Mobile Base Learning Application for Campus on Android Platform, Case Study- University of Tourism, Technology and Business Studies

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Abstract

Most students of University of Tourism Technology and Business Studies are struggling with the accessing class teachers' study material and self-assessment from e-learning platform without having Internet. The researchers used qualitative methods using an observation and an interview. The researchers used qualitative methods by conducting an interview with the students of UTB. An observation was also used to get first-hand information on the access of learning material from e-learning platform. A prototype was designed and distributed between students of data mining course in order to get their feedback. There was 388 BIT Students Population. To conducts research, Slovin's formula was applied where researcher found 20 BIT Students as a sample size. Prototype of a mobile-based learning application was developed on Android Platform using Java programming language and distributed among students for feedback. Students were interviewed whoever had an experience of distributed prototype. Interview response was analysed by using Microsoft excel. The finding was on use of mobile-based learning could be one of the best modules of blended learning technique. The researchers recommend to university of tourism technology and business studies to integrate it with their e-learning platform. This mobile learning application intends to supplement the current traditional classroom and e-learning systems. It makes learners at any time at any place they want to get the knowledge without having Internet in their android mobile device. Future researchers may link between mobile based learning application and other aspects of e-learning platform.

Keywords - *Mobile Learning, Android Platform, Java Programming Language, Mobile Learning Application, without having Internet, eLearning*

I. INTRODUCTION

The use of computing technology for learning has been observed in various ways. In the past few decades, electronic learning or eLearning had been adopted and used by public schools and university students in many parts of the world. They were familiar with both the e-learning terminology and technology but in recent years, the rapid progress in mobile technology has created a new area, which is known as mobile learning technology. Mobile learning is the next generation of eLearning that are based on mobile devices [5]. Wireless technologies such as IEEE 802.11, Bluetooth, and GPRS are used in a project for development of informal classroom and eSchool bag system at the Aletheia University in Taiwan [1].

Using Web services for mobile learning applications helps the process of development by providing a standardized way of communication between mobile clients and servers. It is a research on how to use mobile devices and mobile application development as a mechanism to teach introductory programming to computer science students [2]. The objective of this research is to integrate mobile devices into computing education that could provide more benefits to the students than other teaching techniques. In this research the approach involves Java platform and the Android smart phone as a device. The application associated software tools such as Android Studio IDE, Android Smartphone Emulator and Core Java.

This proposed project of mobile learning applications for the Android platforms is developed for University of Tourism Technology and Business Studies (UTB) as a case study will be used in Information Technology, computer engineering and Computer Applications courses. These applications are multiple choice quiz style and touch based applications that ask students questions relevant to their modules/subjects. These applications also have tutorials and self-assessment exercises and practical exercises as well. Modules are categorized unit wise. There are several different questions to be asked from tutorial. Quiz questions are prepared based on given tutorial in the app. During quiz play, students will be prompted with their answer, if it is right or wrong? If answer is wrong, app immediately toasts right answer along with wrong answer for student correction. Once students complete the quiz, the individual scores are displayed on students mobile automatically. If student achieve best score than previous score then score will

be updated with new best score. Since this is just their learning app to do the self-assessment. This app can be used completely offline, meaning that, there is no need of having Internet in to use this Mobile learning app.

II. LITERATURE SURVEY

Today over 6 billion people have access to a connected mobile device and for every one person who accesses the internet from a computer two do so from a mobile device. Mobile technology is changing the way we live and it is beginning to change the way we learn. Mobile learning involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others, or create content, both inside and outside classrooms. Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school systems and improved communication between schools and families.

Mobile is a key platform for innovation in Sub-Saharan Africa, at the end of 2016; there were 420 million unique mobile subscribers in Sub-Saharan Africa, equivalent to a penetration rate of 43%. The region continues to grow faster than any other region; the CAGR of 6.1% over the five years to 2020 is around 50% higher than the global average. The region will have more than half a billion unique mobile subscribers by 2020, by which time around half the population will subscribe to a mobile service. The total number of SIM connections in the region reached 731 million at the end of 2016, and will rise to nearly 1 billion by 2020 [6].

Rwanda Education System is moving toward a student's centric education supported by the integration of technology. The use of technology enables better teaching and better learning with students using digital, multimedia rich, interactive lessons enabling self-pace and collaborative learning. In recent years, the government of Rwanda has enhanced online learning to deliver cost effective, easily accessible and ever-current education to all ages and social backgrounds, regardless of time and geography. Since the system started, 5,357 students graduated in different courses. An increase of 69% in 4 years, In November 2014, The Government of Rwanda signed an agreement with Positivo BGH. Through this agreement, Positivo is going to put up a production plant of laptops, computers, tablets, and other electronic gadgets in Kigali. In November 2014, Rwanda hosted Innovation Africa Summit 2014. The summit was participated by over 400 decision makers namely ministers, higher education, large and global IT companies such as HP, Microsoft, Intel, IBM, Oracle, Google and many more. The key issues in this large meeting was national education strategies, last mile connectivity, investment in ICT for education, skills development, curriculum, training and the use technology to empower teachers and students [4]. Computing devices have become ubiquitous on today's college campuses. From notebook computers to Wireless phones and handheld devices 1 (or W/H devices for short), the massive infusions of computing devices and rapidly improving Internet capabilities have altered the nature of higher education.

Computer Assisted Learning (CAL) has proliferated tremendously in the last few decades with the use of Internet, email, multimedia technology, and intelligent tutoring system on campus. A 2000 Campus Computing Survey revealed that the majority of college professors use email to communicate with their students, and approximately one-third of college courses utilize CAL technology. Similarly, Jones (2002) reports that a great majority of college students' own computers and wireless devices with almost 80 percent believing that Internet use has enhanced their learning experience.

III. RESEARCH METHOD

A. Methodology used

Research was conducted by the following steps:

1. Conduct Literature study in order to learn and understand mobile-based learning application researched by other researchers.
2. Explore and analyze UTB e-learning platform as a case study in this research. Analysis is done to find out how currently tutorials and self-assessment are done. Based on this analysis, table in database will be designed.
3. Conduct interview to 20 random people/students at UTB Kigali-Rwanda on the importance of Mobile Based Application for campus.
4. Research was conducted during May 2017 to January 2018.
5. A prototype was implemented to test its effectiveness and reliability. The test was done among a few students within this period of data collection.
6. Conclude the result of the application by conducting a phase conversion in order to summarize the research objective and to answer the problem.

B. Findings

During May 2017 including both campuses Rubavu and Kigali, total Population of BIT student at University of Tourism Technology and Business Studies (UTB) was 388. To conduct research, Sample size 20 BIT Students was calculated by applying Slovin's Formula.

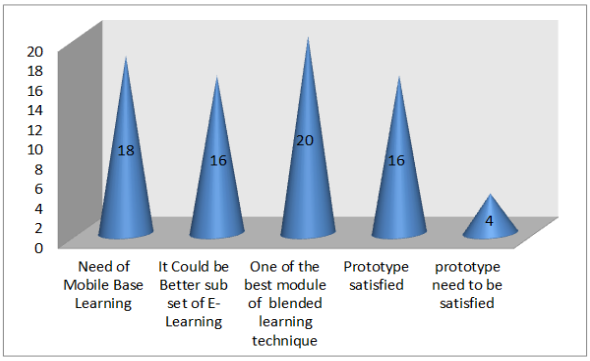

Fig 1: Findings

C. Overview of the Mobile Learning Application

Our application can be installed only on android platform phones. This application consists of the real time e-learning that provide a reliable mobile learning application. This app is used offline. It means no need to have Internet connectivity to use this app. This application basically consist of three part first part has tutorial part where the learning contents are place and in second part chat room is available for user. If any query occurs to user then he/she will fire it on the chat room. The user (expert) on the other side will provide the solution to the user's query thus this application is real time application and provide free of cost e-learning. The application we have developed is to reduce some drawbacks of the existing system. This application is basically based on the Android smart phone. From the literature survey on the growth of mobile phones, it shows that this application has a wider scope area. The Application provides the reliable and convenient way for the mobile learning.

D. Technology Used

In this application, the following technologies are used.

1. Android Studio IDE

Android Studio Integrated Development Environment (IDE), which also includes the Android Software Development Kit (SDK). Android Studio IDE includes tool windows, the code editor, the Designer tool, cloud-base file storage and Integrated Firebase-Real-time Database. In addition, it also includes Google Play specific topics such as implementing maps using the Google Maps Android API, in-app billing and submitting apps to the Google Play Developer Console. Advanced features of Android Studio such as Gradle build configuration and the implementation of build variants to target multiple Android device types from a single project code base [3].

2. Java

Java is an object oriented, multithreaded programming language develop by Sun Microsystems in 1991. It is designed to be small, simple and portable across different platforms as well as operating system. The Popularity of Java is due to its unique technology that is designed on the basis of three key elements. They are usage of applets, powerful programming language constructs and a rich set of significant object classes. When a Java Program is compiled, it is translated into machine code or processor an instruction that is specific of the processor. In the Java development environment there are two parts: a Java Compiler and a Java Interpreter. The Compiler generates byte code (a set of instruction that resemble machine code but are not specific to any processor) instead of machine code and the interpreter executes the java program [3]. In this research, Java is used to perform the server side/back-end operations.

3. XML

XML (Extensible Markup Language) is a buzzword you will see everywhere on the Internet, but it's also a rapidly maturing technology with powerful real-world applications, particularly for the management, display, and organization of data. XML is an essential technology for anyone working with data, whether publicly on the web or privately within your own organization [7]. In this research, XML is used to design user-interface.

4. Shared Preferences

Shared Preferences is the simplest data storing option available in Android. It stores data in key value pairs. Data is stored in XML file in the directory *data/data/<package-name>/shared-prefs* folder. Any primitive data: Boolean, float, int, long, and String can be stored. This data will persist across user sessions (even if your application is killed). In this research, *Shared Preferences* used to store user's highest score [3]

5. Firebase

Firebase can power your app's backend, including data storage, user authentication, static hosting, and more. Focus on creating extraordinary user experiences. Build cross-platform native mobile and web apps with our Android, iOS, and JavaScript SDKs. You can also connect Firebase to your existing backend using our server-side libraries or our REST API [8]

Firebase Features

- **Real-time Database** − Firebase supports JSON data and all users connected to it receive live updates after every change.
- **Authentication** – We can use anonymous, password or different social authentications.
- **Hosting** – The applications can be deployed over secured connection to Firebase servers.

Firebase Advantages

- It is simple and user friendly. No need for complicated configuration.
- The data is real-time, which means that every change will automatically update connected clients.

- Firebase offers simple control dashboard.
- There are a number of useful services to choose.

Firebase Limitations

- Firebase free plan is limited to 50 Connections and 100 MB of storage.

In this research, Firebase real-time database has been used to implement real-time chat room.

IV. SYSTEM DESIGN

A. Existing System

Currently, there are different methods that have been applied for the purpose of students learning at University of Tourism Technology and Business Studies (UTB). Apart from the traditional way of teaching where students sit in class and learn or search for books to read, E-Learning has also been incorporated to support this way of learning. In some cases both the system works same and they provided much of services to the user. But because of the some problems they lose their popularity. For the case of traditional system, students will only learn when the teacher is available but cannot do extra studies since the materials are only what are provided in class. In E-Learning, the drawback comes in when student are not able to do extra practical, self-assessment (like quiz) or research without being connected to the Internet.

B. Proposed System

This application consists of the real time m-learning concept that provides a reliable mobile learning application. In case you are offline then also one can learn from this app. This application basically consist of four part first part has tutorial part where the learning contents are placed; in second part practical and/or exercises are available for user; in third part quiz part is available and fourth part chat room has been integrated. If any query occurs to user then he/she will fire it on the lecturer chat room. The Lecturer (expert) on the other side will provide with solution to the user's query thus this application is real time application and provide free of cost m-learning.

1. Proposed System Architecture

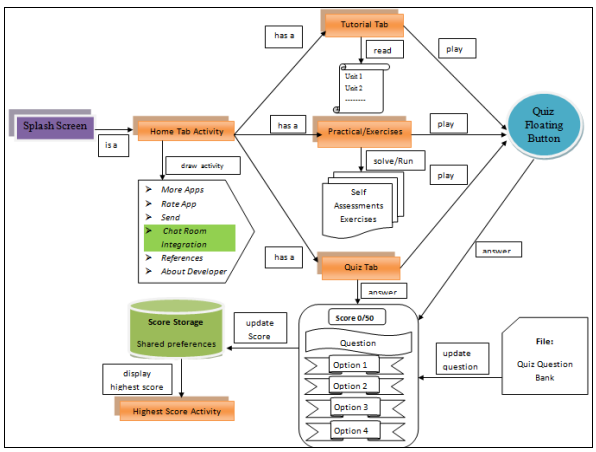

Fig 2: Proposed System Architecture

2. Screen Shots

The proposed system is being implemented through phase conversion and the following are a sample/prototype of the ready-made sections of the m-learning app developed by the authors.

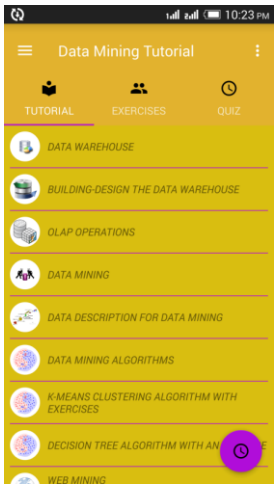

Fig 3: Data Mining Tutorial

Fig 4: Data Mining Exercises

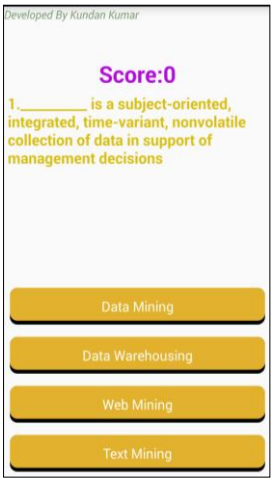

Fig 5: Data Mining Quiz

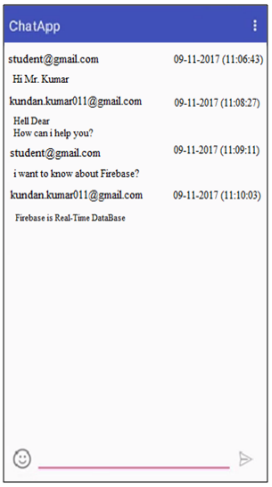

Fig 6: Chat Room

Fig 7: Web Technology Tutorial

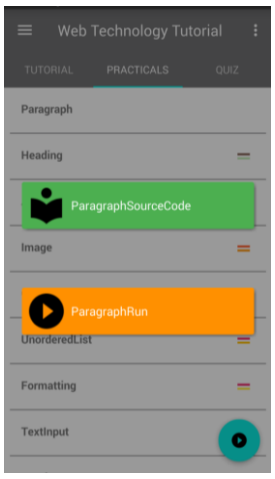

Fig 8: Web Technology Practical

V. CONCLUSIONS AND RECOMMENDATIONS

The development of mobile applications is not an easy task. In this paper we present the main steps in development of a mobile learning application for Android. The application is not yet available on Google play store for download. The system developed includes the testing module. The testing result showed that the system worked correctly. Evaluation on the prototype will be conducted to assess the learning efficiency and effectiveness of this system. This system will persist to grow and the future work will include improving the content of the system by adding more modules; real time-class assessment quiz; a chat forum and more interactive learning options for the system. Continuous enhancement of the system to continuously suit the students' needs and further experiments will be conducted for a longer period of time.

This app could be beneficial for UTB students to study their courses on their own pace anywhere anytime without having Internet in their android smartphone. So we recommend it to UTB to try to implement.

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