Jurnal Pendidikan dan Konseling

Volume 5 Nomor 1 Tahun 2023

E-ISSN: 2685-936X dan P-ISSN: 2685-9351

Universitas Pahlawan Tuanku Tambusai

Human Respiratory System Learning Application Using Augmented Reality In Biology Learning

Dol Frialdo[1*], Dio Alvendri[2], Annisa Tishana[3], Nizwardi Jalinus[4], Waskito[5]

[1,2,3] Padang State University, Padang, Indonesia

Email: Dolfrialdo1@gmail.com[1*]

Abstrak

Siswa merasa kesulitan untuk belajar secara daring karena alat untuk belajar praktikum biologi khususnya pernapasan tidak ada di rumah masing-masing, sehingga diperlukan suatu aplikasi yang dapat mendukung kekurangan tersebut, oleh karena itu dirancanglah aplikasi pembelajaran sistem pernapasan manusia menggunakan augmented realita dalam pembelajaran biologi, aplikasi Penelitian ini bertujuan untuk memberikan pembelajaran tentang materi pernafasan pada mata pelajaran biologi. Aplikasi ini dirancang dengan menggunakan metode Development Life Cycle (MDLC). Augmented reality dibuat dengan metode markerless berbasis android menggunakan software enginering Unity, dan 3D blender adalah software untuk membuat objek 3D organ pernafasan, text-editor yang digunakan untuk script Unity adalah Visual Studio Code yang menggunakan bahasa C#, untuk membuat icon menu menggunakan software Paint tool sai. Aplikasi ini akan memperkenalkan sistem pernapasan dalam bentuk augmented reality.

Kata kunci: *Pelajar, Breathing, Unity, Augmented Reality, Markerless, Visual Studio.*

Abstract

Students find it difficult to learn online because the tools to learn biology practice, especially breathing, are not in their respective homes, so there is a need for an application that can support this deficiency, therefore a human respiratory system learning application is designed using augmented reality in biology learning, applications This study aims to provide learning about breathing material in biology subjects. This application is designed using the Development Life Cycle (MDLC) method. Augmented reality is made with an android-based markerless method using Unity as the enginering software, and 3D blender is software for creating 3D objects of respiratory organs, the text-editor used for the Unity script is Visual Studio Code which uses the C# language, for making menu icons using Paint tool sai software. This application will introduce the respiratory system in the form of augmented reality.

Keywords*: Learner, Breathing, Unity, Augmented Reality, Markerless, Visual Studio.*

INTRODUCING

Education is an effort to improve the quality and efforts to develop the potential of human resources (HR) so that they can have an impact on life. Where is the implementation of education itself in the learning process [1]. Augmented Reality (AR) which is a technology concept that can combine virtual objects, both 2D objects and 3D objects, in real time and projected in real time into real time. Technological innovation in the field of education is utilizing Augmented Reality (AR) technology in designing a learning media for Biology subjects.

Biology is the study of life. Biology is a natural science, the object of study of biology is very broad and includes all living things. One of the materials in biology subjects is the respiratory system which is included

in the anatomy section. The respiratory system is the process of bringing oxygen into the body, expelling CO2 and using the energy obtained. The vital organs that play a role in the respiratory system are the nose, pharynx, trachea, larynx, bronchi, bronchioles, lungs and alveoli.

Mathematics

Augmented reality is a technique that combines two-dimensional and three-dimensional virtual objects into a real three-dimensional sphere and then projects these virtual objects in real time [2]. Augmented reality has been applied in various fields, such as medicine, entertainment, military, planning, mechanical technology and others. Augmented reality has been launched on widely used devices such as mobile phones [3].

In humans, respiration is indirect, i.e. air does not diffuse directly into body cells through the entire surface of the skin. Air enters the body through special channels and organs that form systems that facilitate gas exchange. The respiratory system is a series of respiratory tracts/organs that work together to ensure the availability of oxygen in the body. With the respiratory system, oxygen from the atmosphere can enter and carbon dioxide is released from the body.

There are several methods that can be used in augmented reality, namely marker-based tracking and non-marker-based tracking. Tracking cursing markers These markers are usually in the form of a black-and-white square illustration with a thick black border and white background, which in this study uses markers that contain imaging patterns of organs in the human respiratory system.

Unity 3D engine is a game programming engine for building 3D games. Game engine is a segment that is in the background of every game. Mesh is the default shape of 3D objects. Mesh creation is not done in unity. Meanwhile, game objects are materials for various parts.

Blender is a 3D object design software that seems to be the most popular among other open source software. The tools provided are simple, but cover all the requirements for creating animated films. For character animation, for example, Blender offers editing services despite the fact that it's not as good at enterprise-level programming as 3D Studio Max. Blender is a software whose capabilities can be modified by anyone.

Vuforia will analyze the marker as an image using the marker detector and display 3D information of the detected marker. This software development kit uses computer vision technology that can recognize and track target images in real time. The target image is an image that can be tracked and detected by the image while working, that is, voforia will recognize the target image by comparing the characteristics of the physical image with the captured image stored in the application database [4]. Visual Studio Code (VC Code) can be defined as a lightweight and powerful OpenSource text editor created by Microsoft [5]. SAI or Easy Paint Tool SAI is a raster graphics drawing and editing software for Microsoft Windows developed and published by Systemax Software. [5].

METHOD

System Analysis

In developing a system, there are several things that we must pay attention to first, for that we need a system analysis to be carried out and developed, namely analysis of the current system, analysis of system recommendations, user analysis.

System Requirements Analysis

At this stage, hardware and system requirements analysis will be carried out to train an application. The analyzed system is a system that contains information about everything related to making applications. Needs analysis is used to fulfill requirements specification documents in accordance with what teachers and students want as users of the new system. At this stage, it contains several things that must be prepared to

develop augmented reality media, educational media to study the human respiratory system, from the software and hardware used to the research location that will be used

System Design Method

The MDLC (Multimedia Development Life Cycle) methodology is a methodology that can be used for software development. The MDLC method was chosen because the manufacture of teaching materials must go through well-designed and consistent stages so that the resulting applications are of good quality and can be used as learning media. Android's open source code and licensing licenses allow products to be unconditionally modified and distributed by utility creators, remote administrators, and app developers. When Google.inc bought Android.inc, everyone underestimated the beginning of Android, as it was [6].

Flowchart

Flowchart is a table with certain symbols that describe in detail the sequence of processes and the relationship between a process (instructions) and other processes in a program.

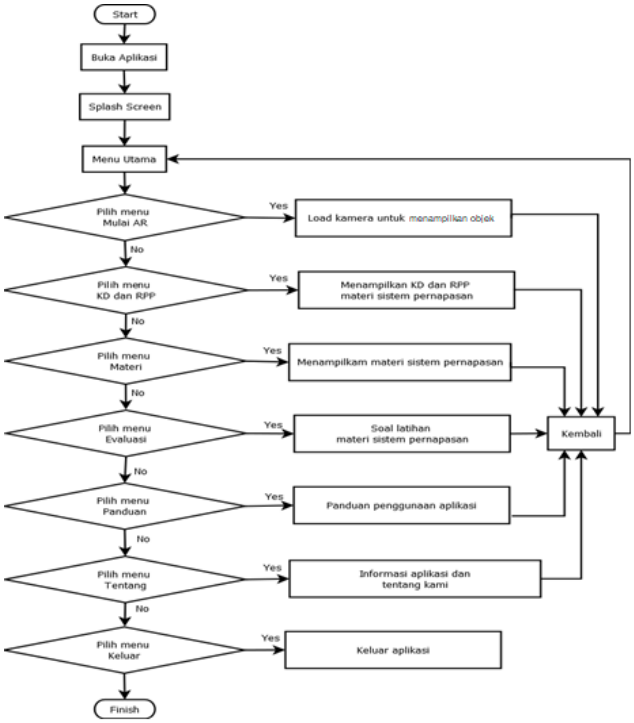

Figure 1. Flowchart of Human respiratory system learning application using augmented reality in biology learning

Use Case Diagram

A use case diagram is a diagram that shows several use cases and actors. This diagram is important to organize and show the behavior of the framework that is needed and expected by users [7].

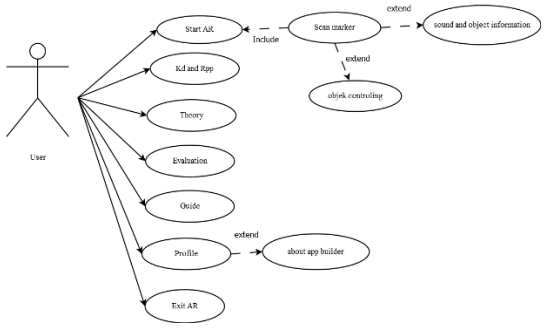

Figure 2. Use Case Diagram of Human respiratory system learning application using augmented reality in biology learning

Class Diagram

A class diagram is the relationship between classes and describes in detail each layer in the design model of a system, also showing the rules and responsibilities of the entities that determine the behavior of the system. Class diagrams typically include: class (classes), relational associations, generalizations and aggregations, properties (properties), activities (activities/methods) and visibility, level of access of external objects to activities or properties. The following is a class diagram of the Respiratory System Learning Multimedia Application:

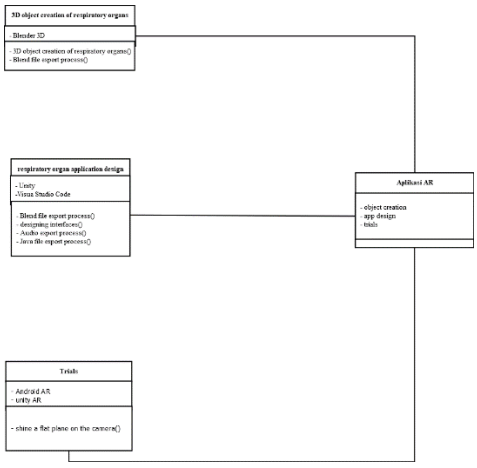

Figure 3. Class Diagram of Human respiratory system learning application using augmented reality in biology learning

Sequence Diagram

Sequence diagram is a diagram that describes the interactions between an object in chronological order. Its purpose is to show a series of messages that are sent between objects and the interactions between objects that occur at a certain point in the execution of the system. The following is a sequence diagram of the Respiratory System AR Learning Multimedia Application:

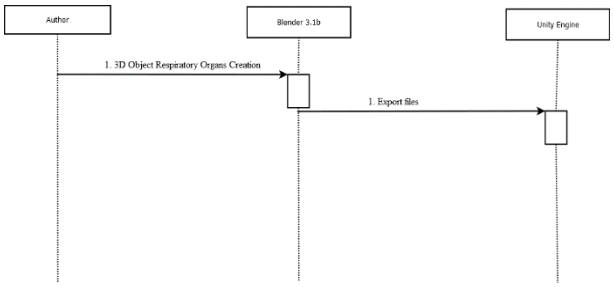

Figure 4. Sequence Diagram Modeling 3D Application of Human respiratory system learning application using augmented reality in biology learning

Activity Diagram

An activity diagram is a chart that depicts or shows an ongoing process. The following is a picture and description of the operation diagram [8].

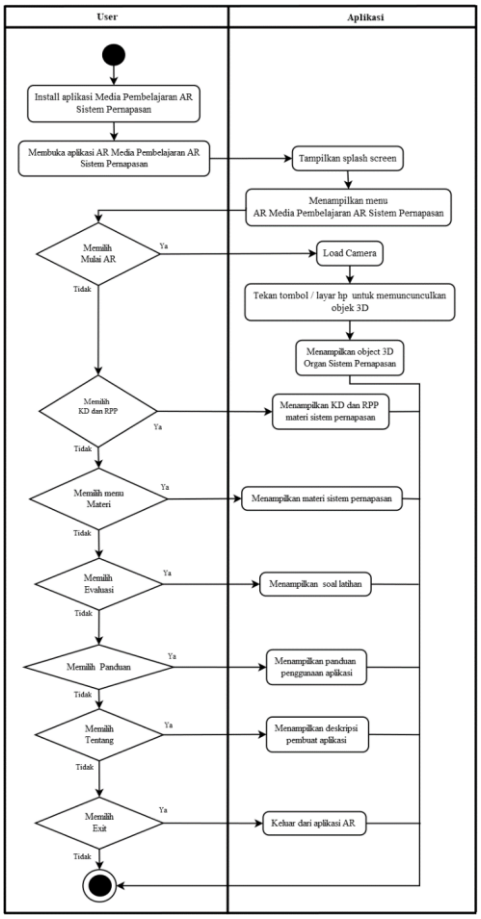

Figure 5. Activity diagram of Human respiratory system learning application using augmented reality in biology learning

RESULTS AND DISCUSSION

The result of the system design is the result of the layout that has been done previously on the interface design in the form of an interface display of the system to be built. The results of this system interface are used to determine whether the designed system can function in accordance with the previously implemented design

Splash Screen Human respiratory system

The splash screen display will display the logo of unity. The following is the splash screen design of the Human respiratory system learning application using augmented reality in biology learning.

Figure 6. The results of the splash screen design of the Human respiratory system learning application using augmented reality in biology learning.

Main Menu Human respiratory system

On the main menu will appear menus that can be selected by the user interface. Namely, there is an AR Start button menu to start displaying 3D objects, the KD and RPP buttons which will display the KD and

RPP of respiratory system material, the material button will display the respiratory system material, the evaluation button will display practice questions or quizzes, the guide button will display the usage guide. AR breathing, Menu about displaying breathing AR usage information and exit button to exit the application. Here's what the main menu of the application looks like:

Figure 7. The results of the main menu design Human respiratory system learning application using augmented reality in biology learning.

Respiratory system guide menu

The tutorial menu contains a 2d canvas which has a background and guide in the form of an AR app manual, the help menu button is just a home button.

Figure 9. The results of the menu design guide Human respiratory system learning application using augmented reality in biology learning

Menu Material Human respiratory system

This menu displays a PDF of biological breathing material, there are not many scripts in this menu, because it uses the pdf plugin asset:

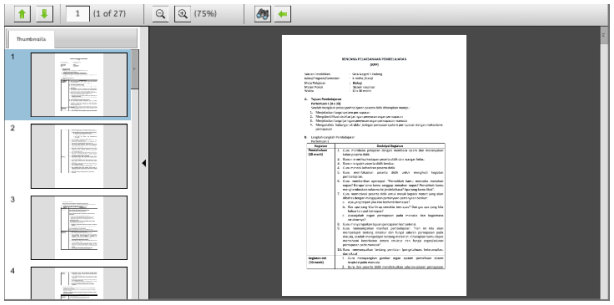

Figure 10. Results of the menu design for Human respiratory system learning application using augmented reality in biology learning

Menu KD and RPP Human respiratory system

This menu displays PDF kd and rpp material for the biological respiratory system, there are not many scripts in this menu, because it uses pdf plugin assets:

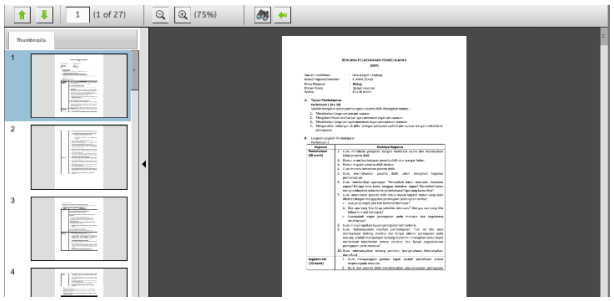

Figure 11. The results of the kd and rpp menu designs Human respiratory system learning application using augmented reality in biology learning

Menu Evaluation Human respiratory system

The evaluation menu contains quizzes on biology subjects, the script in the evaluation menu uses a notepad as a database of questions that will be called using coding that creates an object as a regulator of the question system and the evaluation menu display:

Figure 12. Results of the menu design Evaluation of Human respiratory system learning application using augmented reality in biology learning

Menu Exit Human respiratory system

This AR app exit menu using public void btn_family() in the TransitionCanvas script will be called via the On Click() button component.

Menu AR Human respiratory system

The AR menu of the respiratory organ will direct the user to point the camera at a unique object, so that the camera can track the object, so that the respiratory organ can be displayed on the smart phone and there is and on the camera there is also one button, namely the button to return to play. menu.

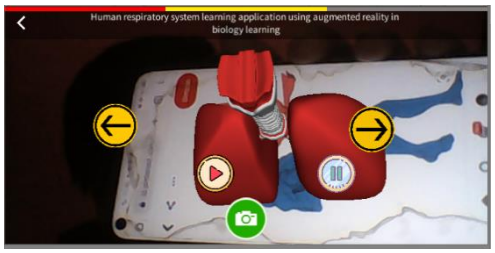

Figure 13. AR menu design results Human respiratory system learning application using augmented reality in biology learning

CONCLUSION

The conclusions obtained from the results of the Human respiratory system learning application using augmented reality in biology learning, the resulting application is an Augmented Reality-based learning media application for biology subject respiratory system materials using the Multimedia Development Life Cycle method and augmented reality with the markerless method, making it easier for students in online learning.

REFERENCES

Hamzah, Saidina, Denny Kurniadi. 2019. Development of Augmented Reality-Based Network Hardware Learning Media on the Android Platform. Votechnic. 7(3), 147-157..

Kurnia, Reni, Huda, Asrul, Nurindah Dwiyani. 2015. Development of Android Augmented Reality-Based Magicbook Interactive Media in Training Courses on Application of Peripheral Functions and PC Installation. Votechnica, 3(1), 31-38.

Mahendra, Ida Bagus, 2016. Implementation of Augmented Reality (Ar) Using Unity 3d and Vuporia Sdk. Scientific Journal of Computer Science, Udayana University. Volume 9(1). hlm. 1-5.

Mauludin, Rizqi, Anggi Srimurdianti Sukamto, Hafiz Muhardi. (2017). Application of Augmented Reality as a Digestive System Learning Media in Humans in Biology Subjects. JEPIN. 3(2). hlm. 117-123llu.

Permana, A Yudi & Puji Romadhon. 2019. “Designing a Housing Sales Information System Using the SDLC Method at PT. Mandiri Land SEJAHTERA Mobile-Based”. SIGMA-Pelita Bangsa Technology Journal. vol. 10 (2). hlm. 155.

Prasetyo, Sigit. 2017. “Development of Android-Based Science Learning Media”. JMI. vol. 1 (1). pp. 121-140.

Rohim, Iim Abdul, Putra Jaya. 2019. "Designing and Making Augmented Reality Learning Media in Electronic Engineering Teaching". VOTECHNIC. Volume 7 (3). hlm. 129-135.

Surahman, Ritman Ishak Paudi, Dewi Tureni. 2015. "Improving Student Learning Outcomes in Learning Natural Science, Language of Living Creatures and Life Processes Through Contextual Picture Media in Second Grade Students of SD Alkahiraat Towera". Tadulako Online Creative Journal. vol. 3 (4). hlm. 92-107.