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Early Childhood Mobile Puzzle Game for Learning Hijaiyah Letters

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Abstract

The use of Arabic in Muslim worship activities is the main and dominant thing to do, especially in the activities of praying and reading the Qur'an. The Arabic language in these two activities is presented in Hijaiyah letters, so that the ability to read Hijaiyah letters is very obligatory and necessary for Muslims from an early age, through learning and playing activities. Salman Al Farisi I Kindergarten in the Yogyakarta area, Indonesia, has taught its students to learn to read Hijaiyah letters. One of the learning activities to recognize Hijaiyah letters is a puzzle game. This study aims to develop a multimedia application for learning Hijaiyah letters. The application was developed according to the needs of early childhood with the concept of a learning environment and playing through smartphone devices. User-Centered Design (UCD) was used in this study which consisted of six steps: Identifying Needs, Determining Context of Use, Determining Needs, Generating Solution Design, Design Evaluation, and Implementation. This research produces applications that suit system requirements and user needs with good multimedia quality. The results of testing the quality of multimedia show that the application gets a score of 4.53 out of a scale of 5. This score shows that the application has a very good rating.

Keywords: Puzzle, Multimedia, Hijaiyah, Early Childhood, Mobile Application

INTRODUCTION

The education system is a catalyst for producing individuals who are able to improve their personal qualities. The education system is also a tool for a nation to achieve unity and harmony. The process of education and learning for children runs since the child is born. Next, the education process can be done through formal education and informal education. Education about religion and worship is education that needs to be taught to children from an early age in order to understand the values of religion so that people become faithful and pious. Indonesia is a country with a Muslim majority population. Many parents choose to send their children to Islamic-based schools to inculcate religious values, form faithful people, and be devoted to pious children.

Indicators of devotion for Muslims are not just about the knowledge of worship but also how one does/implements that understanding in daily worship activities. The main Muslim worship activities are praying both the five daily prayers and the Sunnah prayers, and reading the Holy Qur'an. Praying and reading the Qur'an is an activity carried out in Hijaiyah which is presented in Hijaiyah letters, often known as Hijaiyah letters. The ability to read Hijaiyah is absolutely needed by Muslims. The ability to

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recognize and read Hijaiyah script should be instilled in children from an early age so that they are highly motivated and can perform worship well. Children grow into faithful and pious people so that they become the next generation of quality people in developing their homeland and nation.

Mobile application technology has experienced very rapid development [1][2]. The use of mobile application technology has increased dramatically in line with the development of internet penetration and mobile devices. The use of mobile devices is not only by adults but also by children [3]–[5]. Many interesting applications, especially multimedia, have attracted the attention of children. The five multimedia components, namely text, sound, images, animation, and video, are appropriate technologies to be used as learning media that rely on visualization. The development of multimedia applications for children's education is very popular nowadays. There are many advantages that can be obtained by developing the application, including benefits that include improving children's learning performance. Children learn from things they see and hear. In fact, many applications with various types of animation are not all suitable for children's education.

The role of multimedia in learning is becoming increasingly important in the present because multimedia learning is easily accepted to improve the learning process [6]. This multi-media teaching has unmatched advantages over traditional teaching methods and can greatly improve teaching efficiency [7]. This multimedia is the right medium to apply Hijaiyah learning technology for early childhood. Children will easily access multimedia applications through the mobile devices they have, so they can learn anytime and anywhere. Various technologies are present to support learning, one of which is educational game applications, but few game applications are effective and suitable for learning Hijaiyah letters [8]–[10].

There is a significant difference between children aged 4–6 years and adults regarding the interaction needs and learning application interface on mobile devices. Children's learning applications must pay attention to children's needs for the design of educational applications that are suitable for children. Nowadays, mobile applications are increasingly being used to support users' daily activities. Presenting a mobile application that is right for the user's needs is a major problem in software development. The development effort needed to make a smartphone application is usually substantial. Many methods have been developed to be able to produce an application that can meet the needs of users with good quality. One method that can be used in application design is the User-Centered Design (UCD) method. The UCD method emphasizes design based on user needs. A mobile application can be designed based on the UCD Process model based on the usability context. From the context of usability, the application is designed based on 6 stages, namely: identifying needs, specifying context of use, specifying requirements, producing design solutions, evaluating villages, and system implementation.

The world of children is a world filled with fun and identic with the world of play. One side of the development of cellular technology has entered the world of children. The device has various features that support game applications [11]. Games nowadays serve as both entertainment and education [2][12][13]. Through learning and playing activities, Salman al Farisi I Kindergarten in Yogyakarta has taught his students to learn to read Hijaiyah letters (Hijaiyah). One of the learning activities to recognize Hijaiyah letters is a puzzle game. Game applications, if applied to education, can provide benefits

by presenting learning that can be adapted to students and can provide feedback automatically so as to increase learning motivation [14]–[20].

This study aims to develop multimedia applications for learning Hijaiyah letters for early childhood. How to design applications according to the needs of early childhood with the concept of learning and playing environments through a smartphone device. The method used in this study is the UCD method to produce mobile multimedia applications learning Hijaiyah letters that are appropriate to the characteristics and needs of early childhood.

METHODS

This study uses the UCD (User-Centered Design) method. This method is a software design method that focuses on the user. There are six stages in the UCD process, namely: Identify Need, Specify Context of Use, Specify Requirements, Produce Design Solution, Evaluate Design, and Implementation. These stages can be seen as in Figure 1 shows that the application development method consists of six stages. The following is an explanation of each stage in the study.

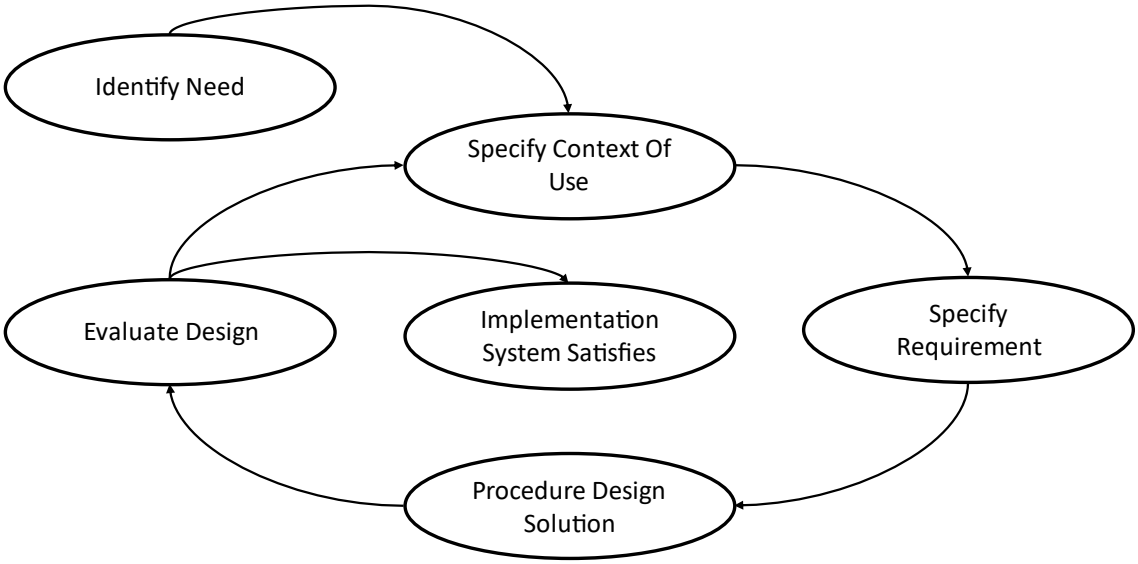


Figure 1. UCD Method

Identify Requirements

This stage identifies the overall need for multimedia applications for learning Hijaiyah letters. Determine the purpose of making a multimedia application for learning Hijaiyah letters. Based on interviews conducted with teachers at Salman Alfarisi Kindergarten, it was found that students were familiar with mobile devices. Children's activities in using mobile devices will be better if directed to learning activities, one of which is learning Hijaiyah letters. The Requirements for this application will attract the attention of students if it is a game. One of the games that children like is a puzzle game. The purpose of making this puzzle game application to learn Hijaiyah letters is to support learning activities by utilizing technology, especially mobile applications, so that students can learn with fun, and their learning motivation can be increased.

Specify Context of Use

The activity at this stage is to identify which users will use the mobile game puzzle application product to learn Hijaiyah letters. Identify user and organizational goals that must be met by Hijaiyah-alphabet multimedia application products.

The specifications of the users of this puzzle game mobile application to learn Hijaiyah letters are Salman Alfrisi Kindergarten students aged 4-6 years. The context of using this application is as a medium for learning Hijaiyah letters both independently by children and accompanied by their parents. This application is designed to be used in the classroom or at home. Children as users of this application do not yet can read the alphabet, so the application must be designed with voice commands and interaction in the form of image illustrations.

Specify Requirement

This requirement specification stage is the stage to identify business needs or user goals that must be met so that the Hijaiyah alphabet learning puzzle game application product is made successful. Application requirements are described as functional and non-functional requirements.

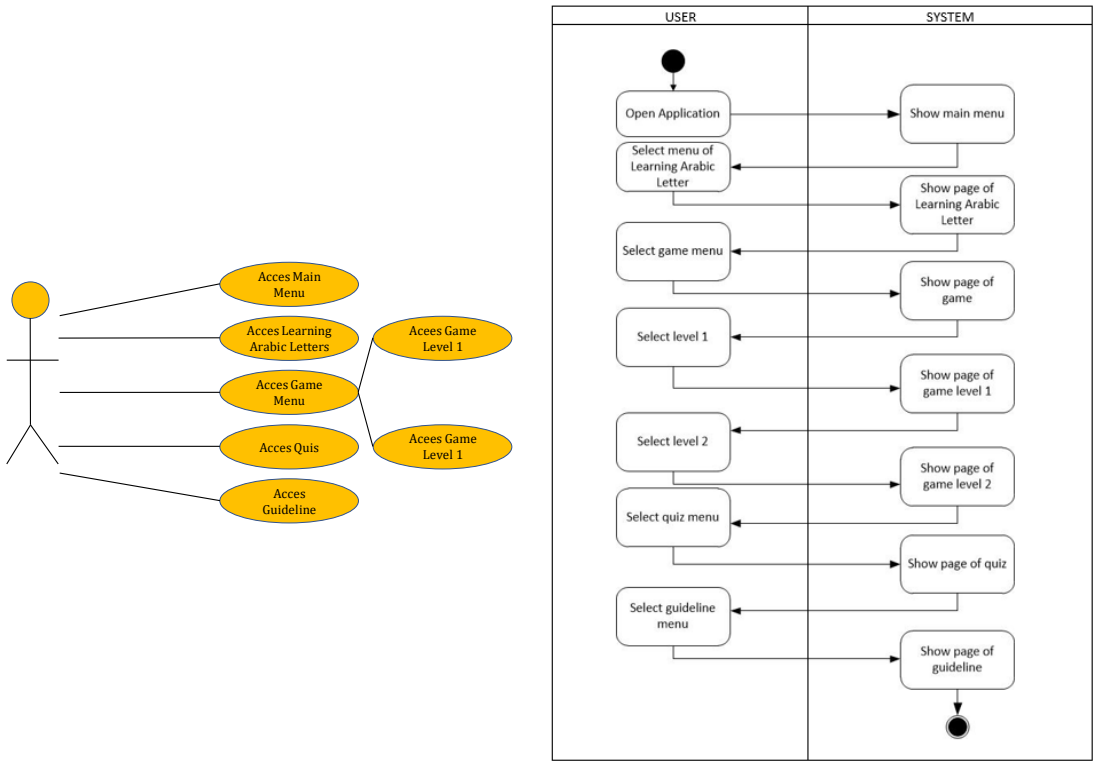
Table 1. Functional and non-functional requirements

Functional Requirements	Non-Functional Requirements
The system can display learning materials.	The system is designed for the needs of early childhood (ages 4-6 years).
The system can display learning evaluations as feedback.	The system is designed for the needs of students who cannot read.
The system can display Hijaiyah alphabet learning materials.	The system can be accessed through various mobile devices, especially smartphones and tablets.
The system has a game facility for learning Hijaiyah letters in the form of puzzles with 2 difficulty levels.	The system can be accessed through devices with the Android operating system.
The evaluation system is presented in the form of multiple-choice questions.	The system can be accessed without having to be connected via the internet.

Produce Design Solution

After the three previous stages are completed, in this section, a complete design of the Hijaiyah letters learning puzzle game mobile application is carried out. At this stage, a storyboard design is made for a multimedia mobile application for learning Hijaiyah letters for children. In doing this interface and content design, consider multimedia components consisting of text, sound, images, video, and animation.

Use Case diagram and Activity diagram are used to describe the activities that occur in the mobile game application system for learning Hijaiyah letters. The interactions that can be carried out by users of Hijaiyah learning multimedia applications can be seen in Figure 2 (a) and Figure 2 (b).



(a) (b)

Figure 2. Design Interactions Games (a) Use Case Diagram (b) Activity Diagram

Evaluate Design

The Evaluate design stage is a stage to evaluate the results of the design of multi-language learning applications of Hijaiyah letters. If the evaluation results indicate that all needs have been fulfilled, it can be continued at the implementation stage. But if the evaluation results provide recommendations for improvement, the activity will return to the specific context of use stage. These activities continue continuously to get a design that meets all the needs of the Hijaiyah alphabet learning application.

Implementation System Satisfies

After getting the appropriate design and meeting all the needs of multimedia application learning Hijaiyah letters users, the next stage is system implementation. The multimedia mobile application for learning letters by children is produced according to the design and implemented for use in early childhood.

RESULT AND DISCUSSIONS

Making this application is done by paying attention to aspects of multimedia components such as images, letters, animations, videos, gestures, and sounds. These components are made according to the needs of early childhood to suit their users. The display of this Hijaiyah letter learning multimedia mobile application can be seen as shown in Figure 3.

Figure 3. Mobile Puzzle Games for Learning Hijaiyah Letters

The evaluation was carried out to find out whether the Hijaiyah letters learning puzzle mobile game application that had been developed met the needs. The evaluation was carried out using a multimedia quality test. The Multimedia Quality Test was conducted by kindergarten teacher Salman Alfarisi and a multimedia expert. The number of respondents in the multimedia feasibility test was 5. After the respondents tried the application, they were then asked to rate the application according to the statements in the questionnaire. Each statement can be rated in the range of 1 to 5 according to the perceptions of teachers and multimedia experts. Table 2 shows the results of multimedia quality testing.

Table 2. Evaluation Result

Statement	Score
Ease of navigation presented	4.4
The accuracy of navigation with the desired menu	4.6
Ease of operation of learning media	4.2
Content placement	4.2
Display design quality	4.4
The presentation is symmetrical	4.2
Text quality	4.2
Readability of text (text)	4.2
Accuracy in font size	4.4
Font color accuracy	4.8
The accuracy of the letter style	4.8
Matching the color of the writing with the background	4.6
The relationship between images and material	4.8
Image quality used	4.8
Appropriate use of themes	4.6
The accuracy of the use of audio with the material	4.8
Sound clarity (no noise)	4.8
Providing feedback to students regarding the answer to the question	4.8
Averages	**4.53**

In Table 1, the score of the respondents' assessment results on the Hijaiyah alphabet learning puzzle mobile game application developed was 4.53 out of a scale of

5. This means that the application is rated with very good criteria. The results of this evaluation indicate that the application system that has been made has met the needs.

CONCLUSIONS

The Hijaiyah alphabet learning puzzle game mobile application for early childhood has been created through the stages of the UCD (User Centered Design) method. This application has been developed according to system requirements and user needs with good multimedia quality. The results of the multimedia quality test show that this application gets a score of 4.53 out of a scale of 5. This value indicates that this application has a very good predicate.

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