

Application of VLAB-Based STEM in The Direct Circuit Electricity Section

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Abstract. Our research aims to determine the results of student responses after applying VLAB-based STEM learning in the direct current electric circuit section. This study uses a qualitative method. Sampling using a purposive sampling technique. The sample consisted of 13 students of mechanical engineering study program at Universitas Majalengka. The sample consisted of 13 students of mechanical engineering study program at Universitas Majalengka.. Data collection techniques using student questionnaire responses. The results of the questionnaire were analyzed descriptively. Most students respond like VLAB-based STEM, the stages of learning provide learning experiences for students so students are motivated in learning.

1. Introduction

The condition of the Basic Physics laboratory in the Faculty of Engineering , Majalengka University , the practicum tools was partially damaged and not suitable for use , so that some of the physics material was not practiced . This has an impact on student interest in learning . The results of the questionnaire in the preliminary study of students that took the basic physics lecture concluded that students ' interest in basic physics courses was very low [1].

Researchers have a solution to apply STEM-based VLAB to overcome the lack of student interest in basic physics courses . This research is based on previous research conducted by previous researchers . This research is an advanced study or developed from previous research conducted by Jannati on the Development of Virtual Laboratory Learning Media to improve the science of literacy skills of mechanical engineering students on the basic physical concepts of material measurement [2]. In this study , it was developed with STEM based learning and developed in the direct current electricity section . STEM education is a top priority to solving global problems and problems facing the world today [3] . Because the importance of future STEMs as expressed by future studies aimed at raising awareness of STEM can be given a reflection of the curriculum installed in practice in the classroom [4].

Student responses to learning media were developed to support independent learning which showed an average score of 3.23 on the Likert scale meaning very good [5] . Virtual laboratories can improve the competency of vocational school students in terms of cognitive (mind-on) , and psychomotor [6]. With VLAB media readability assessment if $\geq 50\%$, It can be stated that the user or reader can understand the contents of the reading easily [2]. One of the concepts in the Basic Physics II course of



tertiary institutions is electricity . The concept of electricity is closely related to the daily lives of students and they are often used in daily life or in certain activities . Students often face problems of electricity so that the basis of learning can be raised [7].

This time the researcher will examine more deeply in the direct current electricity section . STEM-based virtual laboratory learning media on direct current electric material that is applied for this study is the media that has been tested for eligibility . The test was conducted by 2 content experts and 1 multimedia expert.

The following is a STEM-based VLAB **figure 1**.



Figure 1. Virtual laboratory display

Figure 1 above is the initial display of a STEM-based virtual laboratory. can be seen there are several important points, namely: instructions for use, material, virtual practicum, video and evaluation.

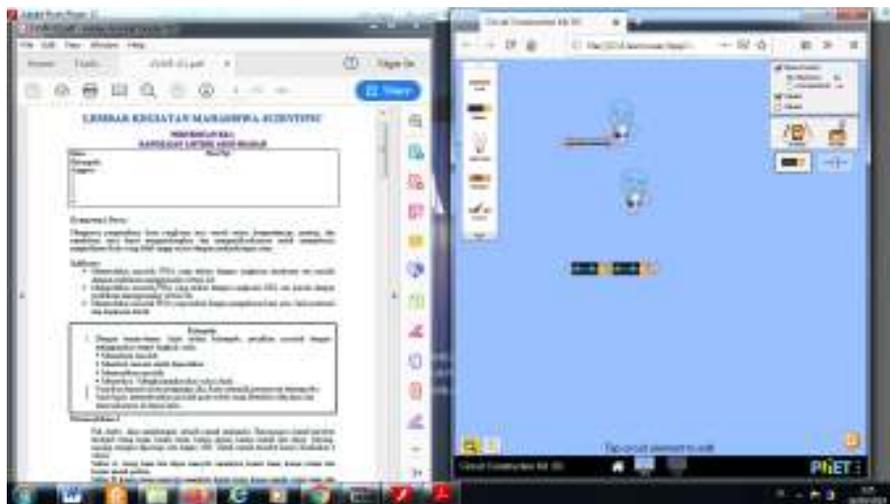


Figure 2. Display lab work in a virtual laboratory

2. Methods

This study uses a qualitative method . Sampling using a purposive sampling technique . The sample consisted of 13 students of mechanical engineering study program at Majalengka University . The sample consisted of 13 students of mechanical engineering study program at Majalengka University . Data collection techniques using student questionnaire responses . The results of the questionnaire were analyzed descriptively . The questionnaire was given to students aiming to determine student responses [8] , questionnaire sheets attracting student responses to STEM-based virtual laboratory learning media . Data analysis techniques used in quantitative descriptive research to process data onto the form of scores of the assessment of student responses .

To measure student responses from the application of learning to use STEM-based VLAB that they have implemented , researchers provide a student response questionnaire .

$$\text{Percentage of each choice } \frac{A}{B} \times 100 \dots\dots\dots(1)$$

Note : A = the number of students that answer a " yes or no " choice , B = the number of students that responded .

3. Result and Discussions

The following are the results of the measurement of students' responses to STL-based VLAB learning media with direct current electric material.

Table1. Results of analysis of students response data

No	Student Response	Hasil			
		Yes		Not	
		Σ	%	Σ	%
1.	Do you agree if in learning to apply STEM-based virtual laboratory media?	13	100		
2.	Would you be more happy if Physics learning applied STEM-based virtual laboratory media?	13	100		
3.	Is the application of STEM-based virtual laboratory media useful for you in learning Physics material?	13	100		
4.	Does learning physics using STEM-based virtual laboratory media appeal to you?	13	100		
5.	By applying STEM-based virtual laboratory media to help me understand Physics more easily?	13	100		
6.	Are you motivated to study Physics by using STEM-based virtual laboratory media?	13	100		
7.	By implementing STEM-based virtual laboratory media, you don't need to meet with lecturers every day?	8	61	5	39
8.	By applying STEM-based virtual laboratory media, can you apply direct current electricity in your daily life?	13	100		
9.	Is the time-consuming STEM-based virtual laboratory media more efficient?	13	100		
10.	Are there any difficulties in understanding physics if using STEM-based virtual laboratory media?	10	77	3	33

From the results of the analysis of student response data onto, it can be said to be positive about learning by using STL-based VLAB media on direct current electric material, because the percentage of student answers on each aspect of the question is $\geq 65\%$. Thus, learning by using STEM-based VLAB media is categorized to help students to understand direct current electric material. One of the attractiveness of students to VLAB, they are helped by the quality of illustrations, [2] images and animations . By learning to use STL-based VLAB media, students can be more eager to learn Physics. Thus the ability of other students will increase as well, such as scientific literacy, the effectiveness of learning to use STEM-based virtual labs is seen from the increase in students 'scientific literacy, meaning that virtual labs can be said to be effectively used in learning when an increase in students ' scientific literacy[9]. However, even though STEM-based VLAB media has helped students to be more enthusiastic about learning Physics, students also still need a lecturer in each learning process. The role of lecturers is very important to the learning process. Especially in the engineering process, students still have to be monitored by lecturers so that the research process minimizes errors.

4. Conclusion

From the results of the application of STEM-based virtual laboratories , it can be concluded that after learning by using STEM-based virtual laboratory media attracts students ' responses to basic physics courses .Virtual laboratory learning media developed on Fluid Mechanics material have fulfilled the requirements suitable for use in learning.

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