especially mobile phone. Lastly, a survey will be

carryout to survey the acceptance level among postgraduates in adopting Mobile Learning as an additional learning tool and communication tool for educational purpose. Technology Acceptance Model (TAM) will be used to collect data about the perceived usefulness and perceived ease of use towards mobile Moodle.

#### **1.4 Objectives of the Research**

The objectives of this research are:

- (i) To study the postgraduates' readiness towards the usage of Mobile Learning based on their preferred activities on mobile device.
- (ii) To study the postgraduates' perceptions from the aspect of their concepts about Mobile Learning.
- (iii) To develop Mobile Learning environment (Mobile Moodle) which connect to a Learning Management System (LMS) based on postgraduates preferred activities.
- (iv) To develop Mobile Interactive Learning Object (MILO) for Mobile Moodle.
- (v) To evaluate postgraduates' acceptance in adopting Mobile Learning as
  - a. an additional learning tool
  - b. a communication tool for learning purposes.
- (vi) To examine the postgraduates' intention to use Mobile Learning environment (Mobile Moodle) based on the main constructs of Technology Acceptance Model (TAM):
  - a. Perceived Usefulness
  - b. Perceived Ease of Use

## **1.5 Research Questions**

The research questions of this research are:

- (i) Are the postgraduates ready towards the usage of Mobile Learning based on their preferred activities on mobile device?
- (ii) What are the postgraduates' perceptions in term of their concepts towards the Mobile Learning?
- (iii) What is the postgraduates' acceptance in adopting Mobile Learning as an additional learning tool for learning purpose?
- (iv) What is the postgraduates' acceptance in adopting Mobile Learning as a communication tool for learning purpose?
- (vii) Are the postgraduate's intent to use Mobile Learning environment based on Perceived Usefulness and Perceived Ease of Use according to Technology Acceptance Model (TAM)?

## **1.6 Theoretical Framework**

Theoretical framework for this research is about the readiness and perceptions of postgraduates toward the usage of Mobile Learning. This study is started with the analysis of postgraduates' readiness based on their daily activities on mobile device and their perceptions about the concepts of Mobile Learning towards the usage of Mobile Learning in education field. This survey is carried out by using questionnaire.

An online Mobile Learning environment (Mobile Moodle) and learning materials are selected and determined. The learning materials for Mobile Learning process are designed based on the principle of Mobile Interactive Learning Objects (MILOs) from Holzinger et al. (2005). The characteristics of MILO are as follow:

- i. Must contain less information than traditional learning object (LO)
- ii. Allow user to stop learning abruptly
- iii. Provide discovery learning environment
- iv. Small and simple information
- v. Fix on mobile device's screen

The Mobile Learning environment which contains all learning materials is build by connecting Mobile Learning environment with Learning Management System (LMS). The Mobile Learning Engine (MLE) is an open source plugin and used together with Learning Management System especially Moodle platform to enable the broad variety of mobile devices can run on it.

The Mobile Learning environment is designed to meet the Social Constructivism learning pedagogy which is fully supported by Moodle platform. Besides that, the Mobile Learning users are encouraged to involve in this interactive and experiential learning where the users can build new knowledge upon the foundation of previous knowledge after interact with the learning materials provided there. The learning materials provided are support the constructivist learning philosophy.

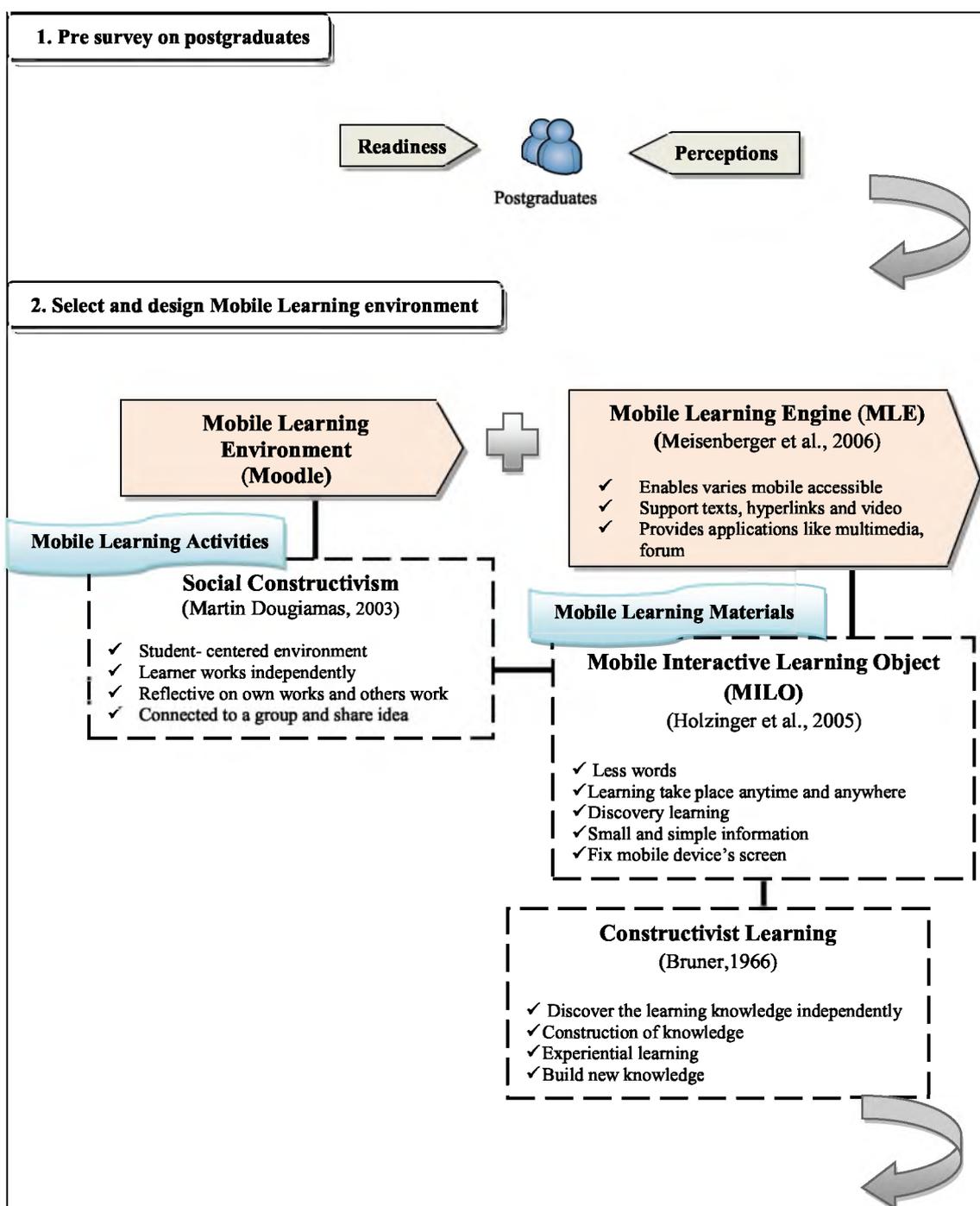
During the implementation process, Mobile Learning environment is tested by using mobile device. Lastly, an evaluation process is carried out to collect data about the postgraduates' acceptance in adopting Mobile Learning as an additional learning tool and communication tool. Besides that, Technology Acceptance Model (TAM) by Davis (1989) is adopted to determine the factors that influence postgraduates' intention to use Mobile Learning. The TAM has two main beliefs:

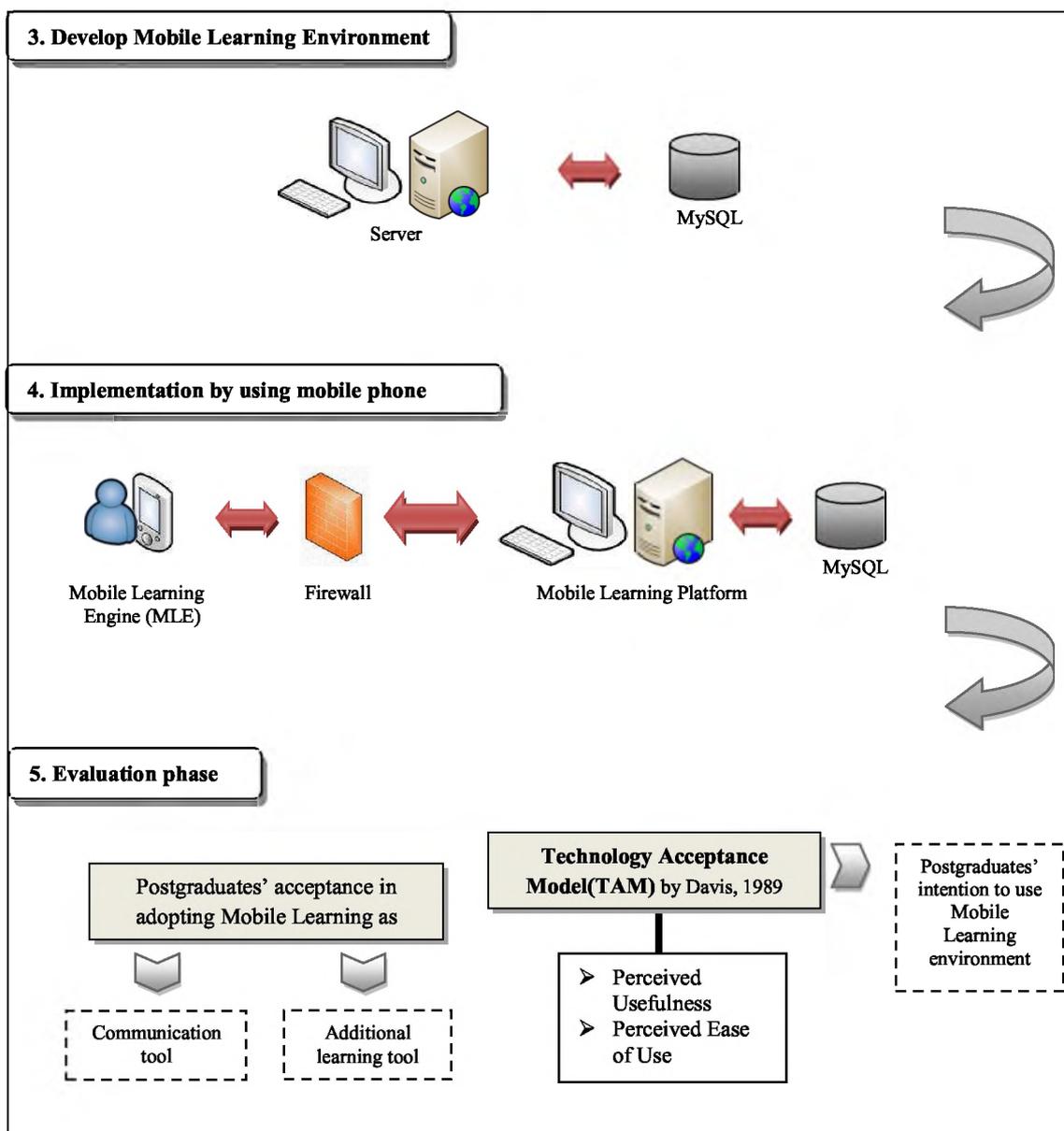
- i. Perceived Usefulness
- ii. Perceived Ease of Use

According to Davis (1989), both perceived usefulness and perceived ease of use have significant impact on user attitude towards using of Mobile Learning environment; hence it is suitable to be used for the this survey. The reason is if an

individual perceives the system to be easy to use, he or she is more likely to perceive the system to be useful also (Morris and Dillion, 1997; Sek et al., 2010).

The whole research use the ADDIE instructional design model (Molenda et al., 2003) as a guide. The 5 phases of development in ADDIE model are Analyse, Design, Development, Implementation and Evaluation. The whole theoretical framework is shown at Figure 1 below:





**Figure 1.1: Theoretical Framework**

## 1.7 Rationale of the Research

Mobile Learning can also be called E-learning through mobile and hand held devices using wireless transmission (Bhaskar and Govindarajulu, 2008). The growth of E-learning and implementation in education are still at a steady growing rate and most of the students already knew how to use E-learning in enhancing their learning.

E-learning cannot give a real independency in term of time and place to users. The limitations in E-learning are now can be enhanced by using Mobile Learning. Mobile Learning or called as M-Learning is the one step advance learning style than E-learning in Malaysia and it offers another way to deliver small and consumable byte learning materials for learner and hence enable learning anywhere and anytime (Liang, 2005; Saipunidzam, 2010).

Besides that, Mobile Learning can increase the interactivity and communication between lecturer and students. M-Learning is the current technology that used to resolve the challenges from traditional learning (Sahilu et al., 2010). Hence, the purpose of this project is to provide another learning environment for local Higher Public Learning Institution (IPTA) students. They can access the learning platform with the aid of mobile devices like smart phones, PDAs and iPhones which are able to connect to wireless networks.

## **1.8 Significance of the Research**

This project will bring benefit to:

### **1.8.1 Campus learner**

Many universities' students will bring along with them one or more mobile computing devices such as smart phones, PDAs or laptops. The Mobile Learning environment enables them to carry out the learning process anywhere and anytime (Bhaskar and Govindarajulu, 2008). The time usually spent in waiting transport or any other activities can be used for learning and they will get the instant news or information because the mobile device is always with them.

### **1.8.2 Lecturer**

The communication between lecturer and students is very important but the conventional learning style provides a unilateral communication between them (E Costa et al., 2008). Mobile device with online learning environment is able to solve the communication problem and enhance teaching and learning process because this platform enables lecturers to get feedbacks instantly from their student.

### **1.8.3 University**

The use of Mobile Learning in University is a good starter and it is better than the traditional face to face instruction learning, paper based distance education learning or traditional E-learning. It is possible that most of the universities in the world applying the anytime, anywhere concept in their education due to its ability to support ubiquitous learning via mobile technologies (Abas et al., 2009). Mobile Learning also a powerful method for engaging learner especially for distance learning learner which face-to-face meeting is very limited.

## **1.9 Scope and Limitation of the Research**

This research is about the development of online Mobile Learning environment and Mobile Learning materials. This Mobile Learning environment can be accessed by using mobile devices such as smart phone, PDA and iPhone. In this survey, the use of mobile devices limited to internet-enabled mobile phones only.

Students can access to learning environment for an educational activity. The Mobile Learning environment is designed generally for students in University especially postgraduates who are taking Educational Technology course at Universiti Teknologi Malaysia (UTM).

Before the development of Mobile Learning environment, the perceptions and readiness of postgraduates towards Mobile Learning will be collected. In this study, a set of questionnaire will be used to collect data from them. The respondents are those Educational Technology's postgraduates who are studying in Universiti Teknologi Malaysia.

After the development of Mobile Learning environment, a survey will be carried out to collect data about the acceptance level of Mobile Learning among campus postgraduates. The scope of contents for learning materials in mobile phones study is focused on a subject in Educational Technology Course (MPP) - Video and Animation Technology Production (MPT1383).

## **1.10 Definition**

The definitions of some terms that are used in this project are as follows:

### **1.10.1 Information and Communication Technologies (ICT)**

Information and communications technologies (ICT) are a diverse set of technological tools and resources used to communicate, and to create, disseminate, store and manage information (Blurton, 2002).

### **1.10.2 Mobile Learning (M-Learning)**

Mobile Learning refers to the usage of information technologies' tools such as PDAs, cell phones, tablets PC and laptops in learning and teaching process. The Mobile Learning exists due to distance learning and electronic learning (Tamimuddin, 2007).

### **1.10.3 Electronic Learning (E-learning)**

E-learning is commonly referred to the intentional use of networked information and communications technology in teaching and learning. A number of other terms are also used to describe this mode of teaching and learning. They include online learning, virtual learning, distributed learning network and web based learning (Som Naidu, 2006).

### **1.10.4 Learning Management System (LMS)**

Learning Management System (LMS) is a software application that automates the administration, tracking and reporting of training events, classroom events, e-learning programs and some training content (Ellis, 2009). LMS can be used as a tool to provide students with external access to various resources like handouts, links and software.

### **1.10.5 Moodle**

Moodle is an open source Learning Management System (LMS). The word Moodle was originally from an acronym for Modular Object-Oriented Dynamic Learning Environment. Moodle is open to register users and offers the possibility to develop forum, wikis, quizzes, surveys and other interactive in built activities. The design of Moodle is based on Social Constructivism pedagogy (Martin Dougiamas, 2003).

### **1.10.6 Mobile Learning Engine (MLE)**

The Mobile Learning Engine (MLE) is an open source plugin for Moodle that adds the functionality of a Mobile Learning environment to Moodle. User can use their mobile device to access MLE-Moodle on their built in mobile browsers or through a special mobile phone application (MLE- Moodle, 2009).

### **1.10.7 Mobile Interactive Learning Objects (MILOs)**

Mobile Interactive Learning Objects (MILOs) is a practical approach to Mobile Learning which can be used within a Mobile Learning Engine (MLE) that runs on mobile phone as learning information. The mobile interactive learning objects are interactive, adaptable and used to achieve educational objectives (Holzinger et al., 2005).

### **1.10.8 Technology Acceptance Model (TAM)**

TAM is a specific model developed to explain and predict user's computer usage behaviour. TAM specifies the causal relationships between system design features, perceived usefulness, perceived ease of use, attitude toward using and actual usage behaviour (Davis, 1993).

## **1.11 Conclusion**

The rapid development of information and communication technologies together with the increasing number of learning tools in education field had change the conventional teaching and learning process to a new educational platform. The traditional E-learning world provides online learning opportunities by delivering the learning materials to learner where the learners can access them using personal computer, laptop or notebook. This learning style cannot give a real independency for learner to obtain information anytime and anywhere.

The solution for this situation is by applying Mobile Learning among learners where they can access to online learning by using their own mobile devices like smart phone. Plugging mobile technology into E-learning has potential for increasing productivity and form a new scope of M-Learning paradigm.

In this study, researcher wants to know the readiness and perceptions of students especially postgraduates in local university before developing the online Mobile Learning environment. The Mobile Learning environment will consist of online learning materials and learning activities. This project can bring out huge benefits especially for postgraduates because they can carry out their learning anytime and at anyplace only with their own mobile devices. The literature review about Mobile Learning and the theory of learning will be discussed in next chapter.

## BIBIOGRAPHY

- Abas, Z.W., Lim, T., Harvinder, K.D.S., Shyang, W.W. (2009). Design and Implementation of Mobile Learning at Open University Malaysia. *The 9<sup>th</sup> SEAAIR Annual Conference*: 13-15 October 2009. Pulau Pinang, Malaysia, pp. 439-445.
- Abas, Z.W., Chng, L.P. and Mansor, N. (2009). A Study on Learner Readiness for Mobile Learning at Open University Malaysia. *In Proceedings of IADIS International Conference Mobile Learning*. 26-28 February 2009. Barcelona, Spain, pp. 151-157.
- Abd Wahab, S. (2008). Mobile Learning Notes for SPM Sejarah “Islam Di Asia Tenggara”. Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM).
- Alexander, B. (2004). M-Learning: Emergent Pedagogical and Campus Issues in the Mobile Learning Environment. *EDUCAUSE Center for Applied Research (ECAR) Bulletin*, Vol. 2004(16). pp 1-10.
- Alfredo, M. Ronchi. (2009). *eCulture: Cultural Content in the Digital Age: Educational Market*. Springer Dordrecht Heidelberg London New York, 2009. [E-Book] Available: Google books.
- Al-Fahad, F. N. (2009). Students’ Attitudes and Perceptions towards the Effectiveness of Mobile Learning in King Saud University, Saudi Arabia. *The Turkish Online Journal of Educational technology-TOJET*. Vol. 8(2), pp. 111 – 119.
- Ariffin, S.A., (2011). Mobile Learning in the Institution of Higher Learning for Malaysia Students: Culture Perspectives. *Proceeding of the International Conference on Advanced Science, Engineering and Information Technology 2011*. 14-15 January 2011. Putrajaya, Malaysia, pp. 283-288.
- Arrigo, M., Novara, G., and Cipri, G. (2008). *M-Learning Accessibility Design: A Case Study*. K. Miesenbergereat. (Eds): ICCHP 2008, LNCS 5105, Springer-Verlag Berlin Heidelberg. pp. 226-233.
- AyseKok (2008). Evaluation of an online social constructivist tool based on a secondary school experience in a Middle East country. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*. 7-18 July 2008. Vol. 4(3).

- Bajahzer, A., Al-Ajlan, A., Zedan, H. (2008). Exercise Services for E-learning in Higher Education with Open Source Software (MOODLE). *IADIS International Conference*, 9-11 April 2008. Algarve, Portugal. pp 51-58.
- Bhaskar, N.U. and Govindarajulu, P. (2008). A Design Methodology for Acceptability Analyzer in Context Aware Adaptive Mobile Learning System Development. *International Journal of Computer Science and Network Security* 8(3), pp. 130-138.
- Blurton, C. (2002). *New Directions of ICT-Use in Education*. UNESCO's World Communication and Information Report.
- Brandl, K. (2005). Are You Ready to "MOODLE" ? *Language Learning & Technology*. Vol. 9(2), pp. 16 – 23. Available on : <http://llt.msu.edu/vol9num2/review1/>
- Chai, L.G. and Poh, Y.N. (2009). E-learning in Malaysia: Success Factors in Implementing E-learning Program. *International Journal of Teaching and Learning in Higher Education* Vol.20(2), pp. 237-246.
- Chaiprasurt, C., Esichaikul, V. and Wishart, J. (2011). Designing Mobile Communication Tools: A Framework to Enhance Motivation in Online Learning Environment. *10<sup>th</sup> World Conference on Mobile and Contextual Learning*. 16-21 October 2011. Beijing, China.
- Chaka, C. (2009). *From Classical Mobile Learning to Mobile Web2.0 Learning*. Guy, R. (Ed.). *The Evolution of Mobile teaching and Learning*. Santa Rosa, California: Informing Science Press (pp. 79-102).
- Cole, J. & Foster, H. (2008). *Using Moodle, 2<sup>nd</sup> Edition*. Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.
- Davis, F.D. (1989). *Perceived Usefulness, perceived ease of use, and user acceptance of information technology*. *MIS Quarterly*, 13(3), pp. 319-339.
- Davis, F.D. (1993). User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioural Impacts. *International Journal of Man-Machine Studies* (1993) 38, pp. 475-487.
- Dougiamas, M. & Taylor, P. (2003). Moodle: Using Learning Communities to Create an Open Source Course Management System. In D. Lassner & C. McNaught (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2003* Chesapeake, VA: AACE. pp. 171-178.
- Douglas, M., Praul, M., and Michael J.L., (2008). Mobile Learning in Higher Education: An Empirical Assessment of a New Educational Tool. *The Turkish Online Journal of Education Technology-TOJET*. Vol.7, No.3 ISSN: pp. 1303-6521.

- E Costa, J.C., Ojala T., and Korhonen, J. (2008). Mobile Lecture Interaction: Making Technology and Learning Click. *IADIS International Conference Mobile Learning 2008*. 11-13 April, 2008. Algarve, Portugal, pp. 119-124.
- Ellis, Ryann K. (2009). *Field Guide to Learning Management Systems*, ASTD Learning Circuits.
- Georgiev, T., Georgieva, E., and Smrikarov, A. (2004). M-Learning – a New Stage of E-learning. *International Conference on Computer Systems and Technologies*. 17- 18 June 2004. Rouse, Bulgaria. pp. 281-285.
- Georgieva, E., and Trifonova, A. (2006). The Influence of the Usage of e-learning on the Students' Expectations about m-Learning. *Proceedings of International Workshop in Learning Networks for Lifelong Competence Development, TENCompetence Conference*. 30-31 March 2006. Sofia, Bulgaria.
- Georgieva, E., and Trifonova, A. (2006). Determining Student's Readiness for Mobile Learning. *5<sup>th</sup> WSEAS International Conference on E-ACTIVITIES*, 20-22 November 2006. Venice, Italy, pp.84-89.
- Gliem, J.A. & Gliem, R. R. (2003). Calculating, Interpreting, and Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales. *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education*. Columbus, Ohio : Ohio State University.
- Goggin, G. (2009). *Mobile Learning: The Significance of New Mobile and Wireless Communications Technologies for Education*. J. Zajda and D. Gibbs (eds.), *Comparative Information Technology*. Springer Science. pp. 65-77.
- Hashim, N.N. (2008). *Learning Multiplication Table in Mobile*. Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM).
- Herrington, A., and Herrington, J. (2007). Authentic mobile learning in higher education. *AARE 2007 International Educational Research Conference*. 26-29 November. University of Notre Dame.
- Holzinger, A., Nischelwitzer, A., and Meisenberger, M. (2005). *Mobile Phones as a Challenge for m-learning: Examples for Mobile Interactive Learning Objects (MILOs)*. *Proceedings of the 3<sup>rd</sup> International Conference Pervasive Computing and Communications Workshops*. 8 – 12 March. Koloa, Hawaii: IEEE, pp. 307 – 311.
- Houser, C., and Kinjo, T.P. (2005). Poodle: a course-management system for mobile phones. *IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'05)*. pp 211-215.
- Ismail, I.B., Sarah, S.M.J., and Idrus, R.M. (2009). Acceptance on Mobile Learning via SMS: A Rasch Model Analysis. *International Journal of Interactive Mobile technologies (iJIM)*. Vol. 4(2), pp. 10 – 16.

- Jacob, S. M., and Issac, B. (2007). Mobile Learning Culture and Effects in Higher Education. *IEEE Multi disciplinary Engineering Education Magazine*. Vol. 2(2), pp.19 – 21.
- Jacob, S. M., and Issac, B. (2008). The Mobile Devices and its Mobile Learning Usage Analysis. *Proceedings of the International Multi Conference of Engineers and Computer Scientists (IMECS) 2008*. 19-21 March 2008. Hong Kong.
- Jairak, K., Praneetpolgrang, P., and Mekhabunchakij, K. (2009). An Acceptance of Mobile Learning for Higher Education Students in Thailand. *The Sixth International Conference on eLearning for Knowledge-Based Society*. 17-18 December 2009. Thailand.
- Joseph, Rene Corbeil and Maria Elena Valdes-Corbeil (2007). *Are You Ready for Mobile Learning?* EDUCASE Quarterly. 2:2007. pp 51-58.
- Krejcie, R.V. (1970). *Determining Sample Size for Research Activities*. Educational and Psychological Measurement, 1970, 30, pp. 607-610.
- Lodico, M.G., Spaulding, D.T. and Voegtler, K.L. (2006). *Methods in Educational Research: From Theory to Practice*. United States of America: A Wiley Imprint.
- Laouris, Y., and Eteokleous, N. (2005). *We need an educationally relevant definition of mobile learning*. Available on:  
[www.mlearn.org.za/CD/papers/Laouris%20&%20Eteokleous.pdf](http://www.mlearn.org.za/CD/papers/Laouris%20&%20Eteokleous.pdf)
- Lu, X. and Viehland, D. (2008). Factors Influencing the Adoption of Mobile Learning. *19<sup>th</sup> Australasian Conference on Information Systems*. 3-5 December 2008. Christchurch, New Zealand: ACIS, pp. 597 – 606.
- Mahendra, G., and Ela, G. (2011). Applicability of Mobile Learning Engine - Moodle in Computer Application Course. *Journal of Information Technology Management*, volume XXII (3). ISSN#1042-1319.
- Marguerite, L.K. (2009). *A Model for Framing Mobile Learning*. Mohamed Ally (Ed.). *Mobile Learning Transforming the Delivery of Education and Training*. pp 45-67. Canada: AU Press.
- Mariam. M and John. W (2008). Why Does Malaysia Need to Consider Mobile Technology? A Review of Current Practices to Support Teaching and Learning with School-age Children. *2<sup>nd</sup> Asia Pacific Mobile learning & Edutainment Conference 2008 (APAC)*. 20-21 Nov 2008. Putra World Trade Centre, KL.
- Matthee, M.C., and Liebenberg, J. (2008). Teaching Systems Architecture by Using Mobile Learning Engine (MLE) As a Platform for a Mobile Learning Project. *Proceedings of the AIS SIG-ED IAIM 2008 Conference*. 12 – 14 December 2008. Paris, France. pp. 1-6.

- Mayorga, T.M.C. (2006). *Learning Object for Mobile Learning: A Case Study in the Actuarial Science Degree*. Current Developments in Technology-Assisted Education, 2006. pp 2095-2099.
- Meisenberger, M., and Nischelwitzer, A. K., (2004). The mobile learning engine (MLE) – a mobile, computer-aided, multimedia- based learning application. *Multimedia Applications in Education Conference Mapec*, 13-15 September 2004. Austria. pp. 52-58.
- McGriff, S. J., (2000). *Instructional System Design (ISD): Using the ADDIE Model*. Instruction Systems, College of Education, Penn State University. Available on:  
[www.iacmeonline.org/system/files/meeting/IACME\\_Fall.../5.+ADDIE-1.pdf](http://www.iacmeonline.org/system/files/meeting/IACME_Fall.../5.+ADDIE-1.pdf)
- Michelle, P., and Davide, D. (2009). *From E-learning to Mobile Learning: New Opportunities*. Mohamed Ally (Ed) *Mobile learning: Transforming the Delivery of Education and Training* (pp 183-194). Canada: AU Press.
- Minovic, M., Stavljanić, V., Milovanovic, M., Starcevic, D. (2010). User-Centered Design of M-Learning System: Moodle on the Go. *Journal of Computing Science and Engineering*, Vol.4(1), March 2010, pp 80-85.
- Molenda, M. (2003). In search of elusive ADDIE model. *Performance Improvement*, 42(5), 1-4.
- Morgan, S. (2010). *Internet Trends*. Available on:  
[http://www.morganstanley.com/institutional/techresearch/pdfs/Internet Trends\\_041210.pdf](http://www.morganstanley.com/institutional/techresearch/pdfs/Internet_Trends_041210.pdf)
- Morrison, G. R., Ross, S. M., Kemp, J. E., and Kalman, H. K. (2007). *Designing Effective Instruction*. (5<sup>th</sup> Ed). Hoboken, NJ: John Wiley & Sons, Inc.
- Naismith, L., Lonsdale, P., Vavoula, G., and Sharples, M. (2006). *Literature Review in Mobile Technologies and Learning*. Future lab Series. Report 11. Available on: [www.futurelab.org.uk/research/lit\\_reviews.htm](http://www.futurelab.org.uk/research/lit_reviews.htm)
- Nedeva, V. (2005). The Possibilities of E-learning, based on Moodle Software Platform. *Trakia Journal of Sciences*, Vol. 3(7), pp 12-19.
- Park, S.Y. (2009). An Analysis of the Technology Acceptance Model in Understanding Students' Behavioral Intention to Use e-Learning. *Educational Technology & Society*, 12(3), pp.150-162.
- Paulus, I.S. (2009). Usability of E-Learning Portal and How It affects Students' Attitude and Satisfaction, An Exploratory Study. *Pacific Asia Conference on Information Systems (PACIS)*. 10-12 July 2009. Hyderabad, India.
- Pieri, M., and Diamantini, D. (2009). *From E-learning to Mobile Learning: New Opportunities*. Mohamed Ally (Ed) *Mobile learning: Transforming the Delivery of Education and Training* (pp 183-194). Canada: AU Press.

- Poon, W.C., Low, L.T., and Yong, G. F. (2004). A Study of Web-based Learning (WBL) Environment in Malaysia. *The International Journal of Educational Management*, 18(6), pp. 374-385.
- Poon, W.C., and Koo, A.C. (2008). Emerging Issues & Developments in Mobile Learning. *2<sup>nd</sup> Asia Pacific Mobile learning & Edutainment Conference 2008*. 20 – 21 November 2008. Kuala Lumpur, Malaysia.
- Sahilu, W., Wan Admad, W.F., and Haron, N.S. (2010). University Students Awareness on M-Learning. *World Academy of Science, Engineering and Technology Issue 62*. 24 – 26 February 2010. Penang, Malaysia, pp. 787 – 791.
- Saipunidzam, M., Noor Ibrahim, M., Abd Malek Foad, M.D., and Mohd Taib, S. (2008). Open Source Implementation of M-Learning for Primary School in Malaysia. *International Journal of Social Sciences*. Vol. 3(4), pp. 309 – 313.
- Saipunidzam, M., Noor Ibrahim, M., and Mohd Taib, S. (2010). M-learning: A New Paradigm of Learning Mathematics in Malaysia. *International Journal of Computer science and Information technology (IJCSIT)*. Vol.2(4), pp. 76 – 86.
- Sek, Y.W., Lau, S.H., Teoh, K.K., Law, C.Y., and Shahril Parumo (2010). Prediction of User Acceptance and Adoption of Smart Phone for Learning with Technology Acceptance Model. *Journal of Applied Sciences*. 10(20), pp. 2395 – 2402.
- Selim, Hassan M. (2003). An Empirical Investigation of Student Acceptance of Course Websites.
- Sharples, M., Taylor, J., and Vavoula, G. (2005). Towards a Theory of Mobile Learning. *Proceedings of mLearn 2005 Conference*. 25-28 October 2005. Cape Town, South Africa.
- Singh, D., and Zaitun, A.B. (2006). Mobile Learning in Wireless Classrooms. *Malaysian Online Journal of Instructional Technology (MOJIT)*, 3(2), pp. 26-42.
- Som Naidu (2006). *E-Learning: A Guidebook of Principles, Procedures and Practices*. Common wealth Educational Media Center for Asia, New Delhi.
- Tamimuddin, M. (2007). *Mengenal Mobile Learning (M-Learning)*. Available on: [http://mtamim.files.wordpress.com/2008/12/mlearn\\_tamim.pdf](http://mtamim.files.wordpress.com/2008/12/mlearn_tamim.pdf)
- Wafa’N, M., and Awatif, M. A-A-S. (2009). University Students’ Attitudes towards Cell Phone Learning Environment. *International Journal of Interactive Mobile Technologies (iJIM)*. Vol. 3(4), pp. 35 – 40.

- William H. Rice IV (2006). *Moodle E-Learning Course Development. A complete guide to successful learning using Moodle*. Packet Publishing Birmingham-Mumbai.
- Woodill, G. (2011). *The Mobile Learning Edge: Tools and Technologies for Developing your Team*. The McGraw-Hill Companies, Inc.
- Wong, H.C. (2008). *A Study on the learner readiness toward mobile learning and the effectiveness of mobile learning application in motivating learning and enhances understanding*. Universiti Teknologi Malaysia.
- Khafa, F., Caballe, S., Rustarazo, I., and Barolli, L., (2010). Implementing a Mobile Campus Using MLE Moodle. *2010 International Conference on P2P, Parallel, Grid, Cloud and Internet Computing*. 4-6 Nov 2010. Fukuoka, Japan, pp 207-214.
- Yordanova, K. (2007). Mobile Learning and integration of advanced technologies in education. *International Conference on Computer Systems and Technologies – CompSysTech '07*. 14-15 June 2007, University of Rousse, Bulgaria. pp 231-236.
- Zurita, G., Nussbaum, M., and Shaples, M. (2003). *Encouraging face-to-face collaborative learning through the use of hand-held computers in the classroom*. Chittaro, L. (Ed.): *Mobile HCI 2003*, LNCS 2795, pp. 193-208, 2003. Springer-Verlag Berlin Heidelberg.