Development of Android-Based Yoruba Language Mobile E-Tutor

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Abstract – This paper discusses the development of a Yoruba language E-Tutor for mobile phones on the android platform. The developed e-learning application is a simple light-weight mobile based software that can tutor both kids and adults on the basics of Yoruba language, the native indigenous language of people in south western Nigeria. Evaluation of the developed mobile app was carried out by distributing questionnaires to 40 participants who installed and explored the app and then rated it based on three criteria (extensibility, ease of use and learning speed). Results showed that 32 out of the 40 respondents (80%) rated the app as above average (excellent or very good) based on extensibility criterion. Similarly 87.5% (35 users) and 77.5% (31 users) rated the ease of use and learning speed above average respectively. We intend to make the app available on the android market and to extend the app to other mobile platforms.

Keywords – *E-learning, E-tutor, Yoruba Language, Android platform, Mobile app.*

1. Introduction

E-learning is an inclusive term that describes educational technology that electronically supports learning and teaching [1] [3]. This broad interpretation focuses on new applications and developments, and also brings learning and media psychology into consideration. The learning process needs techniques and tools to present the knowledge (from different resources), interact with it and share it with others. In this context, e-learning is becoming an important tool to support the learning system to achieve its goals. E-learning is not intended to replace conventional methods of training such as classroom teaching. It is aimed to create an augmented learning environment where technology is used to deliver a combined range of teaching techniques to maximize

individual's participation in the learning process [2][4]. Today's information and communication technologies offer affordances which in many ways have yet to be explored [14]. E-learning is a part of these possibilities and comes in many variations including purely online with no face-to-face meeting or blended learning which combines online and face-to- face meeting. E-learning platforms could also come as mobile based application to allow users access the system anytime without the need of internet or a PC. Learning electronically may be delivered through an instructor-led group or purely a self-study program in a synchronous manner (same time different place) or an asynchronous manner (different time different place) [4]. The advantages of e-learning include the ability to cover very large distance between a teacher and tutor, the opportunity for learning at a self-pace with lots of repetition and social interactivity where learners can share their thoughts about what is being learning [10].

This paper gives details of the development of an android-based mobile e-learning application that enable users to learn Yoruba [13], an indigenous language spoken in south western Nigeria. Section 2 reviews previous related work in the field of e-learning while our development approach is given in Section 3. Our evaluation and discussion of results are discussed in Section 4 while Section 5 concludes the paper with pointers to future work.

2. Related Work

Learning a new language takes considerable effort and time especially for adults. However, access to the right tools and materials can make a huge difference. The use of technological tools through e-learning makes up a large part of materials that can ease the task of learning a

language. Other factors that might influence the learning include previous exposure to the language being learned, learning style as well as personal inclinations [5] [11].

Existing language-learning software applications [15] now have mobile apps which can help a user to squeeze in some extra study time while commuting, waiting in lines, or anywhere one finds him/herself with a few minutes to spare. A mobile application consists of software or set of hardware programs that run on a mobile device and performs certain tasks for the user [6]. It is a new and fast developing segment of the global Information and Communication Technology. Mobile applications are easy, user friendly, inexpensive, downloadable and runnable in most of the mobile phone [7]. Also, other software developers offer live Web classes to get users to speak with other students and a real instructor.

A mobile application has previously been developed for Yoruba proverbs [8]. This application defines proverb as a simple and concrete saying, popularly known and repeated, that expresses a truth based on common sense or the practical experience of humanity. A user-friendly interface was designed with facilities for viewing of lessons, taking of quizzes, computing scores and displaying the rank of the user. Also, a standalone e-learning system for Igbo language, a language spoken in south eastern Nigeria, was previously developed in order to provide opportunities for the younger generations to learn the language [9]. The Igbo e-Learning system was developed using Java and Microsoft Access as the database.

Detailed guidance on designing and developing an e-learning course for trainers and instructional designers who are new to e-learning design has previously been proposed [1].The authors identified six components required for e-learning courses to include scope of the course, setting deadlines, defining a project team, defining common terms/ concepts, identifying all resources and understanding technical design and content guidelines.

3. Yoruba E-Tutor Design & Implementation

The architecture of the mobile E-tutor for Yoruba language consisted of three main components. These are the Android application development environment, database design and software design with the use case diagram. These components are described in Sections 3.1 to 3.3 with the implementation discussed in Section 3.4.

3.1 Android Application Development

Android is a mobile operating system (OS) based on the Linux kernel with a user interface based on direct manipulation. The OS is designed primarily for touch-screen mobile devices such as smart phones and tablet computers, with specialized user interfaces. The OS uses touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to manipulate on-screen objects, and a virtual keyboard. Despite being primarily designed for touch screen input, it also has been used in game consoles, digital cameras, regular PCs (e.g. the HP Slate 21) and other electronics [16].

On top of the Linux kernel, there are middleware, libraries and APIs written in C, and application software running on an application framework which includes Java-compatible libraries. Android Applications are usually developed in Java programming language using the Android Software Development Kit (SDK). The Android SDK includes a comprehensive set of development tools. These include a debugger, libraries, a handset emulator, sample code, and tutorials. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution), Mac OS X 10.5.8 or later, and Windows XP or later. The SDK is not currently available on Android, however software can be developed by using specialized Android applications. Developers may use any text editor to edit Java and XML files, then use command line tools (Java Development Kit and Apache Ant are required) to create, build and debug Android applications as well as control attached Android devices (e.g., triggering a reboot or installing software package(s) remotely).

The developed android app runs on Android API level 16 and above. The app requires two types of users: the administrator and the student. A student is a normal user that will register on the system and can participate in the available e-learning any class desired while an administrator can add more contents to the application from the back-end. The system can run on any kind of phone that has Android operating system installed and is targeted for Android OS version 4.x. No internet is required for the system to work as the system works offline for easy usage and to avoid data network inconsistency.

3.2 Database Design

The entities used in designing database design [12] are user, class, questions, answers, letters, words and

sentences. Fig.1 shows the entity relationship diagram for the database. The User entity represents a user on the system who can be an administrator or student. Class represents an age group for different types of students while the question entity is meant for questions set by the administrator for the students. The answer entity is used to save an answer related to a question being set by the administrator while the letter entity is used to save different Yoruba letters for users of a particular class. Similarly, the word entity represents different words and the sentence entity is for different Yoruba sentences or phrases encoded in the app.
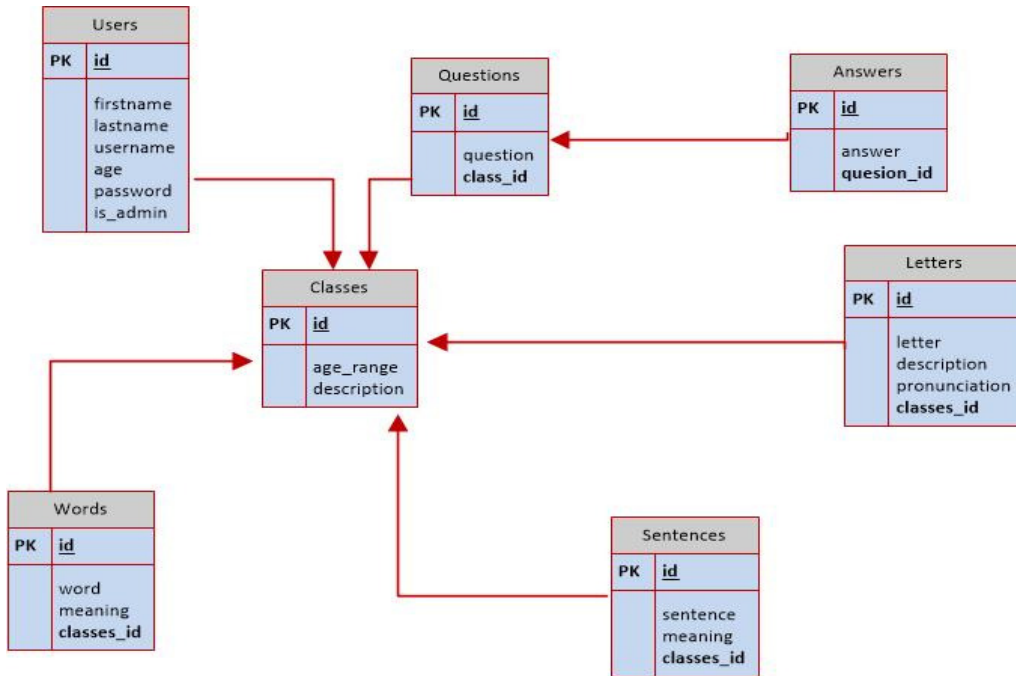

Fig 1: Entity Relationship diagram for Yoruba language E-tutor database

3.3 Use Case Diagram

A use case diagram is a representation of a user's interaction with the system showing the relationship between the user and the different actions in which the user is involved. The use case diagram in Figure 2 shows different objects in the Yoruba e-tutor mobile app and the actions they can perform on the system.
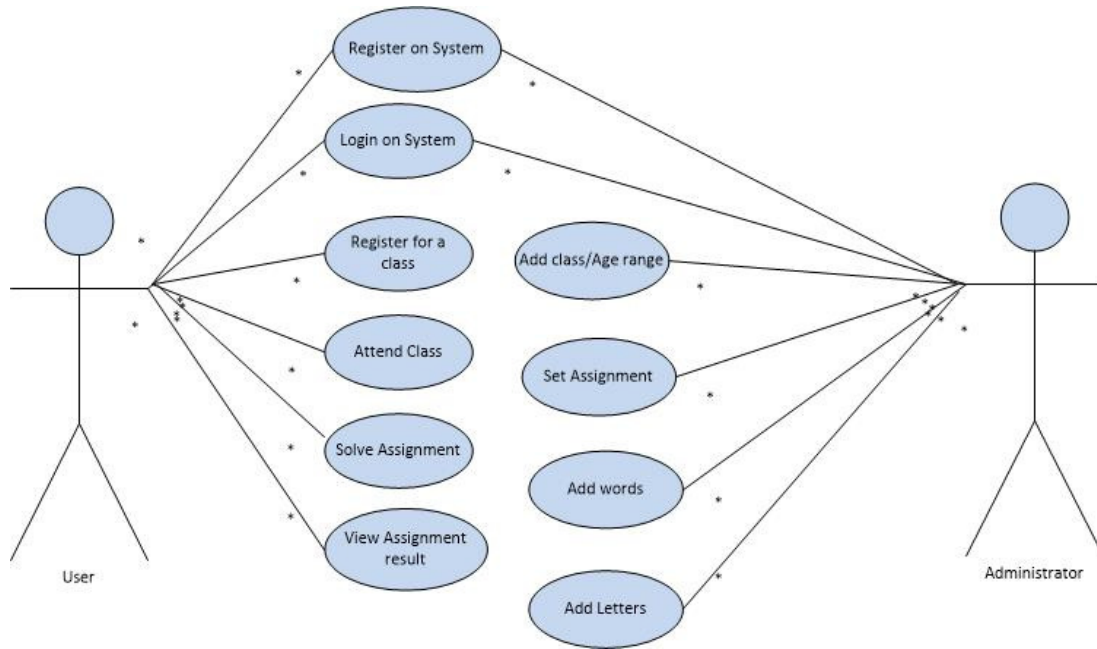
Fig 2: Use case diagram for Yoruba language E-tutor application

3.4 System Implementation

The system design was done on Eclipse IDE using XML language and taking advantage of the IDE's drag and drop tools to create different user interface items for android operating system. Fig 3 shows the main activity interface of the system. The main activity for the application is the landing page of application. The first activity of the system when the user clicks on "Get started" button is the login activity. The login activity keeps track of the current user that is using the system. The login module makes the system identify the user who is currently attempting a self-test. For a particular user to be able to login on the system, they user must have existed in the database. For user existence in the database, user registration is required defined as user registration activity. The user is provided an option of selecting any class he/she wants to attend as shown in Fig 4.

Fig 5 shows the interface of the lowest class selection for pupils who want to learn and hear how Yoruba letters and numbers look and sound including their spellings. Fig 6 shows the activity that displays Yoruba words randomly from the database. When any word is clicked, the system opens a new activity to display the English translation and picture of the object the word represents, mostly animals.

The activity contains a scroll view in a fragment so users with smaller screen resolutions can scroll to see more words.

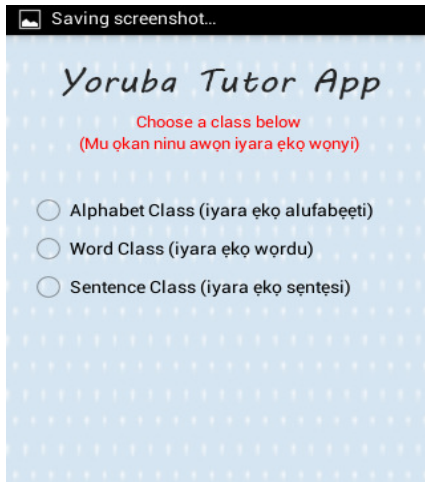Fig 3: Main Activity interface of the system

Fig 4: Class selection activity
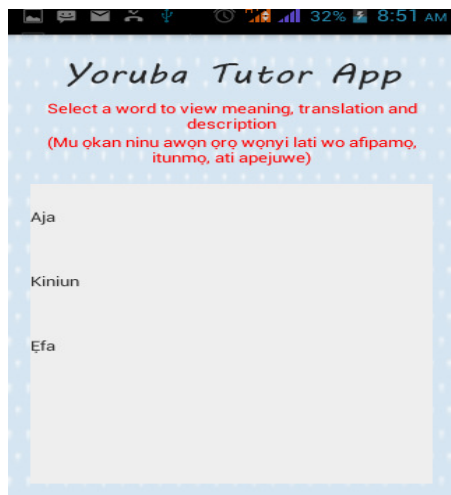

Fig 5: Yoruba letters activity

Fig 6: Words list activity

4. Evaluation Results and Discussion

The Yoruba language e-tutor mobile application was evaluated by recruiting 40 participants, mostly university students, who understand very little Yoruba Language to make use of then software already installed on an android mobile phone. The participants were then requested to complete a 5-scale likert questionnaire according to their opinion. The questionnaire was designed on three criteria namely extensibility, ease of use and learning speed.

Table 1 shows a summary of the user responses. This showed that 32 out of the 40 respondents (80%) rated the app as above average (excellent or very good) based on extensibility criterion. The extensibility criterion measure how easy it is for an administrator to add contents to the application. Very few respondents (2 out of 40) rated the app as poor or very poor based on this criterion.

Similarly 87.5% (35 users) and 77.5% (31 users) rated the ease of use and learning speed above average respectively. The ease of use criterion evaluates the user interface and navigation between screens or activities. None of the respondents rated the application as not easy to use. The learning speed criterion requests the user to rate how long it took them to understand and master some of the classes they took as part of the evaluation. Only one of the forty users rated the app as poor with regards to this criterion.

Table 1: User Evaluation results

	Extensibility	Ease of use	Learning speed
Excellent (5)	22	29	20
Very Good (4)	10	6	11
Good (3)	6	5	8
Neutral (2)	0	0	0
Poor (1)	1	0	1
Very Poor (0)	1	0	0

5. Conclusion

The paper has discussed the development of an android based mobile application for teaching Yoruba language.

The implementation of the work was carried out in two phases. The first phase was the design of the application user interface while the second phase was the coding of required functionalities. The application was developed using XML and Java with SQLite database. The application has been built to cater for different classes of people that are interested in learning the basics of Yoruba language for simple communication.

We intend to make the app available on the android market (Play store). The application will also be extended to other mobile platforms such as Windows and IOS to reach a wider audience.

References

[1]   A. A. Abdel-Aal, "Preparation and Development of the E-learning Courses", Journal of Education and Practice, Vol. 5, No. 38, 2014, pp. 133-141

[2]   B. Cope and M. Kalantzis, Scope of E-learning, Australia: Common Ground Publishing, 2009.

[3]   E. Parks, "What's the "e" in e-Learning?", 2013, available from http://www.askinternational.com, accessed June 2015

[4]   J. Itmezi, E-learning as a study, Australia: Common Ground Publishing, 2000, available from http://elearning.ppu.edu/file.php/1/eLearning/elearning.pdf, accessed June 2015

[5]   J. Duffy, The best Learning Language Software, 2013. available from http://www.pcmag.com/article2/0,2817,2381904,00.asp, accessed June 2015

[6]   J. J. Michael, Smartphone operating system concepts with Symbian OS, John Wiley and Sons, 2007

[7]   A. K. Karlson, B. R. Meyers, A. Jacobs, P. Johns and Kane S.K., "Working overtime: Patterns of smartphone and PC usage in the day of an information worker", Pervasive Computing Conference, LNCS 5538, Berlin Heidelberg, Germany: Springer, 2009

[8]   O. A Opebiyi and A. A. Sadiq, "Development of Yoruba proverbs mobile application", BSc project report, Department of computer science, Nassarawa state university, Nigeria, 2011

[9]   O. M. Oyelami, "Development of Igbo language E-learning system", BSc project report, Department of computer and Information Science, Covenant University, Ota, Nigeria, 2008

[10] C. Bonk and K. Zhang, "Introducing the R2D2 model: Online learning for the diverse learners of this world", Distance Education, Vol. 27, No. 2, 2006, pp. 249-264
.

[11] G. Chi and X. Zhang, "Learning beliefs of distance foreign language learners in China: A survey study", Science Direct, Vol. 38, No. 1, 2010

[12] T. Connolly and C. Begg, A Practical Approach to Design, Implementation and Management, Essex : Pearson Education Limited, 2005

[13] K. Barber, "Yoruba Language and Literature", 2014, available from http://www.oxfordbibliographies.com/view/document/obo-9780199846733/obo-9780199846733-0156.xml, accessed June 2015

[14] R. W. Last, Artificial intelligence techniques in language learning, Chichester: Ellis Horwood, 1989

[15] M. Simonson, S. Smaldino, M. Albright and S. Zvacek, Teaching and learning at a distance: Foundations of distance education, Boston: Pearson, 2012

[16] P. M. Kilgo, "Android OS: A robust free opensource operating system for mobile devices", Technical Report, University of Alabama, 2008

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Akindele ODENIRAN is a graduate of Computer Engineering at the department of Computer Science and Engineering, Ladoke Akintola University of Technology, Ogbomoso, Nigeria. This work presented in this paper was part of his final year project report