Development Multimedia Learning of Introduction of Animals using Augmented Reality Technology for Early Childhood Education Programs

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Abstract: The objectives of this study is to develop multimedia learning of animal introduction using augmented reality technology for early childhood education, to discover the feasibility level of the developed product, and to find whether application is running well or not. The method that used in this research is Multimedia Development Life Cycle system which has six stages, that consist of Design, Obtaining Content Material, Assembly, Testing, and Distribution. The developed product are testing at an alpha test stage involving a media expert, while the beta test involves two parents as a guide. The results are showed that the multimedia learning of animal introduction can be used by early child guided by parents as learning resource using augmented reality technology, the developed product is considered very appropriate based on expert material judgment, media experts, and test subjects, and the application had been running well and no errors that occur during the operation of the application.

1 INTRODUCTION

In the introduction of animals for early childhood there is a lack of learning aids that can visualize objects for the animals themselves. The limited itself such as a viewpoint that provided by books or videos, that not make the whole picture of the 3d object, which results in children only being able to see from a limited perspective. The reason why learning aids are needed because of limited funds and time to look directly at animal habitat or to animal care providers such as zoos. The location of the existing zoo has a far location and cannot be reached by parents. This makes early age children unable to make good observations of animal recognition in that age. To overcome this problem, a media can be used as an intermediary to visualize the animals.

Multimedia learning used in this study are form as an introduction model. The intended introduction model is a program designed to act as an introduction application for children. While augmented reality is needed as a solution to visualize these animals.

Augmented reality is a technology that combines two-dimensional or three-dimensional virtual objects into a real three-dimensional environment and then projected these objects in real time(Furhat, 2011).

The existence of this technology is capable of displaying virtual objects in the real world is getting a high response from android users. This can be seen from one of the Android-based games that use augmented reality technology, Pokemon Go. Pokemon go is one of the games with daily active users approaching the popular Twitter service on the Android platform (Similarweb.com, 2016).

Based on the description above, researchers are interested in developing multimedia learning that will help early childhood to learn animal recognition based on augmented reality. This multimedia learning consists of a handbook and a mobile application for Android. Multimedia learning is a medium that is useful to guide children to learn independently with parents or teachers as facilitators.

2 METHOD

This study aims to develop an interesting and interactive learning media using Augmented Reality by utilizing the camera features on an Android Smartphone. The type of research used in this research is MDLC (Multimedia Development Life Cycle) where this method has 6 stages, namely

concept, design, collecting material, assembly, testing and distribution (Bintaro, 2015). The cycle of MDLC is depicted in Figure 1.
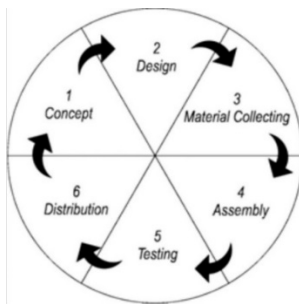

Figure 1: Multimedia Development Life Cycle.

In this study the first test was conducted by media experts. This media expert test to assess and evaluate products before being tested on parents who will guide this application to early childhood. This media test is included in the alpha test. After that the beta test was carried out on two parents.

Development that will be carried out to make this learning media begin with the presurvey stage. The goal is to do research on material needs analysis, what is the topic of discussion on this products that will be develop, and what also the facilities and infrastructure that are available for the product application.

The next stage was carried out with the MDLC development model. These stages are: first is concept, this application made is aimed at early childhood (AUD) accompanied by parents as mentors. This application will certainly contains educational values for the early childhood. Development of learning multimedia using Augmented Reality technology is made based on mobile (android) with the extension .apk (Android Package File).

Second, at the design stage. At this stage the researcher will begin the design of the application, the researcher will do the design in the form of a storyboard and design the navigation structure in the form of a menu hierarchy as shown in Figure 2.
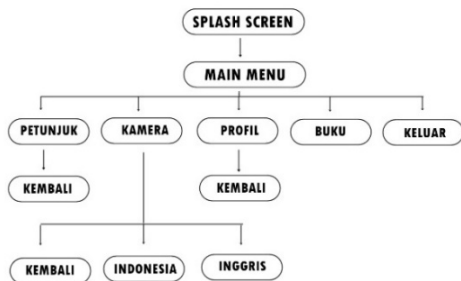

Figure 2: Hierarchy.Menu.

The third is the Obtaining Content Material stage, where at this stage, the author has collected materials that are suitable for applications such as logic links, scripts, images, animation, music and videos. the content used is self-made or takes various sources. The following is an example of the content that has been obtained by the author. Figure 3, Figure 4, Figure 5 and Figure 6 show obtaining content material.
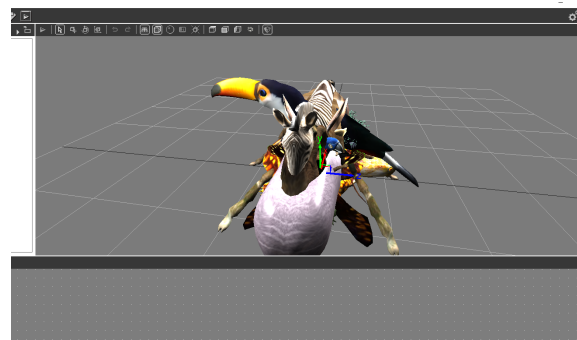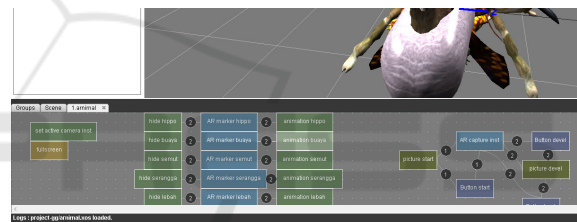

Figure 3: Obtaining Content Material.

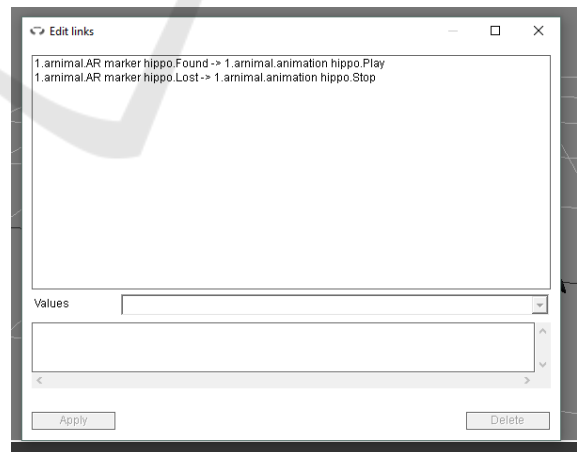Figure 4: Obtaining Content Material.

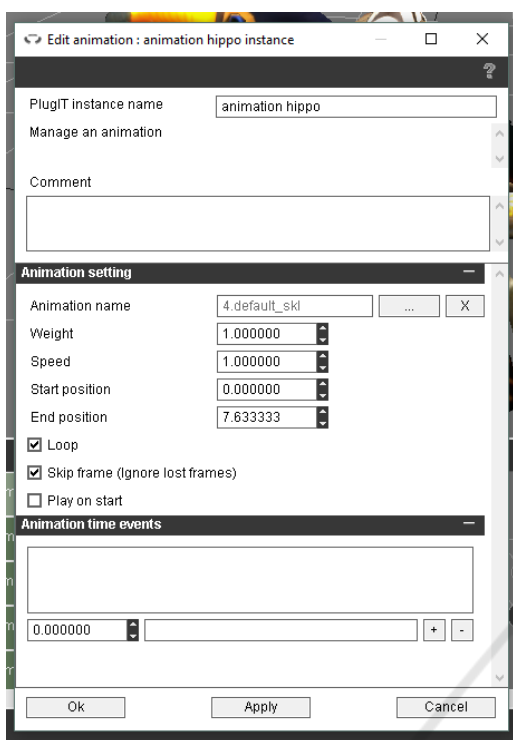Figure 5: Obtaining Content Material.

Figure 6: Obtaining Content Material.

The fourth stage is the Assembly stage, at this stage including determining the button icons that will be used in making the application, the icon comes from searching on the internet and there are also homemade results using Adobe Illustrator and Adobe Photoshop. In processing material content such as images, sounds, animations, videos and others, they are selected and separated according to a predetermined concept, at this stage researchers prefer images that attract children's attention. After processing the content created, the next process is making an application using Open Space 3D where all the content that has been wrapped with the script and also the logic link will be processed and made into a .xos format project.

The fifth stage is the testing phase where when the application has been completed, the system is tested and tested by media and user experts, where the test aims to find out whether the multimedia learning application is in accordance with the plan and whether it is functioning properly. The two stages in testing, namely alpha test and beta test. (1) Alpha test, product testing at this testing stage involves a media expert and one parent. (2) Beta test, will involve two parents who act as early childhood counselors.

Data collection techniques used in this study were interviews and questionnaires. (1) interviews, in this study interviews were conducted to obtain data during the needs analysis process when conducting presurvey. These needs analysts are the basis for developing learning multimedia products. (2) questionnaire, this data collection technique is carried out by giving a questionnaire containing questions that must be answered by the respondent. The nature of the questionnaire is closed, where the respondent has been given a choice of answers so that the respondent just chooses an answer that is in accordance with the respondents' beliefs. Data collection techniques through questionnaires were carried out during the alpha test by media experts and parents. The guidelines for instrument score scoring scale is shown in Table 1.

Table 1. Guidelines for Instrument Score Scoring Scale.

Qualitative Data	Score
Very Feasible	4
Feasible	3
Less Feasible	2
Very Less Feasible	1

3 RESEARCH RESULTS AND DISCUSSION

This study aims to develop an interesting and interactive learning media using Augmented Reality by utilizing the Android Smartphone camera features. The type of research used in this study is MDLC (Multimedia Development Life Cycle) where this method has 6 stages, namely concept, design, collecting material, assembly, testing and distribution.

Next, product trials included alpha test and beta test. The alpha test was carried out by two material experts and two media experts. Beta test was conducted by three students. The material expert evaluates learning material from the material aspects and aspects of learning. Media experts evaluate the aspects of appearance, media aspects, and technical aspects. The results of the media evaluation and the material are used to revise the product. After the revision is done, then a beta test is conducted to obtain responses or input from students regarding the product being developed.

In the alpha test the results obtained from two media experts and two material experts can be seen in Table 2 and Table 3.

Table 2: Material Experts Result.

Material Expert	Average	Category
1	3,4	Very Feasible
2	3,4	Very Feasible

The assessment results found that the average total value of the two material experts was 3.40. based on the conversion table, this value is categorized as "very feasible". And these results indicate that the products developed are suitable for use as multimedia learning for early childhood education by improving the parts according to the advice of media experts.

Table 3. Media Experts Result.

Media Expert	Average	Category
1	2,8	Feasible
2	3,9	Very Feasible

Based on the data shown in the table above, it was found that the value of validation by media experts on learning multimedia products was 3.37. based on conversion tables, this value is categorized as "very feasible" and can be tested on students.

The results of the beta test given to 3 students were obtaining a mean score of 3.52 in a very feasible category. therefore the multimedia learning produced is very feasible to be used as a learning medium for animal recognition material.

Student learning outcomes at pre-test before using learning multimedia averaged 27.70. while the student's post test after using augmented reality based learning media has a mean of 82.91. This shows that the products used can improve the achievement of students' cognitive learning outcomes on animal recognition material. Thus it can be concluded that the learning multimedia products introduction of computer components using augmented reality technology can improve student learning outcomes.

4 CONCLUSIONS

Multimedia learning is developed through the MDLC stage. The purpose of this research is to produce learning multimedia products using augmented reality technology. This technology is interesting and interactive to be used as a learning medium for early childhood. The material in this learning multimedia product is equipped with text, images, animation, sound, and video that are packaged in .apk file format and stored in compact disk (CD).

This multimedia product has been evaluated based on alpha test and beta test by two material experts, two media experts, and based on responses from three students. The results are categorized as "very feasible", thus it can be concluded that this learning multimedia product is appropriate even though there are some parts that need to be revised. After revision, the learning multimedia products were tested for their usefulness by giving pre-test and post-test questions to two parents.

The use of this product for parents should follow the following steps: (a) Before using a multimedia learning program, parents must understand and explain to the child how to operate this multimedia learning program; (b) Submission of material begins with explaining the purpose of learning so that the child can have a shadow of the material to be presented.

As for future development, this media can be add by more collection of animal, so that will be a comprehensive application that can covered many species of animal..

ACKNOWLEDGEMENTS

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