# Practicality of E-Modules Based on Problem-Based Learning (PBL) Learning Model on Digestive System Material

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## Abstract

*Electronic modules are electronic learning media that are systematically arranged and include competencies that will be mastered by students and are equipped with an attractive appearance. Problem-based learning is a learning strategy that focuses on improving students' ability to learn and collaborate in groups to find solutions to problems in the surrounding environment. This study aims to describe the implementation of learning and student activities using e-modules based on problem-based learning of digestive system material. This study used the research and development (R&D) method modified by Sugiyono (2017). Data collection techniques used observation sheets of learning implementation and student activity sheets. The problem-based learning e-module trial was conducted on a limited scale. The subjects in this study were 15 students of Class XI 1 SMA Negeri 1 Tapa. The results of the study found that the practicality test based on the percentage of learning implementation was 88.7% in the "very good" category and student activity was 91.6% in the "very good" category. Based on the study results, it can be concluded that the e-module based on problem-based learning of digestive system material has met the practical criteria so it is feasible to use in biology learning.*

## INTRODUCTION

Education is the most important initial foundation in improving a country's standard of living. A person's cognitive capacity will develop, expand, and grow during the education process. Education can serve as a barometer of resource quality (Asrial et al., 2020). Education is a deliberate and planned effort to provide an active learning environment so that students can develop their potential and personality in a better direction, according to Law Number 20 of 2003 (Praditya et al., 2019). Education can

advance a person by developing their intellectual and emotional abilities. Based on this, it can be said that education has a big share in developing superior human resources.

One of the tools that can advance the education landscape is technology. Problems in education can be solved using technology, which has the added benefit of improving education standards (Pratama et al., 2020; Wulandari, 2020). The rapid advancement of technology has forced educators to abandon print media in favor of online media. This is shown by the availability of educational resources in digital format, for example, e-books. The rapid development of technology can encourage teachers to create more creative learning resources (Pramana et al., 2020).

However, the problem that often occurs is the lack of adequate learning resources and students still rely on conventional teaching materials. This also occurs at Senior high school of SMA Negeri 1 Tapa in biology subjects, especially in digestive system material. The results of observations and interviews conducted with biology teachers in class XI at SMA Negeri 1 Tapa show that there is a lack of supporting teaching materials and students tend to rely on school textbooks as the only source of learning. This makes student activities in the learning process less active. In addition, the factor that affects the learning process is the l ack of interaction between teachers and students and students during the learning process. Based on the existing problems, the suggested solution to overcome these problems so that students can learn independently, be more motivated, and increase student learning activities is to develop electronic-based modules.

E-Modules are electronic learning resources that include text, images, animations, graphics, and videos (Rahmadhani, 2021). E-modules can assist teachers in facilitating students to learn independently (Asrial et al., 2020; Citrawathi et al., 2016). define E-modules as digital learning materials that are systematically organized to enable independent learning and problem-solving by students (Diantari et al., 2018; Udayana, 2017). Based on this point of view, it is determined that E-modules are electronic teaching resources that are systematically organized and digitally presented. Students' interest and enthusiasm for learning can increase thanks to e-modules. This has been proven by the research of (Wirawan, 2017). E-modules can improve student learning outcomes so that it is acceptable to use them to support the learning process, according to the statement. According to (Aryawan, 2018) interactive e-modules can be used to significantly improve student learning outcomes. According to (Hastari, 2019) E-modules successfully increase student engagement and motivation to learn, which has an impact on improving student learning outcomes. Thus, it can be said that E-modules can increase student learning motivation which will have a good impact on student learning outcomes.

Teachers can utilize various learning models to help students in their learning. One of the learning models used in developing e-modules is the problem-based learning model. The problem-based learning model is a problem-based learning model that encourages students' ability to learn and collaborate in groups to find solutions to problems that exist in the real world (Nila, 2014). According to (Aspini, 2020) the use of learning models can help students learn more comfortably and develop their critical thinking skills. Problem-based learning (PBL) is a teaching method that uses real-world issues to help students develop critical thinking and problem-solving skills and their

understanding of the material (Anwar & Jurotun, 2019). The research conducted aims to describe the implementation of learning and student activities in using e-modules based on problem-based learning of digestive system material.

## METHOD

This research was conducted in the even semester of the 2023/2024 academic year in class XI 1 SMA Negeri 1 Tapa. This study used the (Sugiyono, 2017) research and development method. This research was only conducted up to the limited-scale trial stage. The subjects in this study were students of class XI 1 SMA Negeri 1 Tapa totaling 15 people. The instruments used in this study consisted of observation sheets of learning implementation and student activity sheets.

### *Learning Implementation Analysis*

Practicality data was obtained through the learning implementation observation sheet and student activity sheet. The learning process used a score of 1-4. Data analysis used the following formula:

$$\text{learning Implementation} = \frac{\sum Score\ every\ aspect}{\sum Maksimum\ score} \times 100\%$$

Furthermore, the results of data analysis were adjusted to the criteria according (Sukardi, 2017) for learning implementation in the following table 1,

**Table 1.** Criteria for Learning Implementation

| Value Range | Interpretation |
|---|---|
| 86% - 100% | Very good |
| 76% - 85% | Good |
| 66% - 75% | Fair |
| 56% - 65% | Deficient |
| 0% - 55% | Very poor |

### *Student Activity Analysis*

Student activity was assessed using a student activity sheet with a score scale of 1-4. Furthermore, it was analyzed using the following formula:

$$\text{Student Activity} = \frac{\sum Score\ every\ aspect}{\sum Maksimum\ score} \times 100\%$$

The results of the data analysis of student activity are then adjusted to the category of student activity assessment in the following table 2,

**Table 2.** Criteria Student Activities (Yazid, 2016)

| Score | Categories |
|---|---|
| 0%-20% | Very good |
| 21%-40% | Good |
| 41%-60% | Fair |
| 61%-80% | Deficient |
| 81%-100% | Very poor |

## RESULT AND DISCUSSION

### Learning Implementation

The practicality of e-modules, based on problem-based learning, for the digestive system material to train students' thinking skills can be observed from the successful implementation of learning during class activities, as well as from the responses of teachers and students to the developed e-modules. (Agung et al. 2021) state that the results of making a product can be said to be practical if the resulting product can be used in the real world, respondents are interested in utilizing the product for learning, and respondents find the learning content easy to understand.

The results figure 1. Shows the first meeting of the 21 aspects observed, 4 aspects have a percentage value of 50%, namely aspects 3, 6, 9, and 10. In addition, 16 aspects have a percentage value of 75%, namely aspects 1, 2, 4, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, and 21 so that evaluation needs to be done. At meeting 2, the results of learning implementation showed that 6 aspects obtained a score of 75%, namely aspects 4, 9, 10, 13, 14, and 20, therefore it was necessary to re-evaluate. The evaluation referred to in this study is that teachers need to prepare themselves carefully, master the material presented, and provide clear illustrative examples. In meeting 3, the results of learning implementation showed that all aspects observed obtained a score of 100% and had very good criteria so there was no need for evaluation.

Based on the description of the results above, there were several aspects in the first meeting that obtained the category of good enough 4 aspects and good 16 aspects. Whereas at the second meeting, there were 6 aspects that obtained the good category. This is because the teacher has not been able to fully orient the problem to students, organize students to learn, develop and present work, and analyze the problem-solving process. In addition, teacher and student interactions are still not optimal due to the teacher's lack of mastery in carrying out the problem-based learning model. because teachers need to master well the steps in the problem-based learning model. On the other hand, students are also not familiar with the problem-based learning model. (Yusuf, 2017) asserts that teachers need to prepare themselves thoroughly, master all the subjects they will cover, and provide concise and demonstrative examples. In line with the above opinion (Jannah, 2016) that the lack of interaction between teachers and students makes students passive and inattentive in independent and inventive learning. According to (Nurkamilah, 2017) one of the reasons for the implementation of learning has not reached the target is that students are not accustomed to this kind of learning, and students have difficulty when they start doing their investigations because they have been very dependent on the teacher's explanation.
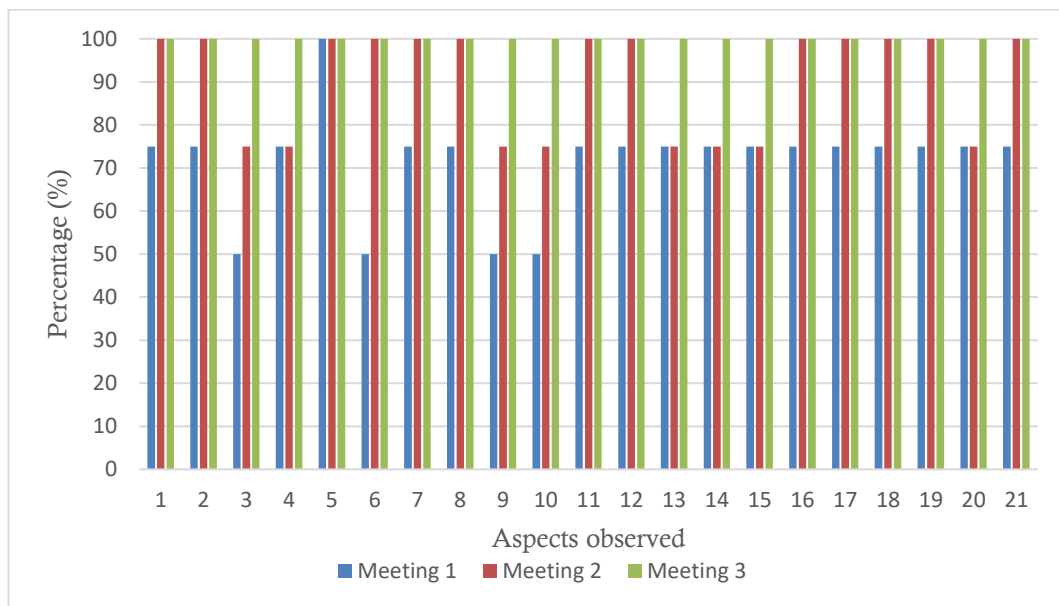
**Figure 1.** Results of Learning Implementation Using E-Modules based on *Problem Based Learning*

**Description**

1. Attracts students' attention
2. Provide apperception
3. Motivate students to ask
4. Invite students to answer questions from their friends.
5. Deliver KD, indicators and learning objectives
6. Provide motivation to increase the enthusiasm for learning the material being taught
7. Provide students with prior knowledge
8. Divide students into groups
9. Provide problem orientation to students
10. Organizing students to learn
11. Guiding students in individual and group investigations
12. Helping students develop and present work
13. Guiding students in analyzing and evaluating the problem-solving process
14. Encourage students to pay attention to each other's presentations.
15. Invite students to reflect and evaluate
16. Provide opportunities for students to ask questions about things that they do not understand
17. Providing motivation
18. Student enthusiasm in learning
19. Teacher-student interaction
20. Student-student interaction
21. Time as allocated

The results of the overall calculation from the first meeting to the third meeting obtained an average percentage value of learning implementation of 88.6% with a very good category. This is in line with (Sukardi, 2017) that classroom management by teachers and interpretation of scores of 85-100% indicates an assessment of the implementation of learning is very good. It can be concluded that the problem-based learning e-module based on digestive system material is said to be practical. This is by the opinion of (Hakim et al., 2020) that the level of learning implementation of 81% can be said to be practical. (Mustami, 2017) argues that to be considered practical, a learning device must meet two conditions: The resulting learning device can be used in the field and the device must be assessed by experts.

***Student Activity***

In this study, observation of student activity took place during three meetings and included 5 indicators of activity observed by the syntax of the problem-based learning model. Table 3. shows that the indicator of learner activity that obtained the highest average score was the indicator of analyzing and evaluating the problem-solving process, which was 94.4%. The second highest is the indicator of presenting and developing work and problem orientation to students at 92.7%, the third highest is the indicator of organizing students to learn, and the fourth highest in guiding individual and group investigations. In addition, Table 5 also shows that the percentage of all average indicators is at 91.6%.

Table 3. shows that there is a decrease in the indicator of problem orientation in students in the second and third meetings. In addition, table 3. Also shows an increase in student activity in the aspects of organizing students to learn, guiding individual/group investigations, developing and presenting work, and analyzing and evaluating the problem-solving process. This shows that the problem-based learning approach can increase student activity in the classroom. In line with the opinion of (Rerung et al., 2017), the problem-based learning model can support students in developing their knowledge through learning activities.

**Table 3.** Percentage of Student Activity Results

| No | Indicator | Percentage of learner activity (%) | | | Average (%) |
|---|---|---|---|---|---|
| | | Meeting I | Meeting II | Meeting III | |
| 1 | Problem Orientation to Students | 95 | 93,3 | 90 | 92,7 |
| 2 | Organizing Students to Learn | 86,6 | 91,6 | 91,6 | 89,9 |
| 3 | Guiding Individual/Group Investigation | 85 | 86,6 | 93,3 | 88,3 |
| 4 | Presenting and Developing Work | 91,6 | 93,3 | 93,3 | 92,7 |
| 5 | Analyze and Evaluate the Problem Solving Process | 90 | 95 | 98,3 | 94,4 |
| | **Meeting average** | **88,8** | **91,9** | **93,3** | |
| | **Average Percentage of Indicators at All Meetings** | | | | **91,6** |

Activities in the first aspect are orienting students to problems that have decreased in meeting I 95%, meeting II 93.3%, and Meeting III 90%. This occurred due to the lack of active participation of some students in the problem orientation process. This can be seen from the fact that there are still some students who do not pay attention to the explanation from the teacher and do their activities. According to (Sirait, 2016) suggests that students' lack of focus on the subject matter they are learning contributes to their failure to succeed in the learning process. The same thing is explained by (Rachmayani, 2014) who states that during the learning process, students who do not understand the subject matter tend to be inactive, so they cannot understand what they are learning.

Student activity in the 2nd aspect organizing students to learn has increased at each meeting, namely, meeting I at 86.6%, meeting II at 91.6%, and meeting III at 91.6%. At this stage, the teacher directs students to form groups and answer questions in the E-Module. Student activity in the 3rd aspect is conducting individual and group investigations has increased at each meeting, namely, meeting I at 85%, meeting I at 86.6%, and meeting III at 93.3%. At this stage, the teacher asks students to collect relevant information and conduct experiments to obtain and solve problems.

Student activity in the 4th aspect is to develop and present the results of the work has increased, namely, meeting I 91.6%, meeting II 93.3%, meeting III 93.3%. At this stage, students develop and present the results of their work in the form of presentation reports and discussions. Student activity in the 5th aspect is to analyze and evaluate the problem-solving process has increased, namely, meeting I at 90%, meeting II at 95%, and meeting III at 98.3%. At this stage, students reflect and conclude the discussion process between friends.

The results of the student activity test shown in Table 3 obtained an average value at the first meeting of 88.8%; second meeting 91.9%; third meeting of 93.3%. This means that there is an increase from the first to the third meeting because, at the first meeting, students are still adapting to problem-based learning e-modules based on digestive system material which is fairly new to students. During the first meeting, there were still many students who looked confused about using E-Modules based on problem-based learning, but in the second and third meetings, some students were proficient in using the E-Modules provided. According to (Fatiqin et al., 2018) it is still very reasonable if, at this initial meeting, there are still students who have not been able to complete their assignments because they are still in the adjustment stage and still need direction from the teacher.

Based on the description of the results above, the e-module based on problem-based learning of digestive system material is in the very good category. So it can be concluded that the e-module based on problem-based learning of digestive system material that has been developed is practical. This statement is by the opinion of (Fortuna, 2021) If the average assessment score obtained from the level of practicality in the practical category is > 80%, then the product developed is considered practical.


**CONCLUSION**

Based on the results of research and discussion, it is concluded that the e-module based on problem-based learning of digestive system material is said to be practical, as seen from the implementation of learning which obtained a percentage value of 88.6% very good category and student activity obtained a percentage value of 91.6%. This makes e-modules based on problem-based learning of digestive system material practically used in biology learning.

## ACKNOWLEDGMENTS

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