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Development Of Student Worksheets (Lkpd) Based On Problem Based Learning (Pbl) On Business And Energy Materials To Improve Students' Scientific Literacy

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ABSTRACT

The objectives of the research are: 1) To determine the feasibility of student worksheets (LKPD) based on problem-based learning (PBL) on class XI.2 business and energy material. Knowing student responses using LKPD on PBL-based business and energy material. 3). Knowing the magnitude of the increase in students' scientific literacy through student worksheets (LKPD) based on problem-based learning (PBL). Based on these objectives, this research uses Research and Development (R & D) research using the Borg and Gall model (Sugiyono, 2009), which includes finding potential and problems, collecting data, product design, design validation, design revision, product testing, product revision, and usage trials. The research subjects were students in class XI IPAS1 and XI IPAS3 at SMA Negeri 1 Gandapura. The results showed that material experts had a percentage of feasibility of 85% in the "very feasible" category. And media experts obtained a percentage of 80% feasible. The results of small-scale product trials carried out on teacher responses were very good or interesting, with an average percentage of 95%. Then class XII. The percentage result obtained was 92% in the "very interesting" category. The increase in scientific literacy skills was also shown based on the results of the experimental class posttest N-gain test, which 0.75 or with a score of 75% in the high category. And the control class scored 0.53 with a percentage of 53% in the medium category. In conclusion, the PBL-based LKPD developed by researchers is highly suitable for implementation in schools to enhance students' scientific literacy skills.

Keywords : Student Worksheets,*Problem Based Learning*,Work and Energy, Scientific Literacy

1. INTRODUCTION

Education is one of the keys to advancing and educating humans. Quality education can create quality human resources (Salahudin et al., 2018). The development of education in Indonesia cannot be separated from curriculum renewal. In each particular period, the curriculum undergoes an evaluation process. Currently, the educational curriculum in Indonesia is always changing following developments in science and technology. The curriculum is dynamic in education, meaning that changes and developments are always made to suit the times (Alhamuddin, 2014). To balance education so that it can develop with the times, an integration of literacy skills, knowledge skills, skills and attitudes, as well as mastery of technology is very important.(Sutrisna, 2021). Among the various abilities that are able to answer the challenges of current civilization development, one of them is scientific literacy abilities.

Scientific literacy is the ability to understand scientific concepts and processes and utilize science to solve problems in everyday life (Sutrisna, 2021). Scientific literacy can be measured through the PISA study conducted by the OECD (Organization for Economic Cooperation and Development) every three years. The results of the 2015 PISA survey showed that Indonesia's

average scientific literacy achievement was ranked 9th from the bottom of 72 OECD member countries with an average score of 403. This average score has a lower difference with the average score of other OECD member countries, namely 90 points. Based on the PISA results, it can be seen that the literacy achievements of Indonesian students are low in the aspects of scientific literacy, namely aspects of context, knowledge, competence, and attitudes.(Zainah Asma and Muchlis, 2018).

Physics is a science or branch of natural science (IPA) that studies phenomena that occur in theories that are actually very close to everyday human life (Pratiwi, 2019). Physics is one part of Natural Science (IPA), which is a science that studies symptoms, events, or natural phenomena, and reveals all the secrets and rules of the universe.(Payudi & Ertikanto, 2015). Learning can be done by implementing student-oriented learning types (student centered approach) such as peer discussion, problem based learning, peer teaching, and inquiry-based learning(Chandrikasari & Qosyim, 2019).

Problem-based learning (PBL) is a learning model where the presence of a problem is the beginning of the learning process (Sukorini, 2019). The PBL model is a learning approach that makes students think critically and have skills to solve problems in the real world, because one strategy for increasing scientific literacy is by connecting scientific concepts with problems that exist in real life. So it is hoped that it can improve scientific literacy skills (Fadhila, 2022). The learning method in the form of problem solving or often called problem based learning (PBL) is a learning model that directs students to a problem to become a stimulus that encourages students to use their knowledge to analyze the problem, followed by a student information search process through discussion. In a small group, to find a solution to a given problem (Hotimah, 2020). PBL should be supported by teaching materials, including student activity sheets (LKPD).

LKPD is a printed teaching material that material, summaries, and instructions for learning tasks that students must complete to achieve asic competencies achieved Octavini Sonia, 2021). Teachers use learning materials used by teachers to explain the material and help students complete a task are called LKPD, where the teacher designs LKPD to suit the needs and abilities of students, so that they can be motivated to be active and develop their scientific literacy skills.(Arindasandy & Trimulyono, 2020).

Based on the results of observations and interviews with physics teacher Mr. Zulfuadi S.Pd at SMA Negeri 1 Gandapura, it was found that students were unable to understand and solve scientific literacy questions due to limited learning media, namely teachers still use textbooks. provided by schools, and in physics learning, teachers tend to use the lecture, discussion method followed by providing practice questions that only require students to remember the material they have studied. This is the main factor in the lack of scientific literacy abilities of students in these schools. The low scientific literacy abilities of students are caused by their inability to work on scientific literacy questions that require understanding and analysis of the questions. This is proven by the low AKM (minimum competency assessment) score at SMA Negeri 1 Gandapura, where the student's reading literacy score is 1.60 and numeracy is 1.42 in the minimum achievement category. Based on these results, it shows that scientific literacy abilities are relatively low.(Hanifah & Retnoningsih, 2019)Good student literacy assessment standards are in the range of 2.10-3.00 or fall into the category above minimum competency. To overcome the aforementioned problems, there needs to be a variety of learning media. There are several options available, one of which is the utilization of problem-based

learning (PBL) through LKPD to enhance scientific literacy.

In accordance with the research conducted(Arindasandy & Trimulyono, 2020)that the PBL-based LKPD to improve the scientific literacy skills of class X students is very valid with an average validation score of 3.65 based on the validator's assessment. Based on these results, it is suitable for use as learning material in schools. Which can be seen from the assessment of the appropriateness of the LKPD in the presentation aspect received a very valid category with a score of 3.92, the language aspect received an average value of 3.33, the aspect of suitability with problem-based learning received a score of 3.67, and the aspect of suitability with skills. Science lietation score is 3.67 and is included in the valid category.

Based on the various descriptions that have been presented, the appropriate use of LKPD as a learning tool for students, they are able to overcome learning problems and increase students' scientific literacy. Therefore, researchers are interested in conducting research entitled "Development of Student Worksheets (LKPD) Based on Problem Based Learning (PBL) on Business and Energy Material to Improve High School Students' Scientific Literacy".

2. METHOD

This research uses the research that develops or Research and development (R&D). research R&D research is a research approach to produce new products or improve existing products. Borg and Gall (1983: 772) define development research as a process used to develop and validate educational products. Research and development (R&D) is an activity of collecting, processing, analyzing, and presenting data systematically and which is accompanied by activities to develop a product to solve the problems faced (Sugiyono, 2009). The research used in the study is both quantitative and qualitative research (Sugiono , 2009). Borg and Gall (2011) stated that it is possible to limit research to a small scale, including limiting research steps that are tailored to the researcher's needs. The researchers' limited funds and time caused the research steps to be simplified into 8 development steps in this research, namely finding potential problems, collecting data, product design, design validation, design revision, product trial, product revision, and usage trial. The research design used was a Nonequivalent Design, which involved measurements carried out in two groups (pre-test) by conducting a certain period of time and then carrying out a second measurement (post-test).

Table 1Nonequivelent design

Class	Pretest	Treatment	Posttest
Experiment	O1	X.1	O2
Control	O3	X.2	O4

Source: (Sugiyono, 2017)

The subjects of this study were students in class XI IPAS1 and XI IPAS3 at SMA Negeri 1 Gandapura. In collecting data, researchers used test instruments to measure students' scientific literacy abilities. The test instrument used was an essay test consisting of 10 questions that have been validated by expert lecturers.

3. RESULTS AND CONCLUSIONS

The results of the feasibility trials conducted by experts regarding PBL-based LKPD are as follows:

Table 2. Feasibility test results by experts

Validator	Average	Percentage%	Criteria
Material expert	4.25	85%	Very Worth It
expert	3.73	80%	Worthy

Based on the table above, the validation results carried out by material expert validators on the PBL-based LKPD that has been developed, namely the validation results from material experts obtained an average score of 4.25 with a percentage of 85% with very feasible criteria. Meanwhile, the validation results carried out by media expert validators on the PBL-based LKPD that has been developed, namely the validation results obtained an average score of 3.73 with a percentage of 80% with appropriate criteria.

The results of the response carried out by teachers and students to see the attractiveness of the LKPD module that has been developed. The results of the response are as follows:

Table 3. Results of responses by teachers and students

Response	Average	Percentage %	Criteria
Teacher	4.75	95%	Very interesting
Student	4.62	92%	Very interesting

Based on the table above, the results of the teacher's response to the PBL-based LKPD that has been developed, namely the assessment results, obtained an average assessment score of 4.75 with a percentage of 95% and very interesting criteria. Similarly, the students' response to the PBL-based LKPD that had been developed was that the assessment results obtained an average assessment score of 4.62 with a percentage of 92% and very interesting criteria. **The study obtained the** results of increased scientific literacy scores among students in business and energy material by analyzing pretest and posttest questions from classes XI IPAS 1 and XI IPAS3. The average pretest-posttest scores are presented below:

Table 4. Data on student pretest-posttest results

Class	**Pretest Average**	**Posttest Average**
X1 IPAS 1(control)	24.75	65
X1 Science 3 (experiment)	28.15	82.1

Based on the table above, it can be seen that the average pretest score for Class XI IPAS 1 is 24.75 and the average posttest score is 65, while Sedangkat is in class. From the results of the pre-test and post-test scores, the N-gain test was carried out to measure the increase in students' scientific literacy in class.

Table 5. N-gain test results

N-gain test results **Test Results**			
Class	Pretest	Posttest	N-gain
XI IPAS 1 (control)	24.75	65	0.53

XI IPAS3 (experiment)	28.15	82.1	0.75

Based on the results of the N-gain test table in class Based on the results of the N-gain test table in the experimental class using PBL-based LKPD, the results were 0.75 or a percentage of 75% in the high category.

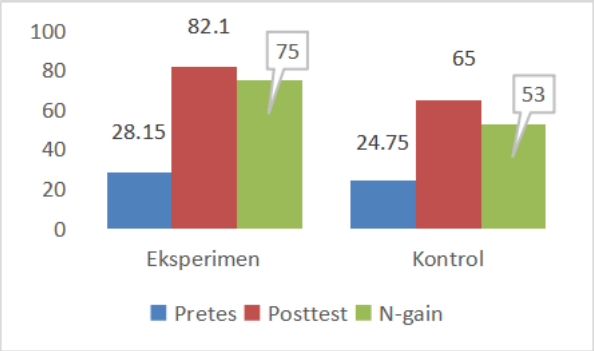

Figure 1. Diagram of N-gain pretest and posttest results for control and experimental classes.

The results of this study are also supported by researchArindasandy & Trimulyono, 2020,Ulandari & Mitarlis, 2021 andZainah Asma and Muchlism (2018) "Development of LKPD with a Problem Based Learning (PBL) Model Orientation to Train Scientific Literacy Skills in Attitude Aspects in Reaction Rate Material for Class XII Students of State High School 1 Kedungwaru Tulungagun". concluded that there was a difference in the scientific literacy skills between students who received problem-based LKPD in science learning and those who received non-problem-based LKPD. The use of problem-based LKPD improved students' scientific literacy skills more than the use of non-problem-based LKPD.

4. CONCLUSION

Based on the results of research conducted by researchers at SMAN 1 Gandapura with the research title "Development of Student Worksheets (LKPD) based on Problem Based Learning on Business and Energy Material to Improve Students' Scientific Literacy" it can be concluded that:

1. Based on the results of expert validation of PBL-based LKPD, the results showed that material experts with a percentage of 85% in the very feasible category, which means the product developed by researchers is very suitable for use. And media experts obtained a percentage result of 80% in the feasible category, which means the product developed by the researcher is suitable for use.
2. The small-scale product trials conducted on teacher responses yielded very good or interesting, with an average percentage of 95%. Next, in class XII, The obtained percentage result was 92% in the "very good" category, which means that the product developed by the researchers was very interesting to use.

Based on the N-gain test conducted in the experimental class, the obtained results with a percentage of 75% were in the "high" category. The control class obtained results with a percentage of 53% in the "medium" category. This suggests an improvement in student learning outcomes following the implementation of the product developed by the researcher.

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