Development of Student Worksheets-PBL
Improve Students Critical Thinking Ability

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Abstract—This study aims to: (1) produce a problem based learning based worksheet that is suitable for thematic learning in grade 5 of elementary school; (2) knowing the students critical thinking skills by applying the participants worksheets in the class. his student worksheet is compiled using the 4D model of Research & Development. Data retrieval research was conducted at SDN 101877 Tanjung Morawa. The research phase is define, design, develop, and Disseminate. The level of feasibility of student worksheets is obtained from expert validators and practitioner validators analyzed. After being validated and revised, the product is tested on a limited basis on students. The results of the trials were then analyzed to determine the feasibility of the worksheet of students from the perspective of students. Extensive tests are conducted after making improvements from the results of limited trials. The final results of the extensive test in the form of pretest and posttest values were then analyzed and obtained a standard gain value of 0.87 in the high category.

Keywords: (Development, Problem Based Learning, Critical Thinking Ability

I. INTRODUCTION

The 2013 curriculum requires students to have the ability to live as individuals and citizens who are faithful, productive, creative, innovative and able to contribute to the life of society, nation, state and world civilization [8]. This is also reinforced by the goal of national education, namely education based on the life line of the nation (culturel-naatiaal) and aimed at the needs of life that can lift the ranks of the state and its people, so that they can work together with other nations for the glory of all people throughout the world [2]. The learning process in the classroom is a system that includes many components, including: teacher, students, objectives, subject matter, learning strategies, learning media and evaluation. Teachers are the key and also the spearhead of achieving the mission of education renewal. They are at the central point to regulate, direct, and create an atmosphere of learning activities to achieve the intended national education goals and missions. Therefore, the teacher is indirectly required to be more professional, innovative, perspective, and proactive in doing the learning task. In this case the teacher must be able to develop their abilities, in developing their abilities in managing learning is one of the factors supporting success in learning.

However, in reality the expectations that are desired in education have not all been realized properly, so that changes are still needed more in terms of the curriculum and the ability of the teacher itself. Based on observations obtained from the test site, it was found that there were discrepancies between teaching materials and curriculum in the learning process. Teachers and students only use teaching material that is ready to use as a reference, namely a textbook. In fact, textbooks facilitated by schools are very limited. Every week students must take turns carrying books or one textbook for two students. The textbook has not facilitated students to achieve the expected competence because it does not fit the needs and characteristics of students at SD Negeri 101877 Tanjung Morawa. Student questions or worksheets are still very limited, so students do not practice much. More writing from the blackboard. While 5th grade students should do more exercise, develop creativity and do various things in problem solving so that students' critical thinking patterns can be formed properly. Therefore, in this study the authors conducted a development worksheet based on problem based learning.

II. THEORETICAL

According to Siddiq [12] states that LKPD is packaged with only an emphasis on training, assignments or questions only. Although it only emphasizes this matter, LKPD still presents a description of the material but is presented briefly. The questions presented in LKPD must really be developed based on an analysis of learning objectives / competencies that have been translated into achievement indicators. According to the Ministry of National Education [8] Student Worksheets (LKPD) are sheets containing assignments that must be done by students. Activity sheet in the form of instructions or steps to complete a task. The task must be clear the basic competencies to be achieved. Trianto [16] argues that LKPD is a student guide that is used to carry out investigation or problem solving activities. This activity sheet can be a guide for developing cognitive aspects of the exercise and a guide for developing aspects of learning in the form of experiments or demonstrations. LKPD contains a set of fundamental activities that must be done by students to maximize understanding in an effort to form basic abilities in accordance with the learning indicators that must be taken. Meanwhile, according to Prastowo [9] LKPD is not an abbreviation of...
Critical thinking is defined as a disciplined mental activity carried out by individuals to understand the truth of a statement. It involves examining the evidence and arguments supporting the statement, analyzing its logical consistency, and evaluating the reasoning process itself. Critical thinking requires the ability to think independently, objectively, and critically, and to suspend personal prejudices and biases. It involves the ability to identify, understand, and evaluate the arguments and evidence presented in a given context.

Problem-based learning (PBL) is an influential approach to teaching and learning. It is based on the premise that students learn best when they are actively engaged in solving problems. In PBL, students work in small groups to tackle complex, real-world problems, and are encouraged to apply their knowledge and skills to find solutions. PBL is characterized by the following characteristics:

1. **Problem-centered Learning:** Students are presented with a real-world problem or question that requires them to apply their knowledge and skills to find a solution.
2. **Team-based Learning:** Students work in small groups to solve the problem, which promotes collaboration and communication.
3. **Reflection and Self-assessment:** Students are encouraged to reflect on their learning process and to assess their own understanding and skills.

PBL is a powerful tool for promoting critical thinking and problem-solving skills among students. It encourages students to think critically, to question assumptions, and to seek multiple perspectives. By engaging with real-world problems, students are able to apply their knowledge and skills in practical contexts, which enhances their understanding and retention of the material.

To implement PBL effectively, educators must first identify the learning objectives and then design a problem that aligns with those objectives. The problem should be challenging yet achievable, and should require students to apply their knowledge and skills in a meaningful way. Educators must also provide guidance and support to help students develop the necessary skills to solve the problem. This includes helping students to identify the key issues, to develop a strategy for solving the problem, and to reflect on their learning process.

In conclusion, critical thinking and problem-based learning are essential components of effective teaching and learning. By promoting critical thinking and problem-solving skills, educators can help students to develop the knowledge and skills they need to succeed in the twenty-first century. Through the implementation of PBL, educators can provide students with the opportunity to engage with real-world problems, to apply their knowledge and skills, and to develop the critical thinking skills that will be essential in their future careers.
occurred; (3) Conclusions, namely ensuring the truth of a statement of the situation that occurs; (4) Situation, namely knowing the condition of the problem to be solved; (5) Clarity, which is the ability to know clearly the problem to be solved; and (6) thorough examination.

In the field of education, critical thinking can help students improve understanding of the material being studied by critically evaluating arguments in textbooks, journals, discussion partners, including teacher’s arguments in learning activities. So critical thinking in education is the competency to be achieved as well as the tools needed to construct knowledge. Thinking displayed in critical thinking is very orderly and systematic. Critical thinking is one of the high-level thought processes that can be used in the formation of students’ conceptual systems. Besides that students’ critical thinking can be developed through providing meaningful experiences. The meaningful experience in question can be in the form of verbal or written opinions as a scientist. These meaningful opportunities can be in the form of discussions that arise from divergent questions or ill-structured problems, as well as practical activities that require observation of symptoms or phenomena that will challenge students’ thinking abilities.

III. RESEARCH OF METHOD

This research is an educational development research (R & D). This study aims to develop a Problem Based Learning Worksheet based on Class V of SDN 101877 Tanjung Morawa. Subjects in the study were 20 students in class V. The device development model as suggested by Thiagarajan, [17] is a 4-D model, which consists of 4 stages of development namely, defining, designing, developing and disseminating. The trial design in this study used the One Group Pretest-Posttest Design design. The first step is to take measurements as an initial test (pretest), then subject to treatment within a certain period, then a final trial (posttest). The pretest and posttest design research design is with the following table pattern:

| Stape Validation | Number | Assessmen Aspect | Mean | % | Category |
|------------------|--------|-----------------|------|---|----------|
| 1                |        | Content / material eligibility | 3.67 | 73.4 | good     |
|                  |        | Language Eligibility | 3.80 | 76.0 | good     |
|                  |        | Design Eligibility   | 3.59 | 89.7 | good     |
| Mean             | 3.68   | 79.7             | Good |
| 2                |        | Content / material eligibility | 4.50 | 90.0 | Best     |
|                  |        | Language Eligibility | 4.50 | 90.0 | Best     |
|                  |        | Design Eligibility   | 3.94 | 98.5 | Good     |
| Score Mean       | 4.31   | 92.8             | Best |

In this table, it can be seen a significant increase between stage 1 validation and stage 2 validation. The average score at stage 1 is 3.68 with the category of "good" and the average score at stage 2 is 4.31 with the category "very well". The following is a graph of the results of the validation of the material and graphic experts.

![Figure 1. Validation Diagram of Expert Content / Material Phase 1 and Phase 2](image)

In this figure, it can be seen an increase in critical thinking skills test, see Table 3.

Data analysis of student effectiveness is done by analyzing student learning completeness, achievement indicators, student responses and learning representations.

IV. RESULT AND DISCUSSION

Data validation results by expert lecturers on content material content / material eligibility, language eligibility and graphic worthiness. Validation from expert lecturers is done twice, the first is done by giving every aspect, while the second can only be seen on all products after revision. Following are the validation results in each aspect.

| TABLE 2 VALIDATION EXPERT CONTENT CONTENT PHASE 1 AND 2 |
|---------------------------------------------------------|
| Stape Validation | Number | Assessmen Aspect | Mean | % | Category |
| 1                |        | Content / material eligibility | 3,67 | 73,4 | good     |
|                  |        | Language Eligibility | 3,80 | 76,0 | good     |
|                  |        | Design Eligibility   | 3,59 | 89,7 | good     |
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|                  |        | Design Eligibility   | 3,94 | 98,5 | Good     |
| Score Mean       | 4,31   | 92,8             | Best |

Fig.1. Validation Diagram of Expert Content / Material Phase 1 and Phase 2
This means that students' critical thinking skills through the use of PBL-based students worksheets are much better, because in the learning process with this model students are directed to conduct several experiments repeatedly. Experiments carried out repeatedly and independently aims to formulate and test hypotheses (PBL syntax), so as to foster student activeness in asking questions and communicating knowledge possessed to his peers. Teachers who act as facilitators in learning problem-based learning make students learn independently so as to foster student activity to dig deeper knowledge possessed. In addition, the problem based learning model which is a learning model that trains students to find their own concepts based on real problems from life with inquiry skills (science process skills) forms better and longer lasting concepts of student knowledge.

The data of this research are in line with the results of the research by [10] with the title research Development of Student Worksheet on Materials Economy Based Problem Solving said that Based on the results of this research, it concludes that the student developed worksheet with problem-based instruction is valid, practical, and effective, so it is very well used by the teacher as a supplement in teaching to complement the teaching materials in the learning process. Then [7] with the research Development of Problem Solving-Oriented Worksheet of Physics Learning In Senior High School said that The results showed that the average increase in the learning outcomes of the learners was equal to 79.44 with a difference in the scores of learning outcomes where \( t_{count} = 32.806 > t_{table} = 1.734 \), with a significance level of 0.000. Also, the improvement of learning outcomes on the response of learners gives significant influence with a score of 0.338 with a significance level of 0.085. Based on these results the development, the problem-solving oriented students' worksheet is declared valid and effective based on the results of validation tests by experts and the results of the implementation of classroom learning. These results impact the students’ learning outcomes. Next research by [3] based on the results of the research, it can be concluded that (1) a student worksheet based on Problem Based Learning has the potency to improve the 7th grade student's creative thinking skill based on assessment of expert lecturers and science teachers on the content business feasibility component, language and image component, component, and presentation graphics component get score 105.75 of a maximum score of 120 with a value of "A" is categorized as "Very Good", (2) a student worksheet categorized as "Good" with a value of 'B" based on student response with score 66.09 of maximum score of 88, (3) the student's creative thinking skill improves after using a student worksheet based on Problem Based Learning with N-gain score 0.72 categorized as "High".

V. CONCLUSION

From the results of this study it can be stated that the development of PBL-based learners worksheets influences students' critical thinking skills. This can be seen from the results of the average pretest score of students who only 45.10 to 82.95 after learning with the PBL-based LKPD.

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