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DEVELOPMENT OF AN AUGMENTED REALITY-BASED POCKET BOOK USING THE DISCOVERY LEARNING MODEL TO INCREASE STUDENT INTEREST AND LEARNING OUTCOMES IN CLASS X HIGH SCHOOL VIRUS MATERIAL

Kania Ditasari [1], Suwondo [2]

[12] Biology Education Postgraduate Program , Riau University

Email : kaniaa_ditasari@yahoo.com, suwondo@lecturer.unri.ac.id

ABSTRACT

This research aims to design pocket book teaching media so that students are enthusiastic in the learning process. Students find it difficult to understand virus material because they cannot see it directly, so it is designed using augmented reality using a discovery learning model in the design of a learning pocket book which was developed to increase student interest and learning outcomes. The development process was carried out using ADDIE, namely analysis, design, development, implementation and evaluation in the FKIP UNRI Masters Program, the second stage of experimentation at SMAN 1 Tembilahan. The analysis stage was carried out by observation using a questionnaire and the design stage was carried out using various computer software. The result of this research is a pocket book design based on augmented reality. Learning by displaying abstract biological objects in 3D and animation through the use of technology is expected to make students better understand the material obtained, one of which is augmented reality. Based on the results of development and implementation testing of the product, it was found that the product quality was very good and the increase in interest and learning outcomes in the experimental class increased significantly compared to the control class. It is hoped that the results of this research can be developed and carried out further.

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Introduction

Learning is a teaching and learning activity carried out between educators and students to achieve educational goals. A good learning process requires learning strategies that suit the characteristics and needs of students. A learning strategy is a method that has been planned to be used by a teacher contextually, in accordance with the needs of students, environmental conditions and the goals that have been planned in the learning process

*CORRESPONDING AUTHOR. Email: kaniaa_ditasari@yahoo.com

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(Sanjaya, 2011). Learning is a process characterized by changes in a person. Changes as a result of the learning process can be shown in various forms such as changes in knowledge, understanding, attitudes and behavior, skills, abilities, habits, as well as changes in other aspects of the individual learning.

The success of the education process in Indonesia cannot be separated from the learning process activities in schools. The learning process during the Covid-19 pandemic that occurred in Indonesia resulted in changes to the learning process online, because learning activities can determine learning success and are expected to improve student learning outcomes (Yunitasari, 2020). To improve learning outcomes, interest in learning is needed. According to Siregar (2022), interest is a persistent tendency to pay attention and like certain activities or teaching materials. Interest in learning is an important factor in the learning process.

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Researchers try to identify various factors that complicate problems regarding education issues at the high school level. Based on the results of observations at SMAN 1 Tembilahan, it appears that students are noisy, appear passive in the learning process and there are still students who do not pay attention to the teacher. Then the researchers carried out identification through analysis of student needs by distributing student interest assessment forms. The needs analysis sample consisted of 30 respondents from SMA Negeri 1 Tembilahan students. The results of the analysis of student interest in learning were 61.41%, indicating that student interest in learning was still low. Student interest in learning is included in one of the internal factors that can influence student learning outcomes, lack of student interest causes low student learning outcomes. (Wati, 2019).

Low interest and learning outcomes can be caused by a less interesting learning process (Dahliani, 2019). This relates to teaching materials or media such as smartphones used in the learning process (Marhaeni, 2020). The use of teaching materials will make it easier for students to understand the material and create meaningful lessons. Teaching materials are not only in the form of printed media, developments in science and technology can also be used as a means of supporting the delivery of material to make it easier for students to receive lesson material.

Based on the results of observations at SMA Negeri 1 Tembilahan in 2020/2021, the learning strategies applied by Biology teachers in learning are still conventional and there are still some teachers who have not implemented learning models that are in accordance with the implementation of the 2013 curriculum with a scientific approach, namely discovery learning. Discovery learning according to Watipah (2019) means that the teacher is only a stimulator, motivator and facilitator in learning, of course this is in line with the expectations of the 2013 curriculum that learning is no longer centered on the teacher. The Discovery Learning learning model can improve students' science process skills (Mustikaningrum, 2021).

Teaching materials that are often used in schools are PowerPoint, LKS, MGMP LKPD. Virus material is one of the materials in biology learning for class Based on the results of the questionnaire through analysis of virus material with the distribution of an assessment form in the form of 20 multiple choice questions. questions distributed by researchers with a total of 33 respondents from Tembilahan 1 Public High School students. The results of the student learning analysis on virus material were 65.30, where the criteria did not meet the school's competency or KKM.

The learning process at SMAN 1 Tembilahan is currently online and offline. Based on this description, one of the benefits that can be taken during the Covid-19 pandemic is online and offline learning where teachers are required to create good teaching techniques, present interesting teaching materials while students are required to actively participate in the online and offline learning process. In the current online and offline learning process, teachers are required to be more active in utilizing technology in the learning and teaching process. The reason for the existence of this technology is to use it as effective, creative and educational teaching materials and media (Bani, 2020). One of them is pocket book teaching materials. According to Lutfiatul (2020) Pocket books are teaching media containing learning material that is displayed attractively with various supporting features such as images, audio and video. According to Khumaidi (2018), pocket books are effectively implemented in schools, based on research showing positive student responses with a percentage of 97.33%.

The existence of technology, especially smartphones, which are now increasingly developing, must be addressed wisely. The benefits that exist from the existence of this technology must continue to be explored for the sake of better human survival (García, 2020). The phenomenon of the high number of smartphone users is certainly a challenge and opportunity in the world of education. This challenge is in the form of misuse for negative things. Besides being a challenge, the existence of smartphones also brings great opportunities to develop technology that is useful in the field of education. The use of mobile devices in learning has become a necessity in the teaching and learning process. Mobile devices such as laptops, tablets and smartphones have become a new alternative for online learning.

One of the benefits that can be taken from the existence of this technology is by using it as an effective, creative and educational medium that can increase. So that educational learning application media can continue to be developed, one of which is Augmented Reality (AR) technology (Azmah, 2020). AR is a technology that can combine a 3D object into a real environment using webcam media (Sholeh, 2021). Based on research (Kamiana, 2019) that by using Augmented reality-based learning media there is a significant influence on student learning outcomes. The average value of learning outcomes for students who use *augmented reality*-based learning media is higher than the average value of learning outcomes for students without using augmented reality-based learning media (Kamaruddin, 2021).

This *augmented reality* can be developed through media or teaching materials, one of which is the development of a pocket *book which* is equipped with supporting learning media in the form of 3D animated markers that help students in the learning process. AR-based pocket books can display 3D animations of biological objects being studied (Armelia, 2019). Virus material is material that is suitable for use in augmented reality learning media. Viruses are one of the biology subjects taught in schools, but currently, as explained above, the delivery of this subject material is still through books or 2D pictures and so it is difficult for students to imagine how the virus reproduces. Learning by displaying 3D objects and animations through the use of technology is expected to make students understand the

material better, one of which is by using augmented reality technology. This research is to test the quality of AR-based pocket book teaching media using the DL model on virus material.

Method

The research that will be carried out is a type of Research and Development (R&D) research, namely research and development is a research method with the aim of producing certain products, and testing the effectiveness of these products (Sugiono, 2019). This development research aims to produce an AR-based pocket book using a discovery learning model to increase student interest and learning outcomes. In this research, a product will be developed in the form of an AR-based pocket book referring to the ADDIE model which consists of analysis carried out using observation questionnaires at several schools and interviews with teachers, design by designing learning tools, questions and pocket books, development using validation tests, questions and limited trials, implementation is carried out by field tests, and evaluation is carried out to find out the whole. The stages of creating AR can be seen in Figure 1 (Hocky, 2019).

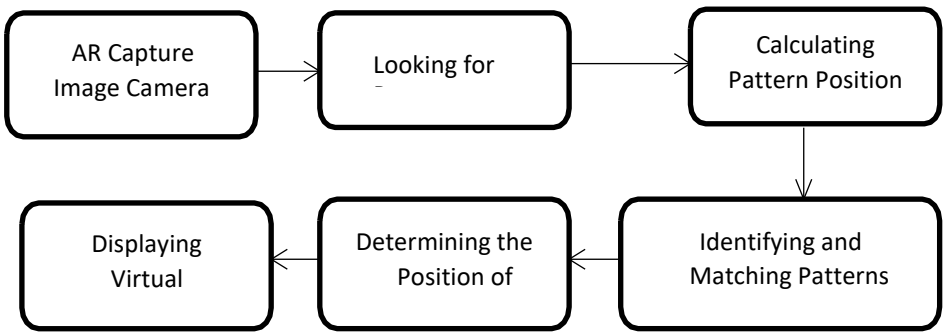

Figure 1. How Augemented Reality Works

Results

The pocket book design stage begins with analysis. According to Syaiful (2020), the analysis stage is an important stage in determining what should be developed and taught to students. This stage consists of analysis of the 2013 curriculum, analysis of student needs, analysis of learning materials and analysis of teaching materials. At this stage, data and information collection was carried out by means of observation, giving questionnaires and interviews at Tembilahan High School. The results of observations were made to show material that students considered difficult.

Biology learning material that is difficult for students shows that the lowest average student daily test score is on virus material, namely 64.39, followed by classification of living things 68.18, biodiversity 69.39 and the scope of biology 70.76. According to Sapuroh (2010), several concepts in biology learning are quite difficult for students to understand. One of them is an abstract concept such as virus material. Development of a pocket book based on augmented reality (AR) using the DL model. The modified pocket book format from Sulistyani in Asyhari (2016) can be seen in Figure 2.

The description of each component in the pocket book format is as follows: Augmented reality-based pocket *book cover* and design using a discovery learning model according to virus material. The pocket *book cover* design that was developed can be seen in Figure 3. The pocket book identity design contains a foreword (figure 4), table of contents (figure 5), list of images (figure 6), instructions for downloading the application and instructions for using the pocket book (figure 7) According to Afifah (2021), the existence of instructions in developing teaching materials aims to make it easier to use teaching materials.

Figure 3. Cover

Figure 4. foreword

Figure 5. table of contents

Figure 6. List of Figures

Figure 7. Instruction

Students can also be assisted by 3D *augmented reality* animations that have been added to the *pocket book*. This 3D animation can also make learning more contextual. According to Mustaqim (2017*), augmented reality* can be used to help visualize abstract concepts for understanding and structure of an object model. The virus parts in the developed *pocket book* are equipped with markers containing a database of 3D animation material as an aid in finding what the parts of the virus are." 1" marker. 3D animation for parts of the virus can be seen in Figure 8..

(a) (b)

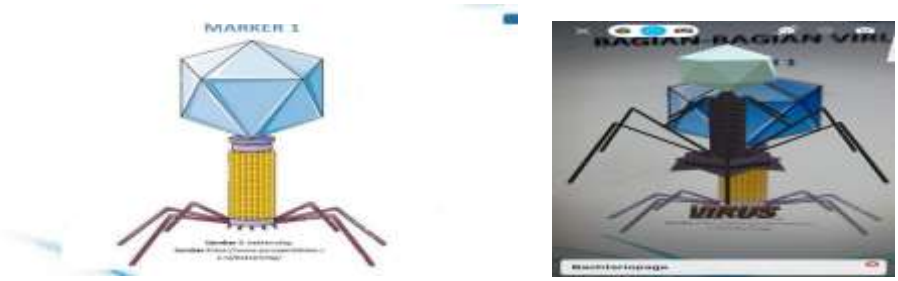

Figure 8. Animation display before using the *Augmented Reality* application (a), display after using the *Augmented Reality* application (b)

The parts of the virus or the body structure of the virus cannot be seen directly, but the pocket book that has been developed can illustrate that there are several parts of the virus or the structure of the body of the virus that are abstract and cannot be seen, and by using the augmented reality (AR) application we can observe the parts of the virus or the structure of the virus's body. The 3D animation can be seen in Figure 9

Figure 9. Parts of Bacteriophage Viruses

3D animation for virus reproduction can be seen in Figure 10.

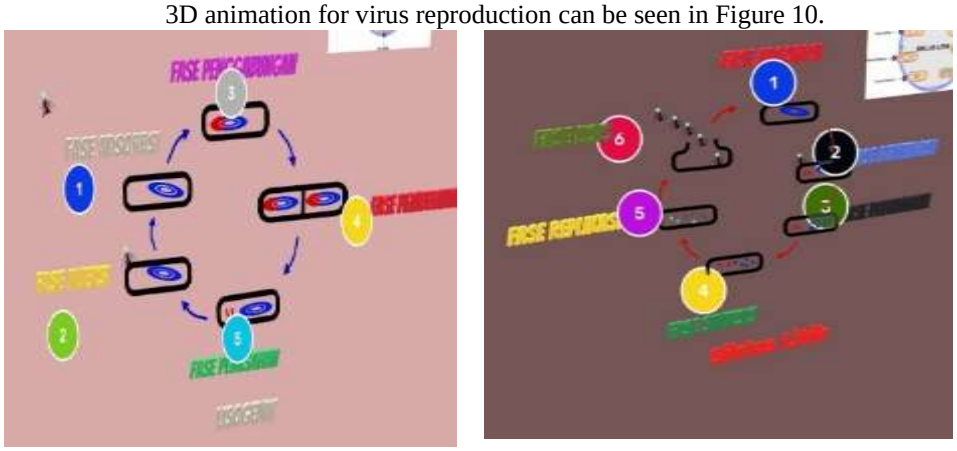

Figure 10. Virus Reproduction (a) Lysogenic (b) Lytic

Reproduction in viruses consists of two cycles where each cycle has different structures, parts and functions. Furthermore, the structure of the virus, the various structures of this virus are illustrated in several 3D animations in the pocket book that was developed. 3D animation of each organ can be seen in Figure 11. Reproduction in viruses consists of two cycles where each cycle has different structures, parts and functions. Furthermore, the structure of the virus, the various structures of this virus are illustrated in several 3D animations in the pocket book that was developed. 3D animation of each organ can be seen in Figure 11.

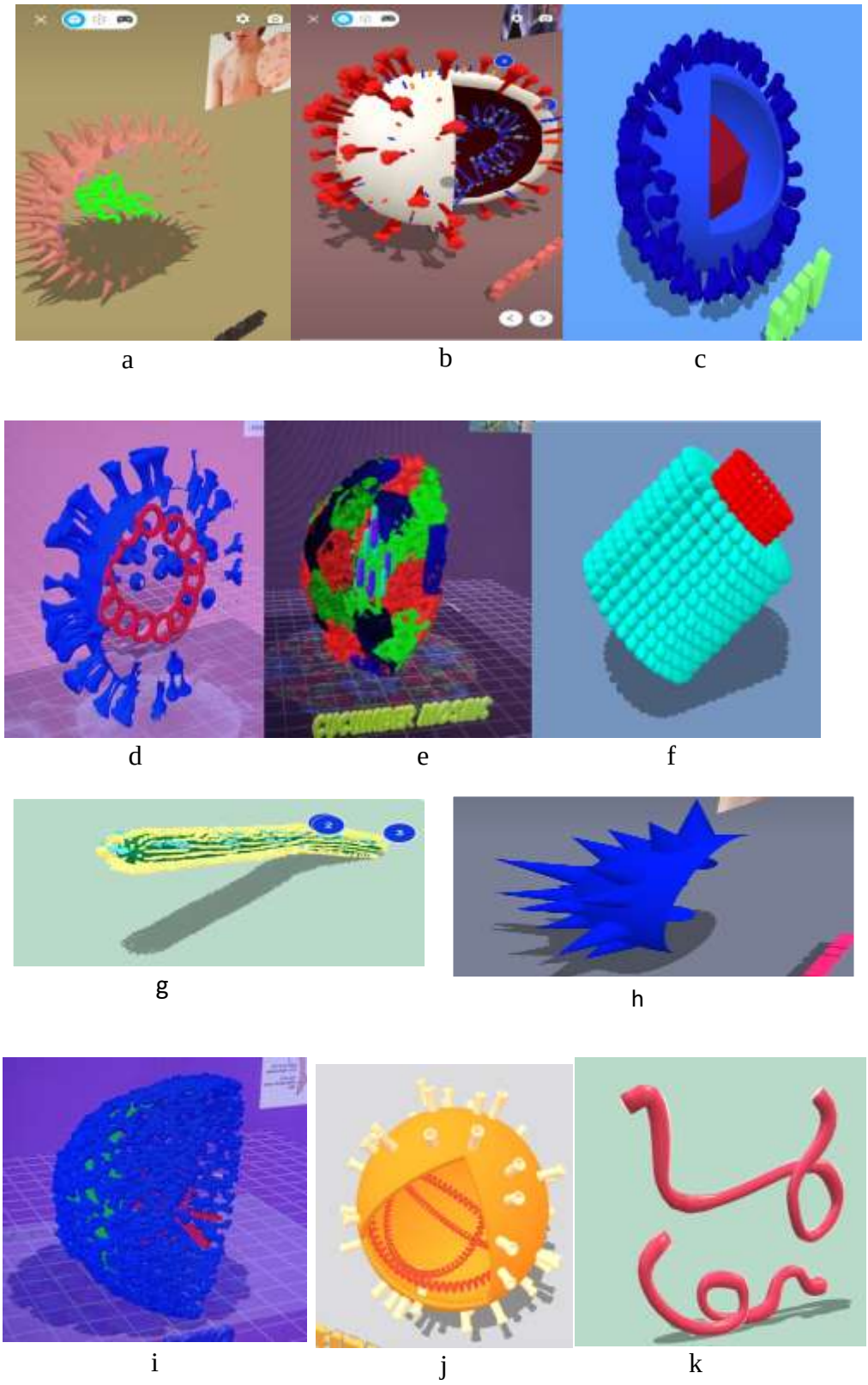

Figure 11. Virus structure (a) Smallpox (b) Sars (c) Hiv (d) Influenza (e) Curcumber Mosaic (f) Tobacco Mosaic (g) Rabies (h) Hepes (i) Polio (j) Hepatitis (k) Ebola

The 3D augmented reality animation that can be observed in the pocket book as a result of the development is an innovation that differentiates this pocket book from ordinary pocket books. previously. This innovation is carried out to increase students' attractiveness or interest in participating in learning, so that learning becomes more enjoyable (Hafzah, 2020). According to Yapici (2021), augmented reality received a positive response from teachers where the lesson content became interesting. Apart from that, 3D animation can increase insight and make it easier for students to find concepts and understand the concepts being studied (Azmah, 2020). Using digital learning media can increase student interest and learning outcomes (Nuur, 2020).

Conclusion

The result of this research is a design for developing a pocket book based on augmented reality (AR) using a discovery learning model on virus material. Pocket book integrated with 3D biological objects. So students can see small biological objects directly through virus example technology. It is hoped that this research can be developed and tested further to create teaching media that is integrated with 3D augmented reality objects.

Confession

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