Mobile Learning Application with Cloud Computing

by

Lee Kah Shing

Technical Report submitted in partial fulfilment of
the requirements for the
Bachelor of Engineering (Hons)
(Business Information System)

May 2011

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CERTIFICATION OF APPROVAL

UTP Mobile Learning System with Cloud Service and Offline Feature

by

LEE KAH SHING

A project dissertation submitted to the
Business Information System Programme
Universiti Teknologi PETRONAS
in partial fulfilment of the requirement for the
BACHELOR OF ENGINEERING (Hons)
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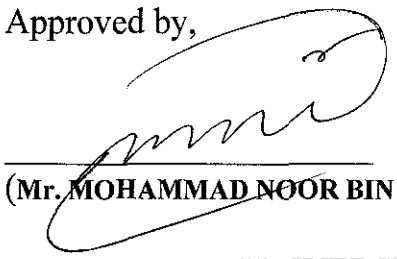
Approved by,



(Mr. MOHAMMAD NOOR BIN IBRAHIM)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2011

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my

own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

LEE KAH SHING

ABSTRACT

This project focuses on the development of M-Learning and Performance Tracking System at university level. The system provides mobility for the University students to do revision through the exercises and perform immediate tracking and analysis on the results. The project also served as a channel for students to access the latest information and news in the industry. The core problems that I had identified before I initiate this project are the immobility and limited features of current learning system which might causing the ineffective of learning among the university student. The inconvenience of the current system also included the trouble in checking their academic performance constantly from time to time.

The primary goal of this research is to investigate the acceptability of the university students of m-learning, designing m-learning features that would help students to improve their academic performance, and develop the system which is able to cater the needs and meet the expectation of the students and lecturers. The methodology adapted in this project is phased development methodology that breaks the projects into 3 stages which are development of quizzes, development of performance tracking and last stage is the library function. The process involved planning, analysis, design, and last but not least implementation. As the result at the end of the project, the result found that the project is feasible with high acceptance level from the university students who believe that mobile learning is useful in learning. However more improvement has to be made on the project especially on the performance tracking method. For future development suggestions, we can adopt several methods in knowledge management in performance tracking to provide more accurate suggestions for the students. Cross platform can be achieved by adapting the HTML5 technology into the development. Cloud computing is important for the development of smartphone program with limited memory and capacity ability.

ACKNOLEDGEMENTS

First and foremost I would like thanks God for Her wisdom and strength that God has blessed me with doing this project.

I would also like to express the greatest gratitude to my family and my lecturers for giving me a lot support and guidance to complete the project. For my supervisor Mr. Mohammed Noor Ibrahim for his patience to me in guiding me and his efforts to review on my work from time to time.

Thank You.

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Chapter 1

Introduction

1.0 Background of Study

With the emergence of cutting edge mobile technologies couple with the ubiquitous market penetration of mobile devices in the global market, mobile devices have shown a great potential to be deployed as learning tools in variety of learning context. The idea of learning through the mobile devices is widely known as mobile learning or M-Leaning.

The term of "mobile learning" in this project adopt the definition from (John Traxler, 2005): Mobile as 'any educational provision where the sole or dominant technologies are handheld or palmtop devices'. This definition mean that mobile learning could include mobile 'phones, smartphones, personal digital assistants (PDAs) and their peripherals, perhaps tablet PCs and laptop PCs, but not desktops in carts and other similar solutions. The definition should address also the growing number of experiments with dedicated mobile devices such as game consoles and iPODs, and it should encompass both mainstream industrial technologies and one-off experimental technologies.

Empirical Study from (Babita, G., Yangmo, K, 2010) stated that more and more people from all ages use mobile devices, and it appears that they are familiar with using these devices (Wagner, 2005). It is estimated that the mobile phones are currently used by 50 percent of world population and is expected to grow to 80 percent in 2013, which would be about 5.8 billion people worldwide, compared to 1.5 billion people in 2004 (IBM Study Finds, 2008; Prensky, 2004). This number is considered to be at least three times more than that of PCs (Muyinda, 2007). In the U.S., in one year between January 2008

and January 2009, the number of people who used web-enabled is prohibited. Mobile devices such as smart phones every day grew from 10.8 million to 22.4 million (Kolakowski, 2009). In 2008, the United States had 5.6% active mobile Internet usage penetration rate with 40 million mobile subscribers who use these services at least once in a month, of these about 39.2% are in age group of 18-34 years (Nielsen Mobile, 2008).

The current mobile technologies transform the current E-Learning system into M-Learning , introducing a new page of learning emphasizing on the capability of just in time learning, which learn in any at where and any in any time. With the rising popularity of mobile application in our future life in addition to the importance of knowledge and information in today society, the ability to making use of the latest technology in delivering information and knowledge in real time becoming a necessary skill in itself. Moreover, with the younger populations becoming acquainted with technology at an earlier age, the effect of learning with the latest mobile technology will be more prominent in the coming future 2012.

With the bright prospect of mobile learning, this project is introduced to design a system which includes the functionalities that suitable for the learning environment for university students. The project focuses in the effort on improving students' academic performance with online quizzes that available also offline, note taking and perform tracking on performance. Cloud computing technique is employed to manage and deliver the course material to the students.

1.1 Problem Statements

1.1.1 Immobility of current learning system

The structure of current learning system is lack of mobility due to the reason that with the traditional learning, learning can only be performed in the physical building like classroom. With the advancement of technology, E-Learning system is created to enable students to access the learning contents. However, the E-Learning system is depending on using the PCs and laptops which does not provide enough mobility.

1.1.2 Limited features of current learning system which leads to effective learning

Effective learning involves listening, reading, practicing and knowledge sharing. However, current university students in Malaysia are focusing more on the lecture notes and prone to study during the examination is coming around the corner. With this ineffective way of learning will potentially lead to the problem of insufficient knowledge and skills of current graduates in the workplace.

1.1.3 Difficulties for students to access their own performance from time to time

In the current university learning system, students might not able to check and track their coursework mark from time to time. The coursework marks alone is not sufficient to provide an overview for the students' performance and is hard for students to further improve.

1.1.4 Insufficient accessing to the news and information from industry

The rate of constantly reading newspapers and news from the industry is not high among university students are not high in Malaysia which might due to the inconvenience in accessing the latest information.

1.1.5 Inconvenience for lecturers to upload and edit the quizzes and results

With the traditional data inserting method using web form might take more time to process. In addition, it is hard and time consuming to edit if there is any changes made on a stream of data.

1.2 Objective

1.2.1 To study and investigate on the attitude, behavior and response of the university students to mobile learning.

This project is to research and study on the acceptance level of mobile learning among the university students and exploring on the potential of mobile learning to cater the needs of the students in academic.

1.2.2 To develop a just learning environment which assisting students in effective learning.

In addition, this project is also to design and develop a learning application that applying the concept of mobile learning which include the characteristics like mobility, ease of learning, and just in time learning. The system also to lead students to perform effective learning involving listening, reading, practicing, note taking, asking questions, and knowledge sharing.

1.2.3 To study and explore the potential of using cloud service to replace the current data form processing.

This project is also exploring on the potential to utilize the latest technology which is cloud computing to replace the traditional data processing. This project will study on the pros and cons of using this method and the applicability to use the cloud service with mobile learning.

1.3 Significance of the project

1.3.1 Introduce informal learning to attract the interest of students to learn.

This project is target to introduce the shift of the formal way of learning through chalkboard or even e-learning system into a more informal way of learning through mobile devices like smartphones, and PDA. The integration of social media and latest mobile and web computing technologies like Web 2.0 and android mobile computing into the learning system will help to create a more interesting and fun learning experience.

1.3.2 Help students to track and measures academic performance and predict on students' results

The project allows the students to check and measure their performance from time to time. Data mining will be performed on the students' result which will then advising the students on their strength and weaknesses and predicting the students' results according to the past final exams' results and the current coursework mark. The tool will also suggest the subject that the students need to pay more attention and the friends who might help them to improve.

1.3.3 Ease of accessing latest updates from the latest news in the industry

Besides, the project will include the tools for students to access the latest news from online newspapers like StarOnline, NewStraitTimes, BBCWorldNews, news from related field of studies, latest tools from the researches, latest careers from the Jobstreets and charity news.

1.3.4 Easing the lecturers in uploading the materials and results

The system proposes a new way for lecturers to upload the course materials and results which will save the capacity to store and manage the files, eliminate the network traffic

issues, save the efforts for the users to upload and edit on the data when there are changes made on the materials and results.

1.4 Scope of the project

The main focus of project is on how to integrate mobile computing to create an efficient M-Learning system. The application is designed mainly suitable for Android smartphones due to the capabilities of smartphones to connect to the Internet. Besides, the application is specially designed to cater the needs or higher education students due to the reason that university students have more purchasing power to buy smartphones. The focuses of this project are on course delivery and encourage students on exploring knowledge.

1.5 Research Questions

1.5.1 How do mobile device users use their mobile devices support intentional informal learning?

1.5.2 What is the latest mobile technology can used to transform the conventional learning process to a new way of learning which is more suitable for the future generation?

1.5.3 What is the attributes that M-Learning should have to attract can mobile device users to use their phone as a learning tool to improve the students' academic performance?

1.5.4 What are the challenges and limitation of using mobile devices as a learning tool?

1.5.5 What are the challenges of the cloud services and how cloud is applicable to mobile application?

Chapter 2

Literature Review

2.0 Concept of M- Learning

Few years ago, E-learning tools had been invented to facilitate distance and face-to-face tertiary education, particularly in forming collaborative, reflective, student-centralized learning environments (JISC, 2004). The drastic advancement in technology especially in the mobile technologies, couple with the increasing affordability of students to own a smartphone has led to the trend of M-Learning. A review of current practice suggests that mobile and wireless learning is the natural next step wherever institutions and practitioners have already adopted e-learning (Knight, 2005).

M-Learning or mobile learning as mentioned above defined by Alexander, Br (2004) is learning that is wireless and ubiquitous so the idea of wearable computing is very well applied to m-learning and the main context in this form of education is to provide flexible education that could assure mobility to the learners. While according to Wikipedia, mobile learning is defined as any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies.

According to KorneliyaYordanova (2007), M-Learning is evolution of traditional learning and distant learning to E-learning and CSCL, finally led to M-Learning. Learning types evolution presented in details in is shown on Figure 1.

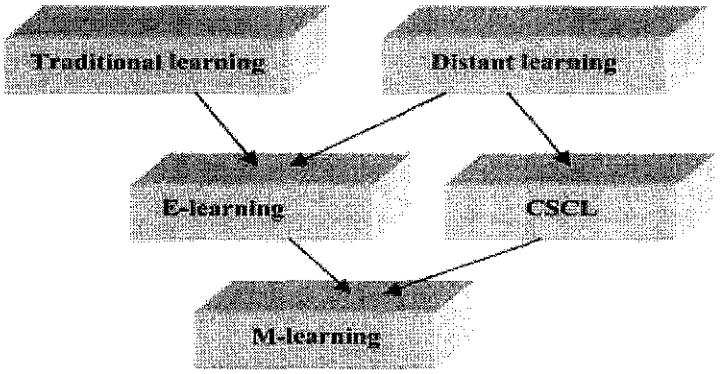


***Figure 2.1.*Learning types evolution.**

Source: "Mobile Learning and Integration of Advanced Technologies in Education," by Korneliya Yordanova,2007, p. 23.1.

He also stated that the fundamental elements of mobile learning are mobile technologies, mobile devices, wireless protocols, wireless language, and wireless applications which all together allow mobile application to be designed and developed using wireless languages like Wireless Markup Language (WML) and wireless protocols like markup used in mobile phones with Wireless Application Protocol (WAP) which are shown in the Figure 2 below.

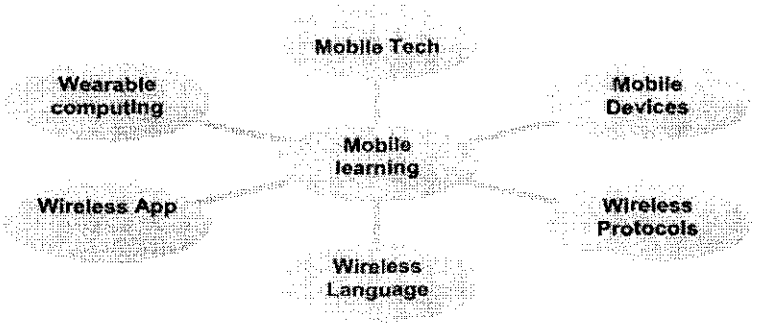


***Figure 2.2* Elements of m-learning and integration of wearable computing.**

Source: "Mobile Learning and Integration Of Advanced Technologies in Education," by Korneliya Yordanova,2007, p. 23.2.

M-Learning is highly related to constructivist learning which has taken on increasing attention recently in the popular shift of instructor and learner roles toward a learner centric model. Constructivism emphasizes the ability of learners to build their

own knowledge. With presence of high end mobile technologies as mentioned above, it opens up the possibility of extending ubiquitous accessing and sharing of data resources.Mobility is quickly being embraced by the learning community and promises to effect dramatic changes (Chwen-Fu Horng, Gwo-JiunHorng,& Chung-Shan Sun, 2007).According to KorneliyaYordanova (2007),besides of mobility, mobile society also demand for better communication and collaboration which require a new form of education to be developed and it should offer high level of collaboration and flexibility adapted by information intensity matrix developed by Porter and Millar (1985).

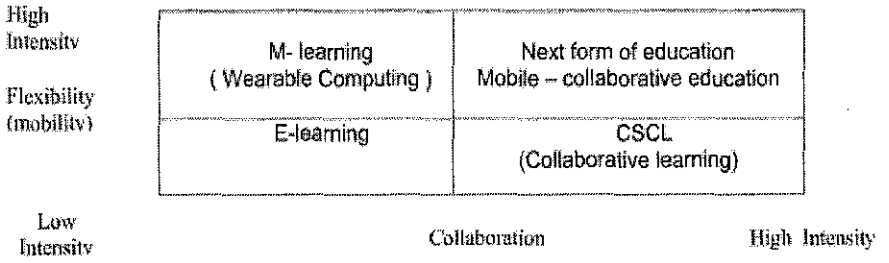


Figure 2.3 **Collaboration/Flexibility intensity matrixes**

Source: "Mobile Learning and Integration Of Advanced Technologies in Education," by KorneliyaYordanova, 2007, p. 23.5.

2.1 Concept of Personalized Learning

With the growing appreciation of individual preferences and aptitudes has led toward more "personalized learning," in which instruction is tailored to a student's individual needs. Personal learning approaches range from modules that students can master at their own pace to computer programs designed to match the way it presents content with a learner's personality.(Grand Challenges For Engineering, 2010, "Advance Personalised Learning"para. 3). Personalized data consider 6 contextual elements in learning environment which are location, time, network performance, network type, and mobile device type. Personalized data (Pi)for learner i is expressed in the formulaP i = (L i , T i , U i , D i , N i , M i). In this formula, Li is refer to location, Ti is refer to the time, Ui is upload speed by the mobile device, Di is download speed, Ni is the network type and Mi is the mobile device. While learning content in personalized learning contains many different items, such as a web page may contains text information, image, and audio, which is described in the formula C = (I 1 , I 2 ,..., I n).n is total different item in the learning content. Each item (I i) of learning content has two vectors: feature vector of item and personalize feature vector of item, which is described inthe formula I i = (fv i , cfv i and fvi=(f i1 , f i2 , f i3 , ..., f in). Each f ijin vector represents a feature value of item i. Whilecfv i =(w i2 , w i2 , ..., w im) shows that each w ij in vector represents a weight for each personalize content; n is the total count of item features; m is the total count of personalize content considered in system.(Kim Svetlana

, YongIk-Yoon, 2009)

2.2 Related Architectures

The successful m-learning system requires a different framework and architecture different from e-learning system which highly supports security, portability, and personalization. Started with the functional framework, Patten, et al (2006) developed a functional framework forcategorizing formal mobile learning applications as stated in Fig 4.

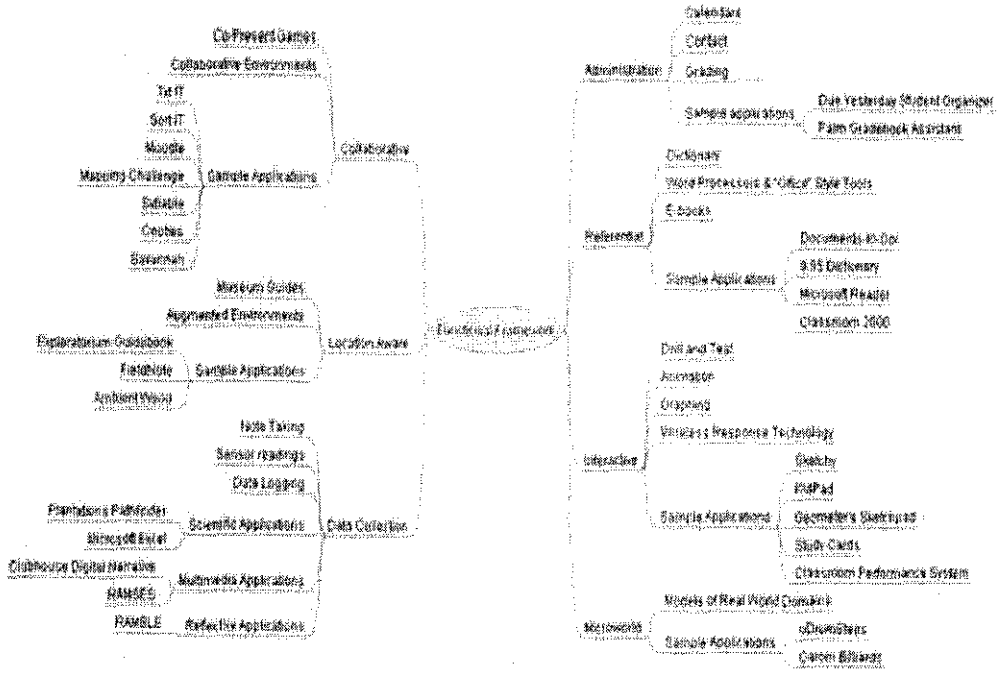


Figure 2.4 **Mobile learning functional framework**

Source: "Designing collaborative, constructionist and contextual applications for handheld devices" byPatten B., Arnedillo Sanchez I. & Tangney B., 2006.

According to this framework, mobile learning applications are subdivided into seven categories which are collaborative, location aware, data collection, administration, and referential, interactive and micro world. It then analyzed each application in terms of its function and combined these two perspectives into a single framework. This framework provided the initial basis for analyzing the informal learning activities undertaken by the mobile device users in this study. However, further analysis revealed that many of the informal learning activities reported by the participants did not fit neatly into this model.

Some appeared to span two or more nodes of the framework. Others did not readily fit intoany. The Patten et al. (2006) framework wasdesigned to help analyze learning applications that could be loaded onto a mobile device and the effects ofmobile Internet connectivity were only covered in thecollaborative category, where Wi-Fi-supported applications

In addition to the functional framework, Kim Svetlana and Yonglk-Yoon (2009)suggest the ALVC (Adaptation Learning Video Content) architecture with the aims to produce video lectures for generic mobile devices, devices with different computational and storage characteristics, from simple video players to PDAs, (from iPods to smart phones).The core components of architecture as shown in Figure 1 are Adaptation Engine (AE), Personalize Engine (PE) and MPEG-21 IPMP/DRM Security Learning Content (SLC). Device/browse Repository takes responsibility for detecting all capabilities (memory, screen size) and detects the contextual information of users, such as location, time, network performance using MPEG-21 Usage Environment Description (UED) framework.

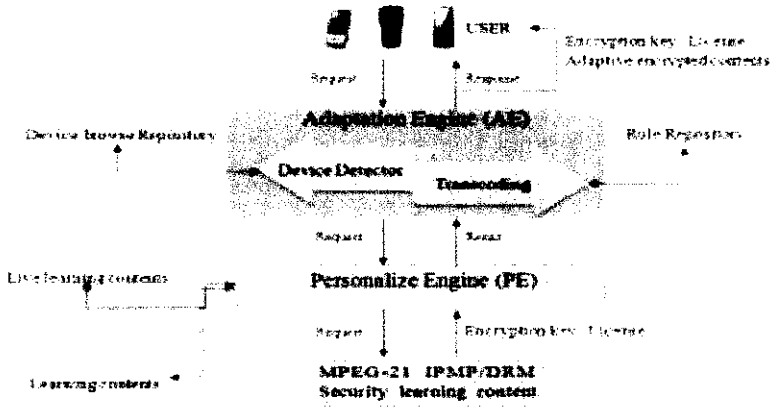


***Figure 2.5* ALVC Architecture**

Source: "Adaptation E-Learning contents in mobile environment" byKim S., Yonglk Y., 2009.

First ALVC identified a set of representative scenarios considered by the most relevant DRM initiatives, including content download, streaming and distribution. Second it chooses MPEG-21,the most general and standard DRM initiative to provide general mechanisms for the management of security in information (licenses and keys). The next level Personalize Engine (PE) contains many different conversion engine for media, such as text, image, standard document, audio and video. After PE parses transcoding request from adaptation engine (AE), it choose a conversion engine to transform contents into adaptive content and responses the transcoding result (DIDL) to ACDE. In AE research, it adopts the Open Mobile Alliance (OMA) standard Digital Item Description Language (DIDL) format for transcoding user request and result. Adaptation Engine is a most important component in adaptive system. It recommends the adaptive learning contents based on learner's contextual data: content features, device capabilities, and learner's preference and experience. The recommended contents are adapted to learner, also to mobile device (Kim Svetlana,YongIk-Yoon,2009)

2.3 Advantages of Mobile Learning

Without doubt, the greatest advantage provided by mobile learning is mobility. According to El-Hussein, M. O. M. and Cronje, J. C. (2010), e-learning is mediated by personal computers and mostly bound by location and time because of the configuration of a personal computer. The computer has no wireless learning tool linked to the Internet, which means that one must always work in one place at a particular time determined by availability and connectivity. But with mobile learning, learning can occurs at any place and at any time. Non-portable personal computers are too heavy to move easily and so learners are compelled to work in the same place and during the time slots allocated to them by university authorities. By contrast, learning with mobile is nomadic, and does not depend on the hardware installed in one particular location. This will allow the users to access the learning content just at anywhere they want with the condition that they have the mobile devices with them.

At the same time, mobile learning devices also have the capacity to enhance a learner's sense of individuality and community as well as his or her motivation to learn through participation in collaborative learning. These devices stimulate a learner's sense of ownership of the content as he/she participates actively in a variety of social, collaborative and cooperative activities - all of which are centered on the mobile learning device. (El-Hussein, M. O. M., Cronje, J. C., 2010)

Uden (2007) observes: "Mobile technologies offer new opportunities for students' educational activities in that they can be used across different locations and times. Students using mobile technologies are not only remote from their instructors; they also fully control the access of information on their mobile devices. In this light, one of the main advantages of mobile learning is that it allows this generation of learners to enjoy a certain amount of freedom and independence." For Banks (2008): "further studies are painting a picture of today's youth becoming increasingly comfortable and accepting of their new digital lifestyles, powered by technology such as mobile phones. These phones are, enriched by portable entertainment devices such as iPods, digital cameras, Sony

PSPs, and Nintendo's Gameboy. Friendships are made, maintained and lost online often in virtual worlds and on social networking sites such as MySpace and Facebook. Much of what we are seeing today—generally out of the classroom but increasingly in it—is technology-driven, but this technology is not universally accessible to all" (Banks, 2008)

Anuj Kumar 1 ,AnujTewari, et.al (2010) stated that mobile device is a low-power device that can be used in places without reliable electricity. He stated that even though it is largely purchased for voice communications, however, it is also able to run educational software that support visuals and voiceovers. He added that most of all, the cellphone is the fastest growing technology platform in the developing world. There are 2.2 billion mobile phones in developing regions like Africa and India, as compared to only 11 million desktops. Looking at this trend, cellphones show the potential to be deployed in schools in developing countries and facilitate informal learning in out-of-school environments so as to complement formal schooling. This might be a great advantages to the underdeveloped regions, particularly rural areas, many schools are not only poorly equipped or lack highly-trained teachers. Moreover,Anuj Kumar, AnujTewari, et.al (2010) also emphasis that multimedia mobile applications for cellphones in developing regions could be designed so as to perform less energy-intensive computations that drain their batteries less quickly. Likewise, cellphones for emerging markets could be sold with hand-operated power generators . With this it will help to cater the electricity barrier in learning at developing country.

Mobile learning devices also have the capacity to enhance a learner's sense of individuality and community as well as his or her motivation to learn through participation in collaborative learning. These devices stimulate a learner's sense of ownership of the content as he/she participates actively in a variety of social, collaborative and cooperative activities - all of which are centered on the mobile learning device. (El-Hussein, M. O. M., Cronje, J. C., 2010)

Mobile learning devices have also enriched the theory and practice of e-learning. Contemporary consumers of higher education in developing countries almost always use mobile learning devices as adjuncts to e-learning in higher education. Sophisticated mobile devices are currently capable of delivering a comprehensive range of e-learning materials by means of web connections , infrared and bluetooth transmissions.(El-Hussein, M. O. M., Cronje, J. C., 2010) For Ally (2005) "mobile learning is at theintersection of mobile computing and e-learning; it provides accessible resources wherever you are, strong

search capabilities, rich interaction, powerful support for effective learning and performance-based assessment".

2.4 Challenges of Mobile Learning

Although mobile device is more economic and flexible in term of accessinginformation, the lackingof specifically designed accessibility features and tools are still the bottleneck in the effort toward M-Learning. Careful study on the challenges of m-learning is important to identify the suitability of the M-Learning adoption to avoid negative impact on the future generation.

First challenge is the acceptance level of Mobile-Learning. Despite widespread enthusiasm, m-learning is still in an embryonic stage, and its theoretical underpinnings have not yet matured (Muyinda, 2007). It is important to note that in m-learning contexts learners are trusted with great autonomy and that they are in charge of their own learning. Unlike learning in conventional formal contexts, the use of m-learning is still a new approach rather than a compulsory responsibility. Hence, the key issues for the success of m-learning depend on an individual's subjective willingness and cognitive engagement in m-learning activities (Yong Liu, Shengnan Han 2010).

Based on two m-learning projects in the UK and a review of usability findings from the empirical studies of m-learning, Kukulska-Hulme (2007) points out that m-learning activity continues to take place on devices which are not designed for educational use, and that therefore usability issues are frequently reported. These issues may include physical attributes (e.g. size, weight, memory, and battery life), content and software applications (e.g. students seem to be more comfortable with built-in functions), network speed and reliability, and physical environment (e.g. use in rainy conditions, risk of loss and theft).

Another key issue which is critical in the implementation of the M-Learning is cited by Kim Svetlana and YongIk-Yoon (2009). They point out that mobile learning may favor technologically advanced students and the large variety of learning devices and cause lectures to be encoded in several formats. However being a digital media, and data resourcesfor examplevideo lectures might be subject of intellectual properties and

copyright issues especially the sharing capability is enable the resources to be shared to the wide range of community.

2.5 Related Successful M-Learning Application

In a research by ShuangBao Wang, et.al (2009), a web portal with online training, resources, events, standards of learning (SOL) and assessments for K-12 educators was constructed to enable teachers to continue their studies and trainings throughout their teaching career. Learning and training content is easily delivered to anyone, anywhere, at any time. As a result of the research, they prove the success of ubiquitous m-Learning and m-Training with their system monthly traffic over 30,000, the system has been used by most schools in the state of Virginia. The average time spent on the site is about 200 seconds and pages-per-visit is around 20.

Another successful application is GPS-enabled Mobiles for learning Shortest Paths application which is developed by Jason J Holdsworth and Siu Man Lui (2009). This application is named as PathFinder, it offers a new and unique user experience which allow the user's real-world movements in outdoor (outside in a field) to control a program running inside the mobile phone. PathFinder is a simple application that allows a student to explore simple graphs loaded into the program. These graphs were designed to demonstrate to the students that a shortest path is not always obvious, without presenting them with overly complex task. The shape of the graphs matches how they are displayed on screen. The application allows a student to explore these graphs in a way similar to the algorithmic process of Dijk-stra's shortest paths algorithm. By moving around, the GPS data changes and we show this as a moving cursor location (the white square) within PathFinder's graphic display.

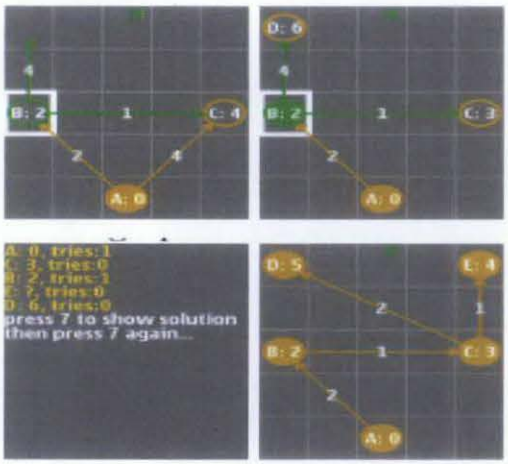


***Figure 2.6* PathFinder Program**

Source: "GPS-enabled Mobilesfor learning Shortest Paths"byJason.J, Siu Man Lui (2009).

The next successful application is Mobile G-Portal Supporting Collaborative Sharing and Learning in Geography Fieldwork by Yin-LengTheng, et.al(2007).The Mobile G-Portal system was inspired by the increasing focus on the mobility of new digital devices to provide "just-in-time/just-enough" information for effective learning and teaching. Focusing on the fieldwork component in the geography syllabus for secondary schools students in Singapore, a new application on the Mobile G-Portal was built to study the outdoor microclimate around the neighborhood of a local school. Mobile G-Portal, implemented as a client system on the PDA, is responsible for data collection, temporary storage and data formatting for transfer (see Figure 3). It accepts location information (e.g. longitudes and latitudes of all the location points of interest and special notices for them if there is any), and uploads the collected data for the fieldwork in XML format to a PC containing middleware – the Mobile G-Portal Desktop Client. After all the data collected for the fieldwork has been obtained, the Mobile G-Portal Client combines the data from different groups, converts it into a standard format compatible to the G-Portal system and uploads it to G-Portal. The G-Portal System with its wide range of capabilities is the final destination of the fieldwork data. Students can access and analyze the collected

data over a period of time from G-Portal. Teachers are also able to interact with students and work together on the collected data via G-Portal as well.

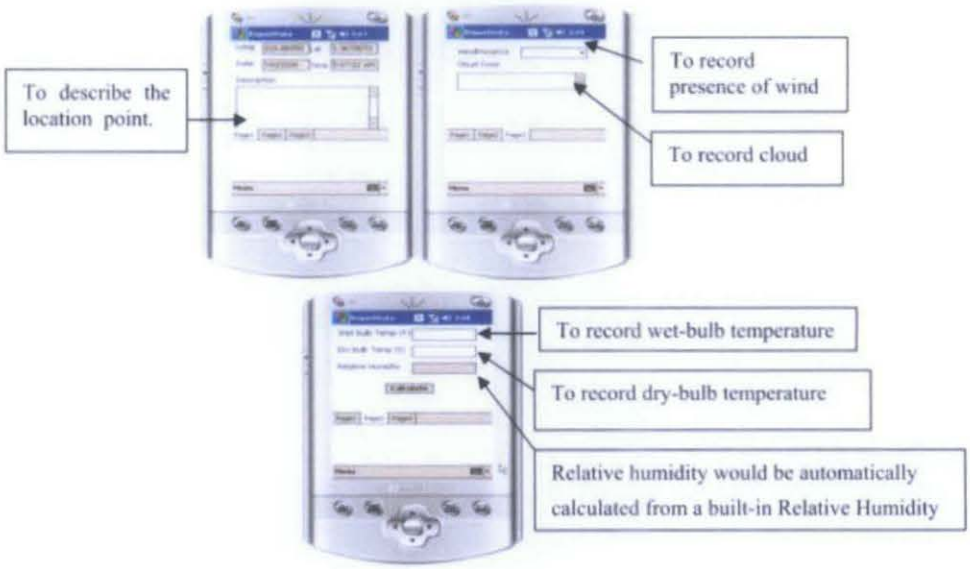


Figure 2.7 **Client Application of the Mobile G-Portal**

Source: "GPS-enabled Mobilesfor learning Shortest Paths" by Yin.L, et.al, 2007.

2.6 Comparing Existing Applications

In the current mobile learning market, there are several LMS systems available such as Moodle, Blackboard Mobile, Chalkboard Mobile, Angel and etc. These LMS systems provide complete online course that can include multimedia content for mobile learning. LMS system differentiates from each other in term of features, cost and version.

Difference between for Angel, Blackboard Mobile and Moodle will be shown by Table1.

Table 2.1: Comparison on Angel, BBLearn 9.0 and Moodle 1.9. Retrieved from http://juliaitani.wordpress.com/2010/05/17/angel-vs-moodle-vs-sakai-vs-blackboard-which-lms/

	Angel 7.3	**BBLearn 9.0**	**Moodle 9.1**
Browser Support	IE 6 and IE7, Firefox, Safari, Chrome	IE6 and IE7, Safari, Chrome	IE6, IE7, Firefox, Safari and Chrome. Have some CSS Issues
Usability	GUI is pleasant, font type is readable, clean, system colors are agreeable to the eye; "L" shape menu composed by left iconic bar and horizontal top tabs menu – tabs are worded with nouns and verbs that	GUI is polluted and busy with too many resource blocks/menus. The "L" shape menu composed by a horizontal top tab menu and a worded menu on the left side confuses the users with the other	GUI offers a great deal of customization through upload of CSSs. The original Moodle theme is not very appealing but Moodle Themes are freely and easily downloadable from moodle.org where user can upload any tailored CSS.

	communicate clear functionality; iconic menu is not worded which may confuse the user to distinguish top and left menu.	menu on top of the page. The color palette is pleasant to the eye. Font type is good and readable. Breadcrumbs are fairly comprehensive. The content areas in the LMS are generally visible and well divided. It is clear where a menu goes and where content goes.	
Number of "Home Pages"	Two – a system home page (after login) and a course home page. Fewer areas to confuse the user.	There are 3 home pages: System home page (after login), institution's home page, list of courses home page and course home page.	System home page (after login) ; course home page
Mobile support	User can activate PDA mode reading from home page	BB developed a free software for iPhone and iTouch access to BB	Some users claim to be able accessing Moodle through some Smart Phones or PDAs. It's not

		Learn 9.	an official feature though.
Calendar	Directly editable - user can click on a given date in the calendar and edit an event.	Not directly editable. Faculty/editor can create only a personal event.	Not directly editable. Editors may add a new event by opening a specific calendar month and press a "New Event" button.
Communication tools	Standard communication tools - mail messages and chat. Include also discussion boards, and office hours as chat.	Standard communication tools - mail messages and chat. Include also discussion boards, and office hours as chat.	Standard communication tools - mail messages and chat. Include also discussion boards.
Learning Repository	Allow editor/faculty to easily work on content without having to publish it first and run the risk of students viewing it. When editing work is done inside the LMS user can choose to either link or import entire	Contains a file manager resource. It also provides the user a "Content" area in which the user can work on "My Content", "Course Content", "Institutional Content", "Library Content", "Portfolio" - too many options.	Users can easily and directly add, edit, indent items in the course outline. Also, a File Manager can be used as a learning repository to upload all contents at once and linking them to a course later.

	content to a specific course - this publishing option. This can also be difficult when you'd like to publish a new material directly into the course.		
Content organization / navigability	Expandable Lesson tree ("Map") on the left side helps student to find themselves within the course's linearity; Content area is large and provides a better reading area to students; it provides Navigability with "Previous" and "Next" links without having to go back to the menu	Course outline utilizes icons that are too large. Faculty/editor can select content window to be displayed in full window. But content window it doesn't provide navigation buttons to enable content navigability.	It depends on the Moodle Theme being used. Some themes are very clean and usable. They present course outlines in an organized fashion.
LMS is great because...	GUI is very user-friendly, look-and-feel is pleasantly visual. So far	"Past due" resource that shows students on	It's PHP - a simple programming language for customization. It's open source - you can

	faculty has been keen towards this interface.	their late activities	create new applications tailored to your institution's needs. You can create a system role and assigned extra roles to each user through Admin.
Web2.0	Blog, Wiki, Forums, AJAX-enabled interface - users can drag resource block within the menu	Blog, Forums, Ajax-enabled interface editors or faculty may drag resource blocks to rearrange menus.	Ajax-enabled for menu content. It's notdrag'n'drop but, depending on the selected theme/skin user can move blocks/menu of position inside the home page. The resource blocks edited by a teacher or a course editor will show only for a specific course. Modifications done by administrator, however, can be selected to be shown in all courses which is referred as to system editing.
Reports	Per achievement (content, learning outcome, grades etc), per activity,	Per group, per forum	Per course, per group, per user, per date, per activity / Shows log reports on two main area: performed actions and

	per user, per date		participation within LMS
Services &Support	Angel offers third party support an institution gets depending on the price paid. It's divided in Tier 1, Tier 2, and Tier 3. They also have an online documentation as well as training, and consulting (also paid but not included in the original price). Documentation includes installation, programmer's manual, and end-user guide (not public)	Blackboard offers 24/7 support included in the application's pricing. It's also divided in Tier 1, Tier 2, and Tier 3.	MoodleRooms offers support under a maintenance package contract. Moodle.org has an extensive "Community" forum where you can find or post any questions users have. Http://docs.moodle.org contains all necessary documentation for Moodle's use.
Third parties Integration	ePortfolio	Wimba Classroom	Google

2.7 Review on Technologies that applicable

Mobile Devices like Apple's iPhone and Android-based systems increased the popularity of smartphones for private users. These devices provide different user interfaces like touch screens or keyboards. Some devices are designed to be used with a stylus pen; others are controlled with the bare finger. Moreover, device-specific screen sizes and resolutions require adapted graphical user interfaces. We can make full utilization from these features to design application and special function that can help to provide convenience to the learning process.

Android

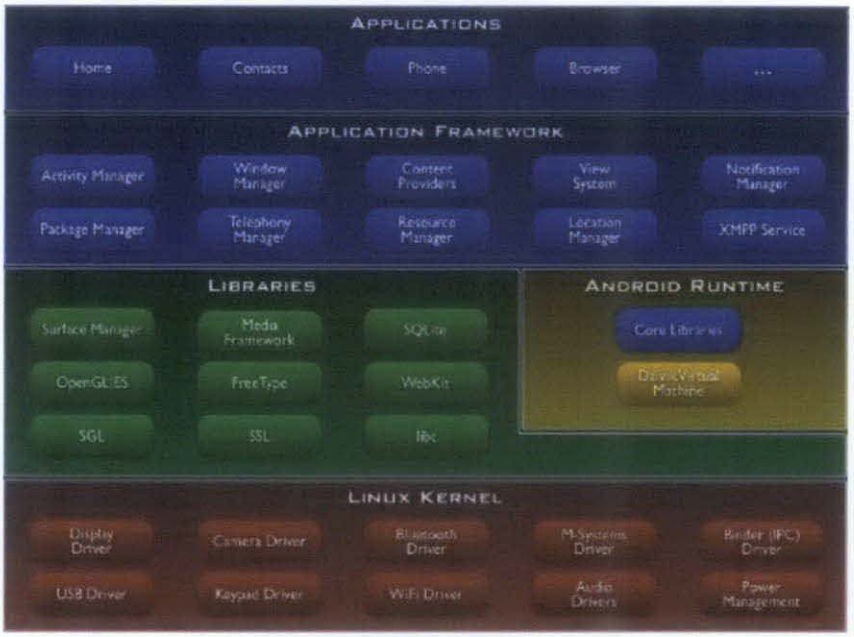


Figure 2.8 Android operating system architecture

Source: http://developer.android.com/guide/basics/what-is-android.html

Android was built from the ground-up to enable developers to create compelling mobile applications that take full advantage of all a handset has to offer. It was built to be truly open. For example, an application can call upon any of the phone's core functionality such as making calls, sending text messages, or using the camera, allowing developers to create richer and more cohesive experiences for users. Android is built on the open Linux Kernel. Furthermore, it utilizes a custom virtual machine that was designed to optimize memory and hardware resources in a mobile environment. Android is open source; it can be liberally extended to incorporate new cutting edge technologies as they emerge. The platform will continue to evolve as the developer community works together to build innovative mobile applications. Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. For example, Android enables developers to obtain the location of the device, and allows

devices to communicate with one another enabling rich peer-to-peer social applications. In addition, Android includes a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications. (Android Developer, n.d.)

iOS

iOS which is also known as iPhone OS is Apple's mobile operating system. Originally developed for the iPhone, it has since been extended to support other Apple devices such as the iPod touch, iPad and Apple TV. Apple does not license iOS for installation on third-party hardware. In the last quarter of 2010, it had a 16% share of the smartphone operating system market in terms of units sold, third behind Google's Android and Symbian. As of May 2010 it accounted for 59% of mobile web consumption (not including the iPad) in North America.

Cocoa is Apple's UI framework which is what developers interact with, and the main development language is Objective-C. In Apple's case, there is no real need for a virtual machine as they control the whole environment – from chip to application to the final device. (Mac OS X Developer Library, 2010)

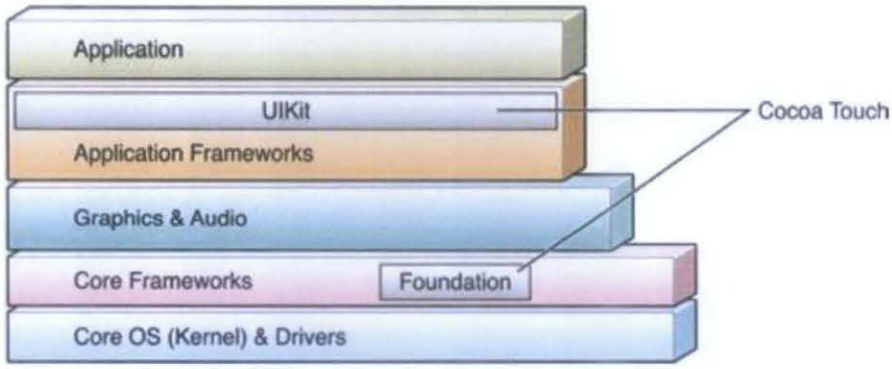


Figure 2.9 **Mapping of Cocoa into Ios operating system architecture**

Source:http://developer.apple.com/library/mac/#documentation/Cocoa/Conceptual/CocoaFundamentals/WhatIsCocoa/WhatIsCocoa.html

Window Mobile 7

Windows Phone 7 is the latest mobile operating system from Microsoft. It is a clean break from previous Windows Mobile operating systems, such as WinMo 6.5, and offers .NET developers a chance to get in on the mobile application explosion that has happened in recent years. Windows Mobile 7 development is done using the .NET framework. The .NET framework is a software framework created by Microsoft for use in creating Windows applications. Programmers write applications using one of the several languages supported by the .NET framework, like C#, and the applications then execute inside of a runtime environment called the Common Language Runtime.

There are two distinct development approaches to create the application.The first approach is to use Silverlight for Windows Phone. Silverlight was originally envisioned as a way for developers to create rich internet applications. Alternatively, we can use the XNA framework to develop Windows Phone 7 app. XNA is Microsoft's game development framework and has been used in recent years to create both Windows and Xbox 360 applications.

Web 2.0

According to Wikipedia, the term web 2.0 is associated with web applications that facilitate interoperability, user-centered design, and developing the World Wide Web. A Web 2.0 site allows users to interact and collaborate with each other in asocial media dialogue as consumers of user-generated content in a virtual community, in contrast to websites where users are limited to the active viewing of content that they created and controlled. Social networking sites, blogs, videosites, hosted services, web applications, mashups and folksonomies are all examples of Web 2.0.

HTML5

According to Wikipedia, as the mobile application space continues to explode, developers are increasingly using HTML5, JavaScript and CSS3 to aid in the creation of web apps and native mobile apps. HTML5 is especially useful when dealing with cross-platform development or when working with content that already exists in some form on

the web. With developers can feel free to use those technologies when creating their applications and not have to worry that the device itself won't support a particular function.

CHAPTER 3
METHODOLOGY

3.0 System Methodology

The development of the project adopted phased development methodology that breaks the projects into different phases. The first stage of the development is gathering information, planning and performing feasibility analysis on the projects and refining the scope of the project.

The following phase of the development will focus on completing the first version of the prototype which includes only the fundamental functions of the system. The process involves analysis, design, and implementation which focus only on developing the main functions of the system. Functionalities of the first version of prototype include learning tool that allow users to register to use the system, do quizzes using smartphones, and sending inquiries regarding to particular topic and read lecture notes.

After the first version is completed, the new ideas and users' experience which collected from the review of the first version of the system will lead to the second version of the system. New functionalities and improvement from the first version of the system are added to the second version of the system. Analysis, design and implementation again will be performed for the second version of the system. Added functionalities are performance tracking on the students result and analyzing on the students' results.

The last version of the system including all functionalities with digital library accessing to the information and knowledge that related to the students' field of study. After the last version functionalities are completed, the last stage is to linking each of the functions and performing testing on the system and fixing potential runtime errors.

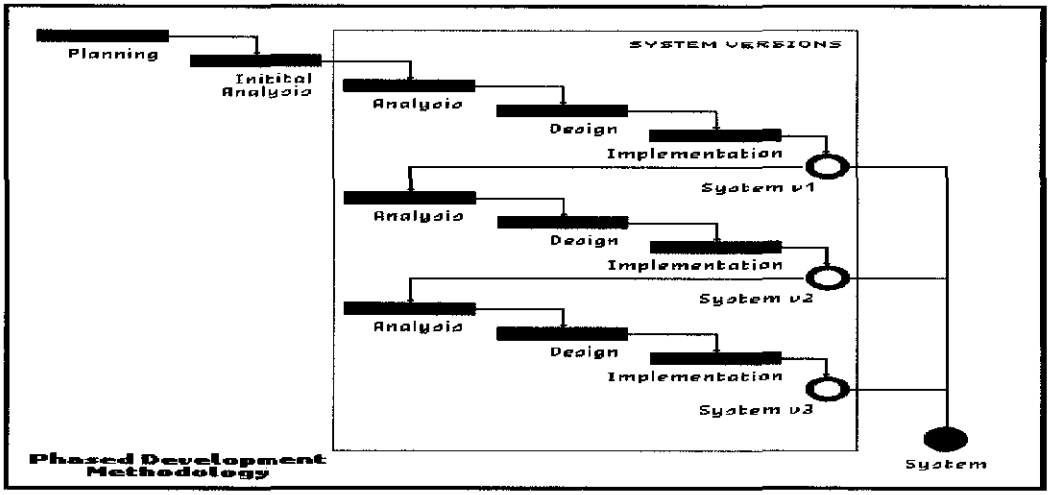


Figure 3.1: Phased Methodology

Source: http://www.slepi.net/blog/system-development/system-development-life-cycle-sdlc-methodologies.html

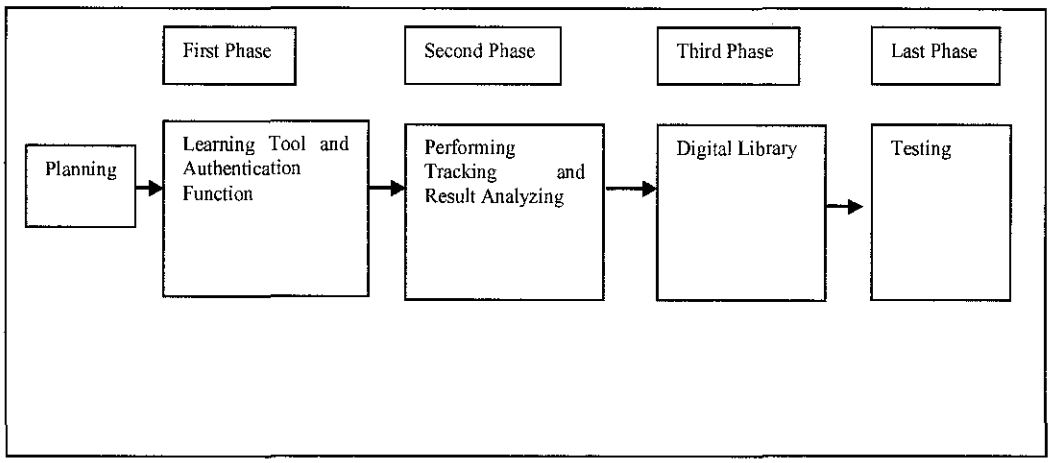


Figure 3.2: Development of Functionalities According to Phased Methodology

The main reason to implement phased development methodology is to identify the most critical requirements to develop an M-Learning environment with performance tracking and analysis. Due to the wide scope and high complicity of the M-Learning system, phased development methodology is important to narrow down the scope of the project. In phased development methodology, the system will be developed in different version starting with the most important function and fundamental design. From the review of the first version of the system, sub functions and new ideas which are suitable to be

included in the M-Learning system can be easily recognized and prioritized according to the importance and relevance. Therefore, phased development methodology is suitable for the development of this project.

In addition, phased development methodology can reduce the risk of developing the system. Due to the reason that each functions in the M-Learning system is depending on other functions, changes on one function always cause impact to other functions. Therefore, it will be a very challenging task if a lot of changes to be made after the system is fully developed. With phased development methodology, testing is performed to identify the issues and problems in the early stage.Changes are made from version to version to reduce the complexity and risk of troubleshooting the system in the later stage.

Since each functions of the system is tested and documented, it allows the ease of extending the project in the future. Revision and improvement on each versions of the system can be easily done. This is important if we would want to further develop the system in the future.

3.1 Phase 1: Planning

A study is conducted to study on potential of M-Learning system and the acceptance level of the university students to use mobile device for learning purpose.

3.1.1 System Request – Personalized M-Learning for Higher Education.

Project Need:

1. Compliment the current E-Learning system

This project is aiming to complement and improve the existing E-Learning system by introducing new features using latest mobile computing technology.

2. Just In Time Learning

Since mobile phone is portable, students can choose to learn through their mobile phone at anytime and anywhere they are. For instances when students have a break between the classes, they can choose to learn through their mobile phone, instead of wasting time for nothing. The saved time can then allocated to other activities like sport.

3. Encourage the exploration of knowledge and information

The project is requested to achieve the university goals of world Research University. With this goal, the system is requested to encourage the students to build knowledge and wisdom with the influx of information available.

4. Performing analyzing and tracking on students' academic performance

The project will requested to analyzing the students' academic performance and showing useful findings to help students to improve their academics performances.

5. Proposing an easier and faster way for uploading the materials

The project is created to propose an easier and faster way for the lecturers to upload the course materials and marks of the course works.

Project Requirements:

1. Allow the students to access to all the latest course materials using smartphone

The system should allow the students to access to the latest materials and resources of the particular topic in the course.

2. Enable student to take exercises or quizzes through the phone

The users can use their phone to access all the latest quizzes for the registered courses. The quiz is mostly in MCQ format due to the reason that it will be hard and less user friendly for some students to type using the touch screen of smartphones.

3. Allow the students to easy reading the own created notes and make podcasting

The system should allow the students to make podcast and creating notes to enhance the understanding of the topics.

4. Enable students to track and analyze their own performance

The system required to calculate and display the students result and provide suggestion to the students in prioritizing certain topics that they need pay more intention and suggesting friends which will help them on the subjects.

5. Enable students to get the latest information using the digital library tool.

The system should provide a channel to ease students in accessing vast information which will help them to build knowledge and ideas.

6. Enable the lecturers to upload the course materials and coursework

The system should allow the lecturers to upload the course materials and coursework in an easier way which does not take much of time and effort.

Project Value:

1. Improve the academic performance of the students.

The features of the system like podcasting, quiz, note taking, qna will lead to effective learning and performance measuring tools can help the students analyze their own performance. The tools will provide advises for the students on the topic they need to pay more attention. Besides, the tools will also suggest a list of course mates who might able to help them in that topic. With all these features, this project is expected to improve the students' performance in academic.

2. Provide Flexibility and convenience of learning through mobile phones.

The students can always revision on the topic at any place and anywhere as long as they have the smartphone. Besides of practicing on the quizzes, the students can easily search more info on exercises they had practiced.

3. Exposing the students to the vast of information.

At the same time, the system encourages the students to build their own knowledge and generating new ideas with the ease of accessing to the vast of information in the field of study.

4. Discovery a faster and easier way of data processing.

The system proposes a new way of processing and uploading data using the google documents features provided by Google which is free and easy to use.

3.1.2 Feasibility Analysis

3.1.2.1 Technical feasibility:

1. Familiarity with the M-Learning Application – Medium Risk

Even though M-Learning idea is still new especially for undergraduate students in Malaysia, but as we can observe that generation X in our society is fast to learn and adapt to the new technology. Since generation X is exposing to the latest technology in the age when they are still young, therefore they are the group which is more familiar and acceptable to use the latest technology. We believe that this would not be a challenge for our application to be implemented in the future.

2. Familiarity with technology –High Risk

In this project, the new web development language like Android, the concept of Web 2.0 and Google Api are used to develop the system. The development of the system would require the programmer to learn several different programming languages in a short period of time of less than 6 months. Unfamiliar of the programming language with limited time available for the projects pose high risk to the project.

3. The project size – Medium Risk

The project scope is medium and the development is completed in a series of versions, therefore this is possible to accomplish with one programmer. The completion of the whole project cannot exceed August. The short development is one of the risks of this project. After the completion of the system, students will involve in testing the system.

4. The capability of the system with the existing system – Low risk

The system is new and standalone, therefore there will not include any integration with the existing system.

3.1.2.2 Economic Feasibility:

The cost of developing is RM 0 for the android touch screen phone. The system is developed with the google open source language and using the free server for testing so no license fees are included.

3.1.2.3 Conclusion:

The project is feasible technically and economically although the process involve some risk. Overall the risk of the project is manageable with the proper project management.

3.2 Phase 2: Analysis

3.2.1 Non-functional Requirements

1. **Operational Requirement**

   The system is expected to operate on Android Phone which higher than 1.6. The web browser that supports the functionality of the system is safari, and chrome.

2. **Performance Requirement**

   Any interaction between the user and the system should not exceed 1 minute. In addition, the system should synchronize the data from the server when the user is connected to internet.Expected speed of loading the system should not more than 1 minute.At the same time, the system should send notification on time.

3. **Security**

   Data involved in the system is not highly confidential; therefore there is no need for encryption. For authority, only the lecturers can view all the students' performance, student can only their own performance and average score in the class.

4. **Culture and Political**

   The system is for education purpose; hence no special performance requirements are anticipated.

3.2.2. Functional Requirements

1. Registration for the resources

In order to access to the course material, students must register the courses that related to them. At the same time, students can also choose to drop the course.

2. Accessing the latest information in digital library

The students can get the latest information not only with the local and international newspaper, they can also access to the latest technology from their field of study and reading on the latest researches from the research library, as well as getting the latest jobs posted in jobstreet and accessing the charity news.

3. Practicing Quizzes

The students can access to all the exercises and quizzes for the courses they had registered. The format for the quizzes will be in MCQ due to the user friendly concern.

4. Podcasting and own note reading

The students can make notes in their pcs and the note is available to read through the phone and they can also record the voice which will ease them in doing revision and therefore improve their understanding of the topic for certain course.

5. Reading the powerpoint slides

The students can read the powerpoint slides using the smartphones without downloading the slides or required to use any special software. Cloud service is applied here.

6. Performance Analysis

Performance analysis is implemented base on the result of the students. Suggestions are provided to the students for example suggestion of the friend list which will help them in certain topics. Analysis on the students overall performances for each course are performed.

7. Uploading the materials and quizzes using web application and google spreadsheet

The lecturers can use the google spreadsheet to create quizzes and updating marks. After they created the google spreadsheet according to the format, they can then uploading the link and the system can read the data.

3.2.3 Functional Model

3.2.3.1 Activity Diagram

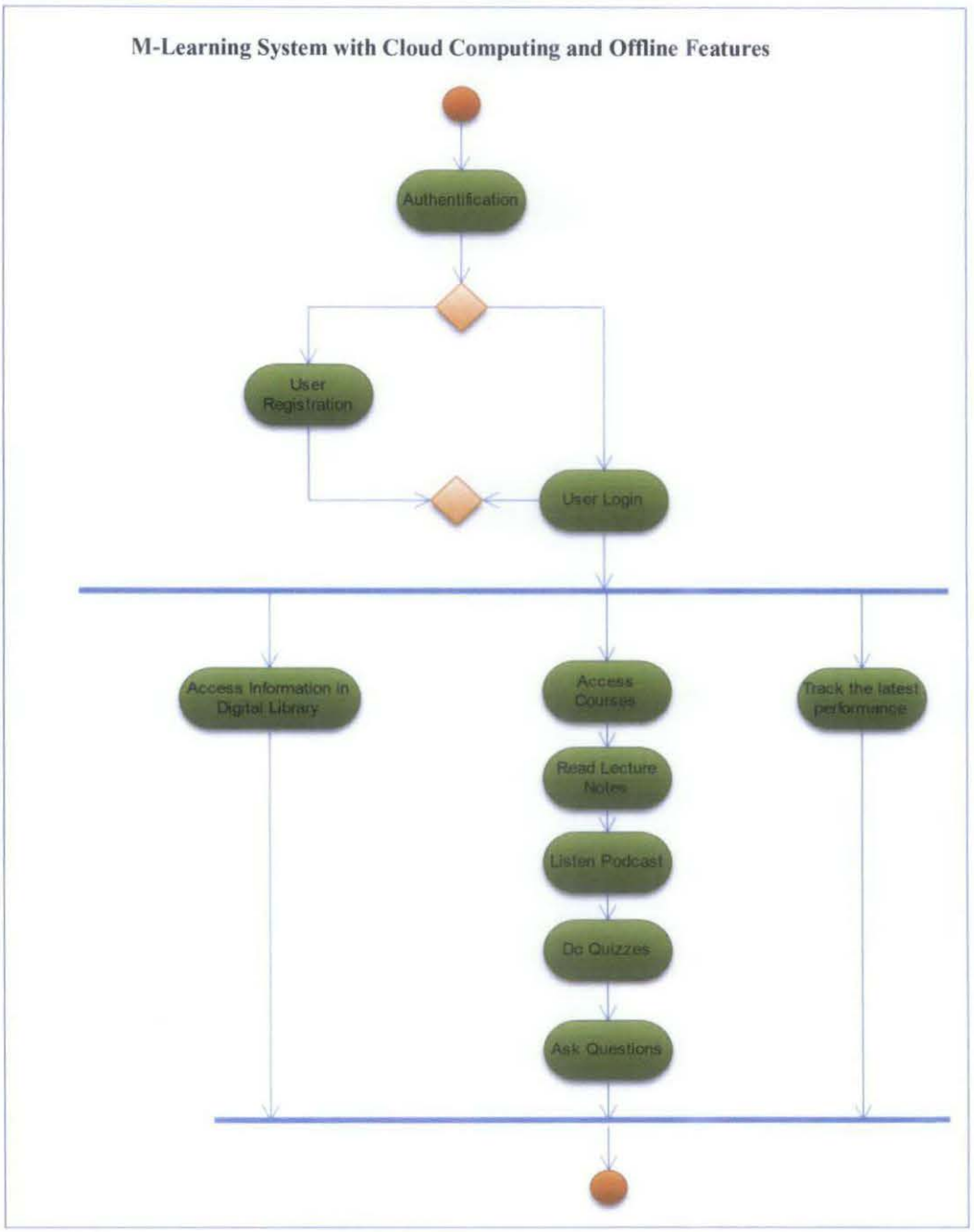


Figure 3.3: Activity Diagram

The activity diagram in **Figure 3.3** shows the behavior and the flow of the system created. At the very beginning, the students need to select the related course and register for the course. After register the course, the students will choose whether to access digital library for latest information or check their latest performance or using the learning tool. If they choose to use the learning tool, they will read the lecture notes following by listen to the podcast, and practicing the quizzes. If they have questions and inquiries they can ask using the QnA at the same time they can check other inquiries as well.

3.2.3.2. Use Case Diagram

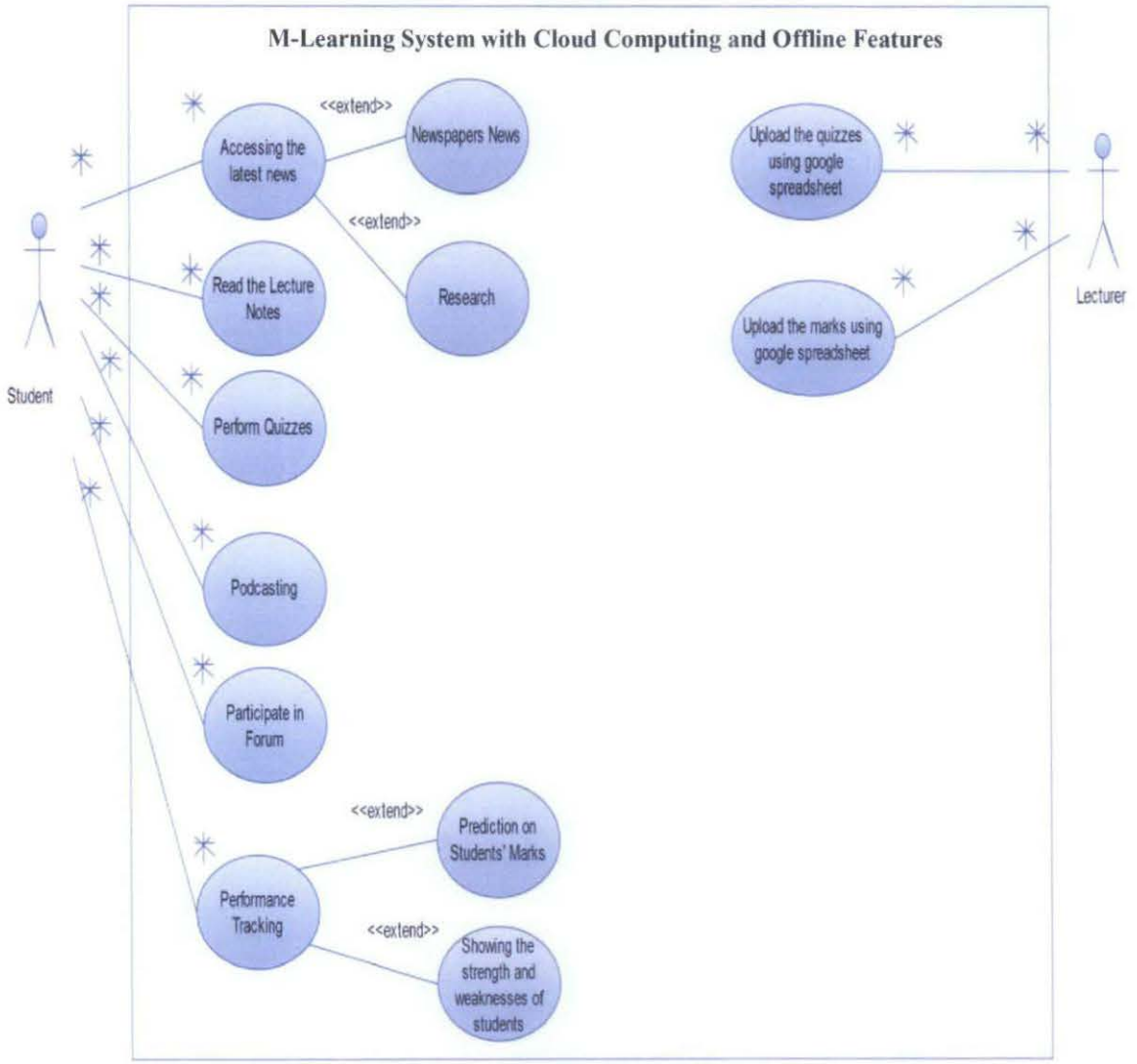


Figure 3.4: Use Case Diagram

The use case diagram shows the functionalities of the system. The functionalities of the system includes student able to register for their related courses and access to the content for the courses using smartphone. After the registration of the course, students can read the lecture notes for the particular topic, and they can perform quizzes, making their own podcast as well as participating into the forum when they have inquiries.

At the same time they can constantly check their performance through the performance analysis features and get the suggestions to improve. The students can compare their performance with the average students' performance. The students can also predict the final examination mark and through the analysis knowing their own weaknesses and strength in the industry.

For the lecturers, they can create a particular course and upload the quizzes and marks using Google Spreadsheet.

3.3 Phase 3: Design

3.3.1 Class Diagram

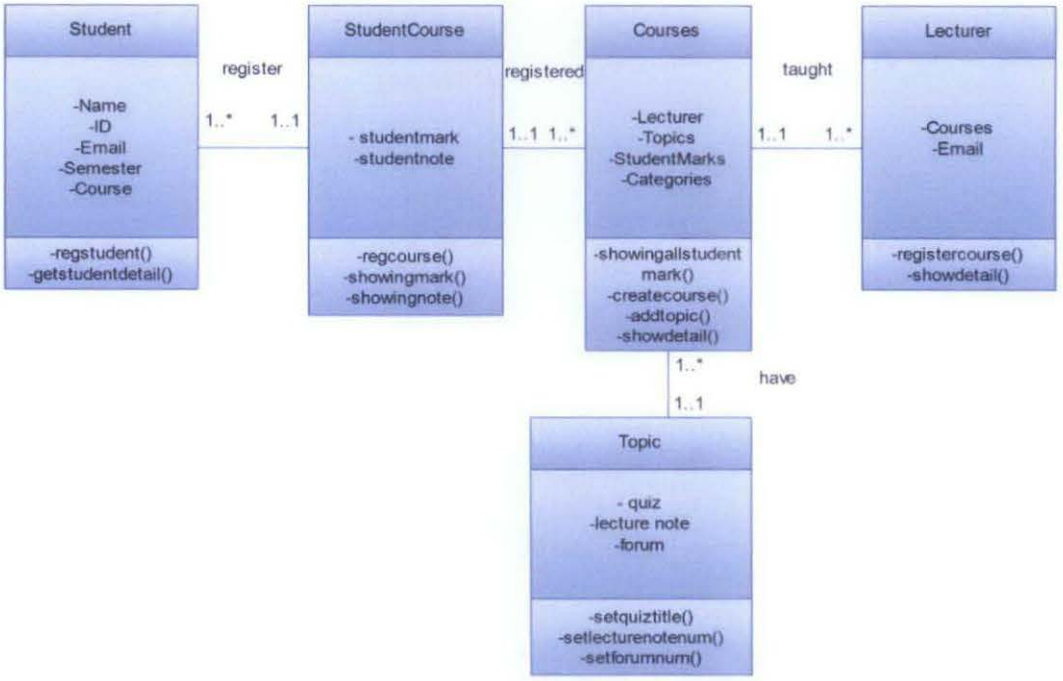


Figure 3.5: Class Diagram

Class diagram in **Figure 3.5** above show the classes for the application developed in Android SDK 2.1. There are three classes which are Student, Lecturer, Courses, StudentCourse and Topic. Data field and functions are described in the class diagram.

3.3.2 Architecture Design

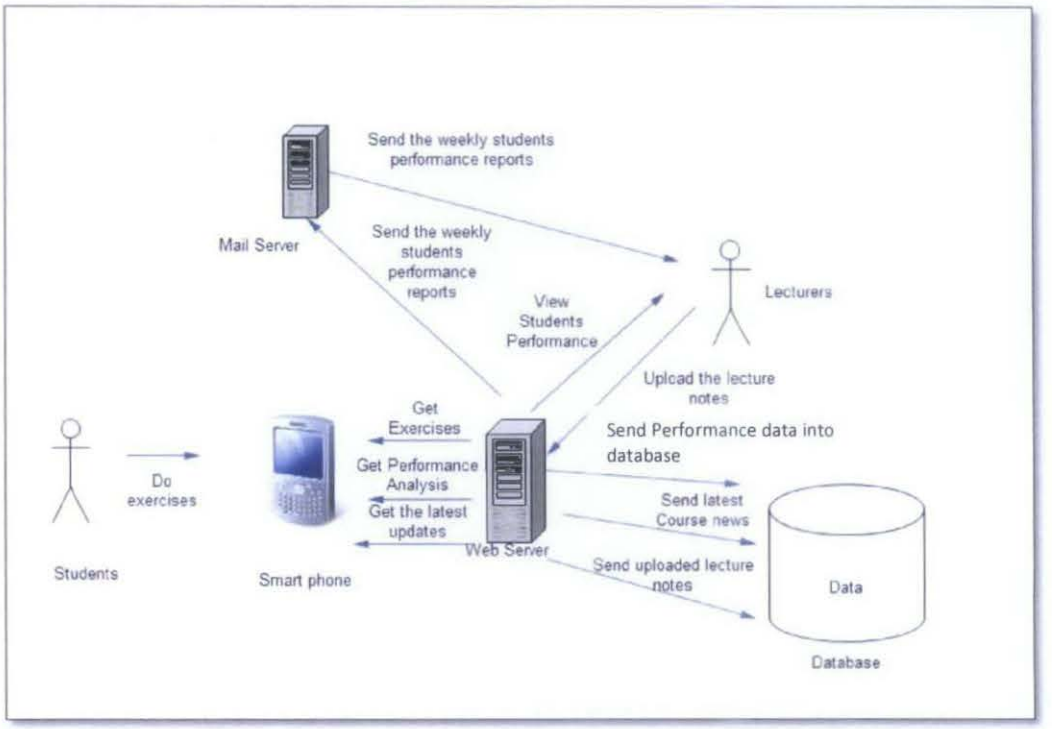


Figure 3.6: Architecture Design

The architecture design in **Figure 3.6** above describe the architecture of the system which including the interaction between the students, lecturers, smartphone, web servers, mail servers and database. The students interact with the smart phone, smart phone will send the students request to the web server and the web server will check with the database and send response to the users. The lecturer will send course contents and updates to the web server and the web server will save in the database. The web server will perform routine task of sending report to the mail server and mail server will redirect the message to the lecturers.

3.3.3 Architecture Design

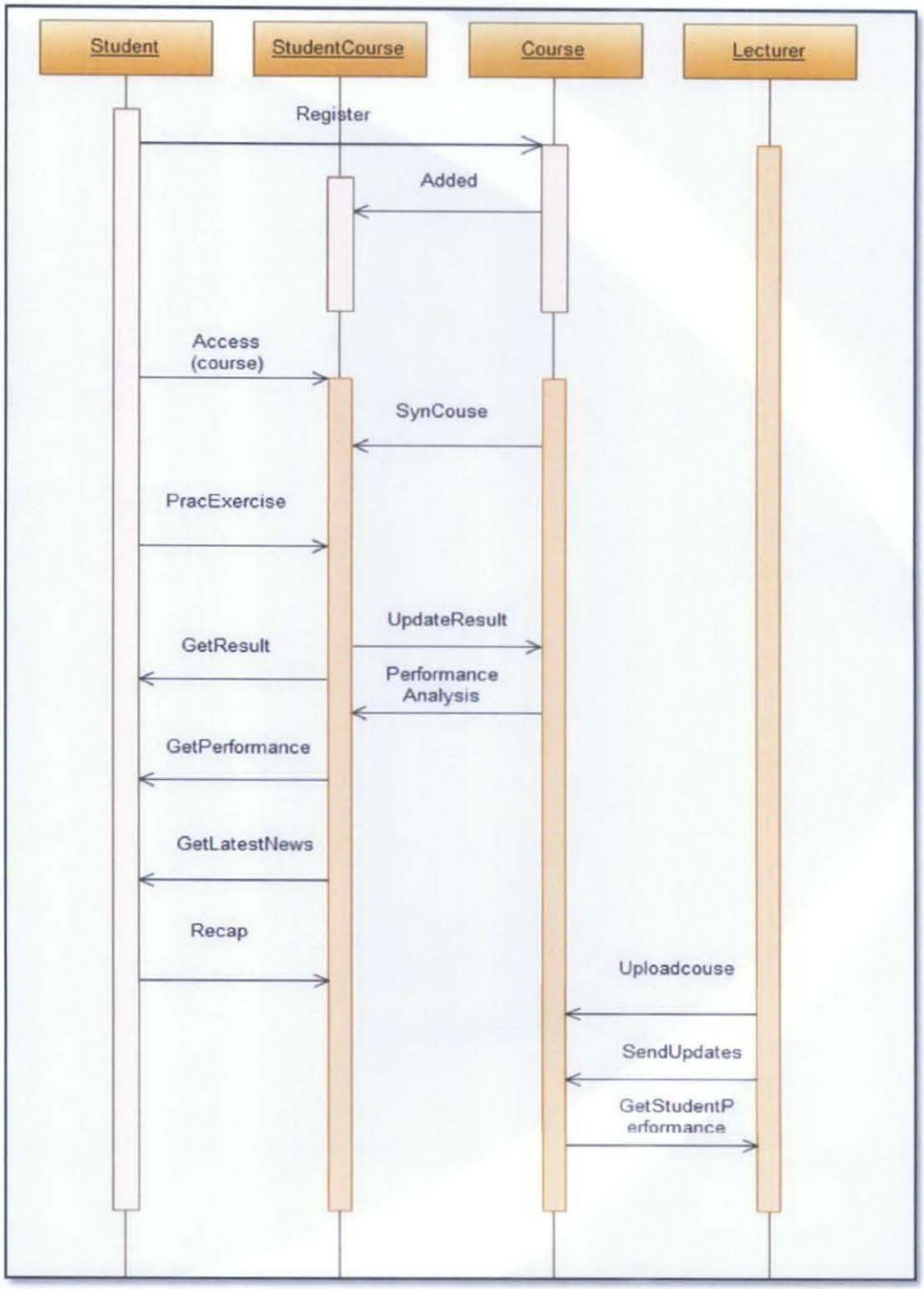
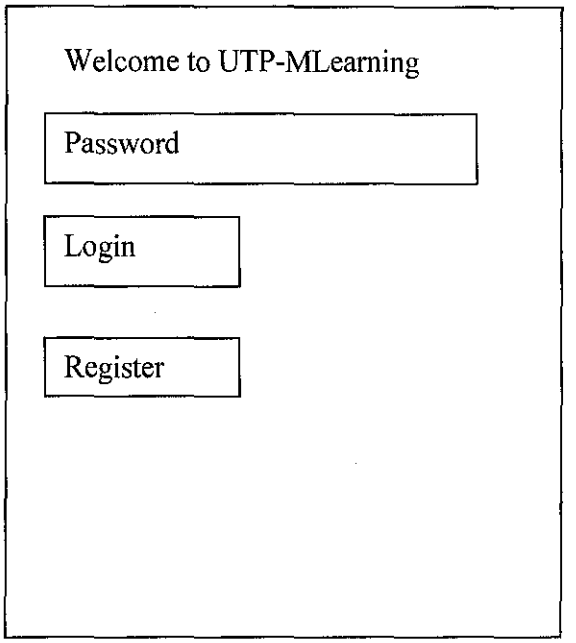


Figure 3.7: Sequence Diagram

Sequence diagram above show the interaction between classes for the application developed in Android SDK 2.1. Interaction between three classes which are Student, Lecturer, Course, StudentCourse are shown above.

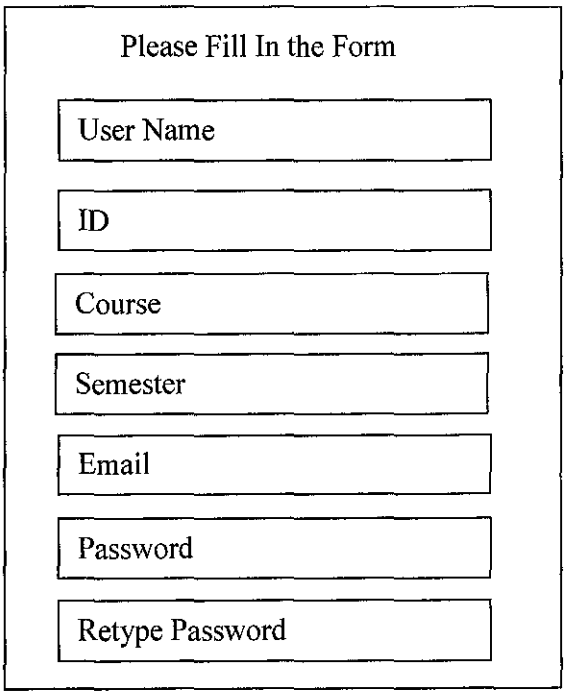
3.3.4 User Interface Design

1.



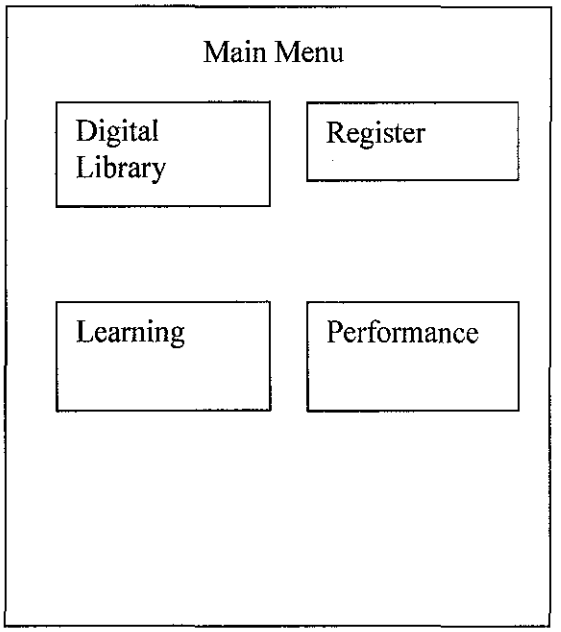
First, the user will login or register to the system

2



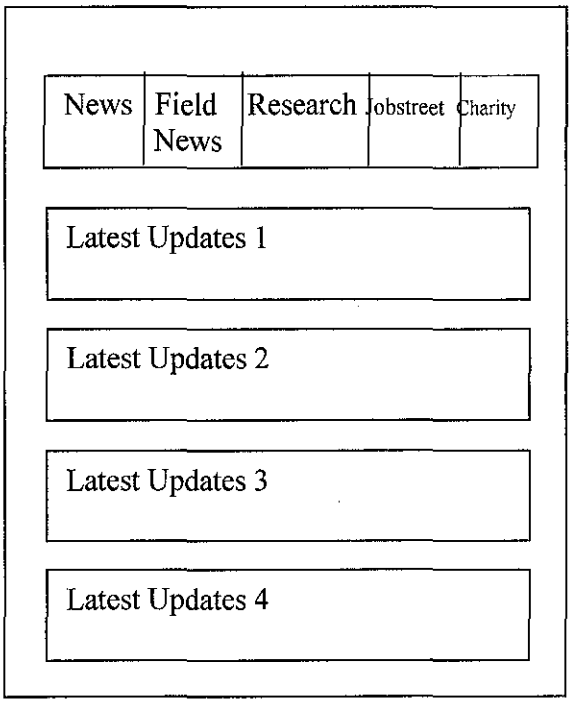
If the user wants to register as a user, they will need to fill up this form.

3



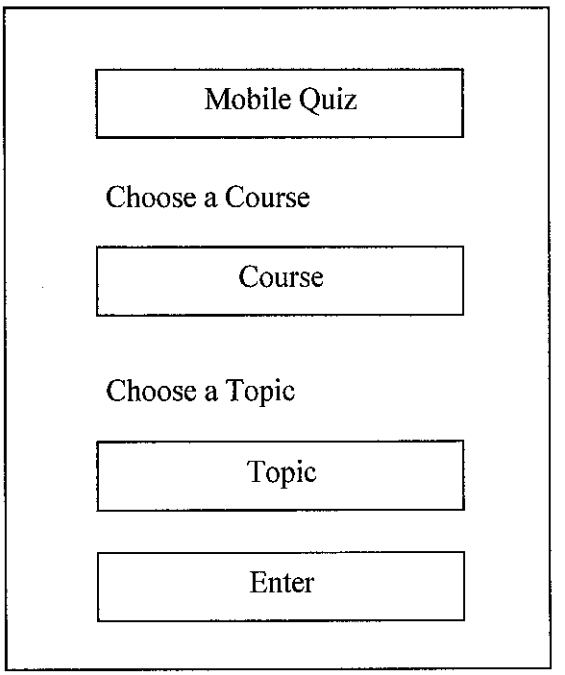
After login, users will enter into the main menu and choose to perform the function they want.

4



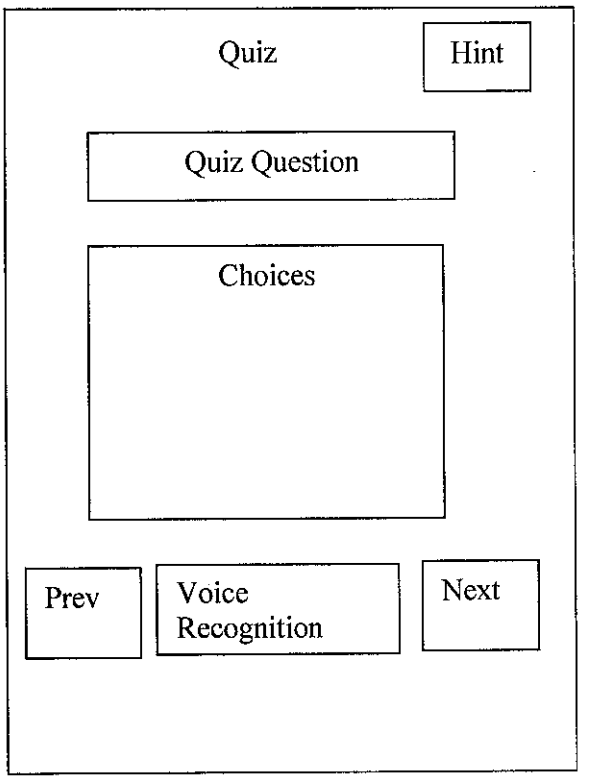
Notifications will show all the latest news in the university.

5



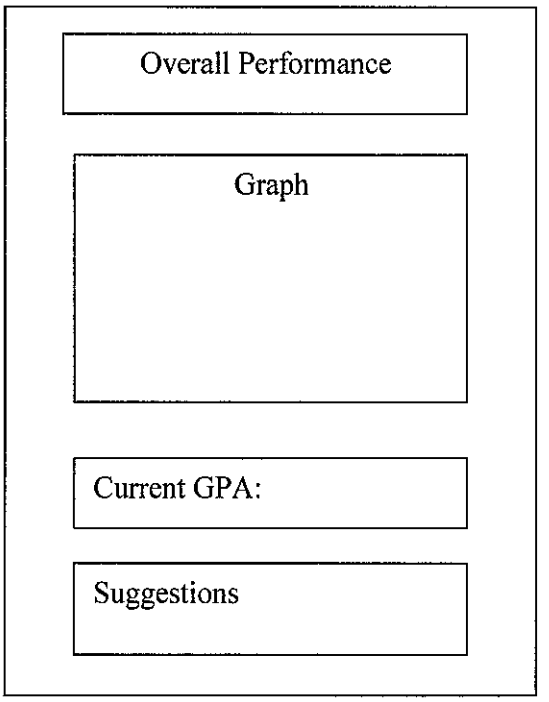
Before the quiz start, the users will choose the course and topic of the course.

6



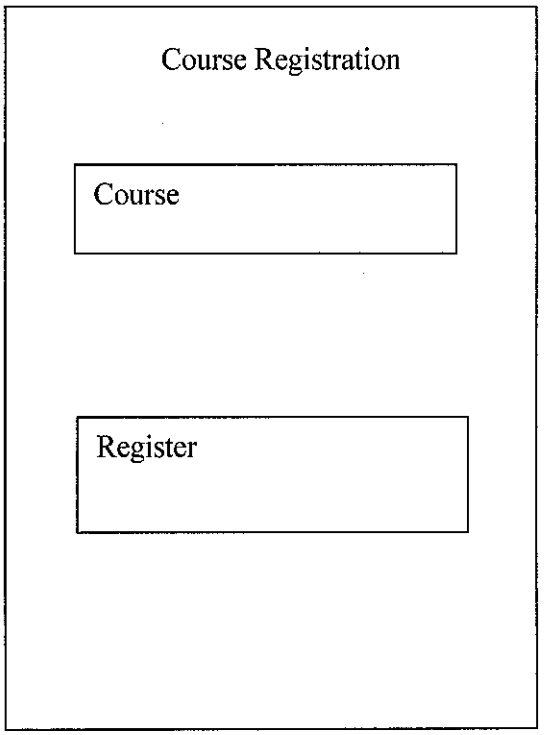
This is the layout of the quiz. The users can read and answer the quiz. They can search the information regarding to the quiz

7.



The users can go to the performance and view their overall performance

8.



Register New Course. The student needs to register the course before they can access the materials

3.4 Phase 4: Implementation

3.4.1 System Development Tools

3.4.1.1 Code the user interface

The user interface of the program will mainly code in android to interact with and response to the users. The main program used here is eclipse.

3.4.1.2 Code the performance tracking feature

The performance tracking feature will code in android and utilizing the Google Chart Tool to create the chart. The main program used here is eclipse.

3.4.1.3 Code the digital library feature

The digital library feature is coded in RSS to retrieve the latest data from the industry.

3.4.1 .4 Connecting to the remote mysql database

Connecting to database using the PHP remote service

3.4.1.5 Cloud computing features

Utilize Google Data Api with ASP.Net to populate the data.

3.4.1.6 Offline features

Utilizing XML technology to store data and synchronize the data from the internet.

3.4.2 Project Gantt Chart

Table 3.1 Project Gantt Chart

Number	Task	Resource	Start	End	Duration	% Complete
1	Planning		1/21/2011	3/16/2011	38	100.0
2	Choose topic		1/21/2011	1/24/2011	2	100.0
3	Preliminary research on topic		1/24/2011	1/31/2011	6	100.0
4	Specify scope		1/31/2011	2/10/2011	9	100.0
5	Feasibility analysis		2/10/2011	2/17/2011	6	100.0
6	Analysis		2/17/2011	2/28/2011	7	100.0
7	Understanding concepts		2/17/2011	2/28/2011	7	100.0
8	Design		3/1/2011	5/10/2011	51	100.0
9	Design Algorithm Structure		3/3/2011	5/10/2011	51	100.0
10	Development		5/20/2011	7/29/2011	49	50.0
11	Testing		8/1/2011	8/10/2011	8	0.0
12	Implementation		8/10/2011	8/19/2011	8	0.0

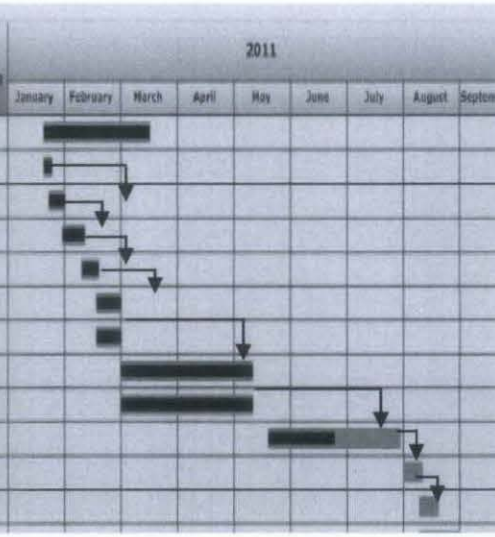


Table 3.1 shows the project gantt chart showing the 12 main activities with the The project is expected to take 8 months to complete including the process of Planning, Analysis, Design, Testing and Implementation. Planning Section take for 1 month, Analysis also consume of 1 month, while Design take around 3 months. For Development will take 3 months, following with Testing for 1 week and last stage Implementation will also take approximately 1 week.

3.4.3 System Coding

The system is developed using Android programming. Android SDK provides API, development and deployment model for building application and deploy to the smartphone. The UI of the system is coded using android drag and drop which integrate all the graphics, texts and web services.

The system is an online application but is also made available for offline users. To enable offline available http request is made to the server to pull data from web server. The data is then stored in the local phone. If the network is present, quiz will populate data from the server, while for offline the quiz will populate the data from local android.

While the users performing the quiz, the program is mainly be handled by Android.
After the users have completed the quiz, the system will update the database in the remote server. For the next process, performance tracking, the system will request for result data from the remote server and create graph using Android API. Analysis part will be handled by the android function.

Lecturers can view all the performance of the students, entering the exercises question and choices through the web application to keep in track on the students' performance. This part is the PHP page which is available only to desktop and laptop users.

CHAPTER 4
Result and Discussion

4.1 Result

The data gathered from 8 engineering students in different field of studies. 2 of them from Mechanical Engineering, 2 from Chemical Engineering, 1 from Civil Engineering, 1 from Petroleum Engineering, 1 from Electronic Engineering, 1 from Business Information System.

The result of the survey is as following:

Table 4.1 Conductivity of the E-Learning System

1. Do you think E-Learning is conductive enough for your studies?
Yes 37.5 % (3 out of 8 users) No 62.5 % (5 out of 8 users)

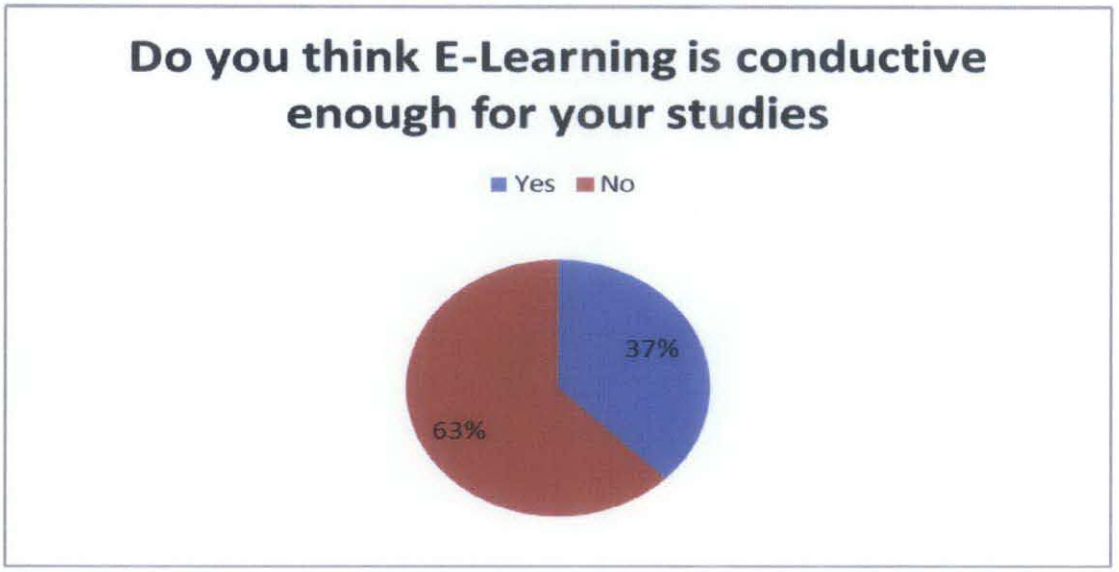


Figure 4.1 Conductivity of the E-Learning System

From data gathered above, we found that only 37.5% of students think that the E-Learning System is conducive and helpful to their studies. The results showed that the current E-Learning System do not satisfy the needs of the students in assisting their study.

Table 4.2 Purpose of Accessing E-Learning System

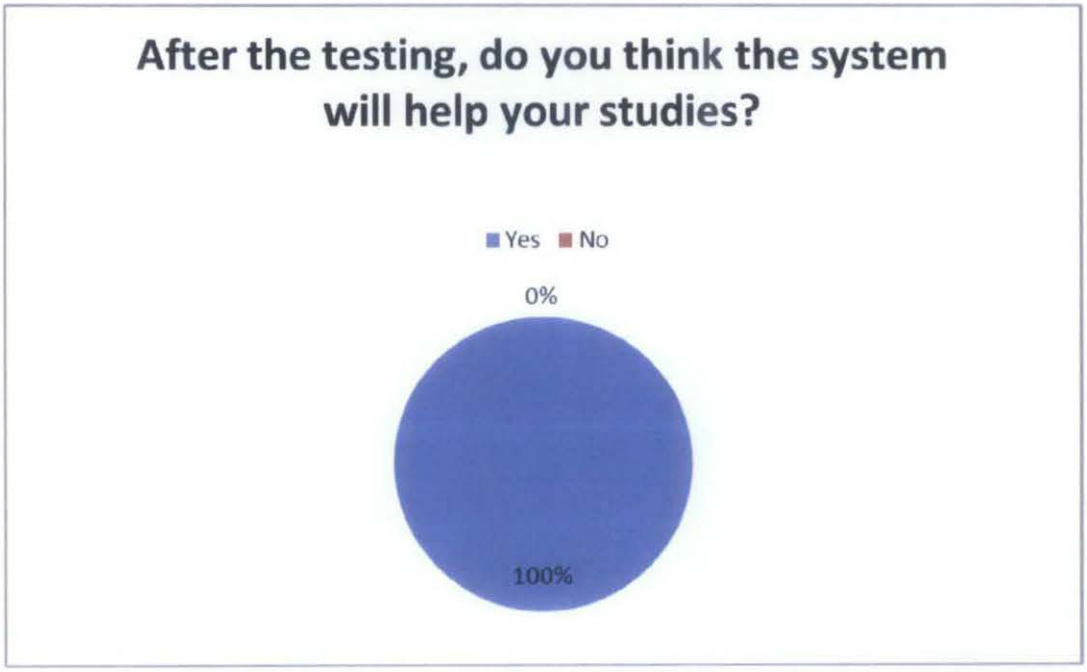
2. What is the purpose for you to visit E-Learning? (e.g. Download notes)
- Download notes - View updates from lecturers - Check coursework marks - Get the latest updates about test time and venue

From the survey result shown as **Table 4.2,** the students normally accessing E-learning system for the purpose of downloading notes, accessing the updates from lecturers, checking the coursework marks, and get the latest updates about test time and venue. The main core purpose of students to access the learning system is to download notes

Table 4.3 Usefulness of the M-Learning System

3. After the testing, do you think the system will help your studies?
Yes 100% (8 out of 8 users) No 0% (0 out of 8 users)

Figure 4.2 Usefulness of the M-Learning System



From data collected as shown in **Table 4.3 and Figure 4.2** shows positive data that most of them think that the system is useful for their learning and they are willing to use the system if it is available. The result shows the high acceptance level of students to use the system.

Table 4.4 Ease of Use of the M-Learning System

4. Is the system Ease to use the system?
Easy 87.5% (7 out of 8 users) Need Tutorial to Use the System 12.5% (1 out of 8 users) Difficult, unable to use the system 0% (0 out of 8 users)

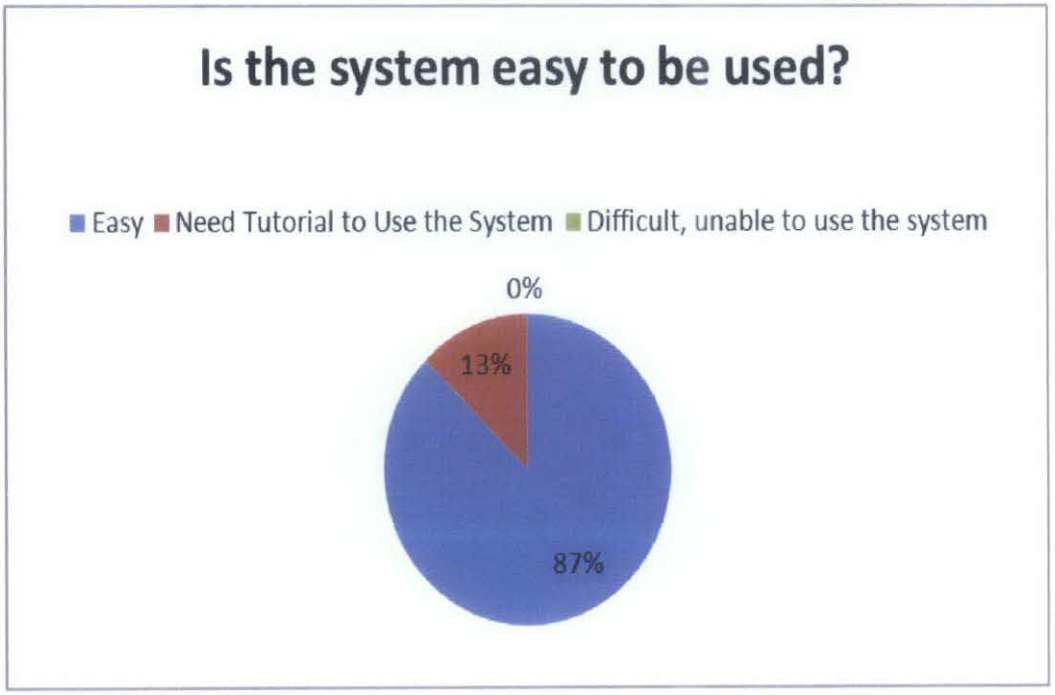


Figure 4.3 Ease of Use of the M-Learning System

From data collected as shown in **Table 4.4 and Figure 4.3** is checking on the ease of use of the system. Even though the system is implemented in Android smartphone, due to the familiarity to the function of smartphone, most of the users found the system is easy to use and the GUI is provide sufficient information to direct the users in using the system.

Table 4.5 Sufficiency of Information of Performance Tracking Tool

5. Do you think the performance tracking tool provide sufficient information about your academic performance?
Yes 100% (8 out of 8 users) No 0% (0 out of 8 users)

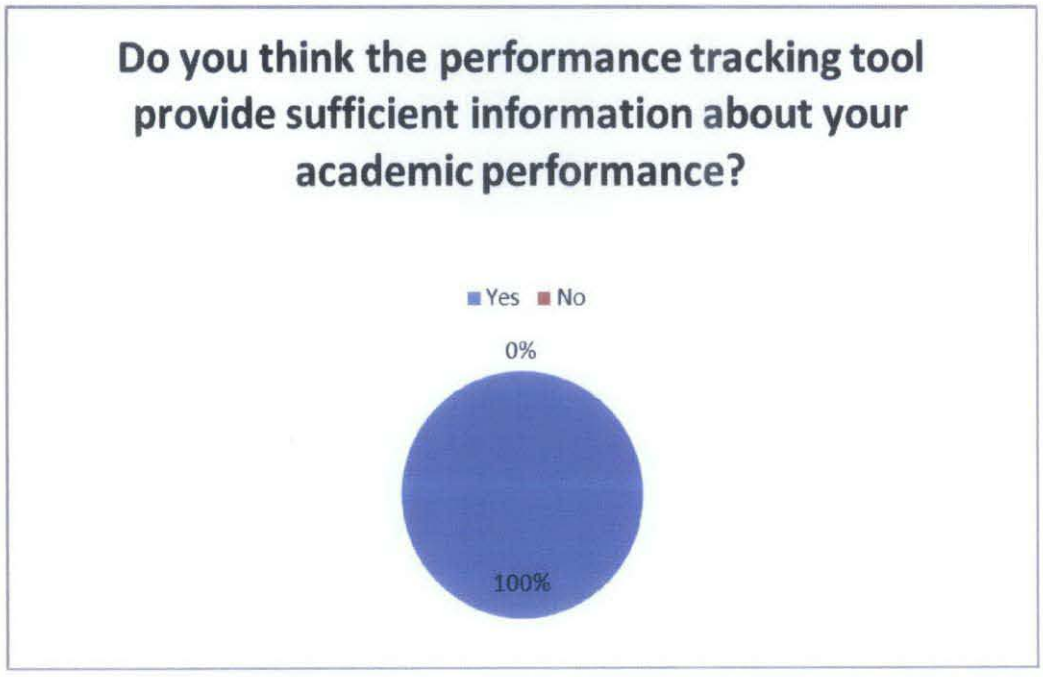


Figure 4.4 Sufficiency of Information of Performance Tracking Tool

From data collected as shown in **Table 4.5 and Figure 4.4** is on checking the sufficiency of the Performance Tracking Tool. Most of them are satisfied with the ability of the system to predict their results and also the ability of the system to show their strength and weaknesses.

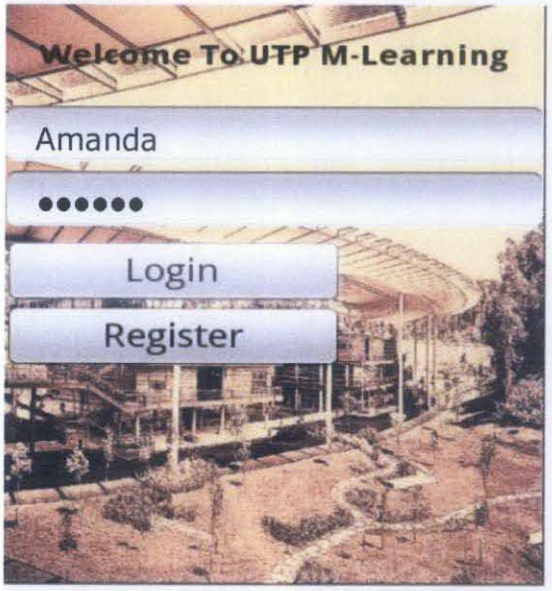
Table 4.6 Improvement on the M-Learning System

6. Any improvement should be made on the system?
- Add past year paper, complete with answer - Include a chat system - Add ability to read pdf and word file

From the survey conducted and the result shown as **Table 4.6,** the students suggested to add pass year paper with complete answer. For this suggestion, we can improve our system further by including the pass year paper as part of the quiz. The students also suggest having a chat system that enables them to more easily find their friends for discussion. The students also suggest adding the ability to read pdf and word file because most of the research and articles are in pdf form. We can further improve the system by benefit from using the cloud google document service.

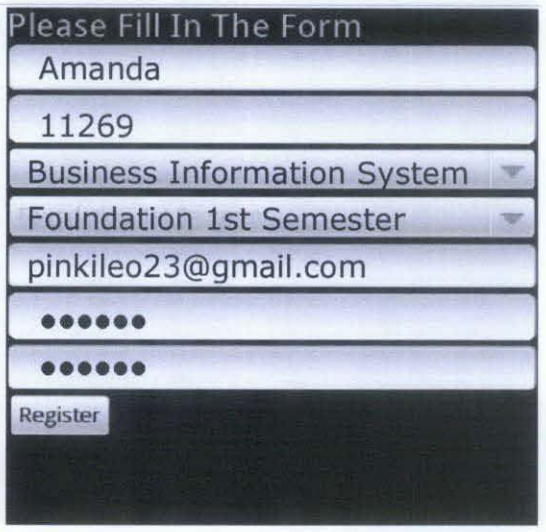
4.2 Prototyping

Scree Shot 1



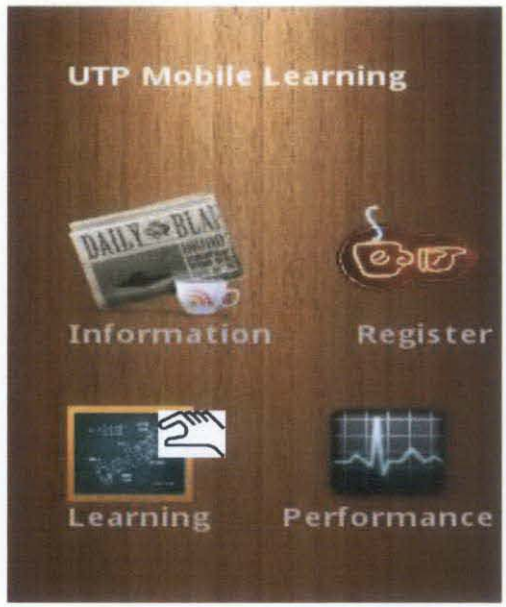
The user enters the name and password to login to the system.

Screen Shot 2



If the users want to register to use the system they will enter their details and press enter.

Screen Shot 3

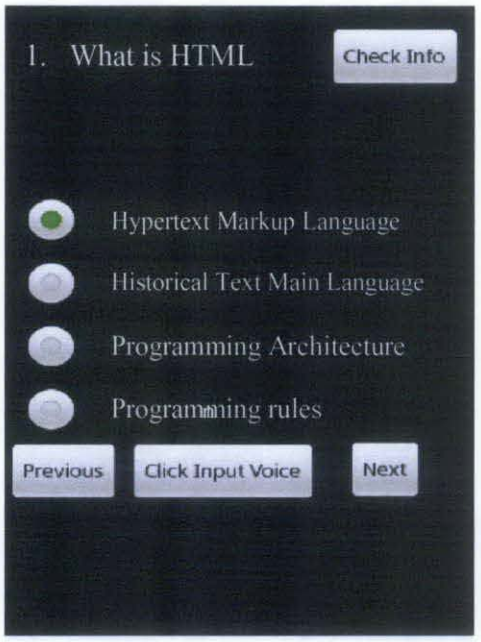


When the users successfully login to the system they will first directed to the menu, where they can choose various function.

Screen Shot 4

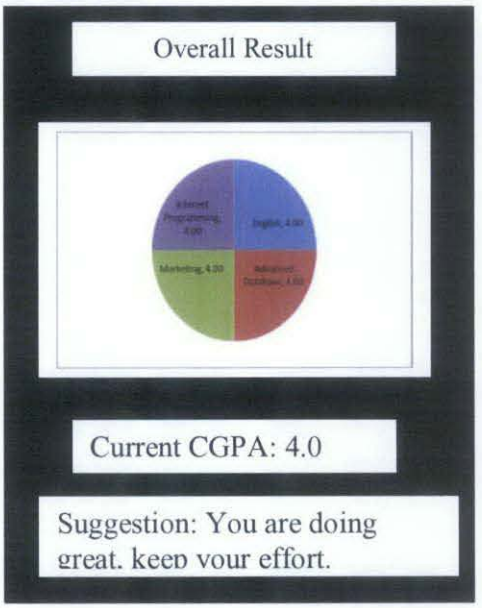
If the users choose Learning as shown above, the users will be directed into this menu. In this menu, they need to choose the course as well as the topic and click to choose to start to get the resources

Screen Shot 5



This is the quiz, the users can choose on the answer by touch on the radio button. They can also search the google by touch on the check info. The Check Input Voice allow them to use voice recognition in performing quiz.

Screen Shot 6



The users can go to the performance tracking and check on the overall results. Suggestion is provided for students to improve.

The users can also using the system to read the latest news from local and international newspaper.

4.3 Discussion

Mobile – Learning for University Student

According to the system testing result, it shows that the University students are easily accept the idea of mobile phone as a learning tool. This is due to their familiarility to the latest technology and they believe that using technology can help them to enhance their learning experience by providing them more features which is not available by the current learning system. Even though mobile learning is still new in the education field, and might not be accepted by every students and lecturers, however the response showed that most of the students are willing to try on the new way of learning.

Cloud Computing Vs Offline features

For current system development, it will be difficult in applying cloud service with offline features. Even through currently html5 technology allow the developer to capture the page for offline usage, however there are still some limitation which is caused by the security cloud service for example google document security feature. This is because the service does not allow the users to direct capture the data from the page. Therefore in order to perform offline service currently, it is still having some limitation. However, in the future the cloud service develop team will work on to provide the offline service.

Contructist Learning

With the latest technology available in the smartphone, we are able to develop contructivist learning system which will encourage the student to learn in anywhere and any place. For example they can make voice recording to learn a particular subjects using the recording tool, reading lecture slides with the smartphone, performing quiz and accessing to the latest news and information. With this learning tool, the students can use many tools available in smartphone to them in understanding a particular subject. At the same time, the system encourage them to expose themselves to the new information in order to generate more new idea in learning.

Performance Tracking

Knowledge management is important, popular, and applicable to all of the industry. Knowledge management can also be applied in the performance tracking tool to explore and retain the students' knowledge and talent ability. In this system, it will show the strength and weaknesses in particular area for example networking, database, or management. This information is important not only to students, but also to the university management to help students finding their most suitable career.

CHAPTER 5

Conclusion and Recommendation

5.1 Conclusion

As a conclusion for the project, mobile learning is suitable to support and compliment the university learning system. Mobile learning improve the system with the ability to provide the features like just in time, recording, reading slides, and doing quiz. The greatest idea of mobile learning is mobility where the students can bring along just to anywhere and they can easily perform their learning at any time. Besides, they can enhance their learning experience with the smartphone features like recording the voice note, or making the note available to be read in the mobile phone.

In this project, we include the effort to explore the potential and limitation in implementing cloud computing. Cloud computing is suitable to the phone application due to the limitation of the phone storage, cloud computing introduce the idea of performing a certain features in the cloud. This is important to reduce the usage of the ph one space at the same time, we can provide more amazing feature for the users.

Another feature which is important to the phone is the offline feature. Offline feature allow the users to use the system even there are no internet connection. With this ability, the users can perform the learning at anywhere and anytime. However, the limited memory space and the security features of the cloud service which is google document, does not allow the users to cache the data as login is required to access data. Therefore, for current application we can only enable part of the system to be accessed offline.

5.2 Recommendation

The recommendation to this system is to include the ability to complement the current Elearning system, so that both system can be working together to improve the learning experience for the students. Besides, if we are able to synchronise both system, we are able to save the time and efforts for both lecturers and students to enter the same data. In addition, we recommend including timetable management in the system, which can alert the students of the latest event. Timetable management can also synchronise with the google calendar service. Last but not least, the system should also include a channel which can help them to develop positive behaviour and positive thinking. For example a sharing place where they can share their positive mind to their friends, or spreading positive news to the peer.

5.3 Future Work

For the future enhancement, the system can be made for cross platform, which is not only available using the android phone, but also can be used in other version of phone. In order to implement the cross platform, HTML5 , jquery, and XML technology are important features that we can use. Besides, the learning tool should working on exploring a new way that can reduce the data size since if we want to implement the offline capability, large storage is needed to store the data for offline usage.

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APPENDIX A

M-Learning Questionaire

Gender: F ( ) M( )
Course:
Year of Study:

Objective:
- Study on the potential of M-learning system to assist university students in learning.
- To test on the system functionalities of M-learning system

(A) Current E-learning System

1. How often are you visiting E-learning system	Every day( ) Every week( ) Twice a week ( ) Rare ( )
2. What is the purpose for you to visit E-learning. Eg: Download notes.	
3. Do you think E-learning is conducive enough for your studies?	Yes( ) No ( )

(B) UTP M-Learning System

1. Do you think that the system will help you in your studies? Will you use the system	Yes( ) No ( ) Yes( ) No( )
2. Ease of the use of M-Learning System?	Easy( ) Need Tutorial to Use the System ( ) Difficult, Unable to Use the System after Tutorial( )
3. Do you think the performance tracking tool provide sufficient information about your	Yes ( ) No ( )

academic performance?	
4. Any bugs found in the system?	Yes( ) _____ _____ _____ No( )
5. Any improvement can be made on the system?	_____ _____ _____ _____
6. Do you plan to buy smartphone in the future?	

APPENDIX B

Main Menu

```
package pro.first;


import android.app.Activity;
import android.content.Context;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.ImageButton;
import android.widget.ImageView;
import android.widget.Toast;
public class menu extends Activity{


  public void onCreate(Bundle savedInstanceState) {


    super.onCreate(savedInstanceState);
    setContentView(R.layout.main2);


    Intent i = getIntent();
    Bundle a = i.getExtras();
    final String newText = a.getString("sid");


    Context context2 = getApplicationContext();
        CharSequence text = newText;
        int duration = Toast.LENGTH_SHORT;


        Toast toast = Toast.makeText(context2, text, duration);
        toast.show();
```

```
ImageView next2 = (ImageView) findViewById(R.id.imageView3);
next2.setOnClickListener(new View.OnClickListener() {
  public void onClick(View view) {
    Intent myIntent = new Intent(view.getContext(), quiz.class);

    startActivityForResult(myIntent, 0);
  }

});

ImageView next3 = (ImageView) findViewById(R.id.imageView1);
next3.setOnClickListener(new View.OnClickListener() {
  public void onClick(View view) {
    Intent myIntent = new Intent(view.getContext(), registercourse.class);

    startActivityForResult(myIntent, 0);
  }

});
ImageView next4 = (ImageView) findViewById(R.id.imageView2);
next4.setOnClickListener(new View.OnClickListener() {
  public void onClick(View view) {
    Intent myIntent = new Intent(view.getContext(), info.class);

    startActivityForResult(myIntent, 0);
  }

});

ImageView next5 = (ImageView) findViewById(R.id.imageView4);
next5.setOnClickListener(new View.OnClickListener() {
```

```
        public void onClick(View view) {
          Intent myIntent = new Intent(view.getContext(), performance.class);
          myIntent.putExtra("sid", newText);
          startActivityForResult(myIntent, 0);
        }

      });

}
}
```

News.java

```
package pro.first;

import android.app.Activity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.ImageView;

public class news extends Activity{

@Override
public void onCreate(Bundle savedInstanceState) {

    super.onCreate(savedInstanceState);
    setContentView(R.layout.newspaper);

    ImageView next2 = (ImageView) findViewById(R.id.imageView1);
    next2.setOnClickListener(new View.OnClickListener() {
      public void onClick(View view) {
        Intent myIntent = new Intent(view.getContext(), RSSReader.class);
        myIntent.putExtra("link", "http://thestar.com.my.feedsportal.com/c/33048/f/534555/index.rss");
        startActivityForResult(myIntent, 0);
      }

    });

    ImageView next3 = (ImageView) findViewById(R.id.imageView2);
    next3.setOnClickListener(new View.OnClickListener() {
      public void onClick(View view) {
        Intent myIntent = new Intent(view.getContext(), RSSReader.class);
```

```
            myIntent.putExtra("link", "http://feeds.bbci.co.uk/news/rss.xml");
            startActivityForResult(myIntent, 0);
        }

    });

    ImageView next4 = (ImageView) findViewById(R.id.imageView3);
    next4.setOnClickListener(new View.OnClickListener() {
        public void onClick(View view) {
            Intent myIntent = new Intent(view.getContext(), RSSReader.class);
            myIntent.putExtra("link", "http://www.nst.com.my/nst/RSS/rss_html?section=Latest");
            startActivityForResult(myIntent, 0);
        }

    });
    }

}
}
}
```

Quiz.java

```
package pro.first;


import java.io.File;
import java.io.FileInputStream;
import java.io.FileNotFoundException;
import java.io.FileOutputStream;
import java.io.IOException;
import java.io.InputStream;
import java.net.URL;

import java.util.ArrayList;

import javax.xml.parsers.DocumentBuilder;
import javax.xml.parsers.DocumentBuilderFactory;

import org.w3c.dom.Document;
import org.w3c.dom.Element;
import org.w3c.dom.Node;
import org.w3c.dom.NodeList;
import org.xml.sax.InputSource;
import org.xmlpull.v1.XmlPullParser;
import org.xmlpull.v1.XmlPullParserFactory;
import org.xmlpull.v1.XmlSerializer;
```

```
import android.app.Activity;
import android.content.Context;
import android.content.Intent;

import android.net.ConnectivityManager;
import android.os.Bundle;
import android.os.Environment;

import android.util.Xml;
import android.view.View;
import android.widget.AdapterView;
import android.widget.AdapterView.OnItemSelectedListener;
import android.widget.ArrayAdapter;
import android.widget.Button;
import android.widget.TextView;

import android.widget.Spinner;

import android.widget.Toast;

public class quiz extends Activity{
 ArrayList <String>course = new ArrayList<String>();
 ArrayList <String>topic = new ArrayList<String>();
/** Called when the activity is first created. */
@Override
public void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.quiz);
 if (checkInternetConnection())
updatexml();
 readxml("Internet Programming");
 final Spinner spinner5 = (Spinner) findViewById(R.id.ccourse);
spinner5.setOnItemSelectedListener(new OnItemSelectedListener() {
@Override
public void onItemSelected(AdapterView<?> arg0, View arg1,
int arg2, long arg3) {
readxml2(spinner5.getSelectedItem().toString());}

@Override
public void onNothingSelected(AdapterView<?> arg0) {
// TODO Auto-generated method stub}

});
 final Button button = (Button) findViewById(R.id.button1);
button.setOnClickListener(new View.OnClickListener() {
public void onClick(View v) {
```

```
Spinner spinner1 = (Spinner) findViewById(R.id.ctopic);
myIntent = new Intent(v.getContext(), topic.class);
myIntent.putExtra("topic", spinner1.getSelectedItem().toString());
startActivityForResult(myIntent, 0);
        }
        });
         }
public void readxml(String a){
course.clear();
topic.clear();
try{
String path = Environment.getExternalStorageDirectory()+"/new.xml";
File file = new File(path);
XmlPullParserFactory factory = XmlPullParserFactory.newInstance();
factory.setValidating(false);
 XmlPullParser myxml = factory.newPullParser();
InputStream raw = new FileInputStream(file);
myxml.setInput(raw, null);
 // Alternatively use:
XmlResourceParser myxml = getContext().getResources().getXml(R.xml.MyXml);
myxml.next();//Get next parse event
int eventType = myxml.getEventType(); //Get current xml event i.e., START_DOCUMENT etc.
String NodeValue;
 while (eventType != XmlPullParser.END_DOCUMENT)  //Keep going until end of xml document
{

if(eventType == XmlPullParser.START_DOCUMENT)
//Start of XML, can check this with myxml.getName() in Log, see if your xml has read successfully
   else if(eventType == XmlPullParser.START_TAG)
   {

NodeValue = myxml.getName();//Start of a Node
}
 }};
```