

Development of Student Worksheet Based on Problem Based Learning to Improve Students' Critical Thinking Ability in 5th Grade Elementary School

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Abstract

The problem of the research and development was the low ability of critical thinking students and the worksheet used during learning does not support the ability of critical thinking of 5th grade Elementary School in north Raman. This research and development to develop worksheet based on PBL that is feasible and effective in improving students critical thinking skill. The research method used the design of Borg & Gall. The population of this research is the students of 5th grade Elementary School in north Raman. The research sample was determined by purposive sampling technique was 20 students' in 5th grade class A of Elementary School Raman Endra. The worksheet was validated by media expert, material expert, language expert, and practitioner. Data Collector uses as valid and reliable objective test instrument. The data analyzed by using N-Gain. The result showed that the worksheet was feasible to use and effectively improved student critical thinking skill.

Keywords: Worksheet, PBL, critical thinking skill

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1. INTRODUCTION

Education in Indonesia is designed in the form of a system that can face the challenges of the times and produce human resources in accordance with the demands of the required competencies. Law Number 20 of 2003 concerning the National Education System Articles 3 and 35 states that the graduate competency standard is a graduate's ability qualification which includes the attitudes, knowledge, and skills of students that must be fulfilled or achieved from an educational unit at the primary and secondary education levels.

Students are not only intelligent human beings who think from memorizing activities, but they need critical thinking skills in solving problems (Judge, et al (2009: 4). Critical and objective thinking is needed in seeing problems so that it is easier to make alternatives and determine solutions. Critical thinking process is needed to sort and choose the most appropriate solution to overcome and solve problems Critical thinking is needed to process the information obtained in order to make logical decisions Stobaugh (2012: 4) As a follow-up to the demands of human resource competence, then the government imposed the 2013 curriculum as a step change from the Abidin curriculum (2014: 11-12).

The implementation of the 2013 curriculum aims to answer the challenges of the times towards education, namely to produce graduates who are competitive, innovative, creative, collaborative and have character. In order to achieve the final orientation, it is realized that educator It is not only done to develop knowledge based on the core subject of learning but it must also be oriented so that students have creative, critical, communicative, and character abilities.

The 2013 curriculum is implemented containing integrated thematic learning which is a complete profile of subjects and the development of subject content into integrated thematic learning that contains background, subject characteristics, understanding, principles, core competencies and basic competencies of subjects, learning design, learning models, assessment, media and learning resources, and the role of educators as developers of school culture. According to Prastowo (2013: 117) basically thematic learning is an integrated learning model that uses themes to link several subjects, so that it can provide meaningful experiences. Based on this statement, thematic learning is seen as theme-based learning that can provide knowledge and meaningful learning experiences.

The results of observations and interviews with the homeroom teacher of class V elementary schools in North Raman District, obtained information related to teaching and learning activities. The information shows that the implementation of the 2013 curriculum has not been implemented optimally. The acquisition of material that occurs during the learning process has not been directed to the learning process that directs the use of a comprehensive scientific approach. Learning tends to be conventional so that it is teacher center characterized by the dominance of the active teacher who presents learning. In addition, educators do not bring up everyday problems that occur around the environment of students as initial capital in acquiring knowledge, so that students only learn in a structured manner according to the procedures written in textbooks. Educators assume that

learning in class is only for completing the material in the book. Students are seen as objects not as learning subjects so that students are less active in exploring knowledge.

This situation resulted in the learning process tending to be less meaningful and boring. The use of learning models that have not varied, has an impact on the process of acquiring knowledge concepts that have not accommodated students' critical thinking skills. In addition, the development of indicators on the basic competencies of each subject has not been developed on cognitive demands (C1-C6), most of the indicators developed on the ability to remember (C1) and understand (C2). This results in students being less stimulated to improve their critical thinking skills, so that when students are faced with a problem that is quite difficult they will find it difficult. Searching for documentation of students' thematic learning results shows that there are still many students who get low scores below the minimum completeness criteria. The following is a table of formative learning outcomes for theme 1 sub-theme 3 for the 2019/2020 school year for fifth grade elementary school students in North Raman District.

Based on the data above, it can be seen that at the State Elementary School 1 Raman Endra out of 40 students, only 16 students reached the minimum completeness criteria with a completeness percentage of 40.00%. At Public Elementary School 1 Kota Raman, there are 19 out of 40 students who reached the minimum completeness criteria with a completeness percentage of 47.50%. Meanwhile, in the public elementary school 1 Rantau Fajar, of the 27 students there were 12 students who reached the minimum completeness criteria with a completeness percentage of 44.44%. Then the average student who reached the minimum completeness criteria from the three elementary schools was 43.98%. The percentage of completeness is low because ideally learning is said to be successful if at least 75.00% of students are able to achieve the minimum completeness criteria.

The results of the needs analysis based on the pre-survey in the form of a questionnaire on critical thinking skills which were carried out on August 14-15, 2019 with a target of 100 students of class V elementary schools in North Raman who applied the 2013 Curriculum. Based on the analysis of students' critical thinking skills in thematic learning, the results obtained that the aspects of critical thinking skills of students who get a percentage below 50.00% are those that express opinions and make conclusions, respectively 37.00% and 33.00%. The low percentage of expressing opinions is due to the fact that educators have not provided many opportunities for students to ask questions, practice, interact with other students. While the low aspect of making conclusions is thought to be because learning has not constructed the knowledge of students and supports students to actualize their academic potential, personality, and creativity so that it shows evidence that students actualize potential, namely bringing out the creativity and ability of students to think critically.

The learning process is basically identical to the process of communicating knowledge from teachers to students or from students to other students. The learning process will run effectively and efficiently if it is supported by the availability of teaching materials or supporting tools. The provision of teaching materials and teaching methods that are dynamic, conducive and dialogical are indispensable for the optimal development of the potential of students. One of the teaching materials that can be used to support the learning process is the Student Activity Sheet. In addition to playing a role as a guide for conducting activities, discussion guides and other scientific activities, student worksheets also have an important role in the concept of knowledge.

The results of the needs analysis regarding student worksheets were also carried out with the subject of 5 elementary school fifth grade educators who were carried out through filling out a questionnaire on August 14-15 2019. Based on the questionnaire, 60.00% educators did not make their own student worksheets and 100% The students' work that is arranged does not contain a structure (title, learning instructions, competencies to be achieved, supporting information, and assessment. The student worksheets used by students have not led students to find concepts, so students cannot develop critical thinking skills because the student worksheets used are from publishers and are not directly made by educators so that they are not in accordance with the needs of students.

Based on the explanation above, a solution is needed to overcome learning problems. One alternative solution in developing the learning process begins with innovation, namely the development of thematic teaching materials in the form of Student Worksheets. According to Lee (2014: 96) Worksheets can be useful in many ways including academic achievement. For example, as a supplement to books, providing additional information for a particular class, can help construct knowledge. Student worksheets are expected to be able to overcome students' learning difficulties, which hopefully can improve thinking skills and student learning outcomes, besides that student worksheets will be able to attract students' interest when combined with certain learning models. The learning models recommended in the 2013 curriculum are Problem Based Learning (PBL), Inquiry, Project Based Learning (PjBL), and Discovery Learning.

Based on the explanation above and the results of the needs analysis questionnaire, it is necessary to have a learning process that can involve students more actively and students can solve the problems that exist in the student worksheets with critical ideas. For this reason, it is necessary to develop student worksheets based on a problem-based learning model to improve students' critical thinking skills.

2. Method

Research and development or Research and Development (R&D) is the method used in this research. The development procedure based on the Borg & Gall model (1989: 781) goes through several stages including: 1) initial information collection, 2) planning, 3) initial product development, 4) initial trial, 5) initial product revision, 6) field test for the main product, and 7) the revision of the main product. The implementation of preliminary studies and testing of student worksheets was carried out at the State Elementary School 1 Raman Endra, while the process of developing learning tools was carried out on the campus of the University of Lampung. The subjects of the study were student worksheets based on problem based learning, while the subjects of the product trial were students of class V elementary school. The population in this study were students of grade V elementary schools in North Raman District.

Table 1. Data on Class V Elementary School Students in North Raman District

No.	School name	Number of study groups	Study group		Total
			1	2	
1.	SDN 1 Raman Endra	2	20	20	40
2.	SDN 1 Kota Raman	2	20	20	40
3.	SDN 1 Rantau Fajar	1	27		27
Amount					107

In this study, the sampling technique used was purposive sampling technique. The research sample was 20 students of class V A Raman Endra 1 public elementary school. Data collection techniques in this development research are using non-test techniques and test techniques. The effectiveness of the use of student worksheets is seen from the learning outcomes of students as well as to measure students' critical thinking skills. The data is in the form of quantitative data obtained through pre-test and post-test. The research design used was one group pre-test - post-test.

3. Results and Discussion

The development of PBL-based student worksheets in thematic learning is focused on class V theme 6 Heat and its Transfer in sub-theme 1 Temperature and Heat. The development of the PBL-based student worksheet adapts the R&D step by Borg & Gall (1983: 784) using seven out of ten steps.

The first stage is research and initial information collection on class V elementary school learning in North Raman District. Initial information is obtained that learning tends to be conventional so that it is a teacher center characterized by the dominance of the active teacher who presents learning, educators do not raise daily problems that occur around the environment of students in the learning process, students are seen as objects, not as learning subjects less active in exploring knowledge.

After the researcher knows the problem that occurs, the researcher plans the target material on the core competencies and basic competencies to then develop PBL-based student worksheets. student worksheets will be used by students so as to improve critical thinking skills seen from student learning outcomes. next, the researcher developed the initial product development of the student worksheet, in this step the researcher outlined the pattern of content development and design of the PBL-based student worksheet in accordance with PBL steps systematically based on the steps determined so that the student worksheet can meet the following requirements: the preparation requirements that must be met are in accordance with the opinion of Ranjit (2012: 2).

The next step is testing the initial product, the researcher conducts a validation test with three validators with the aim of validating the product being developed whether it is in accordance with the development requirements so that it is feasible to be tested. The results of the validation test are described as follows.

3.1 Validation by material expert

The material expert's assessment includes the suitability of the student worksheets being developed with the quality of the content and the suitability of the PBL model of the student worksheets. The assessment of this material expert obtained a score of 96.40 very good and valid categories as shown in table 2.

Table 2. Scores for the Material Expert Validation Assessment

No	Rated aspect	Total score	Maximum Score
1.	The suitability of students' worksheets to PBL	19	24
2.	Quality of student worksheets	62	64
Total score		81	84
Score		96,40	
Category		Valid	

Some of the material expert suggestions for product improvement include indicators developed so that the material is more complete for students to obtain, the material in students 'work sheets is arranged from easy then

to difficult material, completing image support related to the material.

3.2 Validation by media experts

The media expert's assessment includes the requirements for making student worksheets, namely didactic, construction, and technical requirements. The value obtained based on the validation test is 98.00 with the very good category presented in Table 3. Some suggestions from media experts for product improvement include fixing the cover and images on the documentation, improving the objectives of the students work sheet, improving reading discourse by providing pictures supporters, and use a variety of reference sources.

Table 3. Media / Design Expert Validation Score Score

No	Rated aspect	Total score	Maximum Score
1.	Didactic Terms	36	36
2.	Construction Terms	27	28
3.	Technical Requirements	35	36
Total score		98	100
Score		98,00	

3.3 Validation by linguists

The assessment carried out by a linguist includes the suitability of the student worksheets that are developed with the suitability of writing and the use of the right words in the product. The value obtained based on the validation test is 90.38 with the very good category. Some suggestions from linguists for product improvement include writing the student worksheets in Times New Roman font size 12 with 1.5 spacing. In addition, it is also necessary that the image be numbered along with a description of the image.

Table 4. Linguist Validation Assessment Score

No	Aspek	Jumlah Skor	Skor Maksimal
1	straightforward	10	12
2	Communicative	12	12
3	Writing	14	16
4	Use of terms, symbols or images.	11	12
Total score		47	52
Score		90,38	
Information		Very good	

3.4 Peer validation

The assessment carried out by peers includes the suitability of the developed student worksheets with the quality of the content and the suitability of the student worksheets in the pbl model, the requirements for making student worksheets, namely didactic, construction and technical requirements. the results of the product validation assessment by class V educators scored 95.40% in the very good category. Some suggestions from colleagues for product improvement include the need to consider activities in student worksheets with a predetermined time allocation in learning.

After conducting the validation test, the researcher revised the product based on the suggestions and comments of the validators and practitioners, then the next step was the small group trial stage to see the level of validity of the instrument to be used. The next stage is the large group test which is first carried out a pretest to determine the initial ability of the experimental class students before using the PBL-based student worksheets. Then the product was tried out to get the response of students during the learning process using PBL-based student worksheets and then a posttest was carried out.

Based on the data obtained from the results of the pretest and posttest, it shows that the learning outcomes of students have increased based on the average value after answering posttest questions that have been adjusted to the indicators of critical thinking. So it is concluded that the product developed is feasible and effective in improving students' critical thinking skills. These results are supported by research conducted by Bakirci (2011: 76) with the results showing that the use of developed worksheets has an impact on developing hypotheses, correlations and critical thinking skills of students who are among their formal stage features. The results of the analysis showed the average increase and the number of difference scores between the pretest and posttest.

In line with this study, the results of research conducted by Ural (2016: 113) show that 21st century education requires the thinking of students to face real-world problems that involve them in higher-order thinking skills, creativity, innovation, communication, collaboration, critical thinking. and problem solving. This means that by combining student worksheets and the PBL model, it is indirectly able to improve students' higher-order thinking skills to overcome what is needed in overcoming a problem.

The effectiveness test was conducted to determine the effectiveness of PBL-based student worksheets in the

learning process that has been carried out and student learning outcomes that refer to critical thinking skills. The effectiveness test with learning outcomes tests that are designed and assessed based on five indicators of critical thinking skills include the ability of students to identify, ask and answer questions, analyze, conclude, and the ability to evaluate. The average percentage of the five indicators is 76.90%.

The trial phase on the PBL model-based student worksheets in large groups was carried out on January 13 – January 18, 2020 in class VA of the State Elementary School 1 Raman Endra totaling 20 students. Before carrying out the first lesson, students did a pretest. After participating in the learning using PBL-based student worksheets, the students did posttest. This is intended to determine the effectiveness of PBL-based student worksheets by seeing whether or not there is an increase in learning outcomes before and after learning is carried out using PBL-based student worksheets. The results of the effectiveness test of student worksheets can be seen in table 5.

Table 5. Data Recapitulation of Student Learning Outcomes in Large Groups

Large Group Learning Outcomes	Pretest	Posttest
Total value	1056,67	1523,33
Average value	52,83	76,17
Overall N-Gain	0.51	
Category	Medium	

In the effectiveness test, it was analyzed using N-gain. The result of the N-gain calculation is 0.51 (medium category), the average score at the pretest is 52.83, increasing to 76.17 at the posttest. Thus, it can be concluded that there is an increase in student learning outcomes before and after learning using the PBL model-based student worksheets, this shows that the student worksheets effectively improve students' critical thinking skills. The following is an example of the student worksheet section to improve critical thinking which is presented in Figure 1.

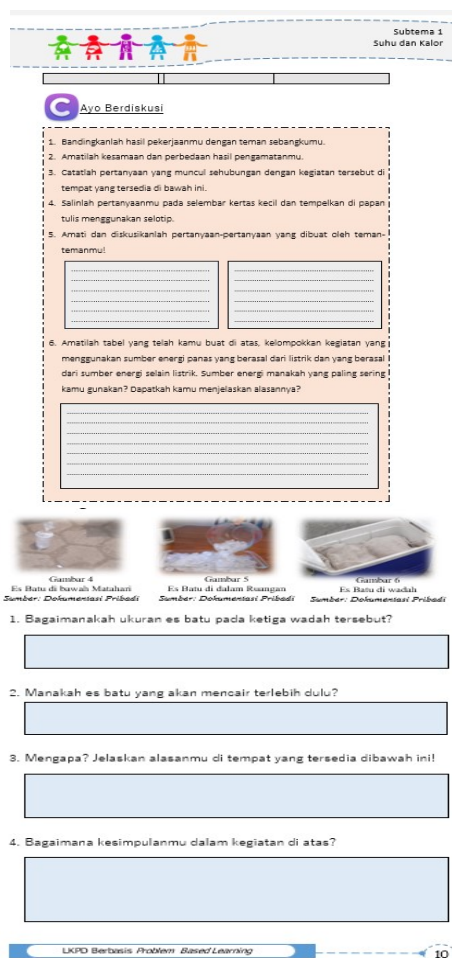


Figure 1. Student worksheets, based on PBL being developed

This is reinforced by the results of research conducted by Siew (2016: 215) with research results which show that the application of the PBL model has a high influence on increasing the critical thinking attitude of students in Elementary Schools. In addition, the results of the research on the development of PBL-based student worksheets are also in accordance with the opinion of Matthew (2015: 113) with the results showing that through the application of the PBL model in learning, students increased significantly between the experimental class using PBL and the control class using the conventional model. . Therefore, this PBL-based student worksheet is highly recommended to be applied in learning activities in schools.

4. Conclusion

The product produced in this research and development is a PBL-based student worksheet suitable for fifth grade elementary school use on the theme 6 Heat and Its Transference. The feasibility is proven from the results of the material expert's assessment, the score is 96.4, the media expert is 98.00, and the linguist is 90.38. Based on the suggestions and validation results, the PBL-based student worksheets are declared valid and suitable for use as teaching materials in class V learning. improve students' critical thinking skills. This is indicated by the results of the N-Gain calculation of 0.51 obtaining the "medium" category.

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