Development Mathematics Learning Device Based Curriculum 2013 on Subject Prism and Pyramidthrough Problem Based Learning

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ABSTRACT

This researchaimed to developmathematics learning device that are Lesson Plan (LP) and Students Worksheet (SW) based curriculum 2013 on subjectprism and pyramidthrough problem based learning.This research use development model by Thiagarajan.Development is done through the following steps: (1) define; (2) design; (3) develop; and (4) disseminate. Learning device that had been developed then validated by three validators and revised based on the input from validators. The valid learning device then tested in the small group trial with subjects are ten students. Based on the data analysis obtained that the mathematics learning device are valid with average for LP 3,74 and 3,44 for SW and practical to use by students.

Keywords: *Research and Development, Mathematics Learning Device, Problem Based Learning, Prism and Pyramid*

INTRODUCTION

The development of the era demands an effort to improve the quality of education, this is in accordance with the development of education curriculum in Indonesia. Curiculum is a set of plans and arrangements regarding the objectives, content and learning materials as well as the means used to guide the implementation of learning activities to achieve specific educational objectives (Rusman, 2008). Indonesia's education objective in Law Number 20 Year 2003 on National Education System is to create a generation of faithful and pious, virtuous, intelligent and creative nation. The purpose of education is then implemented in the curriculum. The curriculum of 2013 have aims to prepare people of Indonesia to have the ability to live as individuals and citizens who believe, productive, creative, innovative, and affective and able to contribute to society, nation, state, and world civilization (Permendikbud No. 68 Year 2013) .

The Government plans the curriculum of 2013 to be applied optimally throughout the schools in Indonesia. In the academic year 2014/2015, Curriculum 2013 has been implemented in some schools, but not for all classes. The Ministry of Education and Culture (Kemendikbud) has developed the 2013 Curriculum for the period 2015-2020. By 2018, all schools will implement the Curriculum 2013, in which case preparation is required before the 2013 Curriculum is re-applied.

The things that must be prepared before the curriculum of 2013 is implemented is a learning tool that can support the achievement of learning objectives. Learning tools can be syllabus, lesson plan (LP), learning resources/students worksheet (SW), and assessment instruments. Curriculum learning device 2013 that already provided by the government is the syllabus. The LP and SW referring to the 2013 Curriculum have not been provided by the government. Teachers should design LP and SWaccording to the needs of students. Learning tools that refer to the curriculum of 2013 should be structured as well as possible so that teachers can carry out the learning activities well. One of the learning tools that must exist in every lesson is the LP. LP is one of the important learning tools because by using LP the teacher has guidance in doing the learning process.

LP is prepared with the aim that the learning can be done in a systematic, effective, fun and can make students feel challenged in following it. LP is a plan-face learning activity for one or more meetings. Development of LP refers to the syllabus and aims to achieve learning objectives. LP includes several components, namely (1) the identity of the school / madrasah; (2) subjects; (3) class / half; (4) the allocation of time; (5) core competencies; (6) basic competence; (7) i ndikator achievement of competence; (8) the learning materials; (9) learning activities; (10) valuation; and (11) the media / tools, materials and learning resources. Learning outcomes assessment consisted of reviewing the attitude (affective), knowledge (cognitive) and skills (psychomotor) (Permendikbud No. 103 201 4).

Learning objectives can be achieved if the teacher also provides opportunities for students to play an active role in every learning that is done. One of alternative that teachers can do so that students can participate actively and independently to promote knowledge is to use Students Worksheet (SW). SWpresents the material in a concise and systematic way, so that students can easily construct the information be delivered. SW can use students to find a concept independently by solving any problems that exist within it. SW also provides a variety of questions that can improve the experience of students to solve various problems relating to everyday life (Nanang Budi Nugroho, 2014).

Ministry of Education (2005) states that SW are sheets that contain tasks that normally form or step instructions to complete a task that must be done students and is one tool that can be used to increase the involvement of teachers or activity students in the learning process. SW is written learning tool that can help teachers to facilitate students in the learning process. Therefore, it is necessary to develop SW that can increase the liveliness and independence of students so that students feel challenged to do a problem solving.

Development of LP and SW was conducted, should be tailored to the appropriate learning model. Learning model should be able to create an active interaction between students with students and students with learning objects, so as to make students independently find the concept of the material being taught. In addition, the learning model used should also be able to make students feel challenged to follow the learning activities. One of the learning model recommended by the Curriculum 2013 for use in the learning activity is Problem Based Learning model (PBM).

Learning by problem is learning that starts from a problems used as a means for investigating students. Each learner or group must complete these problems independently. By trying solve problems independently, hopefully students will be able gain knowledge more meaningfully. This is in accordance with by Bruner (in Trianto, 2009) is a the logical consequence, by solving the problem independently through from the experiences, students will use the experience of solving the problem is to solve a similar problem, this is because experience provides a meaning for a learner. The learning model is based on this issue is compatible to the learning activities, as demanded students to explore, discover and build his own knowledge so that knowledge is stored in memory memories long students.

Based on observations in SMPN 3 Tambang, it is known that LP compiled by teachers still refer to Education Unit Level Curriculum (KTSP) in the form of LP and SW. The components of LP prepared by teachers include (1) school identity; (2) the identity of the subject; (3) classes / semesters; (4) time allocation; (5) standards of competence; (6) basic competence; (7) learning objectives; (8) the learning materials; (9) learning methods; (10) learning steps; (11) learning tools and resources; and (12) assessment of learning outcomes. RPP compiled by teachers still has several weaknesses, among others: (1) teaching methods used by teachers only lectures, question and answer, and assignment, (2) teachers have not included learning model used, (3) learning steps still describes a teacher-centered learning process, and (4) the assessment prioritizes conceptual satisfaction. Learning resources that used by students of SMPN 3 Tambang is SW. SW that was used SW from the issuer. This SW contains only material summaries and exercise questions, not steps to find concepts and solving problems. This is effort of less meaningful students in learning and students tend to be passive in the learning process. So that needed solution for this problem one of them is to produce LP and SW by applying model of problembased learning.

One branch of mathematics that many directly related to the lives of students are geometry (Untung Trisna Suwaji, 2008). The geometry lesson taught in class VIII students including the prism and pyramid. Problem Based Learning (PBL) is a learning model to teach the material from which the prism and pyramid, because application of wake prism and pyramid encountered in daily life, making it easier for students to be understand the real geometry.

Based on the above, authors are encouraged to development mathematics learning device based curriculum 2013 on subject prism and pyramid through problem based learning is valid and already qualified practicalities.

METHODOLOGY

Research that do classified as research and development *(researchanddevelopment),* which intends to produce Lesson Plan (LP) and Students Worksheet (SW) bythe application problem based learning on material prism and pyramid class VIII SMP. Design research development this adapting the model of development 4D by Thiagarajan (in Endan Mulyatiningsih, 2011) with steps development are: (1) *define* (definition); (2) *design* (design); (3) *develop* (development); and (4) *disseminate* (dissemination).

Subject research on test try group small is 10 participants educate with ability academic heterogeneous from VII class I - 6 SMP 3 Tambang. The instrument to collecting data on this research is validation sheet and questionnaire response bystudents. The validation sheet uses a Likert Scale that consists 4 alternative answers, that is 1, 2, 3, and 4 which states are very unsuitable, inappropriate, appropriate, and highly compliant. Questionnaire responses of students using Guttman Scale which consists of two alternative answers, that is Yes and No.

The techniques of data analysis in this study consist of validation sheet analysis and questionnaire response of students. Analysis validation of LP and SWis using the following formula.

$$\bar{M}_v = \frac{\sum_{i=1}^{n} \bar{V}_i}{n}$$

(adapted from Anas Sudijono, 2011)

Information:

$\bar{M}_v$: average total of validation

$\bar{V}_i$: average validator of validation *to-i*

n : number of validators

The determination of the range can be known through the highest score minus the lowest score and divided by the highest score. Based on the determination of the range the range is obtained $0{,}75$. The criteria for validation of the analysis used the average can be seen in the following table.

Table 1. Category of Learning Device Validity

Interval	Category
$3{,}25 \leq \bar{x} < 4$	Very Valid
$2{,}50 \leq \bar{x} < 3{,}25$	Valid
$1{,}75 \leq \bar{x} < 2{,}50$	Less Valid
$1{,}00 \leq \bar{x} < 1{,}75$	Invalid

Source: Suharsimi Arikunto, 2004

Questionnaire data response participants educate analyzed use the following formula:

$$P = \frac{f}{N} \times 100\%$$

Information:

P: The desired percentage

f: Frequency students which gives an assessment

N: The number of grains of statements and questions in the questionnaire responses of students

The criteria for the percentage of students and practicality response LP and SW obtained by Guttman scale in Table 3.6 below:

Table 3.6 LKPD Practicality Category

Interval	Category
$81 - 100\%$	Very Practical
$61 - 80\%$	Practical
$61 - 80\%$	Practical enough
$21 - 40\%$	Less Practical
<21%	Not Practical

Source: Sugiyono, 2007

RESULT AND DISCUSSION

Definition phase consists of five steps front-end analysis, analysis of students, concept analysis, task analysis and specification of learning objectives. In a front-end nalisis useful to define the problem basic the LP and SWthat was used in SMPN 3 Tambang and determine solution. The Basic Competency (KD) associated materials prism and pyramid is 3.9Determining the cube surface area and volume ofcubes, blocks, prism andpyramid After analyzing the characteristics of the participants students who indicate that the material prism and pyramid is material that has been learned participants students in schools Basic. Participants grade students of SMP also own ability to think abstractly, reason logically, to draw conclusions. Then

the concept analysis conducted by researchers is to identify, specify and construct systematically the relevant concepts to be taught based on analysis of the open-ended. While indicators of achievement prepared only for the material prism and limas. Further analysis task to draw up a job to do by participants students in the prism material and limas. From the analysis of the tasks and analyzes the concept of the learning objectives described prism and limas that participants students can find the formula of surface area and volume of prisms and limas also resolve issues related to the daily life of the surface area and volume of prisms and limas.

Then in stage *design* (design) activities carried out by researchers is collecting references and designing lesson plans and students worksheet. In addition, researchers also designed a validation sheet and questionnaire *responses.* After learning device is finished then go to the stage of *development* (development). At this stage validated by a validator to the LP and SW.

Results of validation theLP and mathematics SW with application problem based learning on the material prism and pyramid class VIII SMP could seen on the tablebelows.

Table 3. Results Validation LP and SW

No	The Forth Meeting	Learning Media	
		LP	SW
1.	1	3.82	3.53
2.	2	3.76	3.46
3.	3	3.69	3.38
4.	4	3.70	3.41
Average		3.74	3.44
Validation Categories		Very Valid	Very Valid

Based on the overall average obtained an average assessment for LP is 3.74 and SW is 3.44 then the results of validation of LP and SW expressed very valid. The validation results are then analyzed and revised in accordance with the validator's suggestion. After the revision, the prototype SW istesting on a small group. SW practicalities level is obtained from the questionnaire responses from 10 students VIII-6 SMP Negeri 3 Tambang.

The respondents stated that the material in SWis easy to understand, this indicates that the SW this qualifies didactically. Terms didactic regulates the use of SW is universal which students are clever or less can use this SW very well. Respondents also stated that the explanation of the material in SW is easy to learn because the language used is easy to understand. Based on this response of the SWis completed construction standards that the conditions relating to the use of language, sentence structure, vocabulary, level of difficulty, and clarity, which is essentially to be appropriate in the sense understood by the learner. Respondents also added that the views of SW very interesting so learn to use SW this becomes fun. This indicates that the SW. This technically qualified that emphasizes presentation of SW, that is in the form of text, images, and display.

From the results of the students' responses can be concluded that SW of mathematics with application problem based learning on the material prism and pyramid for class VIII SMP has qualified didactic, construction standards and technical requirements. This is in accordance with the opinion of Darmojo and Kaligis (in Das Salirawati, 2012), in developing of theSW must qualify didactic, construction standards and technical requirements.

CONCLUSIONS

Through this development research has produced a product in the form of LP and SWof mathematics with application

problem based learning on the material prism and pyramid class VIII SMP. LP and this SW rated has valid after through a validation process by the expert. SW also already practicalities eligible to use students after class VIII through stage test try.

In conducting this research, researchers have experienced various obstacles and success. For that reason researchers want to provide some recommendations related to this research development. Recommendations are addressed to anyone who wishes to do the same research. Those recommendations are as follows.

1. In this development study, the researchers limit only to the prism material and pyramid of class VIII SMP. Researchers advised to LP and SW developed for material principal more.
2. Researchers have conducted a limited trial to see the level of SW practice, SW that has been developed can be tested on a larger scale in order to obtain more accurate research results.
3. In this development study, researchers only measure aspect kevalidan and aspect practicality only. For researchers furthermore, LP and SW this could made as basic for researching other aspects in learning, for example connection use LP and SWby results learn participants students.

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