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Mobile Application for m-Learning

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Abstract: In the recent past, self learning plays a significant role in enhancing knowledge of students. The mobile learning environment (m-learning) enables the students to achieve more in education even without the direct assistance of a teacher. The m-learning is a method of electronic learning (e-learning). Learning is very essential to everyone to satisfy their needs and wants. Continuous learning can improve sustainable growth of the individual and nation. In some occasions, students are not able to learn their subject with direct contact of teachers at schools or colleges due to various personal and family reasons such as health problems, migration of family, etc. This problem is addressed by m-learning using mobile application. In m-learning approach-based education, the course contents are uploaded to the cloud server by the teacher. Then, the students those who are not able to attend school or college can download the course content through internet using an m-learning mobile application and learn them. Once the course content is downloaded to the mobile devices through mobile application, the student can learn even without internet connectivity. This paper presents a mobile application for m-learning for the students those who are not able to attend the classes at engineering colleges.

Keywords: Mobile application; m-learning; e-learning; web-application; self-learning; mobile application for e-learning;

I. INTRODUCTION

Learning is a process of gaining knowledge through experience or study or both of them. Learning is very essential for an individual to improve their abilities and skills to satisfy the needs and their wants. Learning develops self-confidence and brings success to everyone. Through this learning, poverty can be eradicated and self discipline is built. Especially, learning directly contributes to the growth of the country [1]. The learning can be categorized into different types such as non-associative, active, associative learning, play, education, multimedia learning, e-learning, etc. In non-associative learning, the learning occurs by habituation and sensitization. In active learning, the learner understands the information with controlled and fully involved manner and learner can identify the learned information and unlearned information. In associative learning, the learner learns the association between two behaviours or personalities, etc. for obtaining the information or knowledge. In play-based learning, the learner learns by playing with an object or with a group through which the learner is educated. In education-based learning, the learner learns information or acquires knowledge through teaching learning process [2] and conduction of experiments. In multimedia-based learning, the learner learns through auditory and visual stimuli with the help of information technology. E-learning is computer aided learning. In e-learning, computer, internet, audio, visual devices are used to perform teaching learning process. The mobile learning (m-learning) is a one type of e-learning [3].

Education is a process of assisting for learning or acquiring the knowledge. It is carried out through collaborative learning, peer-to-peer learning, classroom learning, and self learning. In collaborative learning, a group of people try to learn or peruse new things by discussion. In peer-to-peer learning, the same aged or level individuals teach one other to acquire or exchange the knowledge. In both the types of learning, direct assistance of a facilitator in needed [4]. However, in both types of learning, the students always learn in groups. In some situations, some group members may not cooperate in learning due to lack of interest, personal reasons, etc. Moreover, in these two learning types, the learner's learning capability can be the barrier for smooth learning. The classroom learning is a process of transferring the knowledge from teachers to the students, but the knowledge building depends on the interest of the individual student. If the students are not attentive during the teaching time due to their personal reasons such as illness, physical or mental anxious, etc, the student will not be able to receive the learning content. Hence, self-learning is encouraged among the students. Self-learning is a way of learning in which the learner learns by themselves without direct assistance of teachers [5]. Self-learning can be achieved through the m-learning. The m-learning is more flexible since the learner can learn at any time at any place comfortably [6]. This paper presents a mobile application for m-learning for the students to learn the engineering subjects.

The rest of this paper is organized as follows: Section 2 reviews the literature. Section 3 presents the m-learning application for engineering students. Section 4 provides the implementation details. Section 5 discusses the outputs and Section 6 concludes this paper.

II. LITERATURE SURVEY

This section presents the research works that are related to the proposed work. In recent past, the growth of information technology and wireless technology has increased the availability of mobile devices such as mobile phones, tablets, etc. The mobile devices are attracted by all humankind since it is portable, flexible and cheap. These

mobile devices function with two components namely hardware component and software component. The software component can be classified as mobile operating system (MOS) and mobile application (mobile app). The Android OS, Bada, BlackBerry OS, iPhone, etc. are the examples of mobile operating system. The mobile application is developed with integrated development environment and it is deployed into the application stores. Then the user can download the mobile application from the application stores. Google Play, App Store, etc. are the examples of mobile application stores [7].

In general, the mobile application can be categorised into two as native application and web-based application. The native applications are built for the specific MOS using their code library to access the hardware elements of the mobile devices such as camera, memory, global positioning system (GPS). The web-based application is deployed on the host, and then the features of the application are accessed by the mobile browser. The native-based mobile application reduces the start up time and increases the speed of mobile operations that are performed by the mobile application. This is due to the fact that the mobile application is stored on the local mobile devices hence the mobile device need not download the application code from the web to run the application or operation. It requires more storage space since the mobile application needs to be installed in the local mobile device. However, the storage space is not a barrier for the native-based mobile application since the storage space is cheaper due to the advancement of integrated circuit technology. The speed of the web-based application depends upon the speed of the internet connectivity. Moreover, the speed of the web-based application is slower compared to the native-based mobile application. The web-based application fails to function if the internet connectivity is disconnected but the native-based application can function even without internet connectivity by downloading the contents required when the mobile device is connected to internet [8].

Ning Wang designed architecture for mobile optimization application. This architecture can be used for the development of mobile learning and industrial electronics applications. This architecture is constructed by combining the web and native-based applications. However, hybridisation of web native-based applications can eliminate the cross-platform issues on the native-based application, runtime issue and accessibility of hardware component issue of web-based applications [9].

The learner can be classified into different categorise in terms of their learning style such as auditory learner, kinaesthetic learner, and visual learner. The auditory learner is comfortable with learning the contents through verbal communication, listening, and hearing the learning contents. The kinaesthetic learner is comfortable with learning by practice. The visual learner is comfortable with learning by contents with visual effects. For example, learning through video contents and animations. Hence, before delivering the educational contents to the students, the learning style of the students need to be identified. Moreover, the learning patterns of the students with mobile devices are different for one to another. Hence, analysing the learning pattern of the students is essential and the mobile learning environment is designed to match with different learning styles of the students. Therefore, the researchers conduct the research on identifying the student learning pattern and their learning styles to enhance their learning ability [10].

Evrim Baran conducted a review of m-learning in teacher education [11]. SM. Jacob and B. Issac conducted an analysis on mobile usage by students for learning to identify the learning style of the students in order to improve the learning ability of the students [12]. Castro et al presented the context aware m-learning application. Moreover, this application incorporates additional features such as personalization and monitoring services-based on learning context and learning style [13]. These additional features can be achieved through short message service (SMS), social network and providing the learning contents based on the student learning style [14].

In m-learning perspective, the softwares or applications that are used for the teaching-learning process are known as mobile learning objects (MLOs). These MLOs are accessed and executed by the mobile devices. A. P. Rodríguez et al presented usability assessment of MLOs to enhance quality of education among the students [14]. Furthermore, the researchers developed different types of mobile learning models, architecture and frameworks. N. F. D. Filho et al. developed reference architectures for m-learning environments and provided suggestion for the development, interoperability and reuse in m-learning based on service-oriented architecture [15]. Ivica Boticki et al. designed a methodology for content-independent collaborative m-learning in classroom [16]. Ahmed Al-Hmouz et al. presented adaptive neuro-fuzzy inference system (ANFIS) to deliver the suitable learning content to learners [17]. Collaborative learning-based m-learning approach encourages more interactive learning through online. Ruimin Shen et al developed an interactive m-learning application for the large seated computer science classroom [18]. The mobile devices consume power from the battery. A low energy battery cannot provide power supply for longer period form-learning. Hence, improving the energy efficiency in mobile learning framework is also crucial . A. N. Moldovan et al. addressed opportunity and challenges energy efficient mobile learning [19].

From the literature, it is observed that many researchers worked in different aspects to improve the m-learning application to enhance the learning ability among the students. This paper presents a Java-based m-learning application to deliver the engineering course contents to the students.

III. MOBILE APPLICATION FOR M-LEARNING

The mobile application for m-Learning contains different modules such as registration, login, department selection, subject selection, and content reading as shown in Figure 1. The registration module receives the student details such as registration number, name, department, age, etc. and provides the username and password.

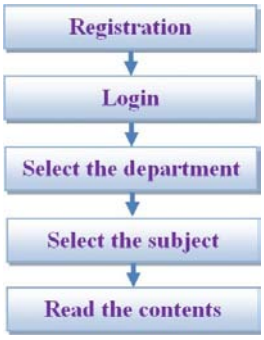


Figure 1 Flowchart representation of m-learning application

The login module authenticates the student by receiving the username and password. The department selection module allows the students to select the department under

which they want to read contents. Subject selection module allows the students to select the subject that belongs to the particular department which has been selected. The content reading module facilitates to read the contents of the subject.

IV. IMPLEMENTATION DETAILS

This application is implemented using the software Sun Java Wireless Toolkit 2.5.2 with the computer system specification of windows10 operating system, 4GB random-access memory (RAM), 500GB Hard disk, and Intel(R) Core(TM) i5 – 3470 CPU@ 3.20GHz processor. The mobile application for m-Learning is implemented with the following procedure.

A. Implementation Procedure

Step 1: Launch the Sun Java Wireless Toolkit 2.5.2

Step2: Select the new project option and enter the project name and the MIDlet name as public class name and select the create project option.

Step3: Write the program in notepad and save the program with the extension of (.java) in specific path as given follow: "C:\... ...\j2mewtk\2.5.2\apps\...<Project name>...\src"

Step4: Open the Java Wireless toolkit window

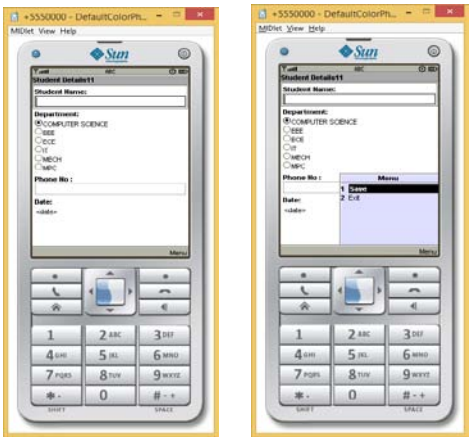
Step5: Select the Open Project option and select the application

Step6: Build the project with help of Build option

Step7: Run the project with help of Run option.

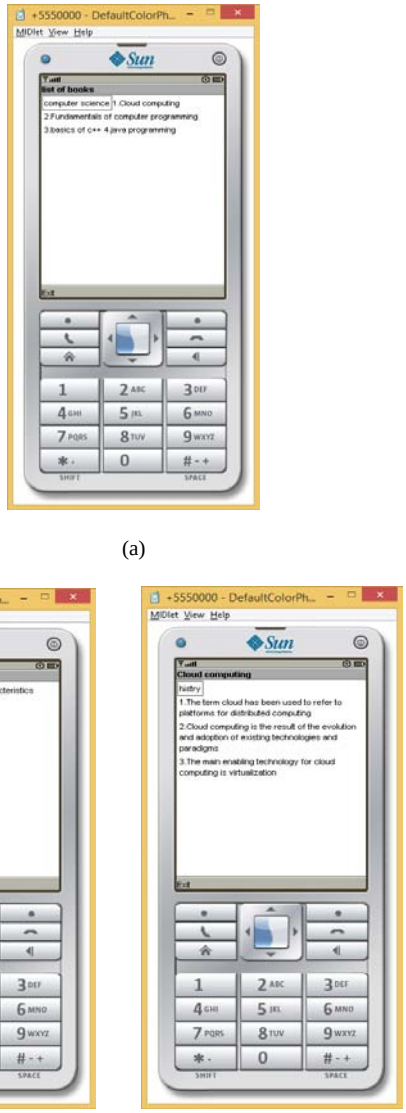
Initially the Sun Java Wireless Toolkit 2.5.2 is launched. From the Sun Java Wireless Toolkit window, the new project option is selected. Then, the project name and the MIDlet name as public class name are given. Then, the project is created by selecting create project option. The application program is written on the notepad and save the program with the file extension of (.java) into the specified path follows: "C:\... ...\j2mewtk\2.5.2\apps\...<Project name>...\src". Then, Sun Java Wireless Toolkit window is launched and the open project option is selected to open the saved project. The application is built using the build option. Then, the application is run using the run option.

V. OUTPUT AND DISCUSSION



(a) (b)

Figure 2. (a) Registration form (b) Update of the registration



(a) (b) (c)

Figure 3. (a) Selection of departments for the subjects (b) Selction of subjects for contents (c) The contents for reading.

This section presents the outputs for the mobile application for m-Learning. The Figure 2 (a) shows the registration form and Figure 2 (b) shows the updated registration details. Figure 3 (a) shows the select option for choosing the departments to find the subjects. Figure 3 (b) shows the the contents of the course for the selected subject. Figure 3 (c) shows the the contents for reading. Figure 2 and Figure 3 shows that the students can register themselves with nesserary deatails. Then, the userneame and passwords are porvided to the students. Using the username and password, the students can log in to the application, then the students can select the department. Then, select the subject and select the portion of the subject. Hence, the students are able to read the contents as they need.

VI. CONCLUSION

Self-learning is a process of learning the contents without direct assistance of the teachers. Self-learning gives more confidence and motivation to the students and drives them to achieve more in their fields. Self-learning is more essential when the student is not able to attend the regular classes. Self-learning is achieved by mobile learning (m-learning).

The m-learning is a type of electronic learning (e-learning). This paper presented a native-based mobile application for m-learning for engineering students. Using this mobile application, students can read their course contents. This application can work even offline since the learning contents are updated to the mobile devices when the mobile device is connected with internet. Moreover, this application is more useful where the students are not able to attend their classes due to the personal or medical reasons. This also overcomes the drawbacks of web-based leaning.

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