M-Learning Application for Basic Computer Architecture

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Abstract—M-learning is a mobile technology in learning and teaching which also another extension to the conventional learning practice specifically e-learning. Mostly, accessing of resources in e-learning is done through fixed nodes such as notebook and desktop PC which generally are restricted either by location, time or both. Through m-learning, accessing to learning resources is independent of time and location. Therefore, this study emphasizes on developing m-learning application for Basic Computer Architecture for supporting teaching and learning process. The application involves modules for notes, flash card and quiz which enables user to learn fundamental topics of the course by using mobile devices while offline. Prototype model is used as the development methodology. This m-learning application has been developed using JAVA programming language specifically J2ME MIDP 2.0 and CLDC 1.1. Netbeans IDE was used to design the interface. As a result, this prototype is expected to be as an alternative learning material which enables user to learn fundamental topics in Basic Computer Architecture course included Basic Structure of Computer, Basic Processing Unit, Arithmetic Unit, and Memory System.

Index Terms--Basic Computer Architecture, e-learning, learning resources, m-learning and mobile application.

I. INTRODUCTION

In most current situations, accessing of resources in e-learning is done through fixed nodes such as notebook and personal computer which usually are limited either by location, time or both. However, the emergence of mobile technology in learning and teaching has providing options which also another extension to the conventional learning practice specifically e-learning. User is not yet restricted of time and location since m-learning allows accessing to learning resources independent of time and location. Research by Metcalf et al. [1] reported that employment of mobile devices in learning process has increased students achievement and interest in study like in mathematic and science courses.

Thus, this study is emphasizes on developing m-learning application for Basic Computer Architecture for supporting teaching and learning process. This prototype is focusing on notes, flash card, quiz and can be used while offline from mobile devices.

The explanation of our method is in the following sections. In section 2, the related works on forwarding of electronic learning (e-learning) to mobile learning (m-learning), m-learning access technology and the needs of mobile learning in education sector are explained. In section 3, the development of the application is analyzed while in section 4 the conclusion, advantages, disadvantages, and outline for future research directions is presented.

II. RELATED WORK PREPARATION

A. Forwarding of e-learning to m-learning

Since 1995, e-learning has been a modern learning method. Most people think that e-learning was the final solution to deliver training and learning process [2]. However, after wireless technology being introduced to access the Internet [3], the access to Internet using mobile devices is now most dominant. Therefore, the e-learning could transform to m-learning without very much specific changes to the contents.

According to Brown [4], m-learning is a subset to e-learning whereby the e-learning is a micro concept which involves as learning environment in online learning and m-learning. These are all subsets to the flexible learning as depicted in Fig. 1.
B. M-learning Access Technology

As briefed by Starr (2003) [5], accessing to electronic learning resources such as web sites, e-mails or Virtual Learning Environments (VLEs) are now frequently done by using mobile devices either online or offline.

While online, the device has to connect directly to the resources through network which is normally the Internet. This can be performed by mobile phone connection methods such as GPRS, 3G, HSPA or wireless LAN (WiFi) which is now emerging as popular wireless LAN standard and becoming available increasingly.

However, when offline, the resources must be downloaded from the server, website or VLE to the mobile device before use on the move as standalone resources. Generally, mobile devices like laptops, mobile phones and PDAs will synchronize (process of downloading and possibly uploading after modification) with learning resources by plugging it back to the network.

C. The needs of m-learning in education sector

M-learning is now ideal for learning practice since it is truly independent of time and location. Additionally, the use of mobile devices such as laptops, PDAs and mobile phones are now increasing together with the development of learning opportunities and learning materials. There is also an enhancement of learning materials and management system to be able to function with an increasing range of access devices. Therefore, these create a huge learning opportunities which has no much restriction of time and location. All these flexibilities are not only very much beneficial to distance learning but also to face-to-face learning which could be as an alternative learning process.

D. Perception on m-learning

A study [6] on learner readiness for m-learning at one of higher institutions in Malaysia has shown that learners generally viewed that m-learning as beneficial. This m-learning would help them managing their time, focusing in their learning, motivating and attracting their interest in learning and the most dominant perception was that m-learning would make learning even more flexible.

Correlation of those aspects of learning environment, access technology, needs and perception from the learners has given an impression that m-learning content is very much significant to be developed in order to support the necessities of learning resources.

III. DESIGN AND IMPLEMENTATION

As to be used in mobile platform, this m-learning application has been developed using JAVA programming language specifically J2ME MIDP 2.0 and CLDC 1.1. Netbeans IDE was used to design the interface of the application.

Screen navigation in this m-learning application has been designed using exploration technique as depicted in Fig. 2 as well that it consists of four main modules which are note, flash card, quiz and help. Flash card module (Fig. 3) is designed to help learner understand and memorize the important point in short while note is to help them understand four main topics included Basic Structure of Computer, Basic Processing Unit, Arithmetic Unit, and Memory system (Fig. 4).

In addition, quiz module (Fig. 5) is prepared to help assessing the learner’s comprehension. As shown in Fig. 6, this module consists of objective questions in three levels; easy, medium and hard. Marks achieved will only expose when learner had finished answering all questions in that level. Moreover, learners can check the answer together with the explanation. This will help them learn why it was the answer. For those user who unfamiliar with the application can obtain guidelines through the help module.

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Fig. 2. Screen navigation of M-learning Application for Basic Computer Architecture
IV. CONCLUSION AND FUTURE WORK

M-learning application for Basic Computer Architecture is a learning resource or learning content developed to facilitate learning practice on mobile platform using mobile devices. This m-learning application has been developed using JAVA programming language specifically J2ME MIDP 2.0 and CLDC 1.1. Netbeans IDE was used to design the interface. Modules involved in the application were notes, flash card and quiz which enables user to learn some fundamental topics included Basic Structure of Computer, Basic Processing Unit, Arithmetic Unit and Memory system.

This m-learning application has its limitation where it can only be used while offline and not synchronize. Therefore, it is essential to make it available either while offline or online and synchronized while online. For future work, the quiz module can be extended to provide question sets randomly in order to assist learner experiences variety pattern of questions.

V. REFERENCES


