

Analysis of the Needs for Using E-Modules to Overcome the Limitations of Physics Teaching Materials on Alternating Electric Current Materials

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Abstrak

Penelitian ini bertujuan untuk menyajikan hasil analisis kebutuhan bahan ajar siswa kelas XII berupa modul elektronik untuk mengatasi keterbatasan bahan ajar fisika pada materi arus listrik bolak-balik. Subyek penelitian ini adalah siswa kelas XII yang berjumlah 282 orang di 6 SMA yang terletak di 4 provinsi yaitu Sumatera Barat, Jambi, Riau dan Bengkulu. Penelitian yang dilakukan adalah penelitian deskriptif kualitatif dengan instrumen penelitian yang digunakan berupa angket yang diberikan kepada guru fisika dan siswa. Data penelitian dianalisis menggunakan Analisis Interaktif dari Miles & Huberman. Hasil analisis data menunjukkan masih kurangnya pemanfaatan modul elektronik sebagai bahan ajar fisika, hal ini menyebabkan perlunya pengembangan dan pemanfaatan modul elektronik. Sehingga dapat membantu guru dalam melaksanakan kegiatan pembelajaran dan siswa mampu belajar mandiri dalam memahami konsep materi dengan baik.

Kata kunci: *Analisis Kebutuhan, Modul Elektronik, Fisika, Arus Listrik Bolak-Balik.*

Abstract

This study aims to present the results of the analysis of the needs of class XII students' teaching materials in the form of electronic modules to overcome the limitations of physics teaching materials in alternating electric current material. The subjects of this study were 282 class XII students in 6 high schools located in 4 provinces, namely West Sumatra, Jambi, Riau and Bengkulu. The research carried out was a qualitative descriptive study with the research instrument used in the form of a questionnaire given to physics teachers and students. The research data were analyzed using Analysis Interactive from Miles & Huberman. The results of the data analysis show that there is still a lack of use of electronic modules as physics teaching materials, this causes the need for the development and use of electronic modules. So that it can help teachers in carrying out learning activities and students are able to learn independently in understanding the concept of material properly.

Keywords : *Needs Analysis, Electronic Modules, Physics, Alternating Electric Current.*

INTRODUCTION

In the 21st century, science and technology are developing very rapidly, thus demanding an increase in the quality of human resources and a better quality of education (Ramadayanty et al., 2021). The use of technology in the learning process can be said to be a form or development of science and technology (Mahardika et al., 2023). Physics is a branch of natural science that explains phenomena and objects in nature physically and is written mathematically so that they can be understood and utilized (Puspitasari, 2019). So that in the process of learning physics, students are required to understand the concept of material that is in accordance with the applied curriculum (Apriyanti et al., 2020).

In the implementation of the 2013 curriculum in Indonesia, the learning process is oriented towards strengthening the learning process, which triggers students to be able to think critically and have balanced abilities in the aspects of attitudes, knowledge, and skills. This is in line with Government Regulation No. 32 of 2013. Article 77, paragraph 1, explains that natural science study materials, including physics, biology, and chemistry, are intended to develop students' knowledge, understanding, and analytical skills of the natural environment and its surroundings (Latifah et al., 2020).

In fact, in general, physics teachers still tend to use the lecture method, which is caused by limited time, pursuing material, and inadequate infrastructure (Latifah et al., 2020). One of the supporting facilities in the learning process is teaching materials (Wulandari et al., 2020). This is supported by observations that have been carried out in six senior high schools in West Sumatra: Jambi, Riau, and Bengkulu. From the results of these observations, it was found that in the physics learning process, one of which is on the topic of alternating electric current, the teacher has not prepared adequate special teaching materials to support the learning process, which is feared to cause an imbalance in the cognitive, affective, and psychomotor abilities of students.

The packaging of physics teaching materials so far is still linear, namely teaching materials that only present concepts and principles, examples of problems and their solutions, as well as practice questions. The teaching materials used are not related to real problems that surround students, so they do not provide opportunities for students to develop skills in formulating problems, solving problems, and developing understanding (Ramadayanty et al., 2021).

Based on these problems, special teaching materials are needed that are in line with current technological developments so that the learning process in the classroom is not monotonous (Matsun & Saputra, 2020). One of the teaching materials that can be used is an e-module. Modules are teaching materials made with the aim that students are able to learn independently and can increase student learning motivation. This is because the use of modules allows students to learn more independently according to their abilities, experience, and mastery of the material that has been obtained with or without supervision from the teacher (Latifah et al., 2020). The use of e-module can be equipped with features such as audio, music, animation, and video so that the learning process becomes more interesting and enjoyable (Darmaji et al., 2019).

E-module can be used to improve student understanding and learning outcomes, as well as their ability to work together. In addition, the use of this e-module can be used to improve students' higher-order thinking skills as well as reduce students' misconceptions (Halim et al., 2021). In addition, e-module can also be used as learning media, where the existence of this learning medium can help students understand material that is difficult to understand and explain in the learning process (Hamid et al., 2020).

Based on research by Sumarmi et al., the use of e-module can be integrated with learning models, and in presenting e-module, they can be linked to real phenomena that students may have experienced so as to improve students' cognitive, affective, and psychomotor abilities (Sumarmi et al., 2021).

This is also supported by research conducted by Darmaji et al., which found that the use of physics e-module, one of which is in the practicum process, can make students more interested in carrying out a physics practicum. The use of this e-module is also able to improve and train students' scientific processing abilities (Darmaji et al., 2019). As well as being able to improve students' critical thinking and problem-solving skills in accordance with the demands of education in the current 21st century (Ramadayanty et al., 2021; Latifah et al., 2020; Wahyuni & Sari, 2020).

From several previous studies, it can be seen that the use of e-module in the physics learning process can help improve students' abilities both in the cognitive, affective, and psychomotor domains, so this paper was created, which aims to analyze the needs of e-module to overcome the limitations of teaching materials. physics on alternating electric Current material.

METHODS

The method used in this study is a qualitative descriptive method that is oriented towards the development of a product. Bogdan & Taylor (Moleong, 2002) define qualitative research as research that produces descriptive data in the form of written or spoken words from people or observable behavior. The subjects in this study were 282 class XII students from six high schools in West Sumatra: Jambi, Riau, and Bengkulu. While the object of this research is the e-module as a teaching material for class XII high school students, Data analysis uses Analysis Interactive from Miles & Huberman (2007); the analysis consists of three streams of activities that occur simultaneously, namely: data reduction, data presentation, and conclusion or verification. The research will be carried out in two stages: interviews with physics teachers and distributing questionnaires to students to find out how many students learn using electronic module teaching materials and those who do not use electronic modules.

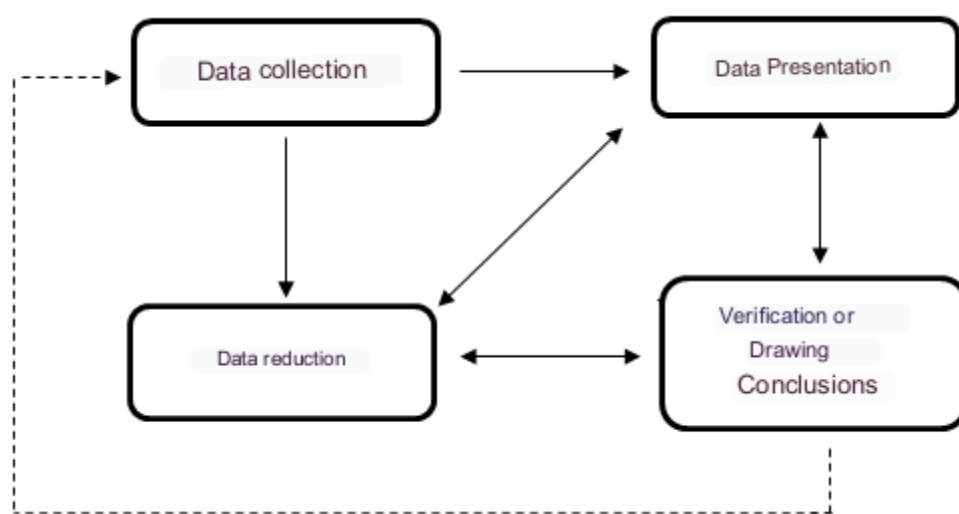


Figure 1. Analisis Interaktif dari Miles & Huberman

RESULT AND DISCUSSION

The needs analysis refers to the existing conditions in six schools in four provinces, namely SMA IT Mutiara Riau; SMAN 2 Kaur Bengkulu; SMA Al-Istiqomah Pasaman; SMAN 3 Lubuk Basung; and MAN 1 Padang, which are located in West Sumatra; and the last SMAN 8 Tebo Jambi. This analysis is needed to find out whether the media really needs to be developed or not. The needs analysis in this study was based on observations at school through interviews with teachers who teach physics in class XII and filling out the initial questionnaire by class XII students in each school. From distributing questionnaires to 282 respondents, it was found that 47 students learned to use electronic modules, while 235 students did not learn to use electronic modules. From these data, as many as 83% of students do not use electronic modules as teaching materials in the physics learning process, as illustrated in 2.

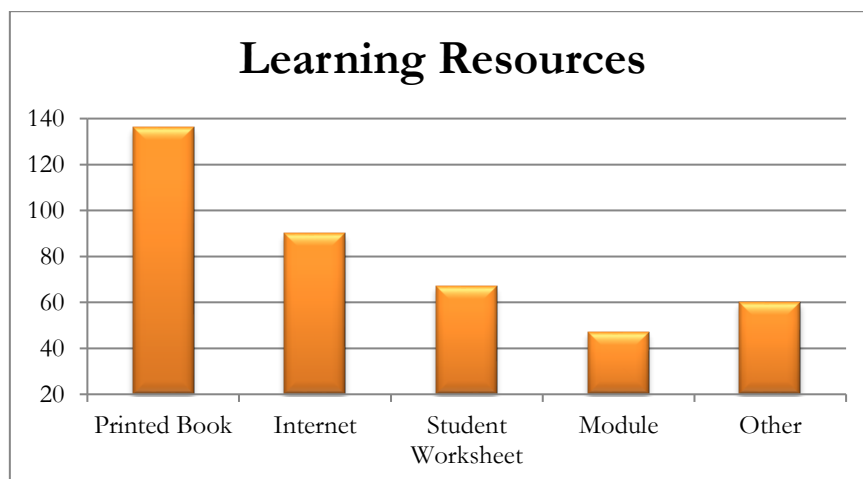


Figure 2. Analysis of Learning Resources Used in Schools

Based on the results of the questionnaire on physics material, especially on alternating current electricity material, which was distributed to six schools, it can be concluded that the most used learning resources were in the print book category with a total of 196 students. Internet learning resources were used by 90 students, LKPD learning resources were used by 67 students, module learning resources were used by 47 students, and other learning resources were used by 60 students.

In addition to administering a questionnaire regarding the learning resources used, students at the delicious school were also asked to fill out a questionnaire on the use of instructional media in teaching physics on alternating current electricity. Based on the results of filling out the questionnaire, the results are obtained, which are shown in Figure 3.

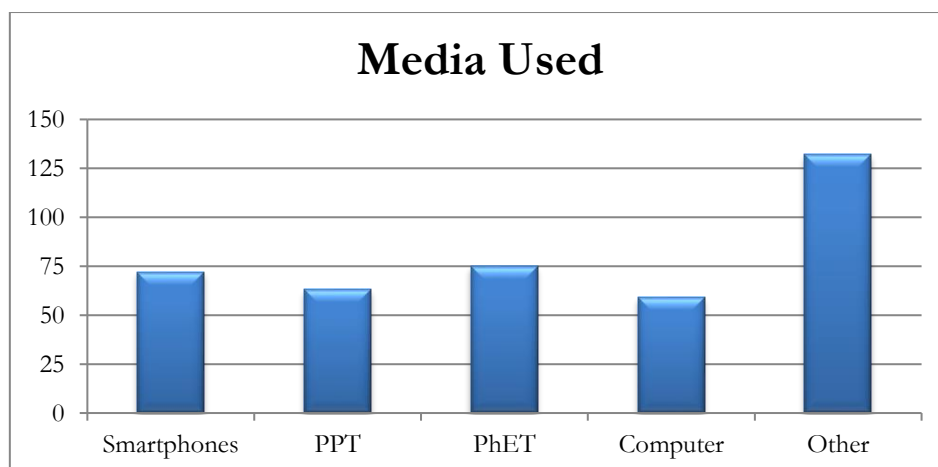


Figure 3. Analysis of Learning Media Used in Schools

Based on the results of the questionnaire regarding the learning media used in physics learning on alternating current electricity material, it can be analyzed that the most used media is in the other categories with a total of 132 students, based on student statements for other media referred to in filling out the questionnaire, which is the use of boards. Smartphone media was used by 72 students, PPT media was used by 63 students, PhET media was used by 75 students, and computer media was used by 59 students.

Meanwhile, based on the material analysis carried out by examining the main material to be taught and the results of interviews and observations with high school physics teachers in six schools teaching class XII, The subject matter is selected and arranged systematically. The material used is adjusted to the syllabus, lesson plans (RPP), and physics books written by the Indonesian Ministry of Education and Culture so that learning objectives are achieved. The

results of the material analysis stated that the material to be taught for the even semester of class XII was current electricity.

Discussion

Based on the results of the data analysis, it can be stated that the learning resources used are government textbooks, worksheets, and modules. The current curriculum for class XII is the 2013 curriculum. From the results of the analysis above, the dominant learning resource used is textbooks. The textbook is a mandatory book that must be used in schools in Indonesia. The existence of government-funded package books based on the 2013 curriculum in schools really helps teachers in the learning process. All the material contained in it is so complete and contains problem-solving techniques that really trigger students to think critically and mathematically. However, this existence turned out to cause problems for students. Many students are not ready for this 2013 curriculum-based package book. According to Anderson (1987), too much subject matter is presented in textbooks, with textbooks tending to turn off interest and cause boredom. Students still find it difficult with the existence of abstract problems in textbooks that must be completed by students, and the level is too high for students, so it is difficult to understand. The learning process in schools should be adapted to the needs of students. Because learning activities that are not in accordance with the level of student development are ineffective, Teachers in practice often only use one textbook (Rahim, 2005). Meanwhile, it is known that textbooks do not discuss topics broadly and in depth, so they cannot fully develop students' ideas and concepts. Therefore, it is necessary to develop teaching resources that can help students in the learning process according to their needs.

Another result obtained from the data analysis is that in the physics learning process, many teachers still only use blackboard media to convey the material being taught. The use of whiteboards in the learning process can cause students to get bored and less motivated to continue learning. In addition, the use of blackboards only presents subject matter visually and is still abstract (Putra, 2021). Electricity is a branch of physics that is studied in class XII. One of the subjects studied is alternating current electricity. Several studies have shown that students in high school rarely master the concept of electricity due to the many difficulties they face in understanding the concept of electric current (Chekour et al., 2022). In the process of learning physics, learning media are needed that are able to present material both visually and audiovisually.

Electronic modules, or abbreviated e-module, are one of the learning resources and learning media needed to learn physics. According to the Ministry of Education and Culture (2017), e-module are teaching materials presented in electronic form that can be directly linked to a website, which, when accessed, will be directly connected to the internet. These sites can be in the form of videos, audio, and animations that can make learning more fun (Ananda & Usmeldi, 2023). Kuncahyono (2018) explains that the use of e-module can help teachers apply learning using electronic media (Maghfiroh et al., 2023). The application of electronic media in the learning process aims to improve the teaching methods and approaches needed to achieve effective learning activities and meet the challenges of 21st century teaching skills (Ghavifekr & Rosdy, 2015). Electronic media is also able to create an interactive and fun learning process (Arif et al., 2019). In addition, many studies have shown that the use of electronic media can have a positive impact on student achievement, one of which is in science lessons (Ahmadi, et al., 2011).

There are many advantages to using e-module. E-module can be interactive learning media that can be made systematically and attractively (Kurniawan et al., 2023). The use of e-module can train and help students understand the material and learn independently and responsibly according to their abilities. E-module can also help teachers measure student learning outcomes (Astalini et al., 2023). The use of e-module can be utilized both as teaching materials or learning resources and as learning media. Material in e-module can be presented in the form of audiovisuals, sound, films, and various other conveniences (Ananda & Usmeldi, 2023).

Physics learning focuses on natural phenomena, and the learning process requires conceptual understanding and critical thinking. However, because many of the phenomena presented are still abstract, it makes it difficult for students to find pleasure in learning (Chekour et al., 2022). E-module can be developed by having pictures, sounds, or animations that can describe

the natural phenomena being studied in various colors (Sumarmi et al., 2021), as well as making physical phenomena easier to understand and fun (Chekour et al., 2022) including alternating electric current. With electronic media in e-module to help concretize abstract electrical concepts so that they are easier for students to understand. The use of e-module on the topic of electricity is also one of the materials and learning media that is effectively used. The use of e-module on this topic is also able to increase student motivation in studying electricity topics (Pazlina & Usmeldi, 2020), one of which is alternating electric current.

The use of e-module can help improve students' critical thinking skills. e-module development can be presented by providing examples of phenomena related to contextual learning with everyday problems and phenomena; this provides an opportunity for students to explore and build physics concepts independently based on the examples given from the e-module (Sujanem & Suwindra, 2023). Another positive impact of using e-module in physics learning is being able to improve students' scientific literacy skills. This is because learning requires technological innovation related to physics concepts. Besides that, e-module can also be accessed from smartphones owned by students so that students can easily learn anywhere and anytime (Maghfiroh et al., 2023).

CONCLUSIONS

Based on the results of observational research and interviews conducted at Mutiara Riau IT High School, Bengkulu KAUR 2 SMAN, Al-Istiqomah Pasaman High School, Lubuk Basung 3 MAN, Padang 1 MAN, and Tebo 8 SMAN, and the discussion above, it was concluded that the availability of textbooks at school still raises problems for students. Students find it difficult with the existence of abstract problems in the textbook that must be completed by students, and the level is too high for students, so it is difficult to understand, especially in alternating electric current material. So that teachers and students need teaching materials in the form of modules to support books in schools.

Other information obtained indicated that electronic-based teaching materials as learning media were still little used in schools. Teaching materials such as electronic-based modules need to be developed because students do not always learn using teaching materials in general. It is hoped that by using fun teaching materials such as electronic modules, students are able to change their opinions and views that physics, especially alternating electric current material, is a subject that is hard but fun.

This electronic module, or e-module, is expected to assist teachers in carrying out learning activities, and students are able to learn independently by understanding the concept of the material properly. In this study, researchers only analyzed the needs of physics e-module as teaching materials for high school students' learning. So that it still needs to be held further regarding the use of e-module on alternating electric current material for various aspects of the learning process.

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