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Creation of Global Warming E-LKPD Based on PBL Model to Facilitate High School Students' Science Literacy: Need Analysis

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ABSTRACT

The world of education has undergone major changes due to the rapid development of technology, thus providing challenges to education. To improve education today, the world of education must make the latest innovations. To keep up with the rapid development of the 21st century with the development of technology and knowledge, the generation that is able to keep up must have skills. One of the skills that students must have to improve their knowledge and compete in the field is scientific literacy. One of the learning resources that can support the learning process is by using electronic teaching materials. Electronic teaching materials that can be used are in the form of E-LKPD. This study uses a qualitative research method. The model used in this study is the ADDIE model. The population in this study were 112 students of class X Phase E in the 2023/2024 academic year. The sample of this study was carried out by random sampling with 30 students as research subjects and 5 lecturers of FMIPA UNP physics lecturers. Based on observations made at SMAN 1 Ulakan Tapakis, there were problems that occurred. The solution that can be done is to create electronic teaching materials in the form of E-LKPD. Based on the problems found, the researcher will create a product in the form of E-LKPD based on the PBL model using liveworksheet.

Keywords : E-LKPD; Problem Based Learning; Science Literacy.

I. INTRODUCTION

The world of education has undergone major changes due to the rapid development of technology, thus providing challenges to education. To improve education today, the world of education must make the latest innovations. Not only in the field of curriculum or facilities and infrastructure, but also in other fields, such as the use of information technology in the learning process [1]. To keep up with the rapid development of the 21st century with the development of technology and knowledge, the generation that is able to keep up must have skills. One of the skills that students must have to improve their knowledge and compete in the field is scientific literacy [2].

Scientific literacy has become a term used to express the broad and comprehensive goals of science education. In PISA 2006, essential qualities of scientific literacy include the ability to apply scientific understanding to life situations involving science [3]. According to PISA (Programme for International Student Assessment), scientific literacy is the ability to use scientific knowledge, identify questions, and draw conclusions based on scientific evidence in order to understand and make decisions regarding nature and its changes due to human activities [4]. Scientific literacy is a goal that is to be achieved by subjects related to science. One of the subjects that teaches science is physics [5].

Science literacy skills also include the field of physics, which is defined as the science that studies natural phenomena. Improving students' abilities in this field is very important to improve students' abilities to adapt to advances in the world of technology [6]. Therefore, the assessment of scientific literacy in physics education is also very important. Scientific literacy can improve understanding of physics, for example in finding problems and exploring sources to solve problems. Several factors in students' low scientific literacy are influenced by the curriculum and education system, the selection of learning methods and models, learning tools and facilities, and learning resources. One of the learning resources that can be applied to support learning activities in the classroom is teaching materials [7].

Teaching materials are a systematically arranged form that allows students to learn independently with the applicable curriculum. Teaching materials that will be used by teachers to help and support the learning process [8]. One of the efforts that can be made to activate students to generate ideas, as well as provide opportunities to express their opinions is by creating interesting teaching materials, one of which is the Student Worksheet (LKPD).

LKPD is a teaching material that contains a series of questions and important information to help students find creative ideas and complete them [9]. The use of LKPD can help teachers manage learning, help students find ideas through individual activities or in group work, and can develop process skills in student success in achieving learning objectives [10]. Currently, LKPD is still very common in schools and usually only contains a summary of the material. The material presented is usually instant and is not accompanied by a detailed explanation of how to use LKPD for teachers and students [11]. LKPD is usually taken from student textbooks that are not necessarily in accordance with the characteristics of students. Therefore, one way to support the teaching and learning process is to use electronic student worksheets (E-LKPD). As technology develops, E-LKPD can encourage student participation during the learning process [12].

E-LKPD is a digital learning tool as an exercise or assignment that can be accessed using a computer/laptop or smartphone, presented in the form of images, videos, audio that can be answered directly on E-LKPD [13]. E-LKPD can also be adjusted to the wishes and creativity of educators to attract students' attention so that it can optimize the teaching and learning process. This E-LKPD will of course be implemented with the Problem Based Learning (PBL) model.

The PBL model is a learning model that uses contextual problems that are "ill structured" which means that it requires additional investigation to solve it. PBL is a model where students are faced with problems and then carry out an information search process that is centered on students. In this learning model, educators play a role in helping students find solutions to problems [14]. Based on the definition that PBL is a model that provides authentic real-world problems, where the problems given to students can be solved or completed with the help of teachers in finding information as a solution to the problems given.

The purpose of this study is to determine the need for the development of teaching materials to be developed for physics subjects that are in accordance with the characteristics of current technological developments that are increasingly rapid. The results of this study will be used as a basis or reference in the development of electronic teaching materials in the form of E-LKPD in physics subjects. In the context of this study, to obtain accurate and relevant information about the research subject, interviews were conducted with physics teachers. The research sample is an informant who has knowledge and experience related to the research topic. Therefore, it is expected that the data from this interview will provide an overview of the existing problem-solving methods.

II. METHOD

This study uses a qualitative research method. Creswell, JW (1994) in his book states that qualitative research is a research process to understand human or social problems by creating a comprehensive and complex picture presented in words, reporting detailed views obtained from information sources, and conducted in natural settings [15]. This means that this qualitative research understands the problems that exist in real life, then makes a report obtained from information around the problem. The model used in this study is the ADDIE model. The stages in this study are the initial analysis stage (Analysis) which is carried out using the survey method in April 2024 including a questionnaire to find out the obstacles experienced by students and student needs in the learning process, an essay test including science literacy indicators to find out the science literacy possessed by students, and interviews with physics teachers to find out the learning process. The population in this study were 112 students of class X Phase E in the 2023/2024 academic year. The sample of this study was carried out by random sampling with 30 students as research subjects and 5 lecturers of FMIPA UNP physics lecturers. Data

collection techniques were carried out using questionnaires, essay tests and interviews. The data collection instrument used a student needs questionnaire, an essay test that included science literacy indicators, and interviews with physics teachers at SMAN 1 Ulakan Tapakis.

III. RESULTS AND DISCUSSION

The results of the data obtained from this study by conducting interviews with physics teachers and distributing questionnaires and giving essay tests to students of SMAN 1 Ulakan Tapakis. The results of the analysis of the physics teacher interviews can be seen in **Table 1**.

Table 1. Results of physics teacher interview analysis

No.	Question	Answer
1	What obstacles did you face during the physics learning process?	Lack of enthusiasm in learning among students, there are students who just sit quietly and there are also students who cannot conclude the material during learning.
2	What learning model do you use in the learning process?	The model used in the learning process uses problem based learning and discovery learning
3	Why did you choose to use this model in the learning process?	The model used can help students understand physics learning and solve problems well.
4	What teaching materials do you use in the learning process?	The teaching materials used are in the form of modules, printed textbooks, handouts in the form of assignments.
5	How do students respond to the teaching materials you use?	Students are more enthusiastic if the teaching materials used have images and colors that match the subject matter.
6	What do you think if the problem based learning model is applied to global warming material?	Very good and supports students in solving problems in everyday life regarding global issues.
7	What do you think if the Student Worksheet (LKPD) is made electronically?	Very good in the learning process, so that it is not monotonous and learning can be more enjoyable for students.

Based on **Table 1**. Teachers have used several teaching materials in the form of teaching modules, printed textbooks, and handouts in the form of student assignments. During the learning process, teachers have never used electronic teaching materials. According to teachers, the use of teaching materials used in the learning process, students are more enthusiastic if the teaching materials have images and colors that match the subject matter. The use of electronic teaching materials such as E-LKPD is very good in the learning process, so that it is not monotonous and learning can be more enjoyable for students.

Teachers have implemented the problem based learning (PBL) model and the learning process. However, the use of the PBL model has not been implemented according to the existing syntax or stages. Teachers stated that students do not understand the existing problems and have difficulty solving problems that occur in everyday life. In fact, according to teachers, the PBL Model can guide students in solving problems if implemented properly. Students have difficulty when faced with complex problems and students' problem-solving abilities are still relatively low [16].

The results of the analysis of the questionnaire given to 112 students at SMAN 1 Ulakan Tapakis can be seen in **Table 2**.

Table 2. Results of student questionnaire analysis

No.	Student Needs Analysis Results
1	50.9% of students stated that physics was not a fun subject
2	54.5% of students find physics lessons difficult
3	100% of students use printed textbooks and modules during the learning process.
4	74.1% of students stated that teaching materials can make it easier to understand physics material.
5	61.6% of students stated that they understood the teaching materials better when they used colorful and attractive materials.
6	79.5% of students use smartphones to search for learning resources on the internet
7	71.4% of students stated that they did not understand the global warming material.

Based on **Table 2**. students still use printed teaching materials during learning. Students also have difficulty in physics lessons where the teacher still uses printed teaching materials and has not implemented learning through electronic teaching materials. This can indicate that there is a need for electronic LKPD to help the learning process of students at SMAN 1 Ulakan Tapakis.One of the interesting teaching materials assisted by technology is E-LKPD [17]. E-LKPD can be designed according to the teacher's wishes and creativity so that the appearance can be more attractive and optimize learning. The advantage of E-LKPD is that it is easy and practical to use.

The results of the analysis of the essay test given to 112 students to determine the scientific literacy possessed by the students can be seen in **Figure 1**.

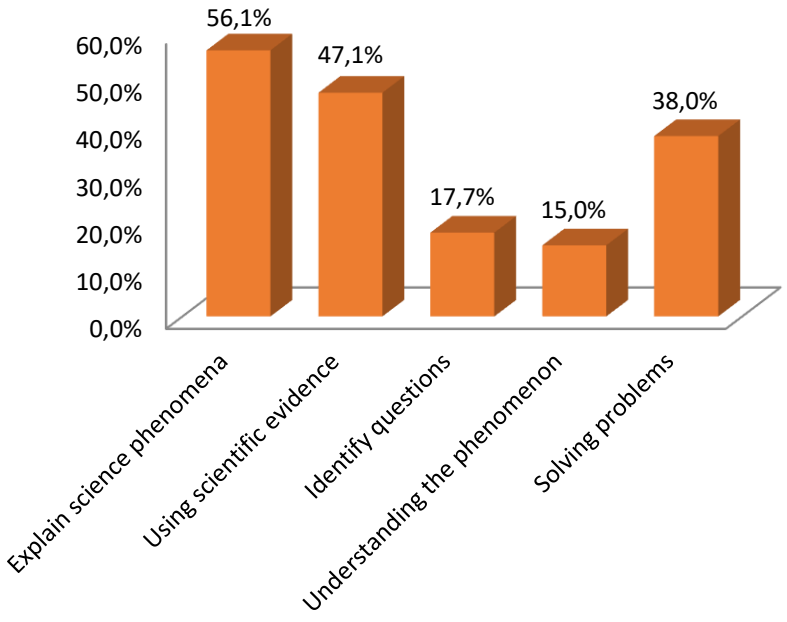

Figure 1. Results of percentage of science literacy scores per indicator

Based on the data in **Figure 1**. it can be seen that the percentage of each indicator of scientific literacy. The first and second indicators are in the medium category. The third and fourth indicators are in the very low

category. The fifth indicator is in the low category. These results are also relevant to the results of the PISA test held by the OECD (Organization for Economic Cooperation and Development) every three years. Every three years, the PISA International assessment assesses the knowledge and skills of 15-year-old children in the fields of literacy, mathematics and science in countries [18].

Based on observations conducted at SMAN 1 Ulakan Tapakis, there are problems that occur. The solution that can be done is to create electronic teaching materials in the form of E-LKPD. E-LKPD is also very helpful for teachers in the learning process that links the material directly to everyday life [19]. This E-LKPD is packaged in a practical and interesting way, presented using images, audio, and video, so that students can better understand the material presented and make learning more interactive [20]. E-LKPD is able to assist in the process of facilitating students' science literacy skills [21].

The next solution is teaching materials developed using the PBL model.This model can help students in finding a problem and solving problems in everyday life. This PBL model can also help solve problems and improve students' scientific literacy. The PBL model has a great influence in improving scientific literacy skills in terms of content, competence, and attitudes that help students solve problems [22].

Problems that present real-world problems, then the material that can be chosen is global warming. The depiction of real-world problems will give students an active role in finding solutions to these problems. Global warming material is material that studies the facts of environmental change and human activity [23]. Based on the results of the questionnaire, 71.4% of students stated that they did not understand the material on global warming. This is in line with previous research stating that global warming material is considered difficult by students because they cannot directly observe natural processes or events [24]. In addition, other studies state that teachers try various ways to achieve material goals, but it turns out that students still have difficulty in understanding the concept of global warming. Student learning is lower than the KKM [25]. With the existence of global facts or issues, students are required to play an active role in providing solutions to problems.

Based on the problems found, the researcher will create a product in the form of E-LKPD based on the PBL model using liveworksheet. Research conducted by previous researchers stated that the use of the liveworksheet platform has flexible advantages so that it can be accessed via Android or laptop or computer that does not require printing again [26]. Making E-LKPD with liveworksheet can also be used as supporting teaching materials for students that can be accessed flexibly and practically according to student needs.

IV. CONCLUSION

Based on the results of the analysis of the research conducted, teachers still use conventional teaching materials in the form of printed textbooks distributed to students. Meanwhile, students use smartphones to search for information as additional material in understanding the material or doing assignments. So teachers and students need electronic teaching materials in the learning process. These electronic teaching materials can be used via smartphones and provide convenience for students. The teaching materials used in this study need to be developed to facilitate students' scientific literacy which is still relatively low based on the essay test given to 112 students. This study is an initial analysis to develop the product to the next stage, namely development. The product development that will be made is in the form of E-LKPD based on the PBL model to facilitate students' scientific literacy.

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