

Virtual Zoo: Learning Media Based on Augmented Reality for Early Childhood

Denik Ristya Rini^{1*}, Agnisa Maulani W.¹, Retno Tri W.¹

¹ University Negeri Malang

* Corresponding Author. Email: denik.ristya.fs@um.ac.id

ABSTRACT

Early Childhood Education is designed as the first level of education given to children to understand their surroundings. The learning process was carried out through a combination of learning and playing. One of the basic competencies stipulated in the 2013 PAUD curriculum is KD 3.8, consisting of knowledge of the natural environment, particularly animals. Conventionally, the introduction of animals to these young students took place by mentioning their names and their characteristics, or taking them out to a field, a zoo or an animal park. To design a sufficiently representative learning experience in class, this research aimed at developing a virtual zoo, presenting animals in 3D shapes. As such, students can remain in class while they are able to recognize animals as well as when they visit the zoo. This development research was conducted using the ADDIE method, with the following stages: 1) Analysis, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation. The development of this learning media eventually helped children not only learn to recognize animals, with both characteristics and environment, but also do it online.

Keywords: *Augmented Reality, Early Childhood Education*

1. INTRODUCTION

Early Childhood Education (PAUD) is an education level specialized for children from birth to the age of 6 (six) years which is carried out through the provision of educational stimuli to help their physical and spiritual growth and development so that they have readiness to enter further education [1]. The results of research by Maryatun [2] suggest that, in the field of Neurology, the development of children's intelligence reached 50% at the age of 0-4 years, 80% at the age of 4-8 years, and 100% at the age of 8-18 years. Meanwhile the physical growth of children aged 0 years reached 25%, 6 years reached 90%, and 12 years reached 100%. Therefore, an early age for a child is a strategic period for the development of a further life. Based on the results of the research above, parents need to provide the right stimulus at the age of child development and make the best use of each age of child growth.

Based on the 2013 PAUD Curriculum [1], one of the basic competencies that must be given to early childhood in school is basic competence 3.8., namely knowing the natural environment (animals, plants, weather, soil, water, rocks, etc.). One of the learning activities given by the teacher to complete this basic competence is to introduce students to various animal traits and

characteristics. At KB PAUD, UM Laboratories are in the learning process if they are in a normal condition/not a pandemic, the school makes an outing program, or invites students directly to the field, for example to learn about the types of school animals, conduct field visits to the zoo or park. This early is intended so that students can directly identify animals along with their karate and characteristics.

Due to the Covid-19 pandemic, the learning process has changed to online. Students can only study from home with the guidance of their parents based on the material guide from the teacher. This will be a problem because students cannot learn about animals directly, but only through pictures or stories given by parents.

Based on the problems above, the authors try to offer a solution by developing a Virtual Zoo, based on augmented reality. The concept of this virtual zoo is to develop a learning media by utilizing digital technology. Through android devices, students can learn various kinds of animals with three-dimensional shapes, have complete illustrations of the animal's environment, and characteristics of the animal.

Augmented Reality is a concept of merging the virtual world into the real world [3]. The creation of a virtual world is done to evoke the user's perception to

understand information from recognized objects. Augmented Reality is defined as the use of real time digital computer devices and other special hardware and software to produce a simulation of an alternative world or environment, which is believed to be real or true to the user. There are two methods of recognizing markers in augmented reality, namely: using markers and not using markers or markerless [4]. Markers are special markers that are made like a barcode or black frame, while markerless are markers that relate to objects directly.

The use of learning media by utilizing Augmented Reality is considered very relevant to current technological advances. According to Risdianto, Yanto, Kristiawan, & Gunawan [5], early childhood teachers strongly agree with the use of Augmented Reality in learning media. The response is indicated by the percentage of 91.92%.

The development of learning media by utilizing Augmented Reality will be more effectively used by students to study the types and characteristics of animals than only using two-dimensional learning media in the form of images. This is supported by previous research conducted by Apriyansyah, Anugraha, Prakoso, Erdiham and Priyana [6] which showed that Augmented Reality-based learning media supports student responses in interactive learning. This study shows that children prefer to learn to recognize animals with Augmented Reality-based applications because they can see animal shapes in 3 Dimensions like real shapes in everyday life. In addition, another previous research conducted by Cahyaningtyas [7] shows that the development of Augmented Reality-based learning media is proven to be able to make students more motivated, and can easily understand lessons, and can learn and play directly.

Therefore, to meet the needs of online learning in PG PAUD Laboratorium UM, this development research really needs to be developed as a variation of interactive learning media.

The difference between the media that will be developed by the authors and the research that has been developed in the AR field is that the development of this learning media has a concept like a Virtual Zoo. Through the application developed, children will be taken to fantasize as if they were entering a zoo and learn about the types of animals in it. This application will be applied to online learning with parental assistance at home.

The absorption of children's knowledge at an early age is done by playing. However, children's games should be used as a way to train children's fine motor and gross motor skills to maximize children's learning activities at the earliest possible age. The form of media that can support early childhood learning activities is innovative learning media. One of them is learning media based on augmented reality. With augmented reality technology, the learning process carried out by playing

using AR media becomes more interesting and fun, because virtual objects are displayed in a form that seems real, and how to operate the learning media is also not difficult [7] (Sinduningrum, Rosalina, & Hilda, 2019). This AR-based learning media by presenting virtual objects into the real world will invite children to imagine to increase their creative power. This is in line with the results of research suggested that the use of Augmented Reality-based learning media is suitable for carrying out learning in PAUD [8]. This is because learning using Augmented Reality is able to make students experience learning directly.

2. METHOD

The type of research used in this research is development research. Researchers will develop Augmented Reality-based Virtual Zoo learning media for early childhood education students. The research approach chosen is development research with the ADDIE model. ADDIE model is one of the systematic learning design models. At the level of learning and development material design, systematics as a procedural aspect of the systems approach has been manifested in the practice of methodologies for the design and development of texts, audiovisual materials and computer-based learning materials [9].

The selection of this model was based on the consideration that this model was developed systematically and based on the theoretical foundation of learning design. This model is arranged systematically with a sequence of activities in an effort to solve learning problems related to learning resources that are in accordance with the needs and characteristics of students. This model consists of five steps, namely (1) analysis, (2) design, (3) development, (4) implementation and (5) evaluation. Visually, the stages of the ADDIE model can be seen in Figure 1.

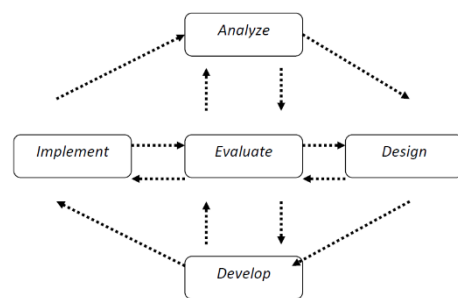


Figure 1 ADDIE Model for Research and Development

Based on the chart above, the first step taken by the researchers was to conduct an analysis. At this stage the researchers collected data, namely: (1) the first stage of evaluation data in the form of data related to the characteristics of students, the basic competencies of the material to be developed by the media, and observing the

learning process that took place in the classroom before the learning media was developed. (2) Design development, based on the results of the analysis that has been carried out on the object of research, the next step is for researchers to compile several alternative designs in media development that are in accordance with the characteristics and needs of students. (3) Development, in the development stage, researchers have begun to develop, realize learning media products based on designs that have been made. (4) Implementation, at this stage the researcher applies the learning media that he has developed and conducts trials. The trial was carried out with individual trials on media experts, and field trials on research subjects. (5) Evaluation, based on the chart above on the ADDIE development model, the evaluation model was carried out at each stage.

3. FINDINGS AND DISCUSSION

The development of Augmented Reality-based Virtual Zoo learning media is completed by using the ADDIE model. At the stage of discussing the results of the study, each stage will be explained in detail.

1. Analyze

At the analysis stage, the research team carried out two activities, namely analyzing the needs of learning media by conducting observations and interviews. Observations were carried out by following the learning process several times at the KB-PAUD laboratory. This activity was intended to find data on what learning media were carried out by the teacher. From the results of observations show that:

- a. The learning process carried out by teachers at KB-PAUD UM Laboratories takes place using the zoom platform and group video calls via Whatsapp.
- b. The learning media used are in the form of showing pictures and videos and then discussing them directly by means of discussion.

In addition to observation, the research team also conducted interviews. The interview was conducted with Mrs. Ayu as the Principal of the UM PAUD KB School. Through interviews, the research team explored data regarding difficulties experienced during the online learning process, and media needs needed to be developed to improve the learning process. From the results of interviews, teachers had difficulty attracting students' interest in learning when online learning took place. What usually happened was that students could only focus at the beginning of learning. Based on the results of observations and interviews, it can be analyzed that schools need the development of learning media that can attract students' attention and focus. Augmented Reality-based Virtual Zoo development is very appropriate to

be developed as a learning medium because it can attract students' attention visually. Through the Virtual Zoo learning media, animals are displayed in 3D which can be observed directly by students.

2. Design

This Augmented Reality-based Virtual Zoo learning media was developed based on a learning design adapted for early childhood. The 2013 PAUD curriculum develops attitudes, knowledge, and skills as an interrelated and inseparable component [1]. The formation of attitudes is directed at building executive functions, which are suspected to be (1) the ability of the brain's working memory to regulate the ability to maintain and manage different information in a short time, (2) mental flexibility that helps maintain responses to different demands in a short time, and (3) self-control in terms of setting priorities and resisting interesting actions/responses. The formation of conceptual knowledge is to build creative abilities by using higher thinking ways. The development of sequential procedural thinking skills is applied either through habituation (habituation) or scientific approach (scientific approach).

Augmented Reality-based virtual zoo learning media was developed from Basic Competencies. 3.8 Get to know the natural environment (animals, plants, weather, soil, water, rocks, etc.). Then the basic competencies are lowered into competency indicators as shown in the following chart:

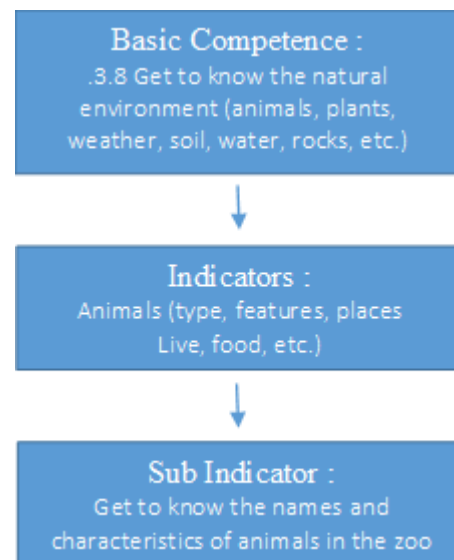


Figure 2 Material Development Design

3. Developed

The design of Augmented Reality-based Virtual Zoo Learning Media is designed using Unity 5.3 software. The development process can be seen in the following chart:

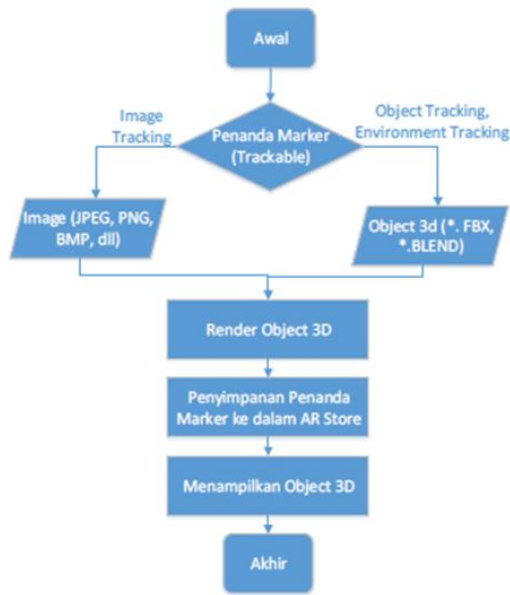


Figure 3 Augmented Reality-based Virtual Zoo Development Process

4. Developed

The product development is then validated and tested. Learning Media Products are validated by material experts and media experts. The material experts gave a value of 98% of the developed media containing material that was in accordance with the competencies for early childhood. However, the material expert provided input for compiling companion books for parents to make it easier to assist children in recognizing animal characteristics. Media experts give a value of 95%, the advice given is to change the color selection used. Media experts suggest choosing colors that are more colorful so that early children are interested in the colors used.

A small trial was conducted on 5 teachers and 5 students. Teachers and students have tried to operate the Virtual Zoo learning media and provide their responses through filling out questionnaires. From the questionnaires distributed, it can be concluded that the learning media developed are interesting for use in learning. The questionnaire form was filled in by the teachers and student guardian who accompanied the experiment process. Of the ten questions the average answer chosen from a scale of 1-4 is number 4. This shows that the Virtual Zoo media developed is very feasible to be produced and used in the learning process.

5. Evaluation

Evaluation of development activities was carried out after the research team carried out product validation and trials. The results of the evaluation show that the learning media developed in its use by students must be accompanied by parents and teachers. Parents and teachers act as

translators/explainers of the characteristics of each animal being observed. In the mentoring process, parents should also be given a guidebook to guide their children in using the media.

4. DISCUSSION AND FINDINGS

Based on the process of developing Augmented Reality-based Virtual Zoo learning media, it can be concluded that the developed media can be accepted during validation and testing. To improve the function and use of media, it is necessary to make a boo manual or a manual that includes a guide to the use of media and an outline of the scope of the material. This is needed so that when students study at home, parents can easily use it.

ACKNOWLEDGMENT

The research team expresses our gratitude to the Institute for Research and Community Service, State University of Malang, which has funded this activity through a non-tax state revenue research grant that has conducted research in 2021. We also thank the research team to all teachers and students of KB PAUD Laboratorium Um who have helped research this

REFERENCES

- [1] F. Yusuf, "Kerangka Dasar dan Struktur Kurikulum 2013 PAUD," 2018.
- [2] I.B. Maryatun, "Peran Pendidik Paud Dalam Membangun Karakter Anak," in *Jurnal Pendidikan Anak*, volume 5 issue 1, 2016, pp. 747-752. [Online]. Available: <https://doi.org/10.21831/jpa.v5i1.12370>.
- [3] E.P. Senduk, A. Sinsuw, and S. Karouw, "M-Learning Pendidikan Karakter untuk Anak Usia Dini Berbasis Augmented Reality," in *Jurnal Teknik Informatika*, volume 9 issue 1, 2016, pp. 1-5. [Online]. Available: <https://doi.org/10.35793/jti.9.1.2016.14929>.
- [4] N. Saurina, "Pengembangan Media Pembelajaran Untuk Anak Usia Dini Menggunakan Augmented Reality," in *Jurnal IPTEK*, volume 20 issue 1, 2016, pp. 95. [Online]. Available: <https://doi.org/10.31284/j.iptek.2016.v20i1.27>.
- [5] E. Risdianto, M. Yanto, M. Kristiawan, and G. Gunawan, *Respon Guru Pendidikan Anak Usia Dini terhadap MOOCs berbantuan Augmented Reality*, volume 5 issue 2, 2021, pg. 1487-1500. [Online]. Available: <https://doi.org/10.31004/obsesi.v5i2.907>.
- [6] A. Aldi, "Aplikasi Pengenalan Hewan dengan Teknologi Marker Less Augmented Reality Berbasis Android," in *DoubleClick: Journal of Computer and Information Technology*, volume 1

issue 1, 2017, pp. 1. [Online]. Available:
<https://doi.org/10.25273/doubleclick.v1i1.1312>.

- [7] E. Sinduningrum, R. Rosalina, and A.M. Hilda, “Pemanfaatan Teknologi Augmented Reality Untuk Media Pengenalan Huruf Alfabet Pada Anak Usia Dini,” in *Jurnal SOLMA*, volume 8 issue 1, 2019, pp. 142. [Online]. Available: <https://doi.org/10.29405/solma.v8i1.3151>.
- [8] C. Ailsa Salsabila, “Pembelajaran Menggunakan Augment Reality Untuk Anak Usia Dini Di Indonesia,” in *Jurnal Teknologi Pendidikan*, volume 5 issue 1, 2020, pp. 20-37. [Online]. Available: <http://jurnal.ikipmataram.ac.id/index.php/jtp/article/view/2850>.
- [9] I.M. Tegeh and I.M. Kirna, “Pengembangan Bahan Ajar Metode Penelitian Pendidikan Dengan Addie Model,” in *Jurnal Ika*, volume 11 issue 1, pp. 12-26.