



Need Analysis of REACT-Based E-Module Development to Improve Critical Thinking Skills in Physics Learning

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ABSTRACT

The research aims to analyze the need for developing REACT-based e-modules in learning Physics. The type of research conducted is descriptive research. The subjects of this research were senior high school students. The research instrument was in the form of filling out a questionnaire filled out by students. Needs analysis is carried out to determine the learning resources used by students, obstacles during learning, and learning resources needed by students. The needs analysis results show that 75% of students have learning resource books for learning physics, but 64% of simple harmonic motion materials in learning resource books are challenging to understand. So that 72% of students need teaching materials containing concepts related to everyday phenomena. And 74% of students agree that physics teachers develop e-modules to support physics learning. The student's critical thinking skills obtained 51.8%, including the poor category. It can be concluded that students need learning resources in the form of REACT-based e-modules to improve students' critical thinking skills in Simple Harmonic Motion material.

INTRODUCTION

Education is a learning process to improve the quality of life for students to develop independently and proactively in responding to the challenges of the times. Every time education is constantly changing with the times. Currently, the world of education is in the 21st century, marked by the rapid development of science and technology. In achieving national education goals, it is necessary to have a curriculum that supports improving the quality of students at the level of each education unit, such as elementary school, junior high school, and high school education units (Asyhari, 2016). A curriculum that follows learning activities can bring out the potential possessed by students so that they can have the expected competencies, namely growing and developing knowledge, attitudes, and skills. The curriculum used in the current era is the 2013 curriculum (Laila, 2020).

In the 2013 curriculum, students must play an active, creative, and innovative role in solving complex problems, assessing each process, and increasing character integrated into every subject, including Physics (Samudra & Yulkifli, 2019). Physics is a branch of science that studies natural phenomena through a scientific process based on applicable concepts, theories, and principles. Students use physics as science to understand natural phenomena and changes due to human activities (Asrizal & Dewi, 2018). In studying Physics, students are required to build knowledge within themselves by always playing an active role in the learning process. One of the factors supporting learning in the classroom is appropriate and exciting teaching materials for students (Kurnia, 2014). Teaching materials are all forms of materials used to assist educators in carrying out learning activities in the classroom (Sadjati, 2012).

One type of teaching material used in physics learning is e-module. E-module is one type of teaching material that is packaged entirely and systematically. It contains a set of learning experiences planned and designed to help students achieve maximum learning goals. E-modules are learning tools presented electronically, containing materials, methods, limitations, and evaluation methods designed systematically and attractively to achieve the expected competencies according to the level of complexity (Andila, 2020).

The learning process must provide opportunities for students to be actively involved in constructing their knowledge to understand, apply, solve problems, and find new ideas through the knowledge they have acquired (Purnamasari, 2016). One of the contextual learning strategies that can emphasize conceptual and contextual understanding to students in physics learning is the REACT learning model. The REACT learning model can help educators instill knowledge to students (Cahyono, 2017). In REACT learning, students are invited to find the ideas learned, work together, apply them in everyday life, and transfer them to new circumstances (Sofia, 2017). The REACT learning model is a contextual learning model consisting of five stages, namely: relating (connecting), experiencing, applying, cooperating (working together), and transferring (Asyhari, 2016). Relating is learning in the context of real-life experiences or previously acquired knowledge. Experiencing is learning through exploration, discovery, and creation. Classroom experiences can include the use of manipulatives, problem-solving, and laboratory activities. Applying is learning by putting concepts to use by providing realistic and relevant exercises. Cooperating is learning in the context of sharing, responding, and communicating with other students. Then, transferring is learning by using knowledge in a new context (Mawarni, 2019).

According to Dewi (2012), the REACT learning model has several advantages, namely: (1) helping teachers to relate the material being taught to real situations, (2) encouraging students to make connections between knowledge and its application in real life, (3) increasing students' understanding towards a material by linking the material with real-life situations so that the material is easier to understand without the need to memorize, (4) increasing the activity of students in the learning process where at the stage cooperating students are asked to be active in collaborating with other friends and (5) at the stage transferring can increase the ability of students to be able to transfer the concepts that have been obtained to more complex problems (Nisa, 2018).

Research that has been conducted by Ibrahim (2018) regarding the application of contextual-based REACT model physics learning modules on the concept of work and energy. Based on the results of his research, it is shown that the application of the contextual-based REACT model of the physics learning module is effective for improving students' cognitive learning outcomes and can increase students' interest in learning. Another study also conducted by Maulida (2019) stated that the REACT-based sound wave physics module for class XI science developed could improve student learning outcomes and obtain an N-gain score of 0.71. Based on these results, it can be concluded that the REACT-based sound wave physics module is said to be effective and suitable for use in physics learning for class XI science.

Research on the application of the REACT learning model to improve understanding of high school physics concepts was also carried out by Sugianti (2020) in this study, only covering students' understanding of concepts and based on his research obtaining the results of increasing concepts from students. The analysis only covers concept improvement from students. Therefore, the research to be carried out aims to analyze the

need for developing REACT-based e-modules (Relating, Experiencing, Applying, Cooperating, and Transferring) in order to improve students' critical thinking skills. Needs analysis research is carried out by field studies. This research aims to determine the conditions of learning in schools. It is in line with the investigation of Marlina (2021), which states that field studies are carried out by collecting various information regarding the analysis of the needs of educators and students on teaching materials or learning media to determine the conditions of learning in the classroom.

RESEARCH METHOD

The type of research that will be conducted is descriptive research. Descriptive analysis aims to describe, interpret, and explain a variable or situation to be studied appropriately (Soendari, 2012). The population in this study were students of class XI MIPA in Senior High School IT Ciloa BL Limbangan. The sample in this study uses one class from the population class. Sampling in this study uses the purposive sampling technique, namely the technique of determining the sample in considering certain aspects.

In this research, there are several stages carried out. The first stage is in the form of problem identification. At this stage, the researcher intends to identify the problems to be studied so that it does not come out of the issues studied in the design stage. The second stage is in the form of a literature study. At this stage, the researcher looks for relevant sources related to the problems studied, then studies and understands the theories that become guidelines or references obtained from various journals, books, and others. The third stage is in the form of data collection. At this stage, the researcher collects data in the form of questionnaires and test questions given to students to determine the needs of e-module development and the effect on students' critical thinking skills. The fourth stage is in the form of making reports based on research results.

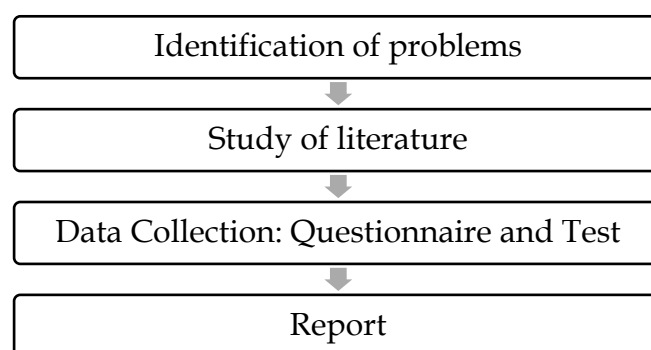


Figure 1. Research flowchart.

(Santoso, 2021)

The research instruments used were tests and questionnaires. The type of test used is a descriptive test of 5 pieces adjusted to the indicators of students' thinking skills. And the type of questionnaire used is a closed questionnaire in the form of a Likert scale consisting of 4 alternative answers. Score 1 if "never", score 2 if "sometimes", score 3 if "often" and score 4 if "always". From the results of questionnaires and tests, the validity and reliability were tested using SPSS. Next, calculate the total score obtained for each indicator and then convert it into a value with a range of 0-100 (Arikunto, 2010).

The value for each indicator is determined using equation (1).

$$value = \frac{Score\ earned}{Maximum\ score} \times 100\% \quad (1)$$

The criteria for analyzing the needs of each indicator areas Tabel 1.

Table 1. Categories of needs analysis.

Category	Value
Very good	$90 < N \leq 100$
Well	$75 < N \leq 90$
Enough	$60 < N \leq 75$
Not good	≤ 60

(Samudra, 2019)

RESULTS AND DISCUSSION

Based on the results of the questionnaire distribution to 40 students the data were obtained as in Table 2.

Table 2. Analysis of student needs questionnaire.

Questions	Percent
Students have learning resource books for learning Physics	75%
Students have difficulty in studying Physics	78%
Students have textbooks or other learning resource books to study physics material	42%
The learning resource book used does not include it as a learning resource	74%
Simple Harmonic Motion material contained in learning resource books is difficult to understand	64%
Students look for other teaching materials other than books from school to help understand the material through modules or others	70%
Students need alternative teaching materials that can be used to learn Simple Harmonic Motion material more quickly and interestingly	68%
Students have never used teaching materials in the form of electronic modules (e-modules)	70%
Students need teaching materials that contain concepts that relate to everyday-life phenomena	72%
Students agree if the Physics teacher develops E-Modules as an alternative to supporting Physics learning	74%

From the results of the questionnaire analysis of student needs in Table 2, students have learning resource books that are used for learning physics. However, in studying physics material, students still have difficulties. It is because the learning resource books used by students have not been covered as learning resources. Students need alternative teaching materials that are easier and more interesting to learn from Simple Harmonic Motion material (Sujanem, 2019). One of the learning resources that can be used easily and attractively is the e-module (Saprudin, 2021). E-modules are learning tools or facilities containing text, images, animations, and learning videos to make learning more interesting. With e-modules, students are more interested in the learning process because they can be accessed anywhere at any time and do not make it difficult for students (Andila, 2020).

Students need teaching materials that contain concepts that relate to everyday life phenomena. The solution to this problem is the development of REACT-based e-modules. The REACT-based e-module has five stages, namely, relating (connecting), experiencing (experiencing), applying (applying), cooperating (working together), and transferring (transferring) (Asyhari, 2016). REACT-based e-modules The REACT model is very efficient for creating student discussions about physics concepts. In addition, this model involves students directly playing a role in connecting the surrounding phenomena by conducting experiments at the next stage, and students explain their experimental experiences in groups to understand the concept (Maulida, 2019). According to 74% of students agree that physics teachers develop E-Modules as an alternative to supporting Physics learning (Latifah, 2020).

One of the physics materials is about Simple Harmonic Motion. Simple Harmonic Motion is one of the physics materials that are able to connect the concepts to be taught with everyday life, and the goal is that students can observe, explain, and can draw conclusions on natural phenomena. Many applications in everyday life can be explored in this material so that students can more easily identify and form knowledge from the events they experience on a daily basis (Al Adawiyah, 2018). Based on the critical thinking ability test results for 40 students, the data were obtained as in Table 3.

Table 3. Critical thinking skills test results on simple harmonic motion material.

Aspects of Critical Thinking Skills	Indicators of Critical Thinking Skills	Percentage of Answers (%)	Category
Provide a basic explanation (Elementary Clarification)	Ask and answer questions that require an explanation	41%	Not good
Determine the basis for decision making (The Basis for the Decision)	Observing and considering the results of observations	71%	Well
Drawing conclusions (Inference)	Conduct induction and assess induction results	52%	Not good
Providing Advanced Clarification (Advances Clarification)	Define terms and consider definitions using appropriate criteria	52%	Not good
Estimating and combining (Supposition and Integration)	Combining information or integrating it in decision making	43%	Not good

The analysis of the critical thinking skills of students shows the average percentage of test results from five aspects, which show a score of 51.8%, including the poor category. It is because the learning resources used by students do not support students' critical thinking skills. Critical thinking ability is always curious about existing information to achieve a deeper understanding (Yustyan et al., 2015). Learning critical thinking in physics learning is very important because, through critical thinking, students are trained to observe the situation, raise questions, formulate hypotheses, make observations and collect data, then provide conclusions (Wahyuni, 2015).

The research implication to develop the e-modules as learning resources that are easy to use and complete to attract students in learning physics, the selection of REACT learning methods is also expected to affect students' critical thinking skills. Based on the results of the analysis of the needs for physics learning problems in SMA IT Ciloa

Limbangan, namely the importance of developing teaching materials in the form of e-modules. The development of the required e-module is an e-module based on REACT. Through the development of REACT-based e-modules, it is hoped that students will be able to find their own concepts they learn, work together, apply these concepts in everyday life and transfer them in new conditions so as to improve student's critical thinking skills (Nikita, 2018).

CONCLUSION

Based on the needs analysis results, data can be obtained that 75% of students have learning resource books for learning physics, but 64% of simple harmonic motion material in learning resource books is difficult to understand. So that 72% of students need teaching materials containing concepts related to everyday phenomena. And 74% of students agree that physics teachers develop e-modules to support physics learning. The student's critical thinking skills obtained 51.8% results, including the poor category. This research implies developing an e-module based on REACT, is expected to improve students' critical thinking skills. This REACT-based e-module is an e-module involves students to discover the concepts they have learned for themselves, collaborate, apply them in daily life, and transfer them to new conditions. The limitation of this research is that it only discusses the needs analysis regarding the importance of developing e-modules for learning physics. For further research, it is expected to be able to develop teaching materials or e-modules using appropriate learning methods to improve students' critical thinking skills.

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