International Journal
of Applied Information Technology
http://journals.telkomuniversity.ac.id/ijait/

Multimedia Augmented Reality Technology in Daily Basic Knowledge Learning Media for Early Childhood and Kindergarten

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ARTICLE INFO

Received 22 July 2019
Revised 10 September 2019
Accepted 16 September 2019
Available online 27 December 2019

Keywords
Augmented Reality, Interactive, Childhood.

ABSTRACT

Education for children from an early age is essential because it can affect the growth of children's knowledge at a later age. The introduction of basic daily things can be given to children to make them feel enjoy learning fun objects and make them critical. Educational institutions have widely used the use of information technology from the initial level such as kindergarten. Therefore, the development of learning media is for supporting parents and teachers in providing basic daily knowledge for children. Augmented Reality has features with combining 3D object animation and audio so that the teaching material displayed can be seen in real. This learning media has a very simple and easy to use the display with some menu. When each menu is selected, it will go directly to the camera mode for scanning the teaching marker. This learning media can be used both at school and at home, as well as by teachers or parents and even the child itself.

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https://doi.org/10.25124/ijait.v3i01.2493
Paper_reg_number IJAIT000030103 2019

1. Introduction

Children are God's gifts that must be guarded by parents since the child is born until they can determine their way of life, or until their parents are gone. Educating children is a difficult task if parents are not right in delivering educational material correctly. Incorrect educational content can have fatal consequences for the future of the child when given at the time of early childhood, where at that time, it was called the age of gold. In the golden age, children will easily record and remember the teachings given by parents and other people. Therefore, the form of teaching material must be delivered clearly and precisely [1].

Today's daily life is inseparable from the role and existence of information technology, both from mobile devices and other electronic media. Parents must be able to monitor and control the needs of children in using these technological devices. Parents can also use mobile devices such as mobile phones to provide educational material to children. Even though sometimes the learning media provided cannot describe what is taught, especially basic knowledge of the shape of 3D objects, which are usually only displayed in 2D. So that children can understand both the learning is given, real objects will be better displayed in 3D in the learning media.

Today's 3D technology has been widely used both in the form of learning media and game applications. However, the majority of its users are from their teens. One kind of technology that is developing now is Augmented Reality, where objects can be displayed in 2D or 3D, both in the form of static and dynamic objects. Augmented Reality is a technology that requires markers as triggers to emerge objects according to markers, the shape of the marker itself can be anything, such as images, location, face detection, sound, and so on [2].

The application of Augmented Reality technology to learning applications for early childhood can be said to be still rare. This is because the operation of applications with Augmented Reality requires a fairly high specification device and requires considerable storage space [3]. As well as applications that are already marketed, it is often difficult to use early childhood directly because navigation is quite complicated. Therefore, developers usually create applications that are used by parents to be taught to their children. Even though the existence of Augmented Reality technology on learning media will provide new experiences to parents, teachers, and children in the daily learning process.

This application is a learning media that contains basic daily knowledge material that can be used by parents and children in the process of learning basic knowledge in daily life. The advantages of this application are the 3D display of objects in some materials can support the content displayed, as well as a simple display that can be operated even by children.

2. Research Method

The development of media learning Augmented Reality technology using the Prototype method with the stages of application development can be seen in Figure 1 [4]. Figure 1 describes the stages of development carried out using the Prototype model with an explanation of each step as follows.

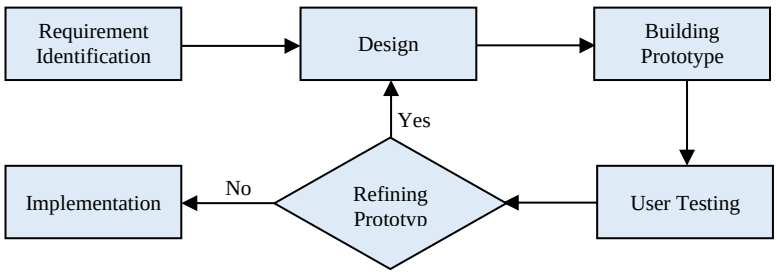


Figure 1 Development Phase of The Prototype Model

1. Requirement Identification, which is the stage of collecting application development needs, including teaching material, hardware and software specifications, analysis of similar applications, and characteristics of early childhood as application users.
2. Design is the stage of designing data results from the identification stage of previous needs. The design process carried out includes a sitemap, storyboard, application mockup, and 3D marker design.
3. Building Prototype is the main stage of application development by implementing programming languages and development software. The application development process includes creating objects and 3D animation, making 3D markers, recording and applying audio [5], and compiling teaching material into the application according to the results of previous designs.
4. User Testing is the stage of testing prototype applications to end-users such as teachers, parents, and children. In this testing phase, the user will operate the application directly and observed by the development team during the testing process, both from the application and from the user.
5. Refining Prototype is the stage of refining the application after the testing phase by the user. If there are inputs or errors during the testing phase, a re-design phase is needed and the application is rebuilt. If there are no obstacles when testing will be carried out in the next stage.
6. Implementation is the stage of publication and submission of applications to end-users. At this stage, there has been no improvement because the application that was built is in accordance with the needs of the users that have been collected in the first stage.

3. Result and Implementation

The development of basic knowledge applications or learning media for early childhood produces the following functions and features.

1. Initial display. When the application is run, the initial display will appear containing 4 (four) menu buttons. 1 (one) application info button, and 1 (one) application select button. The initial display of the application can be seen in Figure 2.

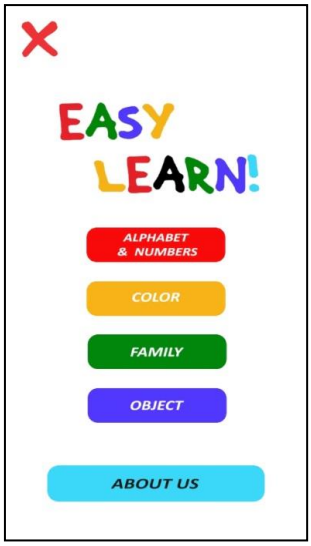
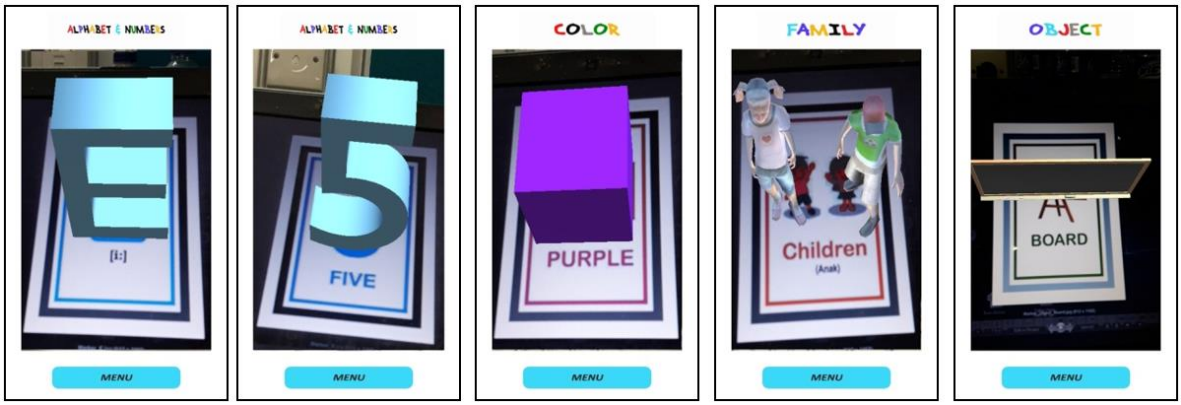


Figure 2 Initial Display of The Application

The application has a very simple initial display with different colors on each button, and the size of the buttons that are large enough to be easily operated by the user. Each menu button will go directly to Augmented Reality mode and activate the camera mode for the 3D marker scanning process and bring up animations and audio on each of the material.

2. Augmented reality menu. The application has four menus of material that provide 3D and audio animation forms with Augmented Reality technology. When the marker material is directed to the camera a 3D character or object will appear along with audio from the material on the card. Figure 3 shows the scanning process of markers for each menu and sample material in it.

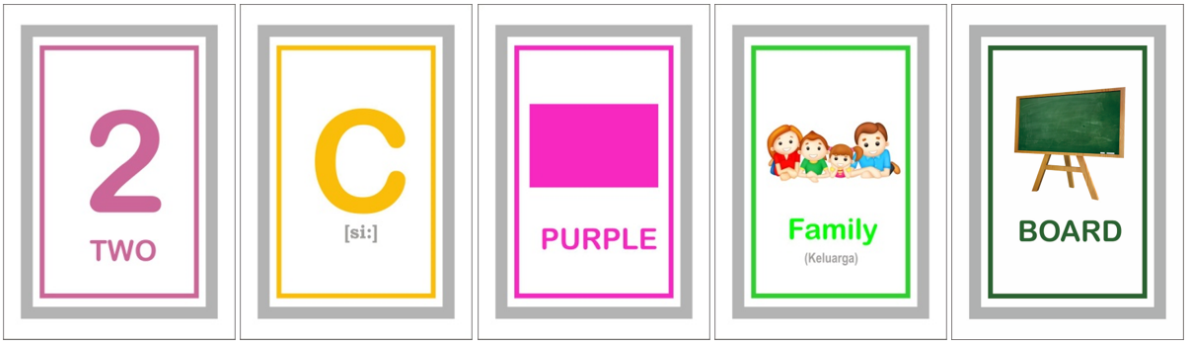


(a) (b) (c) (d) (e)

Figure 3 Augmented Reality Displays: (a) Alphabet, (b) Number, (c) Color, (d) Family, (e) Object

Figure 3 shows an example of scanning 3D markers on each menu by displaying audio-supported 3D objects for each marker of scanned material.

3. 3D Marker. Some examples of design and display of markers made as triggers to bring up 3D objects in this learning application can be seen in Figure 4.



(a) (b) (c) (d) (e)

Figure 4 Displays of 3D marker: (a) Alphabet, (b) Number, (c) Color, (d) Family, (e) Object

Marker designs in the application are made simple with a variety of colors in order to be able to bring the child's atmosphere into fun and can be used for conventional learning processes without using an application. Each marker has a unique image and represents each object displayed on the material in the application. The development of applications still uses 2D markers as the trigger material.

4. Testing

The testing phase is carried out on the end-users of the application, including 5 (five) kindergarten teachers, 5 (five) parents of children, and 5 (five) children aged 3-5 years. However, test data is only obtained from teacher and parent users because children cannot assess the application objectively.

In the application development stage, only do 1 (one) time testing to the user by assessing 5 (five) assessment elements, including Design, Subjects, Navigation, Animation, and Audio with the results of testing, can be seen in Figure 5.

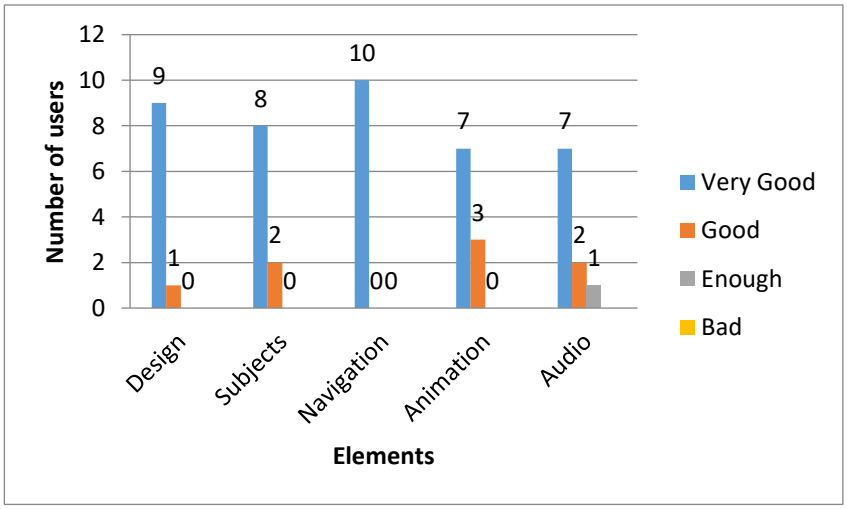


Figure 5 Results of The Testing Learning Media

In Figure 5, it can be seen that the majority of users' rates of the application are very good. There is only 1 (one) element that all users judge very good. It is the navigation element which according to users, is very easy to use.

5. Conclusion

The development of basic learning interactive applications by using Augmented Reality technology produces an application as a learning media for early childhood. The application can be used by teachers, parents, and children in learning daily basic knowledge. All elements of the assessment were felt to be very good by most of the teachers and parents, with a total of 10 people. The application has simple and easy-to-use navigation and is supported by animation and audio in providing material. However, this application also has a disadvantage. The specification of a device that is quite high and requires a very large storage space to run. It has to bring up 3D animation when scanning markers, and the number of markers that must be present as a trigger material when using the application.

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