

WOU mLearning: widening access to teaching and learning in an ODL environment

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WOU mLearning: Widening access to teaching and learning in an ODL environment

Sheng Hung Chung, Ean Teng Khor and Mohandas Balakrishna Menon

Wawasan Open University
Penang, Malaysia

This paper describes an experimental implementation of mobile-learning (mLearning) initiative in Wawasan Open University (WOU). The high penetration rates of mobile phone subscriptions and the rapid growing of handheld users show that it is viable for making inroads towards the usage of mobile devices as an alternative learning mode for distance learners in WOU. The mLearning initiative is aimed to encourage learning and interactions in WOU distance learning communities aiming to bridge the transactional distances faced by the learners and adopt mobility as the key tool in courses delivery. The WOU mLearning initiative focuses on introducing interactive mLearning approach, namely “WOU mLearning App” targeted on handheld devices to be made easily accessible through the use of tablet PCs and such other mobile devices for ODL learners in ubiquitous learning environment. The mLearning approach is considered as a learning alternative to support distance learners, mainly working adults in WOU. This research paper discusses the implementation of the mLearning approach which comprises three development phases namely: Phase I (*Readiness Study*), Phase II (*WOU mLearning App Prototype Design & Specification*) and Phase III (*Deployment & Implementation*). The focuses on the targeted mobile devices platforms and learning preferences by WOU learners are further studied and identified in the readiness study. The project demonstrates the process of using handheld devices to view the course modules, learning materials, attempt quizzes anywhere and anytime, allowing learners in engaging academic activities without the time and location barriers.

1. Introduction

As the world becomes increasingly connected, there is a need for higher education institutions to provide mobile-learning (mLearning) for accessing appropriate educational resources according for mobile learners aiming to facilitate interactive learning in Open Distance Learning (ODL) environment. According to Chung & Khor (2012), mLearning has high potential to fuel collaborative movements and increase learner's interactive through distance learning. According to Hisham (2001) and Flowers (2001), the study reveals that distance learners experienced isolation due to lack of interaction and communication with fellow learners, tutors, and the university as compared to those in traditional universities. This paper presents the development framework and the prototypes for the implementation of WOU mLearning initiative in providing content availability and flexibility across mobile learners and explains how the architecture addresses these challenges and assists in both design and experimental study. The implementation of the WOU mobile-learning approach comprises of three development phases mainly: Phase I (Readiness Study), Phase II (WOU mLearning App Prototype Design & Specification) and Phase III (Deployment & Implementation). The paper is organized as follows: Section 2 identifies the main objectives of the WOU mLearning initiatives. Section 3 reviews the case study of mLearning and relevant technologies and section 4 provides the methodology of research study. The system architecture and the WOU mLearning prototype are illustrated in Section 5 and 6, followed by conclusion in Section 7.

2. Objectives:

The main objectives of the WOU mobile-learning initiative includes:

- To support u-learning (ubiquitous-learning)
- To encourage interactive learning by providing WOU mLearning App via handheld devices
- To increase flexibility of learning by accessing course learning objects in mobile platforms

3. Literature Review:

The literature review covers studies of relevant technologies and learning theories in ODL institutions to determine the technical feasibility of the proposed approach, combining ubiquitous learning with research on the design principles for acquired mobile-learning systems. A review of mobile-learning literature presents the opportunity for conducting a study based on five aspects as illustrated in the section follows:

(I) Designs and implementations of m-learning challenges

The designs and implementation in mobile-learning focuses on mLearning approaches and identifies challenges arises. According to van't Hooft et al. (2007), ubiquitous learning (u-learning) involves learning in an environment where “all students have access to a variety of digital devices such as mobile computing devices, whenever and wherever they need them”. Pea and Maldonado (2006) cited that portability, small screen size, computing power, diverse communication networks, data synchronization and stylus input are the challenges of technology attributes in u-learning.

(II) Pedagogical Framework for m-learning

The pedagogical framework is employed as the main elements as designing the mobile-learning as a learning tool. The study conducted by Yeonjeong (2014) highlighted that transactional distance and mobile-learning are important considerations for learners completing course lessons while learning. Yeonjeong (2014) further described the technological attributes and pedagogical affordances of mobile learning in distance learning environment. The study conducted proposed the effective use of transactional distance theory using mobile-learning in teaching and learning context.

(III) Educational standards for m-learning and m-learning application development

Judy et al. (2014) pointed out the study of educational standards for mobile-learning application development is used to address the portability and development of learning materials. The examples which influence the role of educational standards includes the HTML5 (the new version of HTML) and the Experience API (the extended SCORM API) are defining a new base for content development and delivery in mLearning.

(IV) Media formats and technologies for m-learning platform

According to Uther (2002), successful mobile applications tend to employ many rich media objects, yet they should not distract from the learner's experience. Mobile-learning content can be delivered in short ‘nuggets’ rather than large units of information, which can be supported by appropriate use of different media types namely video, audio, graphics and text. Researchers and course practitioners embedding latest mLearning options such as Bring Your Own Device (BYOD), mobile social media, mobile applications (Apps) and embedded mobile sensors to bring meaningful learning in academic curriculums and training (Inge, 2014).

4. Methodology:

The following is the development phases of essential activities of the system development life cycle (SDLC) in the seven development stages illustrated in Table 1. The WOU App approach highlights new path for learning support and facilitate more widespread use of interactive mobile devices among the mobile learners.

Table 1. Mobile-Learning Development Plan with Management Control Domains

Development Stages	Activities	Management Control Domains
1.	Project Initiation <ul style="list-style-type: none"> • Calling of mobile-learning practitioners • Initial phases discussions 	Planning & Organization
2. Phase I	User Requirements Definition <ul style="list-style-type: none"> • Literature Review • Readiness Study • Dissemination of Collective Measurements 	
3.	System Requirements Definition <ul style="list-style-type: none"> • WOU App specification (receivable contents, additional features) 	Acquisition & Implementation
4. Phase II	Analysis and Design <ul style="list-style-type: none"> • WOU App architecture, process flow design • Instructional design 	
5.	System Build/Prototype <ul style="list-style-type: none"> • WOU App development 	Delivery & Support
6. Phase III	Implementation and Testing <ul style="list-style-type: none"> • Experimental Design • Experimental Results • Discussion • Conclusion 	Monitoring & Evaluation
7.	Sustainment	

4.2 Research Process

This research integrates WOU ubiquitous learning environment which adapts innovation platform technologies using Xcode from iOS platform devices to create WOU learning App. The application design and testing process are presented in development stages are showed in Figure 1. The following mobile-learning readiness study is developed aiming to serve the investigation of two main components mainly technical aspect and summary of profile; requirements and perception on mobile-learning.

4.3 Phase I: WOU Mobile-Learning Readiness Study

The readiness study is proposed to determine the readiness of WOU learners in mobile-learning and highlight the specifications prior to the development of WOU Learning App in WOU. The readiness study as illustrated in *Appendix I & II* covers the determinacy of learners in terms of mobile-learning technology as an additional learning mode in ODL environment. The readiness study in *Component I* covers the determinacy of learners in terms of mobile technology as an additional learning mode in ODL environment. In *Component II*, the study explores the factors, navigations and design requirements of mLearning environment in WOU. The readiness study focuses on the following aspects and data collections:

Component I: (Technical aspects and summary of profile)¹

- i. Mobile devices platforms
- ii. Tablet PC platforms
- iii. Profile of mobile-learners (respondents)
 - a. Geographical distribution
 - b. Gender distribution
 - c. Educational funded learners

Component II: (Requirements and perception on mobile-learning)²

- i. Requirements, navigations and specifications of mobile-learning user interface
- ii. Preferable learning content in mobile-learning (audio, video, course

¹ *Readiness Study (Component I)* survey focuses in investigating the technical aspects and learners' profile in mobile-learning readiness study for WOU learning environment.

² *Readiness Study (Component II)* survey investigate the requirements and perception on mLearning.

- materials, simulations)
- iii. Additional receivable features (quizzes, reminder/notifications, announcements)
- iv. Perception on mobile-learning
 - a. Assist in self-learning
 - b. Attraction and motivation in learning
 - c. Flexibility in learning

4.4 Phase II: WOU App Prototype Design and Specification

- Identification and evaluation of feasible WOU App platforms and features
- Prototype development of WOU App (iOS)
 - i. **Xcode** development environment
 - ii. Testing and debugging application using **iOS Simulator**
 - iii. User Interface design using **Interface Builder**

Mobile devices use small screens, restrictive input methods and limited battery life. Therefore, the UI design for WOU App is designed in order meet users' needs without overloading them with unnecessary complexity, operating too slowly or consuming excessive power.
- Review, testing and evaluation of WOU App prototype in WOU learning environment

4.5 Phase III: Deployment and Implementation

This section indicates the submission and distribution of WOU mLearning App in *Apple App Store*, preparation of periodic project progress, final technical reports, training and documentation of WOU mLearning App. The mLearning support portal includes WOU App documentation, WOU App web portal support (<http://wouapp.wou.edu.my>), WOU App version, compliances (Development Certificate Profile, Distribution Provisioning Profile)

WOU App monitoring and evaluation

Periodic and continuous review in Stage 7: *Sustainment* (Table 1) defines regular App maintenance and adaptation upon completion of initial development and deployment. Proper enhancements and balance of features versus iOS device constraints is studied and included in future release when new mobile OS versions are released.

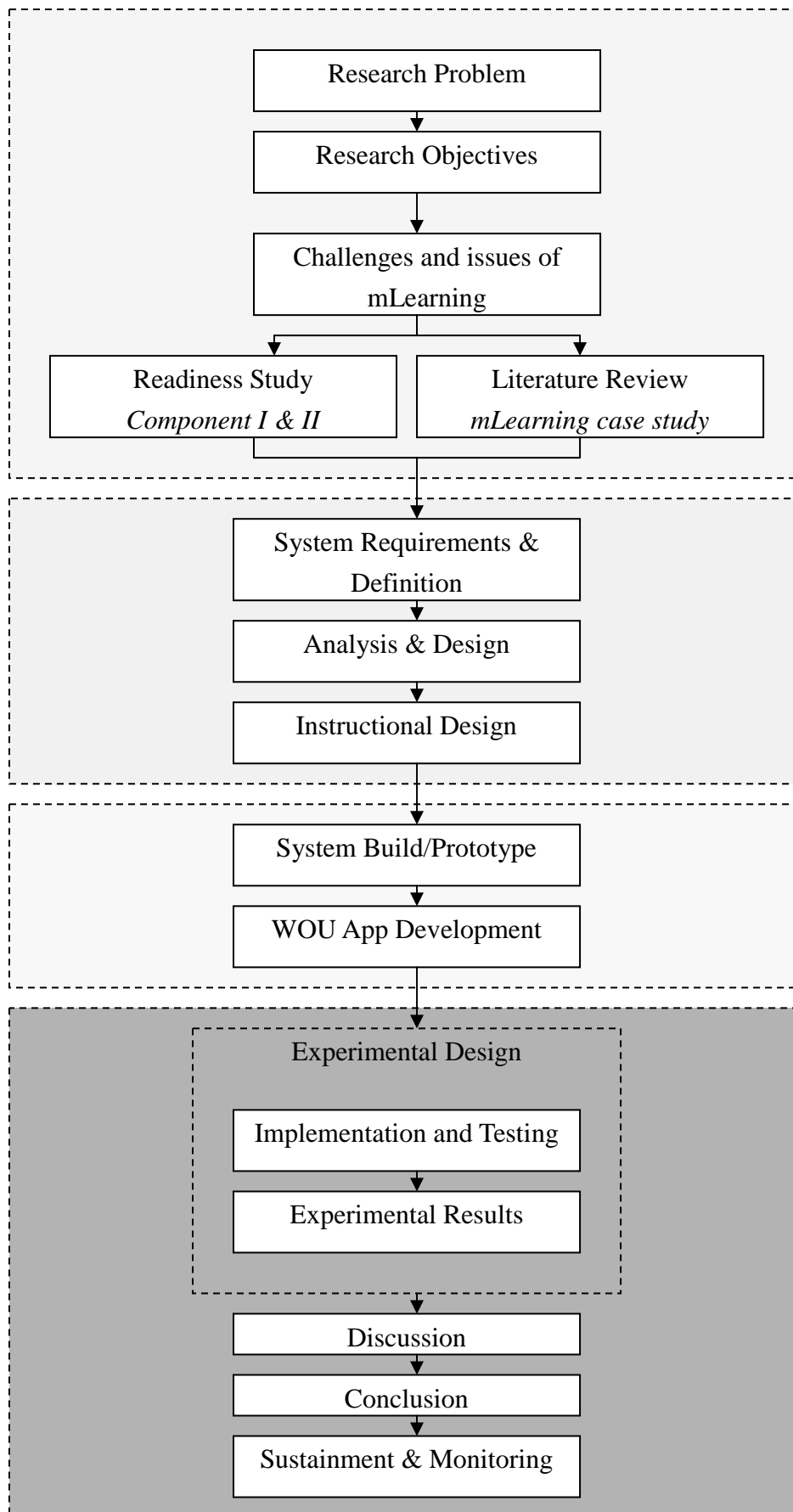


Figure 1: mLearning Research Flowchart

5. System Architecture:

The mLearning framework is designed to be implemented on WOU-level involving learners across all regional centres. This project determines the mLearning framework include aspects such as the process and message flow, system architecture. The learning experiences and reviews are also derived from the pilot study of WOU learners to track downloads, reviews and statistics on respective WOU courses. Acceptance test and experimental studies aims to gauge the acceptance level of the WOU learners towards mLearning and determine the preferable contents and framework for WOU App. The following Figure 2 depicts the work flow of tester, iOS mobile agent and program portal.

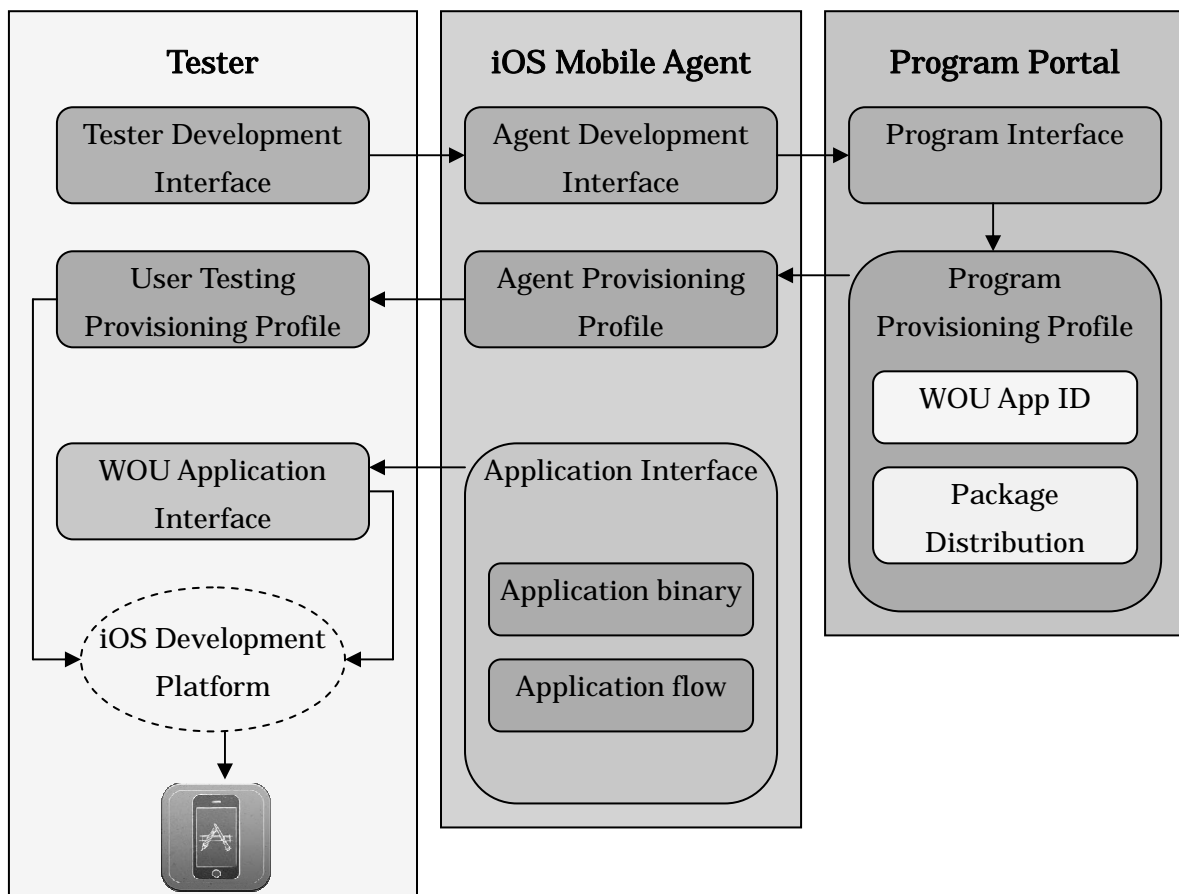


Figure 2: System Architecture for WOU mLearning

6. WOU mLearning Prototype:

In Figure 3, the WOU mLearning App interface that deployed in iOS such as iPhone (iOS version 5.2 or higher), screen size (320 by 480 pixels) enable learners to engage interactive learning which takes place via automated, real-time access of courses such as TCC121/05 Programming Fundamentals with Java, TCC238/05 Structured Programming and TAI304/05 Fundamentals of Artificial Intelligence. The WOU mLearning App prototype provides the alternative to course materials for learners taking various courses offered in undergraduate programmes in WOU such as *Quizzes*, *Extra Resources*, *Social Wall* and *Announcements*.



Figure 3: WOU mLearning App
Main Menu



Figure 4: WOU mLearning App
Extra Resources

Figure 5 highlights the *Social Wall* to facilitate discussions and study groups enrolled by the learners. The *Social Wall*'s functionality emphasizes on the “collaborative” and “personalization” core educational concepts of mobile-learning which stimulate the generation of ideas and opinions. Figure 6 illustrate the *Announcements* feature which provides reminders, alerts, events initiated by the course providers.



Figure 5: WOU mLearning App
Social Wall



Figure 6: WOU mLearning App
Announcements

7. Conclusion:

The WOU mLearning initiative focuses on the initial study of WOU mLearning App and explains the technologies involved and development roadmap for WOU mLearning App based on iOS technology. It is hope that the WOU mLearning App approach would open up new path for learning support and facilitate more widespread use of u-learning and seamless learning environment for a fluent, motivational user learning experience. The project focuses on three main elements in mLearning, namely (i) to support u-learning, (ii) to encourage interactive learning and (iii) to increase flexibility of

learning using WOU mLearning App. The mLearning serve as learning platform to enhance learners' learning experience and encourage interactivity in ODL environment. In this study, the development team proposes the use of WOU mLearning App as the alternative delivery platform in WOU to boost the learners' motivation for lifelong learning. The learning support provided by WOU App is aimed to offer distance educational experience that encourage learning activity in the ODL environment.

8. Acknowledgement:

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References:

Chou, C.C., Block, L., & Jesness, R. (2012). A case study of mobile learning pilot project in K-12 schools. *Journal of Educational Technology Development and Exchange*, 5(2), 11-26.

Chung, S.H. & Khor, E.T. (2012). Mobile Agents Approach for Transaction Processing in Mobile Database Systems — Mobile Learning Environment, *AAOU Journal* 2012, 74-83.

Flowers, J. (2001). Online learning needs in technology education. *Journal of Technology Education*, 13(1), 17–30.

Hisham, D. (2005). The role of learning support in open and distance learning: Learners' experiences and perspectives. *Turkish Online Journal of Distance Education (TOJDE)*, 6(2), ISSN 1302-6488.

Hara, N., & Kling, R. (2001). Student distress in web-based distance education. *Educause Quarterly*, 3, 68–69.

Inge, I. de W. (2014). Using BYOD, Mobile Social Media, Apps, and Sensors for Meaningful Mobile Learning, *Educational Standards for Mobile Learning and Mobile Application Development, Increasing Access through Mobile Learning*, 113-124.

Judy, B., Michael, H., Andy, J. & Jonathan, P. (2014). *Educational Standards for Mobile*

Learning and Mobile Application Development, Increasing Access through Mobile Learning, 17-25.

Stanley, C., & Porter, E. (Eds.). (2002). *Engaging Large Classes: Strategies And Techniques For College Faculty*. Bolton, MA: Anker Publishing Company.

Pea, R., & Maldonado, H. (2006). WILD for learning: Interacting through new computing devices anytime, anywhere. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (427–441). Cambridge: Cambridge University Press.

Uther, M. (2002). Mobile Internet Usability: What Can 'Mobile Learning' Learn From the Past, IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'02), Växjö, Sweden.

van't Hooft, M., Swan, K., Cook, D., & Lin, Y. (2007). What is ubiquitous computing? In M. van't Hooft & K. Swan (Eds.), *Ubiquitous computing in education*. Mahwah, NJ: Lawrence Erlbaum Associates.

Yeonjeong, P. (2014). A Pedagogical Framework for Mobile Learning: Categorising Educational Applications of Mobile Technologies into Four Types, *Increasing Access through Mobile Learning*, 27-48.

Appendix I:

Readiness Study (Component I)

The following survey is conducted to investigate the mobile-learning readiness study in WOU learning environment. Kindly choose the best answer from the available options.

Which kind of mobile devices do you owned?

- *Smartphones*
- *Tablets*
- *Other: (Please specify)*

Which Operating Systems is running on your mobile devices?

- *Android*
- *iOS*
- *Windows Phone*
- *Blackberry*
- *Symbian*
- *Other: (Please specify)*

Kindly indicate your geographical distribution:

- *Penang*
- *Kuala Lumpur*
- *Johor Bahru*
- *Ipoh*
- *Kuching*
- *Other: (Please specify)*

Kindly indicate your gender:

- *Male*
- *Female*

Do you prefer mobile-learning as an alternative to support distance learning?

- *Yes*
- *No*

Do you think it is affordable to invest on a mobile device for the mobile-learning?

- *Yes*
- *No*

Appendix II

Readiness Study (Component II)

Which type of learning content do you think a mobile-learning app should support?

- *Audio*
- *Video*
- *Interactive Mobile Online Course*
- *Simulations*
- *Other:*

Which type of receivable features do you think a mobile-learning app should support?

- *Quizzes*
- *Reminder/Notifications*
- *Announcements*
- *Other:*

Do you agree that using mobile-learning can save the resources such as travel expenses and times?

- *Strongly agree*
- *Agree*
- *Neutral*
- *Disagree*
- *Strongly disagree*

Do you agree that using mobile-learning can achieve the effects of flexible learning?

- *Strongly agree*
- *Agree*
- *Neutral*
- *Disagree*
- *Strongly disagree*

Do you agree that the mobile-learning can assist in self-learning?

- *Strongly agree*
- *Agree*
- *Neutral*
- *Disagree*
- *Strong disagree*

Do you agree that the mobile-learning can be regarded as one of the motivation factors to encourage in distance learning?

- *Strongly agree*
- *Agree*
- *Neutral*
- *Disagree*
- *Strong disagree*