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Development of A Pbl-Based Mushroom Material E-Module for Biology Learning Class X SMA

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Abstract

The learning process in the classroom is centered on the teacher and uses the lecture method, causing students to be less interested in following the learning process, and making students less active during learning. And students have difficulty understanding the material on the human reproductive system. This study aims to determine the feasibility and effectiveness of e-modules based on problem-based learning on mushroom material to improve the learning outcomes of high school students. This study uses a Research and Development (RnD) approach that has been modified into 8 steps of development and research consisting of, namely potential and problems, data collection, product design, design validation, design revision, product trials, product revisions, final products. The subjects of this study were students of X7 MA Riyadlotut Thalabah. The results of the validation of the Material Expert on the product were 81.71% (very feasible), and 95% (very feasible) from the Media Expert. The teacher's assessment obtained a percentage of 95.04% (very feasible). The results of the responses from 35 students of class X7 MA Riyadlotut Thalabah obtained an average of 93.68% (very feasible). The percentage of classical completion of MA Riyadlotut Thalabah students from the pretest was 25.71% and the posttest was 85.71%. And 71.42% of students got a range of medium to high N-gain values. Based on the research data, it can be concluded that the PBL-based mushroom E-module is feasible and effective in improving the learning outcomes of high school students.

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INTRODUCTION

The progress of a nation is largely determined by the quality of its human resources, and education plays a very important role in developing the quality of human resources (Istiqomah et al., 2020). Therefore, improving the quality of education must be something that is considered and always attempted and developed in accordance with the times. Quality education will be able to make a nation develop rapidly and advance.

The learning process is a system to improve the quality of education that begins with analyzing all things that form and influence the learning process itself (Mulyasa, 2013). One of the things that has been considered to influence the education process is the teacher and the curriculum used, as well as the facilities and infrastructure. The success of the learning process is determined by one of them is the teaching materials used by students and teachers in teaching in the classroom.

Teaching materials are very important to develop so that teachers can teach more effectively, efficiently and teach according to the competencies to be achieved. In learning activities, teaching materials are a very important component for students and teachers. Teachers will have difficulty increasing the effectiveness of their learning and students will also have difficulty in learning without the help of teaching materials. Moreover, if it is worsened by the way teachers teach quickly and do not pay attention to the understanding of their students, therefore teaching materials are very important. One of the effective and efficient teaching materials is an electronic module or e-module.

E-module is a module in electronic format that can display text, animation, images and videos through electronic devices such as mobile phones, laptops, and computers (Ismi, Ganefri, and Usmeldi, 2019). E-module teaching materials can help students measure their abilities and control their learning intensity. The use of e-modules is not limited by place and time, so that in addition to being beneficial for students who are helped in their understanding, teachers will also feel that learning is more effective and efficient with students who already understand the material during learning. According to its meaning and advantages, e-modules in this study will be used for teaching materials on mushroom material. The mushroom material in the Independent Curriculum learning is too general and is included in the chapter on biodiversity, and is not interesting for students. In addition, e-modules are also suitable for learning activities with current technological developments.

Based on the results of interviews with biology teachers at MA Riyadlotut Thalabah, it can be seen that during biology learning using the independent curriculum. Teachers deliver material only using the lecture method assisted by PPT media or presentations. The PPT learning resources that have existed and have been used are considered to have less interactive aspects with students and are less helpful for students in terms of understanding. Students are also given additional materials to help the learning process, namely LKS. The LKS is considered less interesting and curious for students to learn mushroom material because in the Independent Curriculum, mushroom material is only studied briefly in the biodiversity chapter, making students tend not to be interested in mushroom material. Learning related to mushrooms carried out by this teacher is less effective for students to understand the concept of mushroom material and practical activities cannot be carried out on mushroom material. The lack of student understanding is seen when asked to answer a quiz related to mushrooms and many of the students answered the quiz incorrectly. For example, in class X7, when students were asked to complete a quiz on mushroom material, out of 35 students, only 12 students answered correctly, the remaining 24 students could not answer. The analysis presented indicates a lack of student understanding of mushroom material, resulting in low student learning outcomes. The selection of E-modules is considered appropriate for developing mushroom teaching materials because they can be easily carried anywhere, because they can be accessed using smartphones, tablets, laptops, iPads or all types of gadgets. E-modules that are packaged in electronic form, in addition to being accessible with all types of gadgets, in e-modules not only display text, but can also display animations, videos or video links, so that e-modules feel more interesting. This e-module will include a PBL or Problem Based Learning-based learning model. PBL itself is a learning that has characteristics with real problems as a context for students to learn to think critically and can solve problems and gain knowledge. This problem-based learning is intended to improve learning outcomes and motivate students, because by learning to

solve problems students will be required to find out, collect all information and analyze hypotheses based on data that is already known.

It is expected that with the presence of PBL-based mushroom e-modules, learning objectives will be achieved. The learning process runs effectively and efficiently and can improve the effectiveness of learning and also the learning outcomes of students.

RESEARCH METHOD

The method in this study is R&D (Research and Development) research. The product that will be developed and tested for its effectiveness in this study is an e-module based on Problem Based Learning on the material of Fungi. The research was conducted at MA Riyadlothut Thalabah. The population of this study were students of class X7 MA Riyadlothut Thalabah in the 2023/2024 academic year. The subjects of this study were 35 students in each class X7 MA Riyadlothut Thalabah. The material used in the implementation of biology learning in this study was fungi with a PBL-based method.

Data collection techniques used interviews, questionnaires, learning outcome tests (posttest and pretest) and documentation. The instruments used in this study included a validation questionnaire sheet instrument, a teacher and student response questionnaire sheet instrument and multiple choice questions. Testing was carried out using Anates v4 software. The validation analysis of the posttest and pretest question instruments was carried out in class XI MIPA 3 and processed using Anates v4 software, with the results of 35 valid questions being used only 20 questions. The results of the validation sheet analysis of the PBL-based mushroom E-module as a whole were carried out by material experts with results of 81.71%, media experts with results of 95%, teachers with results of 95.04% and students getting an average of 93.68%. So overall it is very feasible.

The increase in student learning outcomes is known based on the analysis of pretest and posttest scores in the form of determining pretest and posttest scores, determining classical completeness, N-gain test.

RESULTS AND DISCUSSION

The purpose of this research is Analyzing the feasibility of PBL-based mushroom material E-modules as learning resources for grade X SMA/MA students. PBL-based mushroom material E-modules are said to be feasible if they achieve indicators with a score of more than 62.50%. Analyzing the effectiveness of PBL-based mushroom material E-modules as learning resources for grade X SMA/MA students. The effectiveness of PBL-based mushroom material E-modules is measured from the achievement based on the effectiveness indicators that have been set, namely (1) classical learning completeness ≥ 75% with a minimum completeness criteria (KKM) of 70, (2) N-Gain test if 70% of students get a medium to high n-gain value.

Feasibility of Mushroom Material E-Module Based on Problem Based Learning

The final product is a mushroom material E-module based on PBL or Problem Based Learning. This e-module is in the form of a PDF (Portable Document Format) file, chosen because it is easy to use, compatible on various devices and practical. Compatible means that students can access this E-module via smartphone or laptop. Based on the description above, the E-module was developed with the RnD development model.

E-modul jamur berbasis Problem Based Learning adalah media yang lengkap dengan model pembelajaran PBL atau Problem Based Learning, uraian materi, gambar representatif, link video setiap materi, penugasan, latihan soal, evaluasi, dan kunci jawaban. Sebelum dilakukan uji skala kecil, E-modul jamur di validasi oleh ahli materi dan ahli media. Hasil dari ahli materi menunjukkan bahwa E-modul Jamur berbasis Problem Based Learning dengan presentase 81,71% yang termasuk kriteria sangat layak. Sedangkan hasil dari validasi ahli media menunjukan bahwa E-modul Jamur berbasis Problem Based Learning dengan presentase 95% yang termasuk kriteria sangat layak. Selain dilakukan validasi pada oleh ahli media dan ahli materi, validasi E-modul jamur berbasis Problem Based Learning juga dilakukan oleh Guru pengampu mata pelajaran biologi dan Peserta didik MA Riyadlotut Thalabah kelas 11 MIPA 3

dengan presentase 95,05% (sangat layak) dari Guru pengampu mata pelajaran biologi, sedangkan hasil tanggapan dari peserta didik kelas XI MIPA 3 diperoleh presentase 90,86% yang termasuk kriteria sangat layak.

Effectiveness of the Problem Based Learning-Based Mushroom E-module to Improve Student Learning Outcomes

The effectiveness of the PBL-based mushroom E-module was carried out by conducting a pre-test and post-test on 35 class X7 students of MA Riyadlotut Thalabah, to determine the increase in student learning outcomes before using the mushroom E-module and after using the mushroom E-module. Learning outcomes are very important in learning to provide information to teachers regarding student progress in achieving targets in learning (Nabilah & Abadi, 2019). The pretest and posttest scores of the students can be seen in figure 1..

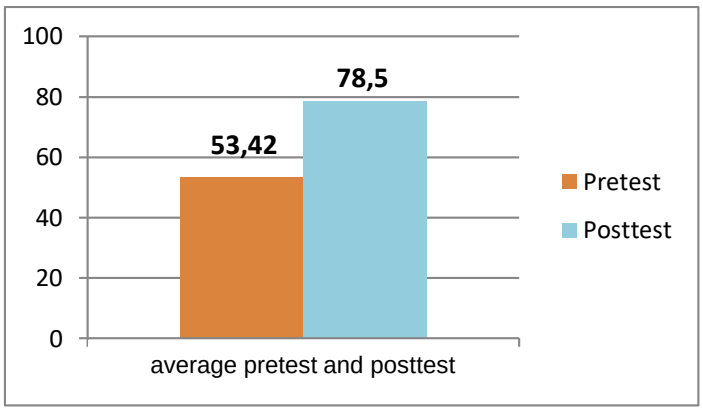

Figure 1. Average Pretest and Posttest Values of MA Riyadlotut Thalabah Students on Mushroom Material Using the Mushroom E-Module Based on Problem Based Learning

The highest score in the pretest was 100 and the lowest score obtained was 10. The highest posttest score was 100 and the lowest score obtained was 50. Based on the scores obtained in table 3.1, the percentage of classical completeness of students, namely, when taking the pre-test was very low at 22.71%, while the classical completeness of students when taking the post-test was ≥ 75%, namely 85.71%. The classical completeness of 85.71% shows that the use of the PBL-based mushroom E-module is effective because it obtains classical completeness of ≥75% (Trianto, 2010; Parahita et al., 2019). In addition, an N-gain test was conducted which aimed to test the increase in student learning with the acquisition of 20% with high criteria, 51.42% with medium criteria and 28.57% with low criteria. So it can be said that by using the PBL-based mushroom E-module, students experienced an increase in learning as evidenced by 71.42% of students getting N-gain values from the medium to high range.

In this study, an analysis was also conducted on each pretest and posttest question on 20 materials tested in class X7. This analysis was conducted to find the phenomenon of student misconceptions on mushroom material, the results are obtained in table 1.

Total Questions (20 questions)	True – True	True – False	False - True	False - False
700 out of 35 students	340	34	210	116
Percentage	48.57%	4.85%	30%	16.57%

Table 1. Recapitulation of Fungal Material Questions

From the table above, it can be explained that 48.57% of students have a strong initial concept and 16.57% of students who still cannot answer the questions correctly on the posttest, this can potentially

cause misconceptions. Furthermore, 30% of students can answer questions correctly on the posttest, this is evidence that students have improved and are starting to understand the mushroom material so that what was initially wrong in answering becomes correct. Students who experience misconceptions are 4.85% who initially answered correctly but became wrong. Misconceptions in students can be caused by students who do not have a strong initial concept, students do not understand when explained, or the learning process that makes students misconceive of the mushroom material. The solution to overcome misconceptions according to Yuyu (2017) is to carry out remediation by implementing more challenging learning and inviting students to construct new knowledge through appropriate learning experiences. In this case, remediation can be carried out in the sub-chapter of the material on the role of fungi in everyday life because in this sub-chapter students experience many misconceptions. Meanwhile, according to Isnawati, et al. (2019) misconceptions can be diagnosed using three-tier multiple choice questions. From the explanation above, 48.57% and 30% can indicate that the PBL-based mushroom material E-module can be used for the mushroom material learning process, because this shows that these students have a strong initial concept and also students who experience an increase in understanding mushroom material.

So the results of this study can be concluded that the product developed, namely the Problem Based Learning-based mushroom E-module, is able to improve student learning outcomes. Such as research conducted by Hariani et al., (2019) which shows the implementation of E-modules based on guided inquiry shows a positive influence and can improve student learning outcomes with an n-gain value of 0.50 in the moderate category. In addition, it is supported by the presence of representative images and video links contained in the E-module and problems that can increase students' understanding of mushroom material. These activities are where students can increase their abilities, knowledge, and experience, so that after learning to use the E-module of mushrooms based on Problem Based Learning, students can improve their learning outcomes.

CONCLUSION

Based on the results of the research conducted, it can be concluded that the developed PBL-based mushroom material E-module is feasible to be used during the learning process as a source of student learning. The results of the material expert assessment were 81.71% with the criteria of "very feasible", the media expert obtained 95% with the criteria of "very feasible", the teacher's response was 95.05% with the criteria of "very feasible", and the student's response was obtained with a total percentage of 93.68% with the criteria of "very feasible". The effectiveness of the PBL-based mushroom material E-module developed is effective for improving student learning outcomes on mushroom material. Proven by the results of classical completeness of 85.71%, and the results of the N-gain test obtained 71.42% from the medium to high range.

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