

Design of Information Technology in Enhancing the Quality of *M-Learning* Based Learning at Diponegoro University

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Abstract

Mobile learning as an intersection of Mobile Computing and E-Learning providing resources that can be accessed in anywhere has capability in an excellent searching system, rich interaction and full support towards an effective learning and performance-based assessment. In addition, it has a characteristic of not being dependent on time and space. Education requires an alternative learning model typically not dependent on time and space. It is also expected that the alternative model can facilitate knowledge sharing and knowledge visualization in order to make knowledge more interesting and easy to understand.

The application of mobile learning can be used through the android operating system that is chosen in consideration to that android has been dominating the Smartphone market and is an open-source operating system that is easily developed. In this case, the versions of android supporting this application are Version 2.2 to Version 4.2. To ease the users to access M-learning, jQuery mobile framework is applied as its display, in addition to its attractive features, is able to adjust the screen from mobile equipment.

This application will be implemented in three types of user: *admin* that will use the web-based application on the desktop and *lecturers* and *college students* that will use android mobile tool-based application. In this case, the function that will be given is by processing the materials that will be uploaded by lecturers and can be downloaded by the college students, task and quizzes given by the lecturers to the college students and the function to show the score from the college students.

Keywords: mobile learning, android operating system, jQuery Mobile, e-learning.

1. Introduction

The rapid advance of Science and Technology in the form of communication technology and information technology has brought an impact on any aspects including in aspects of education and learning in which the information about learning can be rapidly transferred to all learners through computer network (internet). The internet technology characterized through its accessibility in time and place, in involving many users either individually or in a team and in offering all facilities has made it to be a very accurate media for the development of further education level. In human life, the role of technology of information and communication plays a very essential role. In addition to be an information media and a communication accelerator, technology of information and communication also enables human to tackle all of his or her business at ease. This technology can be applied in companies, business, banking sector, education and health. In education, the application of this technology can improve the quality of the education itself.

Concerning with the role of technology of information and communication, the learning information presented in the textual form (book) can make a college student uninterested as the learning media provided is merely in the textual form and lacks of visual information making its appearance monotonous (motionless and not colorful (black and white only)). As a result, it can make a college student bored and less interested.

In response, there is a need to find an interesting and interactive learning method as a solution of this aforementioned issue. An interactive and interesting learning - by adding any visualization through animation, texts, pictures and sound - can make a learning process more interesting and not monotonous. A fact reveals that presenting information via multimedia can enhance the memory in learning as a material in an audio-visual form is much easier to be captured and again people physiologically is more sensitive in using their senses.

Given the application of this interactive learning, it is expected that it can enhance the interest of college students. This application is designed as a learning media via computer that is considered to be abundant in use among societies as a result of the development of information technology. The aim of this research is to introduce an M-learning-based information technology using Android, IOS and Blackberry OS as a learning media.

2. Theoretical Bases

As defined by Clack Quinn (Quinn, 2000), *M-Learning (Mobile Learning)* is as “*the intersection of mobile computing and E-Learning: accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. E-Learning independent of location in time or space*”. Thus, M-learning, by referring to the aforementioned definition, can be referred to a learning model using information and communication technology. Through this learning concept, *M-Learning* can be beneficial for the provision of learning materials that can be accessed in anytime, in this case, via mobile communication devices. Important to highlight here, not all learning materials are suitable in the use of M-learning. The most significant difference between *E-Learning* and *M-Learning* is in the characteristics of *hardware* and *software*. Not all WebPages available at recent are designed to be displayed on desktop computer with the minimum 800×600 pixel resolution for color monitor. In fact, the resolution of a mobile device in general is not more than half of such resolution. This, as a result, makes a direct display of the web pages not so good to see aesthetically. Moreover, it can make navigation so difficult and in the worst case, it becomes unworkable at all. Nevertheless, *M-Learning* has a number of strengths in comparison to the E-learning system such as:

1. Portability
A mobile device can be easier to be carried and to be used to make some notes or to input the data anytime.
2. Supporting the learners
The recent generation prefers to use the mobile devices such as PDA, cellular phones, and hand-held game devices.
3. Enhancing motivation
The ownership of a mobile device tends to enhance the commitment to use and to learn it.
4. A wider scope
Mobile device tends to be cheaper, thus becoming widely affordable for society.
5. Learning punctuality
Mobile device can enhance the work performance or learning in accordance with the needs of the learners.

2.1 jQuery Mobile

Just like JQuery on the desktop, jQuery Mobile is a JavaScript framework, yet its application particularly is targeted to the mobile devices such as *iPad*, *iPhone*, *Blackberry*, *Symbian*, or *Android*. jQuery Mobile, additionally, is possible for the making of multi-platform web application – in other words, it is not relying on certain hardware. jQuery Mobile also has supported the touch-screen application, thus enabling the users to optimize the available devices. Figure 2.6 shows a command code to call *library* from jQuery Mobile. Such calling is used to facilitate the user interface development for *mobile web apps*. The design of Query Mobile is clarified into 3 parts: *header*, *content & footer*. The *header* part functions to make a *toolbar* on the top of page and is issued to save *title* and *button*. *Content*, meanwhile, contains the core contents of the page such as texts, pictures, *button*, *list*, or *form*. The last part, *footer*, functions to make a *toolbar* at the bottom page used for things such as *button*.

2.2 Phonegap

Phonegap refers to an application that accommodates and allows a user for a native application development installed using HTML, CSS & JavaScript. The use of Phonegap enables a developer to write once time and distribute to six core platform mobile and App Store including Apple iOS, Android, BlackBerry, WebOS, Samsung Bada and Symbian. The installation of Phonegap on Android is done as follows:

1. Download the newest Phonegap
2. Make a new project using eclipse as an initial step of Phonegap configuration. This can be done by selecting menu New and then select Android Project.
3. Open folder *project* that has made, then create two new folders: */libs* and */assets/www* under the main folder.
4. Copy file *cordova.js* from Phonegap that has been downloaded into the folder */assets/www*
5. Copy file *cordova.jar* from Phonegap that has been downloaded into the folder */libs*
6. Copy folder xml located in folder library Phonegap (select lib/android) into the folder */res* from the *project* that has been made.
7. Adjust several code lines in main file *Java* in folder *src* (see figure below) :
 - Change class *extend* from Activity into DroidGap
 - Change the lines *setContentView()* into *super.loadUrl("file:///android_asset/www/index.html")*; add the lines *import org.apache.cordova.**; and delete the lines *import android.app.Activity*;

8. *Refresh* in *project* to update the change by pressing F5.
9. Open file *AndroidManifest.xml*, then add a number of permissions functioned to allow the program to access Android features. Copy the following permission code under *versionName*. The addition of this permission is to allow the application to access the features on the Android such as camera, internet access, reading contact and etc.
10. Add an *activity* under tag *application* on *AndroidManifest*. This tag *activity* functions to read the application of *Phonegap* and to change the keyboard orientation on android `<activity android:name="org.apache.cordova.DroidGap" android:label="@string/app_name" android:configChanges="orientation|keyboardHidden"><intent-filter></intent-filter></activity>`
 Create *file HTML* named *index.html* and copy it into *folder /assets/www*. Test the program using a simulator by selecting *Run As* and click *Android Application*.

3. Research Method

3.1 Data and Research Tools

A specific data analysis to support the making of this software requires the following data:

1. *login* data – Authority limited for the level of the application users in which if an admin does *login*, it will be different from the login done by member of this application.
2. *Input Data* – data that must be input into the application in order to result in a number of outputs such as data of the test takers, data of examination, data of answer keys of examination and data of test taker scores.

Meanwhile, the hardware used in this research is as follows:

- One unit computer
- One unit *Smartphone* Samsung Galaxy

The software used to develop M-Learning application is as follows:

- Windows 7 operating system
- XAMPP 1.7.3
- *Eclipse* IDE for Java EE Developers
- *Phonegap* 2.3
- *Android Emulator*
- *MobiOne*
- Browser: Google Chrome, Mozilla Firefox and Internet Explorer.

3.2 Research Steps

Figure 1 shows the flowchart of online testing application.

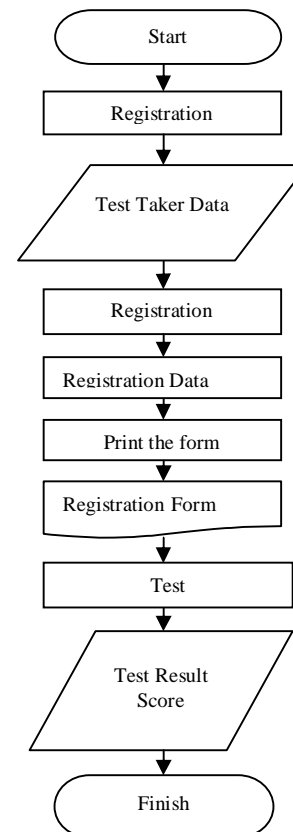


Fig 1. Flowchart of online testing application

The *flowchart* above illustrates the sequence of online test application in which a test taker registers by inputting his or her personal data including name, address, place and date of birth, sex and parents' name. Following this, the test taker must do a registration to the admin and print the registration form. The printed form will be used as authentic evidence after registering the application. Having done this, the test taker can do the test. The test itself will be conducted in accordance with the schedule issued by the program. The score of the test finally will be displayed on the computer screen after the test.

4. Results and Discussion

4.1 The Implementation of M-Learning Interface Design

The display of *login* will be easily accessed even though the size of its layers is varied. Figure 2 shows the display of M-learning login.

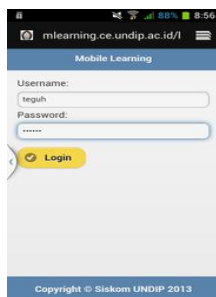


Fig 2. The display of M-Learning login

Having successful done login, the first page of M-learning will come out. This page contains menus that can make the learning activities of the college students easy as shown in Figure 3 below.



Fig 3. The Display of the Initial Page of M-Learning

Figure 3 shows the menu of anything provided on M-learning. There are five menus available in M-learning: edit account Login, Lists of the Subjects, Downloading materials, Doing the question and Seeing the Scores. Those menus are explained as follows.

a. Edit Account

This menu is used to replace *username&password*. Figure 4 shows the form of filling the new *username* and *password*.

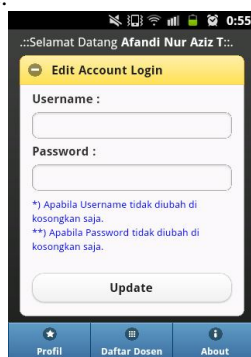


Fig 4. The Display of Menu for M-Learning Edit Account

b. Subject

The menu of the subjects is used to see the subjects taken by a college student. Figure 5 shows the content of the subject menu.

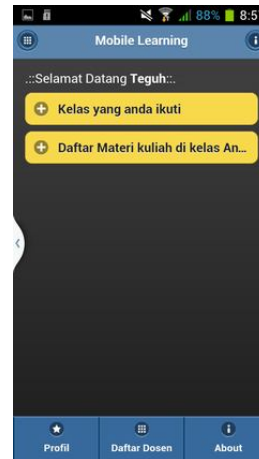


Fig 5. The Display of M-Learning Login

c. Download Materials

The menu of download materials is used to download the materials in accordance with the class taken by a college student. Figure 6 shows the form to download the materials.



Fig 6. The Display of the Menu for Download Materials of M-Learning

d. Quizzes / Tasks

The menu of quizzes/tasks contains a collection of quizzes or tasks that can be done by a college student. There are two types of task in doing the quizzes: Multiple Choice Question and Essay as shown in Figure 7.



Fig 7. The Display of Conducting the Evaluation

e. Score

The score menu is used to see the score after the college students have done the tasks. Figure 8 shows the content of this menu.



Fig 8. The Display of See the Score of M-Learning

5. Conclusions

1. *M-Learning* has an equal database and list PHP. However, in *M-Learning*, PHP is in the form of jQuery Mobile, thus enabling the feature of E-Learning to be possible to be applied in *M-Learning*.
2. Phonegap is a *development framework enabling the developer to use web-based technology in order to make a mobile application. Hence, making application of M-Learning in Diponegoro University can be run using android platform.*
3. The display of *M-Learning* when being accessed can follow the size of the screen of the mobile devices as the web framework of jQuery Mobile is used in the making process.
4. Based on the experiment towards a number of android versions, it can be concluded that the *M-Learning* application can run using from the version of Android 2.2 (Froyo) to the versions of android 4.2 (Jelly Bean).

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