

Analysis of Student Responses to Matlab Applications in Physics Learning in High Schools

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Abstract - The development and presence of computer technology have made it easy for various parties to use it in life, including education, to support education. Physics is a branch of natural science. In learning physics, technology is needed in the learning process. One assistive software that can be used in learning physics is the Matrix Laboratory (MATLAB). This program can improve speed and accuracy in various calculations in learning. So that the time needed to work on it is more efficient and the results are better obtained more accurately than the calculations done manually. The purpose of this study was to describe and analyze students' responses to the application of MATLAB in physics learning. The data collection method used in this research is questionnaires with unstructured interview techniques assisted by the Google form application. The respondents used in the study were 10 class X students at UPT SMA Negeri 1 Ogan Komering Ilir. The results of data collection and analysis were descriptive and qualitative. The percentage of data obtained was analyzed using existing categories. The research results show that all aspects of the proportion of student responses are 83% with very good scores; this means that the MATLAB application is effectively used for learning physics.

Keywords: Physics Lessons; Student Responses; MATLAB application.

INTRODUCTION

In general, technological developments are equipment that continues to develop yearly, both in implementation and physical form (Zulmi et al, 2018). Along with technological advances, human needs continue to increase not only in education but also in technology. For this reason, the world of education must be able to take advantage of information technology, which can advance the education system (Vijayanti, 2015).

Education aims to develop students' ability to become noble, knowledgeable, competent, creative, independent, to become people of faith and fear of God Almighty (Jariyah & Tyastirin, 2020). With the development of technology in education, an educator can undoubtedly use it as a medium in the teaching and learning process. The more advanced the technology, the more difficult it will be to balance it, including studying physics (Triyadin et al., 2020). The

presence of learning media can impact teachers in presenting information that will be given to students (Adhar & Nababa, 2016). However, not only to support technological progress, the media must be able to help deal with various problems in the world of education.

Effective and high-quality learning is a teaching and learning activity that considers learning components such as learning experiences or curriculum, teaching materials, and media, where the students' learning goals are successfully achieved. (Setiyoadji, et al., 2020). Physics is a branch of science that focuses on studying matter, energy, and the relationship between them (Gunawan et al., 2015). Physics learning at various educational levels still faces several challenges, particularly in using learning media (Marisda, et al., 2020).

It cannot be denied that learning physics is indeed difficult to understand, primarily if the learning media does not

support it. The proper media selection is needed in learning physics to help solve various physics problems by utilizing current technological advances. The media used in this study is an application called MATLAB (Muanalifah, 2016).

MATLAB" stands for "Matrix Laboratory." It is an interactive software program for performing numerical calculations (Cahyono, 2013). Cleve Moler originally designed it in the 1970s as a teaching tool, but it has since become a very successful commercial package produced by The MathWorks. From a computational scientist's point of view, one of the best features of MATLAB is its sizeable built-in library of numerical routines and graphical visualization tools (Syaharuddin & Mandalina, 2017).

Based on several studies by Zulmi et al. (2018), with the title "Development of Physics Formulas Based on the MATLAB Program on Temperature and Heat Materials to Increase Learning Motivation in Grade 7 Students of SMPN 2 Labuapi Academic Year 2017/2018", and Triyadi et al., (2020), research showed similar results, namely the same both get positive results.

From some of these studies, the application of MATLAB in physics learning is also effectively applied at several levels of education (Sabaryati & Zulkarnain, 2019). However, the reality encountered in learning physics is not as effective as using the help of the MATLAB application because students cannot make maximum use of existing technology in the learning process, with a lack of awareness of technological advances causing several problems in the learning process. to be less than optimal. The application of MATLAB also raises polemics in the process of learning physics. It happens because the MATLAB application is a new learning application for students. So that it causes some students who

have a poor response, but some students have a good response to the MATLAB application.

Therefore, researchers are interested in researching student responses to the application of MATLAB in learning physics with the title, Analysis of student responses to the application of MATLAB in learning physics at UPT SMA Negeri 1 Ogan Komering Ilir.

The formulation of the problem in this research is how students react to the MATLAB application when learning physics, and the research aims to find out the obstacles students face when using the MATLAB application in learning physics at UPT SMA Negeri 1 Ogan Komering Ilir.

RESEARCH METHODS

This study uses a qualitative descriptive research method to analyze and describe students' responses to the application of MATLAB in learning physics, and what obstacles students at UPT SMA Negeri 1 Ogan Komering Ilir face towards applying MATLAB in learning physics. The research location was carried out in Ogan Komering Ilir Regency, South Sumatra in January 2022. In order to obtain data easily, the researcher chose the location closest to the researcher's house. In this study, 10 class X UPT SMA Negeri 1 Ogan Komering Ilir students were used as subjects, consisting of 5 female students and 5 students. Data collection used unstructured interview techniques and Google Forms assistance to find out student responses to MATLAB applications in physics learning. After applying the MATLAB application to learning physics, students are given a questionnaire sheet. The percentage of teacher and student responses can be calculated using the (Sudijoyo, 2005) following formula:

$$\text{Response percentage} = \frac{\text{Total Score}}{\text{Total Maximum Score}} \times 100\%$$

The results of the percentage of responses are converted into qualitative data according to the standards shown in Table 1. The criteria for student responses are as follows:

Table 1. Student Response Criteria

No	Percentage (%)	Category
1	81,25 < x < 100	Very good
2	62,5 < x < 81,25	Good
3	43,75 < x < 62,5	Not good

(Source: Akbar, 2013)

RESULTS AND DISCUSSION

Results

The results and discussion obtained in this study are as follows:

1. Interview

The interview was conducted with the physics teacher at UPT SMA Negeri Ogan Komering Ilir, namely Mrs. Laila and it was found that on the whole the teacher had carried out all physics learning activities well, there must have been some obstacles in learning and were usually caused by existing technological sophistication. continues to grow. This can be done well by teachers, by introducing and teaching students how to use technology that continues to grow. As a learning medium, the Matlab application is also applied in learning. So that students can operate this application, the learning process also involves information and communication technology teachers so that the material can be conveyed properly and runs optimally.

The following is data on teacher interview results in the form of questionnaire regarding matlab

applications which can be seen in table 2. physics teacher interview results data are as follows:

Table 2. Physics Teacher Interview

Names of Teachers	Question	Answer
Laila Adawiyah, S.Pd	Does the teacher use learning media during the learning process?	Yes
	What learning media are you ever use in the learning process?	Powerpoint, youtube, matlab and others.
	Does the media you use can provide better results on student learning outcomes?	Yes
	What obstacles have you ever faced when using learning media?	Inefficient time
	Have you ever used the matlab application in the learning process?	Yes
	Do you know about the matlab application?	Yes
	Have schools applied the matlab application to assist the physics learning process?	Yes
	If the matlab application has been applied in your school, is there any positive impact on student learning outcomes?	Yes
	Can mother operate it and teach it to students?	Yes
	Does the school head provide facilities during learning using the matlab application?	Yes
	Will the material delivered to students using the matlab application be delivered well?	Yes
	Are students motivated when learning physics using the matlab application?	Yes

2. Questionnaire

After students use the MATLAB application in physics learning, they will be given a questionnaire with the help of Google Forms to find out student responses to the MATLAB application. Student data obtained from the questionnaire can be seen in Table 3. Student data is as follows:

Table 3. Student Data

No	Name	Gender	Class
1	Aldi	Man	X
2	Iwan	Man	X
3	Irman	Man	X
4	Fatur	Man	X
5	Ilham	Man	X
6	Sinta	Woman	X
7	Bella	Woman	X
8	Dewi	Woman	X
9	Siti	Woman	X
10	Santi	Woman	X

The following is the student response questionnaire data from the google form which can be seen in Table 4. The student response data is as follows:

Table 4. Student Response Questionnaire

No.	Aspects of student response	Student response		Percentage (%)	
		Yes	No	Yes	No
1	Is learning with the matlab application Online fun?	9	1	90	10
2	Can you operate the matlab application?	8	2	80	20
3	Can you operate the matlab application?	9	1	90	10
4	Do you use the matlab application in learning physics more ffectively?	8	2	80	20
5	Do you agree that learning physics uses the matlab application?	9	1	90	10
6	Are you having serious problems with your matlab application?	4	6	40	60

No.	Aspects of student response	Student response		Percentage (%)	
		Yes	No	Yes	No
7	Does the teacher provide good support while using the Matlab application?	10	0	100	0
8	Does the teacher rovide facilities during learning using the Matlab application?	10	0	100	0
9	Can the material conveyed by the teacher using the Matlab application be conveyed properly?	8	3	80	30
10	Does your teacher motivate you to study actively?	8	3	80	30
Amount		83	17	830	170
Average		8,3	1,7	8,3	1,7

DISCUSSION

Based on the results of interviews and observations, class X students have various abilities. the existence of learning technology that supports various learning processes is an important component in the learning process (Triyadin et al., 2020). Teachers need application technology such as MATLAB in physics learning. the low level of analysis of physics lessons in achieving learning objectives is caused by several factors, one of which is the lack of technology that can help analyze data on physics material. so students are less motivated in learning.

Matlab (Matrix Laboratory) is a program for analysis and numerical computation and is a language advanced math programming built on the foundation Thinking using the properties and forms of matrices (Zulmi et al, 2018). MATLAB which is a language high-level programming based on matrices is often used for numerical computation techniques, to solve problems involving the mathematical operations of the elements, Matrix, optimization,

approximation and others (Muanalifah, 2016).

This software was first used for numerical analysis, linear algebra and matrix theory. In addition, along with its development, MATLAB has turned into a sophisticated programming language environment that contains functions to perform signal processing tasks, linear algebra, and other mathematical functions. MATLAB is extensible, in the sense that a user can write new functions to be added to the library when existing built-in functions cannot perform certain tasks. The programming skills required are not too difficult if you already have experience in other programming languages such as C, PASCAL, or FORTRAN (Syaharuddin & Mandalina, 2017).

The MATLAB application has the following sophistication: 1. Mathematical calculations, both simple and complex, 2. Numerical computations, 3. Simulation and modeling, 4. Visualization and data analysis, 5. Making graphs for science and engineering purposes 6. Application development (Triyadi, Solahudin, Zulkarnain, (2020).

Based on the results of a questionnaire survey of physics teachers at UPT SMA Negeri 1 Ogan Komering Ilir conducted by researchers regarding the learning process using the MATLAB application for students, it was found that learning physics using the MATLAB application greatly influenced student learning outcomes and greatly motivated students in learning rather than use other applications before using MATLAB applications. And based on the results of a questionnaire survey data via google form regarding the learning process using the MATLAB application to students at UPT SMA Negeri 1 Ogan Komering Ilir who were randomly selected as many as 10 students, it was found that many students

gave positive responses to the use of the MATLAB application in learning physics with answers (yes) in the "very good" category on the student response questionnaire and only a small number of students answered (no). With an average figure obtained of 8.3 or with a proportion value of 83%. So from the data above it can be concluded that the MATLAB application has no significant problems and can be used as a learning media aid in physics learning.

CONCLUSION

Based on the results of the study it can be concluded that the students' responses to the application of MATLAB in physics learning show the "Very Good" category with a percentage value of 83%. This shows that even though the interview data said there were some obstacles in using the MATLAB application during the physics learning process. But all these obstacles are not serious. Everything can be handled properly. So that the MATLAB application can be used and applied properly in learning physics. In connection with the results of the research above, the researcher suggests conducting further research on a broader scale about student responses to the application of MATLAB in physics learning.

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