

Students' Worksheet Development through Problem- Based Learning (PBL) on a Square Plane Figure related to Local Wisdom in Junior High School

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ABSTRACT: This research aims to produce students' worksheet based on Problem-Based Learning (PBL) on the square plane figure material related to local wisdom in a valid, practical, and effective in junior high school level. This type of research is a developmental research designed to follow the stages of 4-D development model- Define, Design, Development, Disseminate. But this study focuses only on Development stage. The subject in this study was grade eight that consist of 32 students. The instruments used in this study were the validity sheet and worksheet for two lecturers and one mathematics teacher, a student response questionnaire to measure the practicality of the worksheet, as well as test of learning outcomes to measure its effectiveness. The results of this research show that: (1) Based on the process of development with 4-D model it was obtained worksheet based on PBL in square plane figure in gradeeight of SMP RK Budi MuliaPematangsiantar. (2) Based on the worksheet validation sheet assessment result, it was found that the average overall score was 4.73 with the category "valid", so it can be said this worksheet is valid. (3) Based on the results of the practicality sheet, it is obtained the average overall score of 4.29 with the category "very good and practical" so that this worksheet can be said to be practical. (4) Based on the results of learning results shows that the students dominantly got 85% with "excellent" criteria so that worksheetis effective.

KEYWORDS: development, worksheet, Problem- Based Learning, local wisdom

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I. INTRODUCTION

The implementation of the curriculum 2013 through the teachers directing the students is a 21st century learning paradigm, that expected to help students to observe, ask, reason, and communicate what they have gained or knew as the national educational vision. The change in mathematics curriculum needs to pay attention to several things that affect each other, namely lesson plan, textbooks along with the students' worksheets, assessment procedures used from the policy issued by the government.

One of the subjects taught in grade eight of Junior High School is the square plane figure. The use of this material is found in daily life and is widely used in other disciplines and also as a prerequisite material to learn the material of solid plane figure. When students are faced with problems relating to determining the breadth and circumference of the rectangular flat areas, they are still experiencing difficulties. Students are accustomed to getting a quadrangle formula from a teacher in the form of an already finished formula, without being given the opportunity to find their own extensive formula and around the square area. As Priyo explained (Ikasari 2017:5) An unsteady understanding will cause the students to have difficulties in solving the problems. The development of worksheet to enhance students' understanding of the plane figure material is to create new learning innovations by applying learning models through local culture. Local wisdom can bring the math closer to everyday life or the environment in which students live.

In terms of the strengthening of character education, local wisdom contains character values that are sourced to the sublime values of the nation's culture. Making the bridge between local culture/wisdom and mathematics is an important step to recognize the different ways of thinking that can lead to various forms of mathematics. It can be interpreted that various mathematical concepts can be excavated and found in local wisdom so as to clarify that local mathematics and wisdom are interconnected, mathematics can be born from culture, mathematics can be excavated in culture so that can be utilized as a source of learning mathematics that is concrete and there are around the students, on the local wisdom many of the flat can be found ". By adjusting the local wisdom, learning can take place well. Based on the thoughts outlined above, researchers are interested to study on the development of students' worksheets based on PBL on the square plane figure material building related to local wisdom in the private junior high school RK Budi MuliaPematangsiantar.

II. METHODOLOGY

The type of research used in this study is development research. This development research is conducted to produce the next students' worksheet that will be tested in the class to see the validity, practicality and effectiveness based on PBL related to local culture.

In this study, it will be developed students' worksheets based on PBL related to local wisdom with the development phase referring to the 4-D model that consists of 4 stages of development namely definition, design, development, and dissemination (Trianto, 2018:189). The development procedure in this research focuses on the development model. In this research the data collected is the data that can be obtained from the resource (using a primary source) with the intention to know whether the product is in accordance with the field needs or not. Judging from the data source, the collection can use both primary and secondary sources. The data in this study was collected with two studies of the field. Data analysis techniques are conducted to obtain good quality of students' worksheet products in accordance with the criteria of its quality products, namely: validity, practicality and effectiveness.

III. FINDING AND DISCUSSION

Students' worksheets research based on PBL related to a valid, practical and effective culture with development model 4-D, namely Define, Design, Develop and Disseminate are:

A. Define

1. Front End Analysis
2. Task Analysis

B. Design

1. Compiling need analysis
2. Defining the titles
3. Writing credits

C. Develop

- 1) Developing
- 2) Expert validation
- 3) Revision I
- 4) Trial and Error
- 5) Revision II

From the calculation result by using the Cronbach Alpha formula, it was obtained a test reliability coefficient of 0.8093. Then the reliability coefficient of test is in the category of high correlation and is in the interpretation of high reliability which means good. In the phase of Defining, front end analysis and task analysis are performed. It was found that there are still limitations on the students' worksheets that enrich experience, build student concepts, facilitate students with student-centered activities, and low students' mathematics learning outcomes. It is therefore compiled by the students' worksheets that lead students to improve their mathematical learning outcomes on the square plane figure material. The results of the task analysis show the analysis of the contents structure, procedural analysis to complete activities and exercises in the students' worksheets that refer to PBL. The use of PBL stages is because this stage has systematic stages of finding and discovering the completion of problems found. The procedure used in the students' worksheets products is a good one for learning mathematics, especially on triangular plane figure material.

The Analysis of Information Process by Drafting Lesson Plan.

The preparation of lesson plan is adjusted with syllabus. The analysis is a concept which maps the theory used in accordance with the basic competencies that must be achieved in the students' worksheets. In the design phase, drafting is done. The arrangement of the students' worksheet was done by arranging the results of the analysis of the contents structure, concept map, activity title drafting and writing. Based on the concept map, the order is known and the number of students' worksheets are prepared with regard to the prerequisites given in advance to the students before studying square plane figure materials, namely Activity 1: Understanding the definition and characteristics, Activity 2: Finding the circumference and area within exercise problems, Activity 3: Assessing the area of irregular plane figure. The title of the activities based on the indicators to be achieved, namely: (1) knowing and understanding the quadrangle, (2) explaining the types of quadrangle based on its side and angle, (3) solving problems in daily life using the properties of the quadrangle, (4) understanding the circumference and area of the triangle, (5) applying the concept of circumference and area of quadrangle to solve the problem and (6) assessing the area of irregular plane figure. The use of activities in the students' worksheets is appropriate, considering the purpose of activities is to increase the ability of learners to develop a square plane figure material. Activity in the development of students' worksheets products is written in the form of writing with a variety of analysis on a problem in the topic studied.

The writing of students' worksheets is done by designing the technical until the preparation of materials based on the source obtained and modifying according to the needs of computer application programs namely: Microsoft Office Word 2016, Microsoft Office Power Point 2016, and Geogebra.

Using several application programs aims to allow the students' worksheets to be developed into an attractive and endeared by learners (users) so that students can perform the activities and stimulated by seeing the design. The preparation of the students' worksheets is not separated from the students' interests in doing it later. Therefore, students' worksheets is designed with a full color display both text and images or illustrations, a combination of supporting and instructing images along with providing empty columns to work on the stage instruction. The students' worksheets are compiled with three activities that in each one there is only one paragraph of problem in the form of narrative. The introduction of images and short definition, blank parts and meaningful images are the things that should be considered in the creation of the students' worksheets. In the Developing phase, the development of students' worksheets was done in the form of A4 and bounded print media, with the specifications: title, material, study instruction, core and basic competencies, activities, and practices.

Activity is a learner's studying by using PBL stages. The assessment was then conducted by using a validator assessment poll conducted by 3 validators, consisting of 2 expert lecturers and 1 mathematics teacher. From the validation results are categorized as having good validity, so that the students' worksheets are valid and can be tested. After review assessment, it was obtained suggestions and criticism from the validator. It is found that the students' worksheets have a conceptual map and a less interesting cover page. The revision was then performed based on the suggestion and criticism. The revision of views is done by consulting experts. The results of a consultation and expert discussion resulted in a new review of the cover page. During the revision of the researchers conducted trials, on the students' worksheets' activity 1, it was found constraints in the form of formulation of problems not found what is the purpose of the emergence of the problem. Then conducted a consultation on the mathematics teacher which also as one of the students' worksheets Development Assessment validator. The result of this stage is the second product of students' worksheets ready to be deployed and tested in the classroom. Because eligibility test is not enough, it is used trial phase to assess effectiveness, where effectiveness will become very important in the evaluation of the students' worksheets product developed. Based on the trial, the findings gained that students were struggling to work on the worksheets.

This finding is one of the basic carried out revision of phase II that participants still difficulty and confusion in understanding the stages of PBL due to lack of guidance of work in the students' worksheets. This causes the working time takes longer than the allocated time set in the lesson plan so that the phase II revision is performed. The revision of phase II was done as a refinement of the students' worksheets product development and given that students are the users so that the addition of instructions for using and improvement of narrative in formulating problems in the students' worksheets. The activity revised phase II was made in the final from the development of students' worksheets products. The 4-D development model used in this research is only up to three stages above, namely define, design, and develop. As for the disseminate stage or the spread is not used because the disseminate stage for quality measurement of students' worksheets is done at the time of trial, in addition to the disseminate stage requires a long time and a large amount of cost. Therefore the students' worksheets product development research is only done until the develop stage. The developed product of students' worksheets development must be of good quality in order to be useful in mathematics learning at school. Therefore, students' worksheets product quality assessment is done by analyzing the validity, practicality and effectiveness.

The students' worksheets quality is based on validity and shows the average score of each validator for the aspect of PBL was 4.6 with a good category which means that PBL can be implemented in the students' worksheets well. The content eligibility aspect reaches 4.7 with a very good category which means the contents in the students' worksheets correspond to the curriculum. The requirement aspect construction reaches 4.73 with excellent categories. The aspect of the condition is didactically reaches 4.70 with excellent categories. This aspect of technical requirements reaches 4.92 with excellent categories which mean that the students' worksheets have a layout, illustrations, drawings and attractive display design. The average conclusion of the score for quality analysis is 4.73 with excellent category which means that the students' worksheets learning math of square plane figure for junior high school grade eight in even semester by using PBL meets one of the quality of development products, is valid. The quality of students' worksheets based on practicality shows the average score for the PBL aspect is 4.29 with excellent categories which means learners assess the stage of PBL easily considering the development of students' worksheets products is new and the first time learners to work on it. By using PBL from the technical requirement aspect of 4.29 with excellent categories, the learners assess that the design and appearance of the students' worksheets looks good and attractive.

Then for the motivation aspect reaches 4.39 with excellent categories which mean the learners are motivated to learn and work on the worksheet. On the aspect of students' needs reaches 4.15 with good categories which mean the worksheets attract students to study and to work. The average score of the

worksheets' response quality analysis using the students' responses poll is 4.29 with excellent categories which means the developed worksheets products can be applied and easy to use. The quality is based on the effectiveness of the results based on the percentage of the classification. From the results of the assessment, there are many students who are complete in working on the problems in the worksheet. Therefore, for the overall classifications percentage reaches 73% with good category. This means that the level of achievement of learning objectives is in accordance with the plan that has been drafted previously. In other words, the worksheet of learning square plane figure for junior high school grade eight with PBL is effective and can be developed with 4-D development model with good quality of validity, practicality and effectiveness.

IV. CONCLUSION

Based on the results of research and discussion, it can be concluded that:

1. The developed worksheet is valid according to the content eligibility of the product.
2. The development products of worksheet are reviewed from the practicality of a good worksheet. This means the level achievement of learning objectives is in accordance with the plan that has been prepared, in other words with the use of students' worksheet related to local wisdom on the material of Square Plane Figure in grade eight of Junior High School is effective.
4. The students' response to the worksheet with PBL related to local wisdom on the square plane figure material in Junior High School is positive.

The writer suggests that the school of junior high school level can apply the mathematics worksheet related to local wisdom on the material of square plane figure to enrich the experience of students, to improve the learning outcomes of square plane figure material and to improve the ability to seek and to find problems. The instructions on the use of the worksheets should be clearly delivered to the students before starting mathematics learning. Deployment and testing should be carried out on some classes or schools with other teachers to improve the development stage and get more varied results later to test the effectiveness of the use of students' worksheet in learning.

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