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THE EFFECTIVENESS OF STATIC ELECTRIC VIRTUAL REALITY PANDEMIC LEARNING MEDIA TO INCREASE STUDENT LEARNING MOTIVATION

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ABSTRACT

Conceptual physics learning in the pandemic era has an impact on students' low motivation to learn. This study aims to determine the effectiveness of learning physics using virtual reality media to increase student motivation in class XII MAN 1 Indragiri Hulu on static electricity. The research was conducted in a quasi-experimental design study in the form of a nonequivalent control group. Gave The ARCS learning motivation questionnaire before and after treatment was given to 60 students as respondents, were given the experimental class was given treatment by applying virtual reality media. Based on the results of the learning motivation questionnaire's data analysis, the average score of all indicators on the pretest and posttest was obtained, Gain = 0.76 in the high category. Thus the virtual reality media that has been applied has been declared effective for learning physics on other materials.

Keywords: Effectiveness, Learning media, Pandemic era lessons, Static electricity, Virtual Reality

A. INTRODUCTION

Physics learning is an interaction between students and teachers or learning resources used in educational situations in studying natural phenomena and phenomena empirically, logically, systematically and rationally through a series of scientific products, scientific processes, and scientific attitudes(Mikrajudin, 2013). Physics learning indeed consists of many concepts and principles that are generally very abstract, such as static electricity. Many students face difficulties interpreting various concepts and principles of physics due to decreased motivation to learn physics. Student motivation in learning plays an essential role in supporting the learning process to achieve the goal of achieving learning outcomes (Ghergulescu & Hava Muntean, 2010). Qu et al. (2005) said that educators must have the ability to detect the state of student learning motivation.

The use of learning media in the teaching and learning process can generate new desires and interests, generate motivation, stimulate learning activities, and even provide psychological effects for students. (Liliana et al., 2020). Aliyu & Talib (2019) Media by utilizing information and communication technology in the era of the industrial revolution 4.0 is a good factor in the success of a learning process. Entering the era of information and communication technology today, the need and importance for improving and improving the quality of learning are felt.

So that educational learning application media can continue to be developed, one of which is Virtual Reality (AR) technology. The advantage of this Virtual Reality method is an attractive visual appearance because it can display 3D objects as if they were in a natural environment. In addition, the application of the concepts to be used is expected to increase students' reasoning power and imagination power (Nasharuddin et al., 2021).

This research is essential to find out the effectiveness of using static electricity virtual reality learning media in increasing students' learning motivation.

B. LITERATURE REVIEW

Virtual Reality

Virtual Reality is a technology that allows a person to simulate a real object using a computer that can evoke a 3-dimensional atmosphere to make the user feel as if he is physically involved. (Aliyu & Talib, 2019). An earlier virtual reality technology was the Aspen Cinema Map, created by MIT in 1977. The program was a rough simulation of the city of Aspen in Colorado, where users could wander in one of three styles: summer, winter, and polygon.

Virtual reality environments generally provide a visual experience displayed on a computer screen or via a stereoscopic viewer. Still, some simulations include additional sensory information, such as sound through speakers or headphones.

Examples of virtual reality applications used today are in the military field. Virtual reality is used to simulate war drills, parachuting training simulations. Etc. Wherewith the use of this technology can save costs and time compared to conventional methods. Another example is a pilot who uses virtual reality to simulate a flight before making an actual flight. Actual impressions in virtual reality can be created using several types of equipment, such as gloves, walkers, and headsets. Through the headset, glove, and walker, all user movements are monitored by a system that will give an appropriate reaction. The user feels as if he is in an actual situation, both physically and psychologically.

In recent years, the use of VR in science education has become increasingly widespread in the world of education, such as physics (Georgiou et al., 2020; Aleotti & Caselli, 2011; Budi et al., 2021), biology (Nasharuddin et al., 2021), and chemistry (Edwards et al., 2019).

VR technology has recently begun to attract the attention of several researchers in teaching physics subjects as part of science. As an example, Boettcher & Behr (2021) developed an interactive application that supports VR software for teaching fluid mechanics. Their research results show that it can improve student learning outcomes. Research by

Mengoni et al. (2011) developing learning media on mechanics can improve students' attitudes, motivation, and attention. Also, Hoffman et al. (2003) investigated the potential of VR to improve student attitudes in secondary schools. They make VR applications related to electromagnetic subjects in physics courses.

C. METHODOLOGY

This research was conducted at MAN 1 Indragiri Hulu class 12. The research design used in this study was pre-experimental in the form of one group pre-test-post-test design. According to Suyitno (2020) this research design includes three steps, namely the implementation of a pre-test to measure the dependent variable (O1); implementation of treatment or experiment (X); and implementation of post-test to measure the outcome or impact on the dependent variable (02).

Figure 1. Research Design *One group pre-test-post-test design*

The data collection instrument in this study used a learning motivation questionnaire with the ARCS motivation model(Keller, 2016). Student learning motivation in ARCS consists of 4 indicators, namely Attention, Relevance, Confidence, Satisfaction.

The questionnaire was valid and provided by the researcher. Furthermore, the statement items were modified by identifying the statement items of students' learning motivation instruments in learning by applying Static Electric Virtual Reality learning media with components that can be seen in Table 1.

Table 1. Identification of Student Learning Motivation Items

No	Indicator	Statement Item Number	Amount
1	Confidence	1 2 7 11 16 24	6
2	Attention	5 6 9 12 14 15 19 20	8
3	Relevance	4 10 17 21	4
4	Satisfaction	3 8 13 18 22 23 25	7
number of statements			25

Initial motivation data was taken by distributing questionnaires to research subjects before treatment, while the final motivation was taken by distributing questionnaires after treatment. In filling out the questionnaire individually in the classroom, students may not ask or pay attention to other friends regarding the answers to the questionnaire.

Descriptive statistics processed the data in this study. Before the data was analyzed, the statements in the questionnaire were categorized into two types, namely positive and negative. The provision of learning motivation scores is arranged based on a Likert scale arranged as Table 2.

Table 2. Category of Student Learning Motivation

Average Motivation Score	Category
1,0 - < 1,75	Very Low (SR)
≥ 1,75 - < 2,5	Low (R)
≥ 2,5 - < 3,25	High (T)
≥ 3,25 - 4,0	Very High (ST)

D. RESULTS

This study has gone through the stages of research that have been carried out by previous researchers, namely providing an initial questionnaire to see the initial motivation data (pretest), giving treatment (treatment) in the experimental class with the application of learning media. From the results of the study, students' motivation scores are shown in Table 3.

Table 3. Learning Motivation of Class 12 MIPA 1 MAN 1 Indragiri Hulu

No	Indicator	Initial Motivation		Final Motivation		Gain
		Score	Category	Score	Category	
1	Confidence	2,43	Low	3,29	Very High	0,86
2	Attention	2,52	High	3,27	Very High	0,75
3	Relevance	2,42	Low	3,23	High	0,81
4	Satisfaction	2,44	Low	3,29	Very High	0,85
Average score		2,45	Low	3,27	Very High	0,82

Based on Table 3. the learning motivation of grade 12 MIPA 1 students with the application of VR media on the subject matter of static electricity has an average value of very high category and has increased by 0.82. Judging from each indicator, the learning motivation of grade 12 MIPA 1 students has increased in different categories. Changes in students' learning motivation in grade 12 Mathematics and Natural Sciences 1, which are high, are indicators of attention and satisfaction with applying static electricity Virtual Reality media. Changes in student learning motivation can be seen in Figure 2

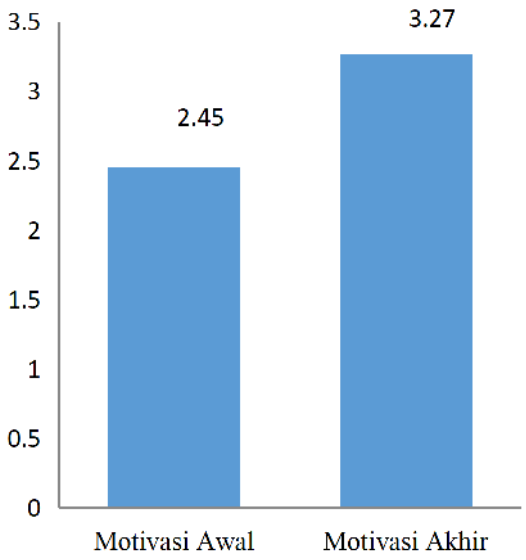

Figure 2. Changes in Class Students' Learning Motivation 12 MIPA 1 MAN 1 Indragiri Hulu

Figure 2 shows that the experimental class's initial and final learning motivation scores have increased, where the change in the motivation index in the experimental class is the early learning motivation score (X1) = 2.45 and the final learning motivation score (X2) = 3.27. From these data, it can be seen that X1 > X2, with an increasing category. At the same time, the percentage of changes in student learning motivation has increased by 33%.

Based on descriptive analysis, the results obtained from students' learning motivation scores are based on indicators. Each indicator shows a change in the average value of motivation by applying Virtual Reality media to the subject matter of static electricity. The results of data analysis about the increase in each indicator of learning motivation can be seen in Figure 3.

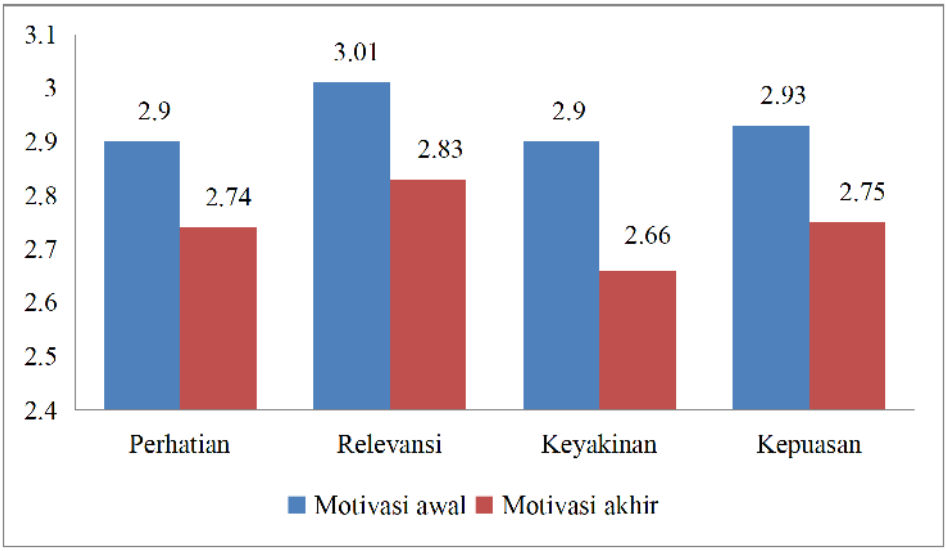

Figure 3. Changes in Student Motivation Indicators

Attention and motivation are closely related. To foster an interest in students takes motivation. A student will study hard when he feels the need, trying to achieve what he needs—the more substantial the motivation to be achieved, the stronger the effort that will be done.

Students' learning motivation on the attention indicator has the most significant increase in score compared to other indicators. Learning using Virtual Reality media can arouse students' attention. It is by the opinion of Shin et al. (2019) , which says there are three types of strategies to attract and retain students' attention during learning: Generating students' perceptual power, Cultivating a desire to research, and Using various learning elements.

From the research results obtained, for the relevance indicator, the initial motivation score is 2.52, while the final motivation score is 3.27. This score experienced an increase in motivation of 0.75.

In students with learning, it can be done by using examples, concepts that are related or related to the experiences and values of students' lives. When VR is applied, students can relate events that occur from various demonstrations presented to everyday life. It is what was stated by Liliana et al. (2020). There are many ways to arouse students' attention; one is with pictures or through demonstrations. It is in line with Istiningsih et al.

(2018) that picture media or demonstration media are very suitable for learning because they can make lessons more fun and minimise learning difficulties. Using visual media, one of which is an image, will attract students' attention more because students get new experiences that have never been obtained before.

From the research results obtained, for the confidence indicator, the initial motivation score is 2.42, while the final motivation score is 3.23. This score experienced an increase in motivation of 0.81.

Learning using VR media can foster student confidence during the learning process. Giving pictures that create puzzles that will make students motivated at the beginning of the learning process can be one of the prerequisites in learning. These prerequisites will indirectly make students confident and confident in participating in the learning process.

From the research results obtained, for the satisfaction indicator, the initial motivation score is 2.44, while the final motivation score is 3.29. This score experienced an increase in motivation of 0.85.

The element of satisfaction in learning is one of the factors that the teacher must consider. Students will be more motivated to learn if they are satisfied with the material taught at school.

Providing opportunities for students to participate in this learning can also grow or increase students' self-confidence and ultimately create a sense of satisfaction in students because they feel involved in the learning process (Shin et al., 2019).

Descriptively, students' motivation to learn Science Physics in class 12 MIPA 1 MAN 1 Indragiri Hulu has increased in every indicator, both for indicators of attention, relevance, confidence and satisfaction indicators. It shows that learning by applying VR media to the subject matter of Static Electricity can make students more motivated in learning.

E. CONCLUSIONS

Based on the study results, it can be concluded that learning science physics using VR media can increase students' learning motivation in class 12 Mathematics and Natural Sciences 1 MAN 1 Indragiri Hulu. It is hoped that learning using virtual reality media can be a reference for teaching and learning activities in schools to motivate students to learn more.

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