



Animal Educational Games Based on Augmented Reality

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ABSTRACT

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Problems in achieving teaching and learning success are often caused by the application of learning strategies that are not appropriate and seem monotonous and even boring. One of the reasons is rooted in the conventional educational paradigm which always uses classical teaching methods and lectures. Therefore, a more interactive and interesting learning support media is needed. One example is making learning support media using Augmented Reality (AR) based educational games. AR is a combination of real and virtual objects in a real environment, running interactively in real time, and there is integration in the real world. With this educational game, it can help teachers and parents as early childhood teachers to present media or learning environments that are more effective and interactive..

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1. Introduction

Today, everyone from a young age to an adult uses Android-based gadgets in their daily lives. Various applications in these gadgets can facilitate mobility to game applications and so on as entertainment facilities. With the use of Android gadgets, there are many impacts that arise, ranging from positive impacts that can facilitate mobility in daily life to negative impacts that can have a very bad impact on users.[1]

Game is a game that has been structured, where the game itself can be played by several groups, both children, teenagers and even adults. Game usually played to eliminate boredom, it can also be made in the form of education so that someone who wants to learn doesn't feel boring about something what they want to learn. The game according to the Big Indonesian Dictionary is something that can be used to relieve boredom.[2]

The game is a fact that is analyzed to understand the behavioral process in the game, the choice of each decision in acting or saying becomes a conclusion as a result learning produces itself while Education is "education". Education comes from the basic word "student", namely "maintain and train", while education is "the process, method, act of educating.[3]

Cognitive learning activities through animal recognition for Early Childhood have a very important role in developing the full potential of children. One of them is the potential of children's natural intelligence. Therefore, it is important to develop the potential of children's natural intelligence from an early age so that their cognitive development is optimal. Children's understanding of the concept of the natural environment and of living things is taken through three stages, namely understanding the concept, the transition period, and the level of the symbol. Therefore, understanding the concept of the natural environment is a strong basis and foundation for children in increasing natural intelligence at a more complex later stage.[4]

Mobile-based games are games that are growing rapidly at this time along with the rapid use of smartphones (smartphones) in society which is followed by the development of smartphone technology and also Android as the most widely used operating system in the world. Data from the Indonesian Game



Association (AGI) in 2014 published on the website http://koran-sindo.com/page/news/2018-01-18/2/6/Industri_Game_RI_Berkembang_Pesat, the Indonesian Game Industry is worth Rp. 2.3 trillion, every year. the year around 100 new games were born by game developers, this industry started to develop since 2009, when high speed internet connection started booming in Indonesia, the game industry is estimated to grow by 15-20% every year. Along with the times, games or games have experienced a lot of evolution.

One clear example of this evolution is the widespread use of games as a means of learning. It has been recognized by many that games are a very interesting medium, this is what encourages game makers to create games that contain elements of education and not just put forward elements of entertainment.

Problems in achieving the success of teaching and learning activities are often caused by the application of learning strategies that are not appropriate and seem monotonous and even boring. The main cause of this problem is that besides being caused by methodological inaccuracies, it is also rooted in the conventional education paradigm which always uses classical teaching methods and lectures, without ever being interspersed with various challenging methods. Including structural space divider that is so high between teachers and students[5].

Children aged 5 to 7 years experience a golden age which is a time when children begin to be sensitive to receiving stimuli, so children easily accept things that are considered new and interesting, at this age it is also very important to teach children about living things that exist around them such as introducing the types of animals[6].

Therefore, a more interactive and interesting learning support media is needed. One example is making learning support media using Augmented Reality (AR) based educational games. Currently, the application of Augmented Reality technology is still relatively small, so there are still many people who are not familiar with this technology or how to apply it in Android smartphones, games, and even in the teaching and learning process.

There are several sources of research on learning media in the form of educational games that can be used improve student learning outcomes, educational games can increase the activity and learning outcomes of elementary school students.[7]

According to Yuen et al. stated that "AUGMENTED REALITY (AR) is an interactive technology that is able to project virtual objects into real objects in real time[3]. Today's technological developments have contributed a lot in various fields. One of the implementations of AR in the field of education is AR CARD. Cards are also widely used as learning media, such as drawing cards of various land animals, so that with this AR technology students can interact directly with 3-dimensional objects in the form of animals through picture cards.

2. Method

Computer is a piece of equipment that can receive input, process input, provide information, using a program stored in computer memory, can save programs and processing results, and work automatically[8].

To solve the problems that have been described previously, the authors need hardware and software which will later be used for the purposes of making educational game applications about animals.

2.1 Multimedia Technique

Multimedia technology can be used in various ways, one of which is used as a learning medium. The teaching and learning system in Indonesia is currently mostly still using conventional methods in delivering the material.[9]

Multimedia is a new technique in field computer which combine more than one medium in a form of communication includes text, sound, graphics, animation and video into the computer system.[10]

So far, the learning method used by the teacher only explains and provides information. This monotonous information entry process can be overcome by using interactive teaching methods.

This media has combined images, animations, colors, sounds, buttons and attractive backgrounds designed in an interactive form so that students are enthusiastic in participating in learning.[11]

2.2 Algorithm Design



The process of searching data with this method quite simple and easy. Search process data is done by matching the data done sequentially one by one starting from the 1st data to the data in the last order.[12]

In the design of this educational game application to know animals, the author uses a sequential search algorithm, or it can also be called a sequential search, the sequential method can be used to search for data both on sorted and unordered arrays, namely by using a simple sequential search method. compares each array element one by one successively starting from the first element until the element being searched for is found or all elements have been checked.

The sequential search algorithm uses the following working principle:

- a. Existing data is compared one by one in a row with what is sought until the data is found or not found.
- b. Basically, this search only loops from 1 (one to the number of data.)
- c. At each repetition, the i-th data is compared with what is sought.
- d. If it is the same, it means that the data has been found, on the other hand, if the data is not the same until the end of the loop, it means that the data does not exist.

While the sequential search algorithm can be written as follows

- a. $i \leftarrow 0$
- b. Found \leftarrow false

3. Results and Discussion

The implementation stage is carried out after the analysis stage, the design stage and the testing stage are completed. The implementation stage contains the output display on the game application that has been finished and is ready to operate. Here are the implementation views of the game application that the author has designed in the previous discussion.

3.1 Main Page View

This page displays the title of the game application, menu options for learning, playing, scanning AR, how to use it and the button to exit the game application.



Figure 1. Main Menu Implementation

3.2 Study Panel

On this page showing 3 pictures of land animals along with the names of the animals, users can choose one of the three available options.

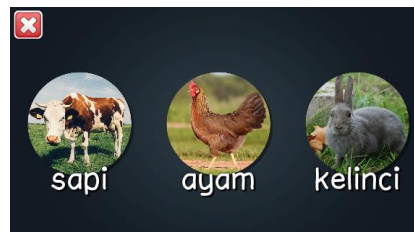


Figure 2. Learning Panel Implementation

3.3 Complete Word Game

This page displays the first game mode, which is a complete word game, containing pictures, incomplete wording, and 4 choices of letters.



Figure 3. Complete Word Game

3.4 Counting Game

This page shows the second game mode, which is the counting game, contains several different images, and also 4 number choices.



Figure 4. Counting Games

3.5 Picture Matching Game

This page shows the third game mode, which is the game of equalizing images, containing several different images, and also provided a similar image with a darker color that serves as a place to put the image.



Figure 5. Picture Matching Game

3.6 Scan Augmented Reality

On this page the user's camera will light up and function as a target image detection tool which will later display the related 3-dimensional animal object along with several image displays such as animated buttons, buttons to toggle camera lights, game titles and also the back button.



Figure 6. Scan Augmented Reality

3.7 About Page

This page displays some pictures and info that provides info on how to use this game application, it also contains navigation buttons, target images that can be downloaded or shared.



Figure 7. About Page

3.8 Confirm Exit

On this page displays an exit confirmation dialog, when the user selects the exit menu the user is asked to confirm whether he really wants to exit, there are 2 buttons available in this panel, namely the exit button to exit the game application and the back button to cancel exiting the game application.



Figure 8. Confirm Exit Page

4. Conclusion

Based on the test results regarding the Design of Augmented Reality-Based Educational Games for Animals, the authors make several conclusions, including: The design of the Augmented Reality-Based Animal Educational Game was made using the C# programming language. The design of an Augmented Reality-Based Animal Educational Game was created using Unity3D software. The facilities available in this game application include Text, Image, Sound and Interactive Animation about Animals which are on the "Learn" and "Play" menus, 3 Dimensional Objects accompanied by various animations wrapped with Augmented Reality technology. Alternative media that can be used anywhere and anytime only with an Android-based smartphone. The author hopes that the application of Augmented Reality-Based Educational Game Design for Knowing Animals is useful for the wider community, especially for parents and early childhood teachers.

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