



## mFakih: Modelling Mobile Learning Game to Recite Quran for deaf Children

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### ABSTRACT

Quran learning is compulsory for every Muslim because there is a code of ethics in Quran for every field of life. However, the Quran educations among deaf students are far behind compared to blind students. They are unable to hear and difficult for teachers to teach deaf students. Fakih is an innovative approach to teach Arabic for children with hearing impairment. This technique assists educators to teach deaf students to recite the Quran in more practical way by using number and color. However, some children were getting tired when they have to pay attentions on the same entity every day. Thus, this study designed a model consisting of requirements and architecture of mobile game that can be used to develop an application on mobile devices. The model was validated through prototype development. The result shows that the prototype can be developed by using the model created called mFakih

**Keywords:** Fakih, mobile learning, game, Quran.

### 1. Introduction

With the emerging features and amazing uses, Smartphones and Tablets have created a positive effect in all the aspects of life. It improved relations, social lives, interactions, networks and communications. The technology used in these devices lets its users to access typical things that were used only on their desktops or laptops, so that they are now being used on their Smartphone or Tablets. Every day the technology is helping people live better lives. Technology is getting better and better each day and with these advancements we are starting to see some amazing improvements that are happening in the deaf community. Some of the newest technologies are being worked on to make everyday life more normal for deaf communities.

Sign Language is a fantastic way to communicate for the deaf. Signing has always been part of human communications. For millennia, deaf people have created and used signs among themselves. These signs were the only form of communication available for many

deaf people. Hijaiyyah Sign Code is a sign language of Arabic letters; sign language is used for deaf students to communicate.

In general, people prefer to communicate using speech, but for the deaf, there are several ways for them to deliver information. The most widespread communication of this group is by using the language code of hand signals. Currently this type of font character code representing the hands of the Roman (A to Z) called Gallaudet, in conjunction with the name of the university for the deaf in the United States. While the code for the letters hand Hijaiyah [Arabic alphabet set that starts with Alif and ends with Ya] in Malaysia was designed by the Department of Special Education, Ministry of Education and has been adopted in the country's special education syllabus.

Non-interactive in traditional teaching classes normally will cause the students to give up halfway during learning process. Moreover, there are a lot of mobile applications developed for learning sign language, but there are very less quality-assured applications that enable people to truly and fully understand the fundamentals of Fakhri method language. Deaf students can improve their Quran reciting when they play the game and they also can enjoy reciting Quran while playing the game. The development of m-Fakhri is crucial to deaf community to increase their interest as well as to help them to learn to recite Quran.

This paper is organized as follow. Section two shows the related works, Section three explain on approach of the study, Section four presents the design of mFakhri, Section five describes the prototype implementation and testing and section six concludes with a discussion.

## **2. Related Works**

Fakhri is defined as a person of expert in the knowledge of Fiqh and other recognized domain knowledge in Islamic Studies. Fakhri is an innovative approach invented by Daud (2011) to teach Arabic for children with hearing impairment. Teaching how to recite Quran for these types of children is very complicated, especially to spell the words that contain a variety of lines and signs. Fakhri method could help al-Quran literate by applying coloured and numbered techniques to represent each Arabic alphabet in the al-Quran. However Al-Quran recitation for deaf is using sign language as a skill to recite al-Quran.

This method addresses the issue of lack of teaching material and learning aids in the field of Islamic knowledge for children with learning disability such as the hearing impaired children. In addition, reading or reciting al-Quran using sign language is difficult to master by the hearing impaired students. Unfortunately the teaching and learning is still constrained to the conventional method of drilling the students solely on exercises. To solve this constrain, a numbered and coloured system is adopted as a method to teach the students how to read the Arabic alphabets. The contents (words and phrases) are selected based on a deductive approach to make it more systematic, focused and understandable to students.

Designing interactive learning systems for users with special needs is a challenge to system developers that have an inadequate understanding of the life experiences of people with disabilities. Building empathy for target users, particularly those with special needs, is increasingly being recognized as essential for effective design. Ismail & Jaafar (2011) summarized the problems that dyslexic children encountered for instance dislike crowding

texts, slow reading speed and lack of patience while using the educational multimedia courseware. They suggested a specific guideline to overcome the problem like minimizing visual discomfort and facilitate the visual part of the reading process. The study also showed that every child with special needs has different strengths and approaches to learning.

Playing games on mobile phone while learning will make the learning process become more interesting (Robertson & Howells, 2008). There is increasing interest in the use of ICT and educational technologies to promote effective learning formally or informally. Such technologies are educational software in CD, web-based, online learning, e-learning, computer-based training (CBT), and most recently mobile learning (m-learning).

Many applications on mobile devices are available to help Quran learner for example “Learn to Recite Quran” and “Learn to Read Quran” for iPhone device. Some applications also help users to improve the tajweed during reciting the Quran and some of them are free to be downloaded. However, to the best of our knowledge, there has been no study undertaken to design any learning games with regards to Quran reading for deaf communities. The only application developed that employ Fakhri method is i-Fakhri designed by Aziah et al., (2011). This interactive application was developed for PWDs to learn how to recite Quran. The platforms used for this application is iPhone and iPad and can be enhanced to other platform such as Android and Windows Pocket PC. Currently, i-Fakhri also used by trainer during Quran learning to enhance PWDs interest on Quran reading.

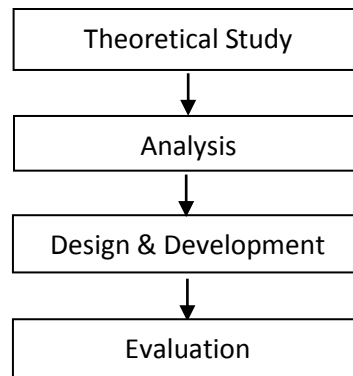
Designing games for mobile devices are slightly different compared to desktop computer (Maryam et al., 2009). Many characteristics of mobile devices (for example the screen size, processing power, limited memory and etc.) will influence the design of mobile application. Mobile game learning can motivate student to learn without stress because they learn while playing. This statement supported by Garris et al., (2002) that motivation is a major aspect of effective learning through games and further stressed that motivation can be promoted and sustained through reflection, feedback responses, and active involvement. Furthermore, mobile environment offers learning in a natural setting, everywhere, and anytime. For that reasons, the key challenges for effective learning with mobile game are for the learners to be interested, motivated, engaged and mobility accessed.

Previous work shows that mobile game learning is a tool that can motivate student to learn in happy and without stress. They can learn in anywhere and anytime that they think they want to study. In this case, the deaf communities will feel more comfortable in learning Quran because they can play but at the same time they are learnin about the word. Besides, they are happy when they are rewarded based on the right answer.

### **3. Research Approach**

The research approach of this study was divided into four main steps as shown in the figure 1. In the initial stage, board range of study was required in many different aspects of current mobile learning and game learning. This includes identifying new features of mobile game learning, past and current trends. To get good foundation of knowledge and understanding of the requirements, development tools, strength and weaknesses of the mobile learning game, this study reviews previous literature and interviews Fakhri instructor to collect ideas, issues and articles related to mobile learning game.

The analysis phase focuses on how to gather the requirements. The methods that will be used to collect the requirement are through interviews and observations. Some requirements will be given by the Fakhri instructor based on the experience in using Fakhri method among the deaf students. Researcher will do some observation to the PWDs in Akademi Fakhri who is using Fakhri method to reading Quran. Based on interviews and observations, researcher will summarize and identify the requirements of m-Fakhri through use case.



*Fig 1: Research Methodology*

The following phases are attempts to construct a model to visualize the captured requirements. Since this study will be develop a reference model of m-Fakhri, so the modeling language used is UML (Unified Modeling Language), the easiest modeling language which is used generally in information system development. Two evaluation techniques which are expert review and demonstration by developing a prototype of the m-Fakhri will be implemented similar to Sherwood & Rout (1998). The purpose of evaluation technique is to ensure that final implementation of the reference model of m-Fakhri represents an approach development that should have proven benefits and established effectiveness in terms of both productivity and product quality.

#### **4. Modeling mFakhri**

The requirements of the system are discussed including the Functional requirements and Non-Functional requirements, as well as the system requirements that cover both software and hardware needs and targets of the user as well as the device being used.

A number of gathering techniques have been discussed to capture the requirements of the system and also to study about the domain. Because of the size of the domain (Arabic letter Sign Code), there are limitations of sources to gather the information required. The techniques used to gather the information and requirements to develop mFakhri includes brainstorming, field test, internet search and literature search.

##### **4.1 Functional Requirements**

Functional requirements specify the functions that the system should provide and must be able to perform. It describes the core functionality of the application. Functional requirements

also capture the intended behavior of the system. This behavior may be expressed as services, tasks or functions the system is required to perform. For this study, the system shall implement the following user function:

- User can learn letters from the application (Level-1)  
The application should display all the letters together with the hand sign for each letter both in grid view and Full view.
- User can perform quizzes (Level-2)
- The application provides the list of quizzes to the users. The user can select the category of quiz that they want to perform either it is easy, medium or difficult.
- User can learn the sequencing or numbering of a word through “Practice” (Level-3).
- User can know the alphabet in the combined words through “Learn”.
- User can draw anything and perform or play various options like erase, change the background or color through “Paint”.
- User can play a “puzzle” consisting of alphabets(Level-4)

Non-Functional Requirements will mainly contain the quality attributes of the system.

#### 4.2 Use Case

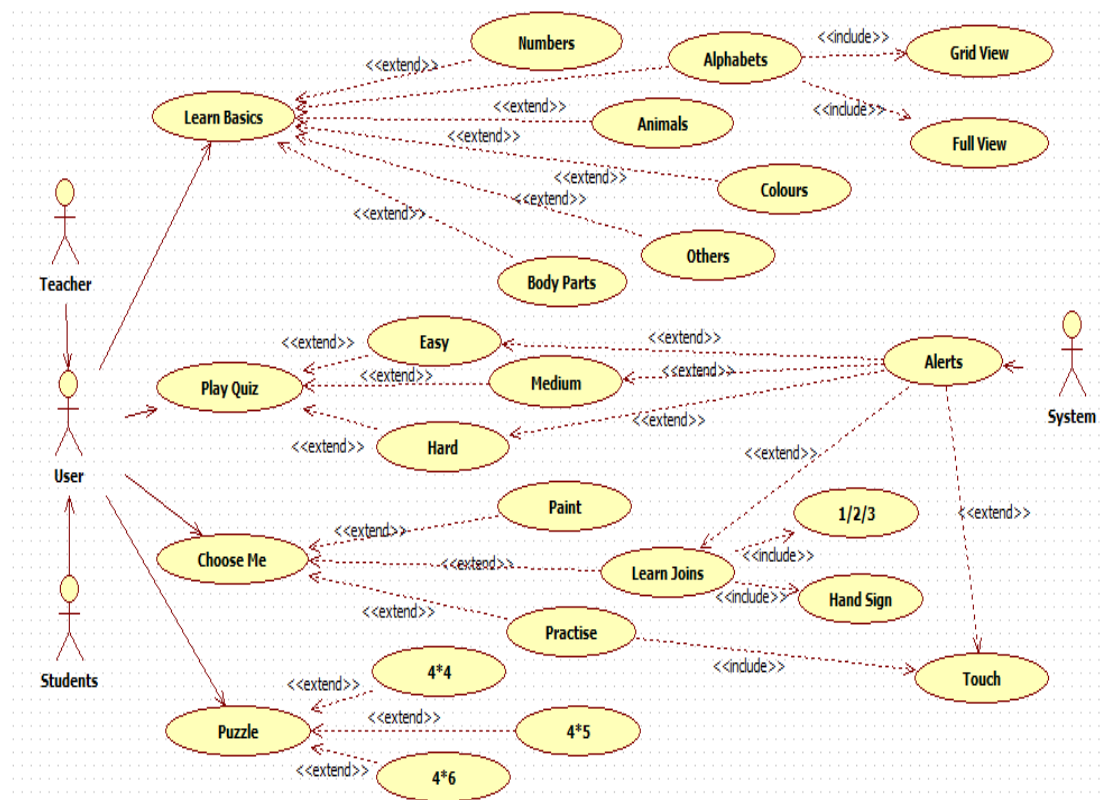


Fig 2: Use-Case diagram

The diagram consists of four use cases which are Learn Basic, Play Quiz, Choose Me and Puzzle. The diagram also describes the actors of the game which are teachers and students. Players have many options for each use cases as described in pre-condition.

### 4.3 Architecture of m-Fakih

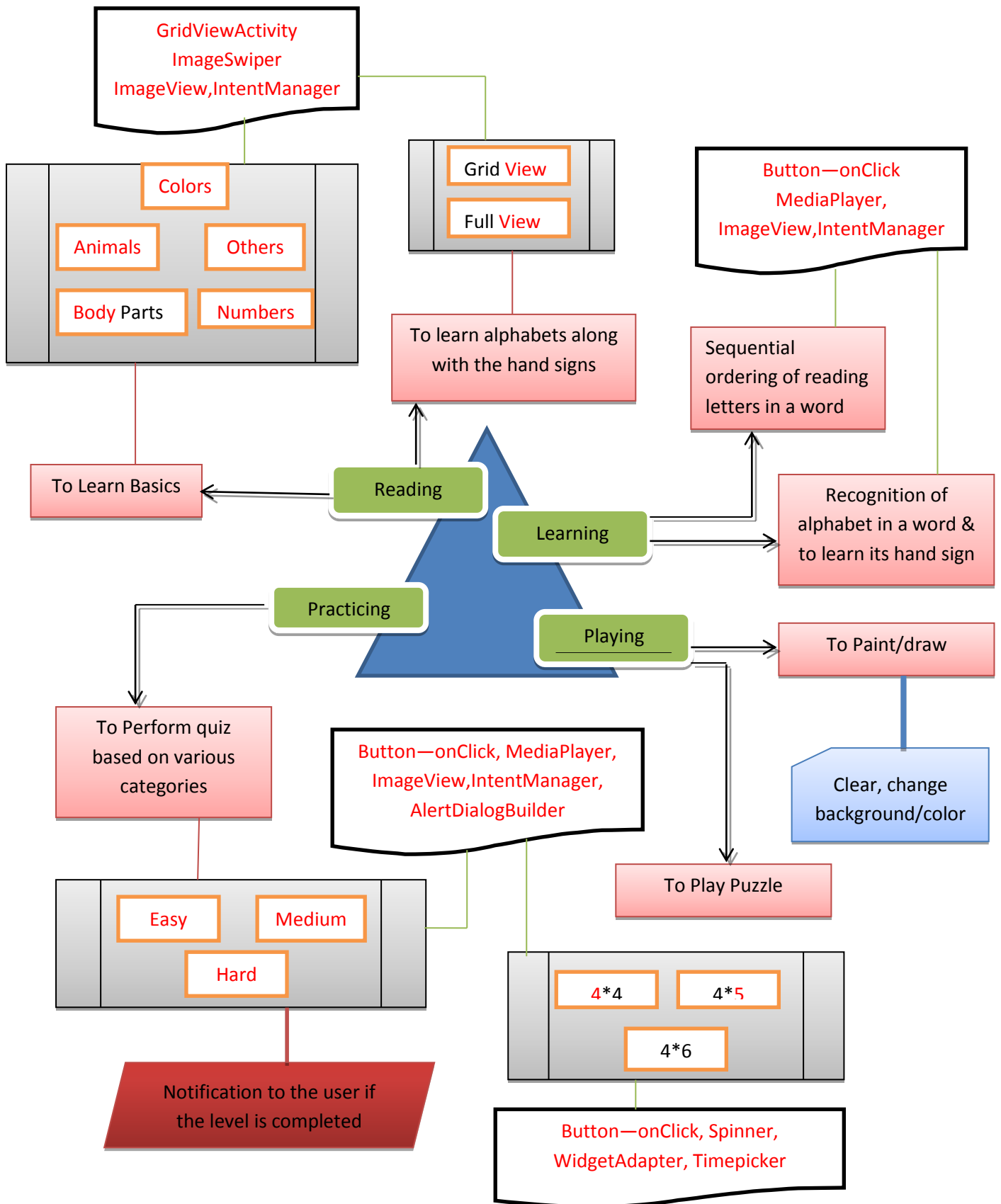
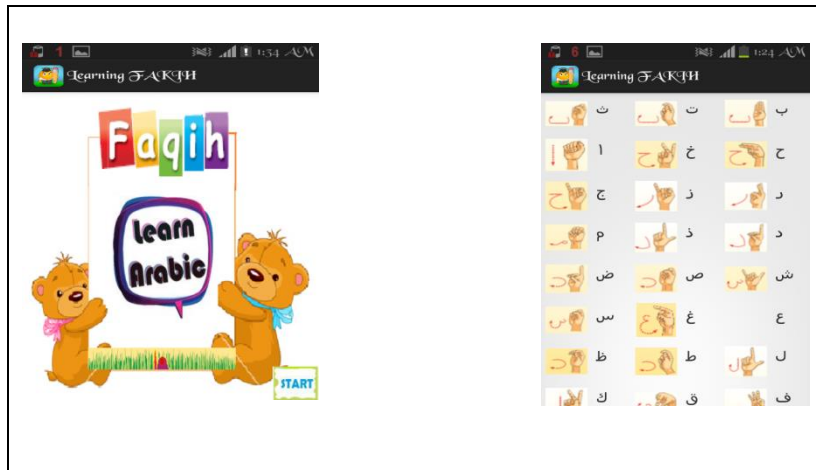


Fig 3: The Architecture of mFakih

## 5. Prototype Implementation

The tool used to develop the prototype is Eclipse. Eclipse is a multi-language software development environment comprising a base workspace and an extensible plug-in system for customizing the environment. The Eclipse SDK includes the basic platform plus two major tools that are useful for plug-in development. The Java development tools (JDT) implement a full featured Java development environment. The Plug-in Developer Environment (PDE) adds specialized tools that streamline the development of plug-ins and extensions.

Pictures 1 below are among the layouts of the prototype:



Picture 1: Layout of mFakih game

Testing is a very important phase during the software development life cycle. Each phase ends with the verification and evaluation to identify and remove all the errors occur in the phase. The main aim of testing is to identify and eliminate major errors in the system and to prepare and test suite that contains some test cases used during the maintenance phase. Usually errors occur in the system during different phases, therefore testing should be done in various levels to identify errors occurred during the various phases. This study tests the prototype using test case form for each level. The result shows that the prototype working well without any major mistakes. However, the interfaces of the prototype need to be improved in order to attract users to play the game.

## 6. Conclusions

Games are expected to serve as teaching material for teachers and is expected to attract high participation from the children through the interactive features thus prolonging the student understanding on the content. It also gives feedback for the user interactions based on their actions. These feedback and interaction techniques make the student approach to the content more interesting.

The prototype was developed using Eclipse IDE and Android SDK with Java and XML language. This is an android application which can be deployed on Smartphones or Tablets. The student is provided with this application at free of cost, it helps all the Arabic learning students. This application can be used to improve the student abilities in learning Arabic. The interactions provided for student are more of free hand interactions and solves their problems

in learning. The student is provided with various Examples, Exercises, and tests. These features provide student with an appropriate feedback and also keeps track of what is right and wrong. These feedbacks help the teacher to analyse their students quickly and the student can learn quickly.

Development of applications in android platform always gives room for future enhancements. With increasing usage of Smartphone and Tablets gives more flexibility in future modifications whenever and by whom so ever it may be. Keeping in consideration this important factor, the application is designed in such a way to serve that. The application is developed in modules and are efficient enough to accept future changes in the software to get more information.

This application includes many interactive modules. Based on the application usage more interaction designs/modules can be included. This application contains examples and exercises with simple words from Quran. In future more complex words or various interactive Quran reading modules can be included. The interactions like dragging/tapping or animations can be introduced using different visual aids. Writing tools can also be integrated for effective learning of language.

More modules can be integrated based on the requirements from the users for instance integrating language translator (English to Arabic/Arabic to English), automatic reading of text entered and etc. Furthermore the application can also be implemented in mobiles with other operating system like iOS or Blackberry OS.

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