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Development of Physics Learning Module Using Research Based Learning Model Integrated with Soil Pollution for MAN Students

Losita Dewi[1*], Yeva Lenda Mahyastuti[2], Arya Ningsih[3]
[1,2,3]*Dosen Teknik Sipil, Akademi Teknik Adi Karya, Kerinci, Indonesia*
* Corresponding Author. E-mail: lositadewi61@gmail.com

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Abstrak

Penelitian ini bertujuan untuk mengetahui validitas dan praktikalitas modul Penelitian ini bertujuan untuk mengetahui praktikalitas modul pembelajaran fisika menggunakan model Reseacrh Based Learning terintegrasi pencemaran tanah pada siswa Madrasah Aliyah Negeri (MAN). Jenis penelitian adalah penelitian Research & Development (R&D) dengan model Ploomp. Populasi penelitian ini berasal dari siswa kelas XI MAN 2 Sungai Penuh. Sampel penelitian kelas XI IPA MAN 2 Sungai Penuh. Instrumen penelitian ini adalah tes, Lembar validasi dan praktikalitas. Tes digunakan untuk mengetahui kompetensi pengetahuan, sikap dan keterampilan siswa. Analisis data adalah analisis kuantitatif. Hasil penelitian menyimpulkan bahwa nilai validitas modul pembelajaran fisika menggunakan Research Based Learning terintegrasi pencemaran tanah dengan nilai praktikalitas dari siswa sebesar 84.19 % dan respon dari guru sebesar 87.5 %. Temuan ini menunjukan modul pembelajaran fisika menggunakan model Reseacrh Based Learning terintegrasi pencemaran tanah sangat valid dan praktis diterapkan dalam pembelajaran IPA

Kata Kunci: *Modul, Pembelajaran Fisika, Reseacr Based Learning, Pencemaran Tanah*

Development of Physics Learning Module Using Research Based Learning Model Integrated with Soil Pollution for MAN Students

Abstract

This study aims to determine the practicality of the physics learning module using the Reseacrh Based Learning model integrated with soil pollution for Madrasah Aliyah Negeri (MAN) students. The type of research is Research & Development (R&D) research with the Ploomp model. The population of this study came from class XI students of MAN 2 Sungai Penuh. The research sample was XI science class of MAN 2 Full River. This research instrument is a test, validation sheet and practicality. Tests are used to determine the competence of knowledge, attitudes and skills of students. Data analysis is quantitative analysis. The results concluded that the validity value of the physics learning module using integrated Research Based Learning on soil pollution the practicality value from students was 84.19 % and the response from teachers was 87.5 %. This finding shows that the physics learning module using the Reseach Based Learning model integrated with soil pollution is very valid and practical to be applied in science learning.

***Keywords**: Module, Physics Learning, Reseacr Based Learning, Soil Pollution*

Introduction

The Industrial Revolution 4.0 has a huge impact in all fields including education (Aminah, 2022; Rahman et al., 2023; Oktarina et al., 2021). Education is a process of changing the attitudes and behavior of students to achieve learning goals (Wijayanto et al., 2015; Usman et al., 2022; Razak et al., 2021). Education plays an important role for every individual in living their lives (Sugiarti & Hussain, 2021; Lubis et al., 2019). Furthermore, in education teachers have an important task in fostering, teaching and guiding students in the learning process (Izzah et al., 2021). In learning activities, students must have competencies that support the achievement of learning objectives (Wahyuni & Gianyar, 2021). In addition, students must master Science and Technology to assist the student learning process (Supriyadi et al., 2023; Suryono et al., 2023).

Physics is one of the sciences that studies natural phenomena through knowledge (Suseno et al., 2022). In the learning process of physics, students are not only able to memorize formulas but also have to apply them in life (Syawaludin et al., 2022; Prahanı et al., 2022). Lawu et al., (2019) Physics is a subject that plays an important role in encouraging students to be critical, creative and think scientifically. Furthermore, physics is a subject that examines phenomena that occur in life (Abtokhi et al., 2021; Putranta et al., 2021; Atasoy & Toksoy, 2020). This causes learning activities to require students' soft skills and hard skills competencies to learn physics.

But in reality, physics learning in schools today still experiences many problems. In learning activities are too teacher-centered so that students find it difficult to understand the subject matter (Ichsan et al., 2022; Suhaimi et al., 2022; Bani & Masruddin, 2021). Research results (Agung & Wibowo, 2019) Students' ability to understand the subject matter is still low so that learning objectives are not achieved. In addition, the limited resources and teaching materials used by teachers in physics learning activities (Abdi et al., 2021; Elfira et al., 2023). Because of the need for teaching materials that can help the learning process.

Modules are one of the complete and effective teaching materials used in learning activities (Setyandaru et al., 2017; Aji & Hudha, 2017). Modules can be studied independently by students so that they can encourage students' interest in learning (Moro et al., 2019). Novianto & Masykuri (2018) stated that modules can develop students' creativity in learning. Furthermore, modules help students learn creatively and independently to achieve learning objectives (Kurniawan et al., 2022).

Previous research by (Nurohman, 2014) stated that the development of a physics learning module can improve student learning achievement at school. Research results (Sulistiyono, 2022) The development of a physics learning module can foster learning independence and student learning outcomes. The application of learning modules encourages students to develop students' cognitive potential in learning (Halim et al., 2021). Based on these problems, this study aims to determine the validity and practicality of physics learning modules using the Reseacrh Based Learning model integrated with soil pollution for Madrasah Aliyah Negeri (MAN) students.

Methods

Berisi This research is a type of Research & Development research with the Ploomp model. The Ploomp model has 3

phases, namely preliminary research, prototyping phase, and assessment phase. The population of this study came from class XI students of MAN 2 Sungai Penuh. The research sample was XI science class of MAN 2 Full River. This research instrument is a test, validation sheet and practicality. Tests are used to determine the competence of knowledge, attitudes and skills of students. Data analysis is quantitative analysis with the help of SPSS. Data analysis to assess the final initial analysis using indicators that can be seen in Table 1.

Table 1. Analysis Category Beginning End

Interval (%)	Category
0 – 20	Not Good
21 – 40	Not Good
41- 60	Good Enaough
61 – 80	Good
81 – 100	Very Good

Source : Modifikasi (Ridwan, 2017)

Result and Discussion

Result

From the results of this study, the development of physics learning modules using the Reseacrh Based Learning model integrated with soil pollution in Madrasah Aliyah Negeri (MAN) students was carried out by analyzing needs analysis, learner analysis, material analysis, and analysis of regional potential. Needs analysis is a process to obtain information about the conditions in the field and the expected goals. The results of the needs analysis of the physics learning module can be seen in graph 1.

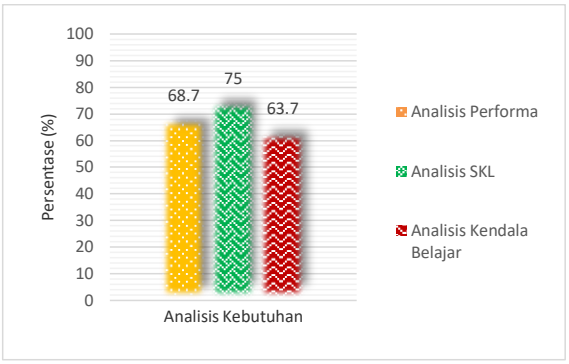

Figure 1. Needs Analysis

Graph 1. Shows the value of the needs analysis consisting of 68.7% performance analysis, 75% SKL analysis and 63.7% student learning constraints analysis. Performance analysis includes analyzing teacher performance, infrastructure, school policy, and social climate. The results of the SKL analysis can be seen in Figure 1.

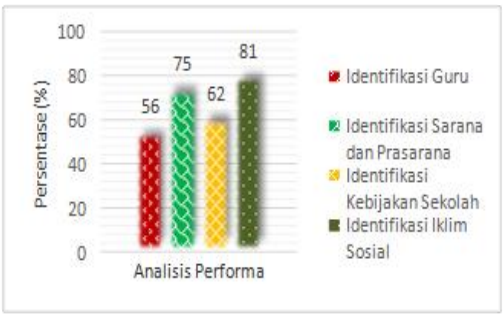

Figure 1. Performance Analysis

Based on Figure 1. shows the value of performance analysis consisting of 56% teacher identification, 75% identification of facilities and infrastructure, 62% identification of school policies, and 81% identification of the social climate. These results explain that the teacher's performance in preparing teaching materials is not optimal, although the types of teaching materials used are many, but the teaching materials are not developed by the teacher so that they are not in accordance with the needs of students. The learning model used has not been able to activate students in the classroom.

SKL analysis includes analysis of spiritual and social attitudes, knowledge and skills analysis. The results of the SKL analysis can be seen in Figure 2.

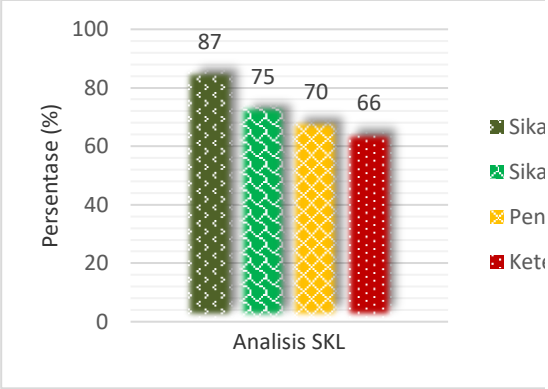

Figure 2. Analysis of the SKL

Figure 2. shows the results of the SKL analysis which consists of analyzing spiritual attitudes by 87%, social attitudes by 75%, knowledge by 70% and skills by 66%. These results show that the results of the SKL analysis of students behave in accordance with the teachings they adhere to, respect the diversity of religions, races, and nations can solve problems given by the teacher. Learners are able to think logically but have not been able to solve problems that occur in their environment, especially those related to environmental problems. In addition, learners' skills have not developed optimally. Next, analyze students' learning constraints. The analysis of learning constraints includes time, learning resources, methods, and students' learning motivation. The results of the learning constraints analysis can be seen in Figure 3.

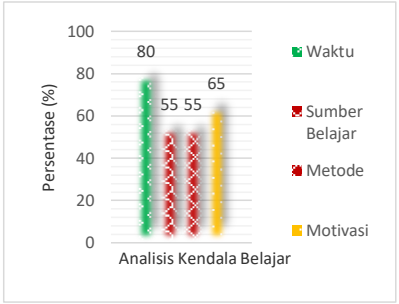

Figure 3. Analysis of learning constraints

Based on Figure 3. shows the analysis of student learning constraints consisting of 80% time analysis, 55% learning resources, 55% methods, and 65% motivation. These results show that students are less motivated to read the teaching materials used. One of the causes is because in the mindset of physics students there are many formulas that are difficult to understand even though students have paid attention to the teacher during learning. Learners also have difficulty in translating and solving problems with the level of analysis (C4). In addition, the method used by the teacher is the usual method, namely the lecture and discussion method. Learning takes place only in the classroom, students also rarely do practicum in the laboratory. The methods used by teachers have not shown methods that are in accordance with the 2013 curriculum.

Furthermore, the analysis of learners is carried out to find out the characteristics of students as a reference for developing learning modules. This analysis was carried out through distributing questionnaires to students. The results of the detailed learner analysis can be seen in Figure 4.

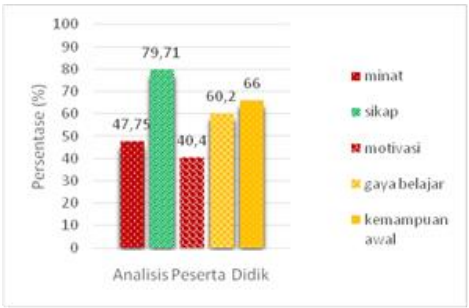

Figure 4. Learner Analysis

Figure 4. Shows the analysis of students consisting of interest scores of 47.75%, attitudes of 79.71%, motivation of 40.4%, learning styles of 60.2% and initial ability of students of 66%. These results show that students' interest and motivation in learning physics are still low. Furthermore, analyzing the learning material can be interpreted as an activity of selecting essential material from the entire material of

a lesson which is the minimum subject matter that must be mastered and owned in the learning process. The results of the material analysis are presented in Figure 5.

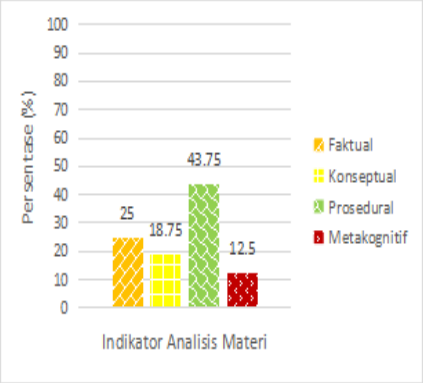

Figure 5. Material Analysis

The results of the material analysis consist of students' factual knowledge by 25%, conceptual by 18.75%, procedural by 43.75% and metacognitive by 12.5%. These results explain that the characteristics of the material on heat and temperature are procedural, so a suitable model is needed to be used in learning, namely the research-based learning model. Furthermore, analyzing the validity of using the physics learning module module using the Reseacrh Based Learning model integrated with soil pollution in Madrasah Aliyah Negeri (MAN) students can be seen in Table 2.

Table 2. Practicality of Physics Learning Module

Respon	Persentase (%)	Criteria
Teacher	87.5	Practical
Students	84.19	Practical

Table 2 shows the value of the teacher's response to the physics learning module of 87.5% and student response of 84.19%. These results explain that the application of physics learning modules using the Reseacrh Based Learning model integrated with soil pollution is practically used for student science learning.

Discussion

The development of a physics learning module using the Reseacrh Based Learning model integrated with soil pollution is practically used for science learning. The teacher response value is 87.5% and the student response is 84.19%. The results of this study are in line with (Hasanah et al., 2017) Physics learning modules can help students learn more practically and effectively to achieve learning objectives. Physics learning module using Reseacrh Based Learning model integrated with soil pollution helps students to improve their thinking ability and scientific attitude in learning. (Sumiati et al., 2018; Sujanem, 2012). The application of physics learning modules integrated with soil pollution can improve students' understanding of learning concepts (Orleans, 2017; Mehmet, 2009).

Furthermore, the application of modules in learning helps students to be more creative and independent in learning (Lumbantoruan & Samosir, 2019). (Bakri et al., 2015) The application of physics learning modules using the Reseacrh Based Learning model integrated with soil pollution can determine the ability of students according to their abilities. Furthermore, the module helps students will be easier in understanding the material and increase students' knowledge in learning (Budiarti, 2022). Knowledge is all information obtained by students through various reading sources (Ferry et al., 2019; Rahman et al., 2023; Sofianora et al., 2023). So, the existence of a physics learning module using the Reseacrh Based Learning model integrated with soil pollution helps teachers and students more easily achieve learning objectives.

Research results Almuharomah et al., (2019) Physics learning modules can foster students' creative thinking skills. Teaching materials in the form of modules are more

effective in improving students' concept understanding and learning outcomes (Halim, 2016). Furthermore, the application of a physics learning module based on the Reseacrh Based Learning model makes students more critical, creative and innovative in learning that supports the development of their thinking potential (Agustin et al., 2012).

Conclusion

From this study it can be concluded that the practicality value of the physics learning module using Research Based Learning integrated soil pollution student response is 84.19% and the response of the teacher is 87.5. This finding shows that the physics learning module using the Reseach Based Learning model integrated with soil pollution is practically applied in science learning. Furthermore, this physics learning module helps students be more independent and creative in learning.

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