



## PHET LEARNING MEDIA ON SCIENCE LEARNING OUTCOMES MATERIAL ELECTRICAL CIRCUITS IN MADRASAH IBTIDAIYAH

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### ARTICLE INFO

### ABSTRACT

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*The results of interviews with teachers of class VIA stated that students of class VIA found it challenging to learn simple electrical circuit material because the media used in the science learning process only used mind-media mapping. The purpose of this study was to determine the effect of PhET (Physics Education Technology) learning media on science learning outcomes for students in class VI-A of simple electrical circuits at MINU Waru I. This study used quantitative research. The method used is the Pre-Experimental Design experimental method in the form of One Group Pretest - Posttest. Data collection techniques used in this study were through observation, interviews, and tests. Meanwhile, the data analysis techniques used were a normality test, homogeneity test, and non-parametric Wilcoxon signed rank test statistical test. Teach science simple electrical circuits material*

## INTRODUCTION

Learning science studies man or issues related to a better human life. In science or science education, emphasis is placed on learning directly, and activities directly to develop Skills so that Students can explore and understand science. Science education or Natural science aims to know and do so to help participants understand the natural environment. They were learning science in basically the same way as learning, which is closely related to directly how to build good relationships between teachers and students. The good relationship between teachers and students can be seen from the conditions in which teachers can make students learn with ease and motivation for learning, which needed following the curriculum which there is.

So that the learning process runs well and effectively, all parts of learning should also play the most significant role. The learning process may only occur with the support of all learning components. For example, a teacher requests a participant to learn something draft, but this is not supported by media learning, which is adequate. Matter this, of course, just makes participants educate no material lesson, which is enough to understand the concept. Thus, teachers must consider everything that needs learning, including providing room and media. Participants can also participate in delivering learning opportunities with easy access and no difficulty (Sari 2020). In the learning process, every teacher certainly has a desire so students can understand the lesson material explained easily.

The use of learning media often becomes special attention by the teacher so that the learning process can be carried out smoothly (Hanannika and Sukartono 2022). Media learning is a tool that can support process learning to clarify the material presented to achieve objectives, and learning can be performed optimally (Julaila 2019). Considering the many types of learning media, the teacher must be able to choose the material studied accordingly so that students and teachers use it appropriately (Kustandi and Darmawan 2020) is one of them use application Physics Education Technology ( PhET ) (Endrayani, Efendi, and Yamtinah 2022).

Physics Education Technology ( PhET ) is an effortless application to simulate the suitable material, complex and abstract, developed by University of Colorado. Simulation PhET is mainly carried out in physics learning, biology, And chemistry, so it helps to learn in class or study independently. PhET simulations emphasize relationships between real-world phenomena with underlying knowledge, support learning, provide feedback turning, and present a creative workspace with an interactive and approach constructivist (Haryanto 2016; Hau 2021).

Based on the experience of Edgar Dale (Dale's Cone of Experience ), media simulation PhET reached a level most concrete that 90% of participants participated actively in activity learning observation, doing tests, And concluding from data accepted. Media simulation PhET regarding Energy Forms and Changes provides visualization of shapes and change energy which there is in life daily. Through system PhET simulations, students can create, experiment, and observe to study the forms of energy and the process of changing energy forms to become forms of energy.

Using media simulation, PhET reaches maximum results if prepared with deep knowledge implementation use of the media. Following are the procedures for using

simulation media PhET described in PhET's Reflections Rubrics are: 1) Class Preparation, 2) Activity Sheet, 3) Pre and Post Assessment (Optional), 4) Topic Introduction and Motivation, 5) Sim Play Time, 6) During Sim Activities, and 7) Reflection (Pramanda and Arianto 2016). Media simulation PhET can give a more realistic learning experience by reinventing the original format with shallow risk and close to the live atmosphere (Muzana, Lubis, and Wirda 2021; Nafrianti, Supardi, and Erman 2016). According to Nurhayati et al, the results Study participants were educated on the use of the media PhET more than the results study, which used method lecture (Saputra, Susilawati, and Verawati 2020). Concerned et al, state that activity learning collaborative use media PhET simulation can push And Motivate students to do practicum capable of increasing results Study student (Subiki et al. 2022) . PhET media has several advantages, such as overcoming obstacles time, overcoming limitations source Power, and making the learning process more effective (Ardius 2019; Muzana et al. 2021) .

Based on the number of excess expected media virtual laboratories PhET can help teachers give material and practice. Learning to participants educate without existing constraints limitations facility and time. Related to matter, there is a previous study by Riko Ariyanto, et al. in 2022 in a journal entitled "Effect of Use Virtual Laboratory PhET on Elementary School Students' Science Learning Outcomes in Principal Discussion Suite Electricity Simple". Results test t showing sig.  $0.00 < 0.05$ , therefore,  $H_0$  is rejected, and  $H_1$  is accepted, so there is an influence of the use of virtual laboratories PhET on the results study participants educate IPA material simple electrical circuit. Further research by Ika Fitriyati, et al. in 2022 in a journal entitled "Online Learning Using PhET Simulations to Increase Student Activity and Learning Outcomes Ibtidaiyah Madrasah ". The results showed that the participants were active students, can increase by a percentage of 84.85%, and participant learning outcomes education also increased by 72.73%. Meanwhile, in the control class, learning outcomes Completeness was only 36.36%.7 In this research, the researcher only focused on determining the effect of implementing PhET media on science learning outcomes material Suite electricity simple class VIA in MINU Waru I.

Based on the results of interviews with class VI-A teachers, class students VI-A find it challenging to learn simple electrical circuit material because the media used in the science learning process only uses mind-media mapping. In simple electrical circuit material, required tools are shown so that participants can understand the material with maximum. From the explanation, the researcher wants to use media PhET in the science learning process with simple electrical circuits in class VIA in MINU Waru I. With formulation, the problem is as follows: 1) How to apply the PhET model in the process of learning science material Suite electricity on participant educate class VIA in MINU Waru I? 2) How to influence media PhET to results Study participant educate class VI- A in MINU Waru I? This research aims to determine the influence of PhET (Physics learning media Education Technology) against science learning results on simple electrical circuits for class VI-A students in MINU Waru I.

## METHODS

This research uses quantitative research. Quantitative research is research that requires the use of numbers, starting by collecting data, interpreting data, and displaying results. Likewise, at the end of the research, photos, tables, graphs, or others. The method used in this research is method experimental design Pre-Experimental Design in the form of One Group Pretest - Posttest (Sugiyono 2007). The procedure for this research is to measure the dependent variable, a group of subjects (pretest), subjects who were given treatment over time (exposure). A second measurement (posttest) is carried out on the variable independently and compares the results of the pretest measurements with the result posttest measurements. The Table 1 is an overview of procedure one group pretest-posttest design.

Table 1. Research Design One Group Pretest Posttest

Subject	Pre	Treat	Post
Group	O1	X	O2

Information:

O 1 : Pretest , learning before use model problem based learning

X : Treatment , Use model problem based learning

O 2 : Posttest , learning after use model problem based learning .

This research was conducted at MINU Waru I. The subjects of this research were class VI-A MINU Waru I students, with a total of 37 students. Technique Data collection used in this research was via observation, interviews, and tests. Observation is direct observation of the research object to observe the activities held closely. Observations in this research were carried out to find out the implementation of PhET media in the learning process of electrical circuit material simple science subjects in class VI-A. An interview is a data collection technique that is carried out by asking directly to respondents or informants. Data collection techniques through interviews were conducted with class VI-A teachers to discover the problem with learners on eye lesson IPA. The test consists of a series of questions that must honestly resolve respondents to measure an aspect of the respondent. Test measurement This is done with a pretest and posttest in the form of an electrical circuit material simple. The test instrument used is in the form of multiple-choice questions and ten questions. Meanwhile, the data analysis technique used is the dependent t-test, which is preceded by test normality and homogeneity test. If the data is not normal, then next, with non-parametric statistical tests, Wilcoxon signed rank test (Irvangi and Rahmani 2022).

## RESULTS AND DISCUSSION

This observation is used to determine the impact of the use PhET media in improving student learning outcomes at MINU Waru I, Sidoarjo. on the tree discussion of electrical circuits. Before researching, researchers carried out a series of pretest and posttest tests on child education with 10 questions with details ten

choices, and double matter. This tests whether or not students with science lessons use media PhET.

Table 2. Value Pretest and Posttest

	N	Min	Max	Sum	Mean	Std. Dev
Pre	35	40	60	1780	50,86	5,621
Post	35	70	90	2990	85,43	6,108
Valid N (listwise)	35					

Based on the table results, it is found that the minimum pretest score is 40 and the maximum posttest score is 60, while the minimum posttest score and top students are 70 and 90. Learning outcomes before and after using PhET media can be seen from the mean data in the table. To find out whether the pretest and posttest data match each other, a distributed Normality test needs to be carried out. Processing results in Table 2. Normality Test, was obtained Asymp. Sig (2-tailed) for pretest and posttest media use data PhET learning (Physics Education Technology ) is  $0.000 < 0.05$  then The data is classified as a non-normal distribution. These results explain that the value of science learning outcomes regarding electricity with media use learning PhET ( Physics Education Technology ) using pretest and posttest is not normally distributed, so further testing uses a method non-parametric form Wilcoxon Signed Rank Test.

Table 3. Test Normality

**One- Sample Kolmogorov-Smirnov Test**

		Unstandardized Residual
Negative		35
Normal Parameters <sup>a, b</sup>	Mean	,0000000
	Std . Deviation	5.56612226
Most ExtremeDifferences	Absolute	,319
	Positive	,319
		-,247
Test Statistics		,319
Asymp . Sig . (2-tailed)		,000 <sup>c</sup>

Table 4. Wilcoxon Signed Rank Test

N			Mean Rank	Sum of Ranks
Pro- test - Pre -test	Negative Ranks	0 <sup>a</sup>	.00	.00
	Positive Ranks	24 <sup>b</sup>	12.50	300.00
	Ties	0 <sup>c</sup>		
	Total	24		

Pro- test < pretest  
Pro- test > Pretest  
Pro- test = Pre-test

The negative Rank or difference between learning outcomes for the pretest and posttest class experiment is 0, good in mark N Mean Rank, and Sum Rank. A value of 0 indicates no decrease from the pretest value to the posttest value test. Positive Rank or difference between learning outcomes for pretest and posttest with Mean The rank or average increase in the experimental class is 12.50. In contrast, the Sum of Ranks is 300.00. It can be seen that the Ties value from the results above is 0, which means there is no value. The same between pretest the posttest in class VI-A. Based on the table from the SPSS output, it can be seen that Asymp. Sig (2-tailed) value 0.001 is smaller than 0.05 ( $0.001 < 0.05$ ) then  $H_0$  is rejected and  $H_a$  accepted, which means there is an average difference between the PreTest results and PostTest, so it can be said that there is an influence on the use of PhET media (Physics Education Technology ) on science learning outcomes in series material electricity on student class VI-A MINU Waru 1.

Learning material electricity is abstract material (Wakhidah 2016), so it's easier for teachers to teach the material if they do not use suitable learning media. Research results show that the average pretest score is taller than the posttest, and there are differences between pretest and posttest. This means using learning media with simulation PhET influences the results of studying students on the material electricity. Learning using PhET makes it easier madrasah ibtidaiyah students to understand material electricity that doesn't can observed using eye (Ariyanto, Khusniyah, and Susanto 2022; Masrurroh et al. 2020; Naen 2021).

Simulation learning electricity use PhET gives a description to MI students about draft electricity. Suite abstract and complex electricity can be understood with existing simulations. Apart from that, students are also motivated to learn and activate students in the study of science, especially the material electricity. The use of this media has influenced the understanding and results of students.

## CONCLUSION

Based on research results regarding improving participant learning outcomes students in science learning electrical circuit material using media PhET learning , it can be concluded that there are differences in results students learn after being given learning using PhET learning media in class VI-A at MINU Waru I. Use of media PhET helps students in understanding concepts and adding student creativity so that it can add to the student's learning output educate. Suggestions for other research are expected in the teacher learning process can use interesting media to increase participant interest students in learning and students do not get bored easily, apart from that he use of PhET media can increase students' skills in the field of technology, as well as the learning process should be carried out with interactive, fun, motivates students to be more active and his teaching meaningful.

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