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Research Article

3D Animal Illustration Flashcard as a Learning Media Innovation in Early Childhood Education

Denik Ristya Rini, Agnisa Maulani W. and Retno Tri W.

Universitas Negeri Malang, Indonesia

ORCID
Denik Ristya Rini: https://orcid.org/0000-0002-6264-8633

Corresponding Author: Denik Ristya Rini; email: denik.ristya.fs@um.ac.id

Abstract.

Augmented reality (AR) is a technology that allows users to interact with virtual elements in a real-world environment. In the context of early childhood education, AR-based learning media can provide a number of benefits for children learning about animals. With the assistance of parents, children can learn 3-dimensional shapes and animal characters that are integrated with smartpones. The aim of this research is to develope 3D flashcards based on Augmented Reality for learning media in Early Childhood Education. The developed flashcards are also given the distinctive sound of each animal so that the child can easily recognize it. The product was developed using ADDIE (Analyze, Design, Develompent, Implementation and Evaluation), and it was then tested on a limited group, and validated to get input for improvements before being mass-produced. The result of this research in AR-based learning media is that it can make learning about animals more engaging and interactive for children. This can make the learning process more fun and interesting for children, and can also help to retain their attention and focus during the learning process. Another benefit of using AR-based learning media is that it can help to make the information more relatable and concrete for children. For instance, instead of just reading about a cow in a flashcard, children can use an AR app to see a 3D model of a cow in front of them and even interact with it. The limitation of this study is that from the results of the trial, the data shows that the use of paper-based flasshcards can be damaging in early childhood, and teachers suggest using sturdier materials such as PVC.

Keywords: flashcards, augmented reality, animals, early childhood, education

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1. Introduction

Augmented reality (AR) is a technology that enhances the real world with digital information [1], and has the potential to be a powerful learning tool in early childhood education. In the context of animal education, AR could be used to create interactive and engaging experiences that help young children learn about different types of animals, their habitats, and behaviors [2]. One way to use AR in early childhood education is to develop interactive educational media that allow children to interact with virtual animals in a real-world environment.

For example, an AR-enabled mobile app could be used to create virtual animal habitats that children can explore. The app could include information and interactive features such as videos, photos, and animations that help children learn about the animals and their characteristics [3]. One benefit of using AR-based learning media is that it can make learning about animals more engaging and interactive for children. For example, an AR app could allow children to point their device at a picture of a cow and see a virtual cow appear in the room, complete with information about the cow's characteristics and habitat. This can make learning about animals more fun and interesting for children, and can also help to keep their attention and focus during the learning process.

Another approach would be to use AR to create interactive flashcards that feature animals and related information. These flashcards could be used to teach children about different animals in a fun and interactive way, and could include animations, videos, and sound effects to help children learn. Physical AR learning card/toys would also be another approach that can be used in this context [4], children can scan these cards with a mobile device and see a 3D animal come out from the card or a toy, or even see the animal in different habitat or weather. In addition to providing children with interactive and engaging experiences, the use of AR in early childhood education can also help to increase children's motivation to learn, improve their retention of information, and promote active learning [5]. It is important for the learning media to be designed to be age-appropriate and easy to use for young children and also make sure to be aligned with the curriculum.

Overall, the use of AR in early childhood education has the potential to be a powerful tool for teaching children about animals and many other subjects. With the right

approach, AR-based learning media can help to make education more engaging, interactive, and effective for young children.

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2. Methods

Developing 3D flashcards as a learning media based on augmented reality for early childhood education can be a fun and interactive way to engage young students in their learning. Here is the methodology using ADDIE model to developed 3D flashcards as learning media in this reasearch:

1. Identify the learning objectives: The first step in creating 3D flashcards based on augmented reality for early childhood education is to identify the specific learning objectives that used for the flashcards to support. In this research, the used of flashcards is for learning about animal.

2. Design the flashcards: Once we know what we want to teach, we can begin designing the flashcards. Each flashcard should have a picture or image that relates to the animal identity that we want to teach, as well as text that provides the name of the animal. In this flashcards we also add soun for each animal to make childern easier to know what animal is it.

3. Develop the augmented reality: The next step is start developing the augmented reality component. This might involve creating 3D models of objects or characters related to the flashcards, or developing animations that help to explain the animals characteristics.

4. Test and refine: Before we use the flashcards in a classroom setting, it's a good idea to test them with a small group of students to see how well they work and what improvements can be made. This will help us to identify any bugs or usability issues and make any necessary changes.

5. Implement in class and measure the effectiveness: Finall stage, we use the flashcards in a classroom setting and observe the students' engagement and understanding of the material.

3. Findings

The purpose of this research was to develop 3D flashcards based on *augmented reality* for early childhood education to learn animal character. The development process employed the ADDIE prosess.

3.1. Analysis Phase

The analysis phase was the basic and fundamental stage, so the material was developed according to the need for its development, and for the technology and media to be used. The analysis phase in this research consisted of several stages, a needs assessment and an analysis the technology, media and the extend data.

3.2. Development Phase

In general, flashcard designs are designed by displaying animal illustrations and their names. Overall, the main design for flashcard development is as follows:
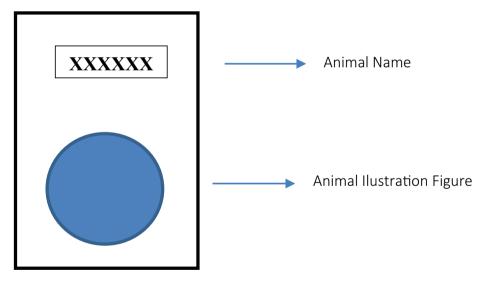

Figure 1: Flashcard main design

Flashcards are made with ergonomic elements in mind, so that they are easy to hold by children. This flashcard was made with a size of 6.35 x 8.89 cm using 150 gram art paper. The developed flashcard contains several types of animals that usually live in the forest or that can be found in zoos. The choice of this type of animal is because in early childhood it is very possible once invited by his parents to visit the zoo. So that the designed flashcard can stimulate their memory of the types of animals that can be

found in the zoo. Some examples of the flashcard layouts that were developed are as follows:

The following are some of the tools used in application's development process:

1. Blender : an open source 3D software that can be used to create 3D models and animation.

2. Unity : A software used to process 3D images, animation, programme scripts and other things.

3. Vuvoria : a plug-in or additional feature for unity that allows us to scan an image, so an object can be placed in it. The block diagram of the working principles, explains that the scanning process for augmented reality technology can be done by firstly directing the phone towards the marker. Automatically, the application will try to scan the marker and check wether the marker is in the database. Once it is detected, the app will match the marker will its 3D database, after the 3D animations appear on the Android screen.

3.3. Test Results

3.3.1. Product Trial

The product's trial is the testing phase to for learning media. The trial aims to ensure that the developmed learning media is suitable to be used by the proposed users. The following table is the result of the material and the media assessment.

TABLE 1

Material Assesment						
The Aspects	Content's Quality	Learning Goals	Motivation	Content's Quality	Learning Goals	Motivation
	Before revision			After Revision		
Material Ex[ert 1	56	57	58	68	60	65
Material Expert 2	54	55	60	69	68	65

Total score convertion. Highly feasible 92>x.74.75; Feasible 74.75>x>57.7.5; Fairly feasible : 57.5>x>40.25; Not feasible: 40.25>x>23.

TABLE 2

The Aspects	Media Assesment			
	Presentation's design	Interaction's usability	Presentation's design	Interaction's usability
	Before Revision		After Revision	
Media Expert 1	69	70	75	77
Media Expert 2	72	73	76	78

4. Conclution

Based on the result, 3D flashcards based on augmented reality was succefully designed and developed using the ADDIE model. This media produced a positive feedback by material and media experts. From the result of material and the media assessment conclude that the 3D flashcards are feasible to implement as learning media.

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