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The Use Of Augmented Reality (Ar) Media To Enhance Student Motivation Learning

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Abstract

This study aims to increase student learning motivation using Augmented Reality (AR) media in the context of science learning. The research method used was collaborative classroom action research with research subjects consisting of XI MIPA 1 students at SMA Negeri 9 Bogor City. This study used learning motivation questionnaires as a measuring tool, with indicators that included confidence in self-ability, learning strategies that activate students, the meaning of science learning, achievement, and learning environment stimuli. Augmented Reality media was developed using the Halo AR application and applied to learning plant tissue structure and function material (KD 3.3 and 4.3) and animal tissue structure and function (KD 3.4 and 4.4). The results showed that the application of AR media in learning has succeeded in increasing the average learning motivation of students by 0.6 points, which increased from 2.41 to 3.01 in the 2nd action cycle. Based on the results of this collaborative classroom action research, it can be concluded that the use of Augmented Reality media is effective in increasing the learning motivation of students in class XI MIPA 1 at SMA Negeri 9 Kota Bogor. These results make an important contribution to developing innovative and more engaging learning strategies and can lay the foundation for developing broader technology-based education in the future.

Keywords: *augmented reality* (ar), classroom action research, learning motivation

INTRODUCTION

The influence of technological developments and the acceleration of information in the 21st century that is so fast has resulted in changes in all aspects of life including education. The significant increase in knowledge has an impact on the individual's need to acquire increasingly complex knowledge and skills. So the development of the 21st century oriented to information technology needs to be used to support and enrich the world of education. In this context, educational technology can be interpreted as a complex and integrated process that involves individuals, methods, concepts, tools, and organisational structures to analyse complex situations, find solutions to problems, implement actions, evaluate results, and manage those solutions by paying attention to all aspects of human learning, especially learners.

In addition, the current curriculum is considered less able to answer the expectations of today's students called the digital generation or Generation Z. The learners of the 21st century, the so-called digital society that is different from previous generations because of the hallmarks of 21st-century learners is the desire to access information very quickly, access games rather than subject matter, visual elements and graphics rather than long texts, have parallel cognitive structures, and be able to do more than one job simultaneously (Omurtak et al., 2022). Therefore, teachers as professionals must continue to adapt to knowing the characteristics of the new generation and adjust the educational teaching process to teaching methods that suit their characteristics or at least adjustments in the

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paradigm of learning strategies, approaches, and technologies in accommodating 21st-century learners.

In line with the rapid development of technology, it causes many innovations in teaching and learning methods, one of which is by using *Augmented reality* (AR). According to Azuma (1997 (Yapici &; Karakoyun, 2021) AR is defined as a technology where the real world and virtual images are combined and simultaneous interaction between real and virtual objects. AR allows users to see the real world with virtual objects superimposed or combined. According to Azuma (1997), there are three features in scenes produced with AR. Reality and virtuality coexist in this scene; Images are real-time and interactive, and scenes are viewed in three dimensions (Yapici &; Karakoyun, 2021). The Development of *Augmented reality* (AR) in the field of education has changed the conventional classroom environment. This innovative approach provides a three-dimensional visualisation of learning content that increases student interest, especially for abstract materials such as biology (Junaini, 2020).

In Biology there are various complex phenomena involving concrete, abstract, spatial planning, systemic and temporal understanding to represent objects in two dimensions or three dimensions. In addition, biological phenomena require observation at a certain time, so teaching in biology requires external visualization. It is often seen by students that biology is a difficult material to understand. Thus causing a lack of motivation for students to study biology. As reported by Gibbens (2019) The motivation of students in biology has decreased due to the lack of stimulus carried out in class. In fact, like cognitive factors, affective factors also play an important role in student learning achievement, motivation which is one of the affective factors, which plays an important role in the learning process so that students have high motivation to participate more in learning (Omurtak et al., 2022).

The structure and function of plant and animal tissues is one of the materials in biology subjects in which there are congressional and abstract concepts. This concrete concept is a concept that didi participants can observe in real terms with five senses such as muscle tissue in animals and parenchyma tissue in plants. Abstract concepts in the structure and function of plant and animal tissues include concepts that are difficult to observe directly with sensory observations so they require the help of tools such as microscopes and visualization of the functions of each constituent part. So it takes strategies and teacher skills to explain this material.

Based on these problems, there are opportunities for researchers to develop interactive and interesting learning media that are expected to increase student motivation in the structure and function of animal and plant tissues. For this reason, the purpose of this study is to examine the use of *augmented reality* media to increase student learning motivation on the structure and function of animal and plant tissues. Research will be carried out by utilizing *augmented reality* to encourage student motivation in learning biology.

RESEARCH METHODS

The type of research carried out is Collaborative Classroom Action Research (PTK-K) based on lesson study through the stages of Plan, Do, and Reflection (*See*) which are all carried out collaboratively. In the planning stage of both Cycle I and Cycle II, researchers compile learning tools which include: the preparation of lesson plans, preparation of learning media developed with the help of the Halo AR application, compiling worksheets, and compiling student learning motivation

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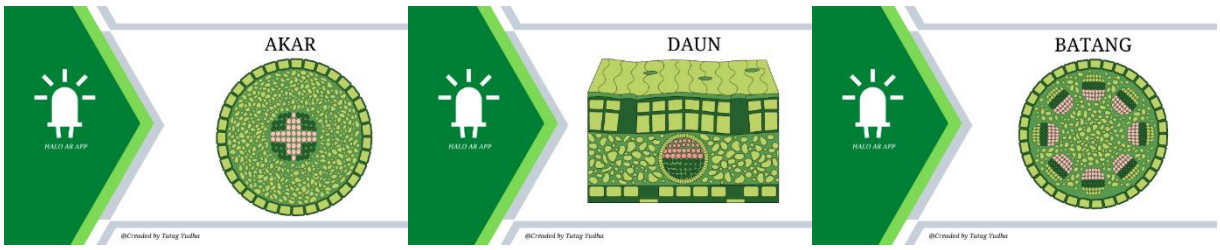
instruments. In the implementation of PTK in the "Do" stage in the lesson study format, researchers will carry out learning in the classroom by pre-prepared planning by applying the Discovery learning model. Finally, the reflection stage, or "See, is carried out at the end of each learning cycle, both Cycle I and Cycle II. This reflection involves collaboration between Researchers, Teachers, and Field Assistance Lecturers. The purpose of this reflection stage is to present information and data that have been collected by observers regarding student activities and participation, as well as actions taken by the Model Teacher during the learning process in a cycle.

The research was carried out at SMA Negeri 9 Kota Bogor, with the subject of the study being 30 students of grade XI MIPA 1. The research was carried out for two and three months, namely in July 2023 the stage of preparing proposals and research instruments, and in August 2023 the stage of collecting cycle 1 and cycle 2 data. In September 2023, the stage of preparing a research report. The data collection stage was carried out in 6 face-to-face meetings equivalent to 12 hours of lessons (JP) (1 JP = 45 minutes).

The research was carried out in 2 cycles, cycle 1 by carrying out learning on the structure and function of plant tissues, and cycle 2 on the structure and function of animal tissues. Both cycles are carried out using augmented reality media developed with the help of the Halo AR application.

Action Stage Cycle 1

In the action stage of cycle 1, they have carried out 150 minutes (3 X 2 JP) offline in class. Learning activities are carried out using discovery learning instruction. Students are directed to build concepts using learning media that have been provided by the teacher with the help of the Halo AR application. The learning activities carried out are exploring the concept of the structure and function of plant tissue. Students are given markers that can be scanned with the Halo AR application. Students are also guided by LKPD which contains guiding questions in exporting material. Here is the Augmented reality marker in Figure 1.



Picture 1. Marker Augmented Reality on plant tissue material

Action Stage Cycle 2

The action stage of cycle 2 is carried out for 150 minutes (3 X 2JP) conducted offline. Learning activities are carried out using discovery learning syntax on the structure and function of animal tissue. The material was developed with the help of the Halo AR application. Learning activities are also guided with the help of LKPD containing guiding questions for students to find concepts on Augmented Reality given. Here are the markers of Augmented Reality in the material structure and function of animal tissue in Figure 2.

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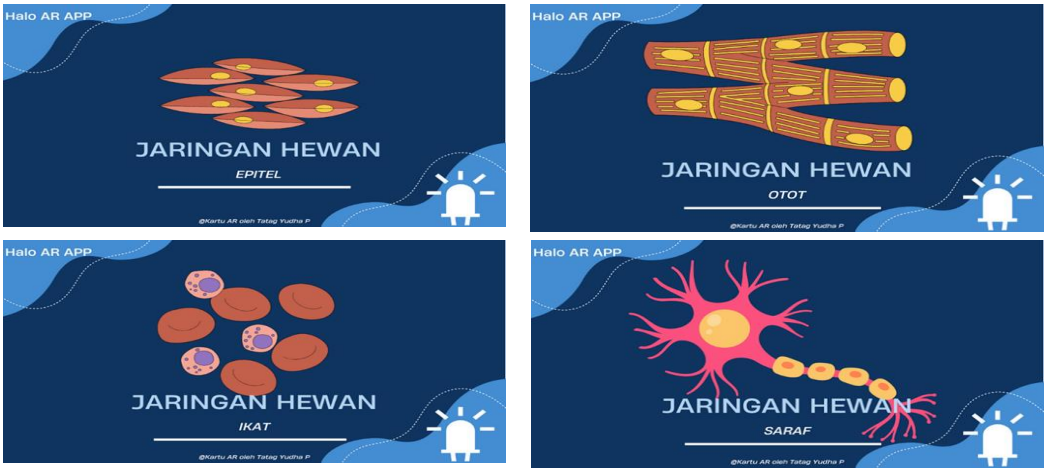

Picture 2. Marker Augmented Reality on animal tissue material

The instruments used in this study consist of learning motivation instruments developed by Salsabila, (2019) and refer to indicators Tuan et al., (2005) with indicators of self-efficacy, active learning strategies, science learning value, achievement goals, performance goals, and learning environment stimulation. A total of 30 statements with a Likert scale of 1-4 were used in the study. The data of the results of class actions are analyzed in a quantitative descriptive manner by describing the data obtained while taking into account the success indicators that have been set. Quantitative descriptive techniques are implemented without making conclusions of a general nature (Sugiyono, 2016).

Action success criteria refer to the research objective of increasing learning motivation based on instruments that have been developed in cycle 2 compared to the first cycle.

RESULTS AND DISCUSSION

Research Results

The study was conducted in two cycles by applying media Augmented Reality as a medium for delivering material. Before conducting the research, researchers first observed the problems that occurred in class XI MIPA 1. From observation by entering directly into the classroom and asking the teacher of biology subjects, it was found that the motivation to learn class XI MIPA 1 was not good. In the first cycle of learning, learning is carried out on the structure and function of plant tissue KD 3.3 and 4.3 of the 2013 curriculum. The delivery of material is carried out with the help of the media Augmented Reality developed by researchers using the Halo AR application. The second cycle was carried out on the structure and function of animal tissue KD 3.4 and 4.4 using similar media to help motivate students. Finally, at the end of each cycle, the measurement of student motivation was carried out by adapting from the instrument developed by Salsabila, (2019) regarding Tuan et al.,

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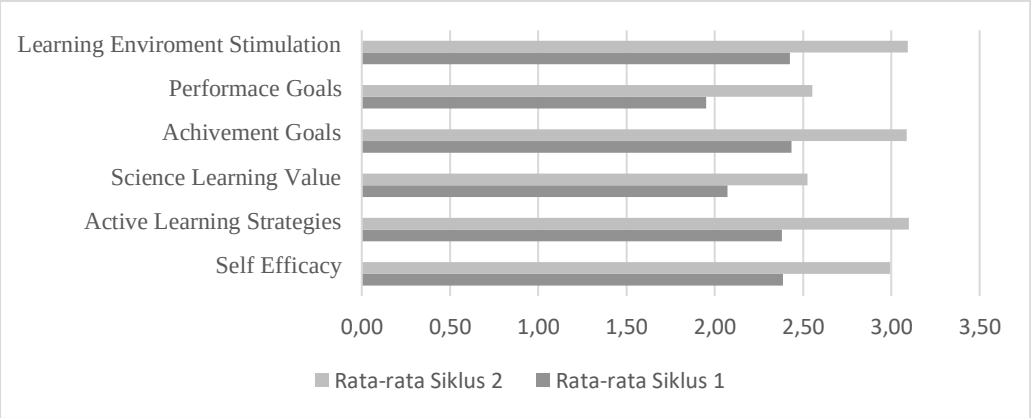
(2005). Furthermore, the results of the implementation of collaborative class action research are presented in Figure 1.



Picture 3. Average scores of learners' learning motivation on two cycles

From the measurement of student learning motivation, it was found that the average score of student learning motivation was 2.41. The standard deviation found in the study was 0.7. From this standard deviation, it can be seen that the data is homogeneous with a fairly small difference. This indicates that the condition of student learning motivation is equal.

Based on the results of each aspect of student learning motivation in chart 4.1, it can be seen that learning environment stimulation, achievement goals, active learning strategy and self-efficacy are the aspects with the highest scores. In contrast, the lowest motivation aspect, namely performance goals and science learning value is the lowest aspect.

From the results of learning motivation in the second cycle after learning with augmented reality on animal tissue material, it was found that the average score obtained was 3.01. The standard deviation obtained from the calculation of learning motivation results is 0.6. This indicates that the data obtained from the results of student learning motivation tends to be uniform.

When viewed from each aspect of learning motivation, it is found in chart 4.1 that the learning environment stimulation, achievement goals, and active learning strategy become a fairly high increase. However, when viewed as a whole, there is an increase in student motivation obtained in cycle 2 of learning.

Research Discussion

Discussion of research on media use of Augmented reality (AR) to increase student learning motivation is discussed through the research instrument used, namely student learning motivation questionnaire sheets equipped with anecdotal notes when learning is carried out. The term Augmented Reality refers to technology that enhances a user's sensory perception of the real world with digitally aided contextual information (Serio et al., 2013). The motivation of students in this study adapts from learning motivation indicators developed by Tuan et al., (2005) with 6 indicators, namely Self Efficacy, Active Learning Strategies, Science Learning Value, Achievement Goals, Performance Goals and Learning Environment Stimulation. Overall motivation of learning students after being given the act of providing media Augmented reality improvement on all indicators. These results are

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in line with research conducted by (Carolina, 2022) that learning using *Augmented reality* can make improvements to learners' learning motivation.

This section will explain to what extent the use of *augmented reality* learning media contributes to increasing student learning motivation, especially in the structure and function of plant tissues and animal tissues. Further in this section, the advantages and disadvantages of using augmented reality media in the learning carried out will be explained.

A comparison of the score calculation of each learning motivation indicator in cycle 1 and cycle 2 can be seen in Figure 1. Based on these figures, it can be seen that during the implementation of cycle 1, students have an average learning motivation of 2.41 (Scale 4). This value shows that students already have learning motivation but not yet maximized and not comprehensive in all students of grade X Mipa 1 Although it is quite good, these results have not achieved maximum results as expected by researchers. Therefore, the next cycle was carried out with the same research steps on different materials and obtained better results, namely an average of 3.01 (Scale 4).

Increased student motivation due to the act of providing media Augmented reality occurs because students become easier to understand abstract learning material (Fatha &; Sujatmiko, 2020) or microscopic in the material structure of the model of an object (Mustaqin, 2016) that there is no confusion in students. The ease of students in understanding learning material will increase student learning motivation. According to the findings (Fatha &; Sujatmiko, 2020) learning with Augmented reality has many benefits such as stimulating learners to process, critical thinking, improving the quality of learning, and learner learning motivation.

Meanwhile, based on the results of the difference in collaborative classroom action research, it can be seen that the highest increase occurs in learning strategies that activate students. This is thought to be due to the use of media Augmented Reality Able to attract the attention of students by inviting students to actively learn. According to Serio et al., (2013), Motivation influences what, when, and how of learning, and increases the likelihood of engaging in activities that will help learners to learn and achieve better performance. Thus, learning strategies that relate to students' interests and allow them to take an active part in teaching can increase engagement, effort, and success in the end. It is closely related to the concept that motivation plays an important role in the learning process. By providing learning experiences that are interactive, engaging, and relevant to the real world, Augmented Reality stimulates students' interest in learning actively.

Learning motivation is an important element needed for quality education. Hadre et al. in Filgona et al., (2020) Revealed that motivation is one of the most powerful determinants of the success or failure of learners in school. In the realm of learning, spurring student motivation to engage in academic activities is part of the teacher's teaching and learning strategy if teachers want to see consistent and quality results. In addition, it is also necessary to use strategies such as using local content, teaching with hot news, using technology) to teach, or connect subjects with student culture (Syamsuddin, 2021).

In an AR environment, students can visually explore plant and animal tissues, undergo virtual experiments, and relate those concepts to practical situations. This not only increases student engagement but also helps learners understand and remember the material better. AR helps concretize the subjects taught and abstract concepts, facilitates learning, makes lessons entertaining, increases participation in lessons, and provides opportunities to repeat subjects. In addition, many studies show

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that this approach to learning can answer the needs and demands of students in the 21st century and provide innovative solutions to existing pedagogical problems (Labib et al., 2021).

However, based on the results of the study it was also obtained that the use of media Augmented Reality Against learning motivation in the sub-indicator of the meaning of science learning, students experienced the lowest increase. This is allegedly because students do not see a direct relationship between the use of AR technology and learning broader science concepts, so the meaning of learning obtained feels less felt. Vargas et al., (2020) reveal that Augmented Reality still has shortcomings, especially the limitations of image recognition, capturing power and interaction with students to better understand in depth the material presented.

CONCLUSION

Based on classroom action research that has been carried out, it can be concluded that the average score of student learning motivation has increased in action cycle 2. Data on the average value of learning motivation increased by 0.6 points, from 2.41 to 3.01 (on a scale of 4). The use of *Augmented reality* (AR) media can be an action that teachers can take to increase student motivation on various motivational indicators, including confidence in self-ability, learning strategies that activate students, the meaning of science learning, achievement, performance achievement, and learning environment stimuli. Although the use of *augmented reality* media has many benefits in increasing learning motivation, there are also drawbacks, especially in increasing student motivation related to the meaning of science learning. This is due to the lack of a clear linkage between AR technology and learning broader science concepts.

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