

DEVELOPMENT OF MATHEMATICS LEARNING DEVICES WITH PROBLEM BASED LEARNING (PBL) MODELS ON MATERIALS FOR CONSTRUCTING FLAT SIDE SPACE

Nurbaiti^{1*)}, Sri Rezeki²

^{1,2}Universitas Islam Riau

^{1*)} nurbaiti@student.uir.ac.id

²⁾ sri_rezeki@edu.uir.ac.id

Received: 2021-01-07; **Accepted:** 2021-02-07; **Published:** 2021-02-28

Abstract. This study aims to produce mathematics learning tools in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD) with Problem Based Learning (PBL) Models on the Material of Building Flat Side Spaces were tested valid. This study's development of learning tools used the development or R&D method using the 4-D model. The stages used in this research consist of three stages, namely: (1) the defining stage, (2) the design stage, and (3) the development stage. The data collection instruments in this study were the RPP validation sheet and the LKPD validation sheet. The data collection technique used was validation data from 2 Mathematics Education Lecturers, FKIP UIR, and two mathematics teachers at SMP Negeri 36 Pekanbaru. The analysis technique used is data validity analysis. The validity results of the RPP were 86.25% with a very valid category, and the results of the validity of the LKPD were 84.06% with a valid category. Based on this research, it was obtained that the mathematics learning device with the Problem Based Learning (PBL) Model on the Material of Building a Flat Side Space for Class VIII1 of SMP Negeri 36 Pekanbaru was valid.

Keywords: *Development, Learning Tools, Problem Based Learning (PBL)*

1. INTRODUCTION

Mathematics is an educational science that has an important role in the world of education. This can be seen by teaching mathematics at every level of education, starting from elementary school to the lecture bench and with a relatively large number of lesson hours compared to other subjects. This is because mathematics can improve students' intellectual skills and abilities. In addition, the application of mathematics is very much we encounter in everyday life. However, in reality, many students still do not master mathematics and think that mathematics is difficult. [1] states that mathematics is the most difficult field of study for many people. However, mathematics must still be studied because this science has an important role in everyday life.

According to [2] states, the role and function of mathematics are to solve problems either in the field of mathematics itself or in other fields. In line with this, it proves that mathematics learning must indeed be given to all students, and it is hoped that students can master it to equip students with logical, analytical, systematic, creative, critical, and cooperative thinking skills. For school mathematics to be mastered by students, quality learning is needed. One way to achieve this goal is to apply the right learning tools.

A professional teacher is needed to achieve learning objectives, especially in mathematics. A teacher's professionalism can be seen by their ability to prepare themselves

optimally before holding learning in class. The preparation is outlined in the form of learning tools. According to [3], the learning device is a device used to manage the learning process. These learning tools can be in the form of a syllabus, lesson plans, LKPD, etc.

According to [4], a good teacher must prepare a plan before implementing learning in class. A good teaching and learning process must be preceded by good preparation. Without good preparation, it isn't easy to produce good learning. Therefore, before teaching, the teacher should prepare a plan or learning device. Programs or plans that must be prepared by teachers before carrying out learning include (1) Annual Programs, (2) Semester Programs, (3) Syllabus, (4) Learning Implementation Plans (RPP).

From the description above, it is clear that teachers must have the ability to develop learning tools that follow the needs of students to achieve the objectives of learning mathematics. Learning devices are learning components that must be prepared by a teacher as a learning provider so that the learning carried out can run effectively, efficiently, and obtain the desired results. Therefore, in delivering mathematics learning, teachers should use various approaches, strategies, models, and learning media adapted to the situation so that the planned learning objectives are achieved.

Several learning models are included in the learning tools in compiling learning tools, one of which is opinion [3]. Various kinds of learning models are often considered practical in teaching, one of which is a problem-based learning model. Problem Based Learning or better known as the problem-based learning model, is an alternative that pays attention to students' thinking patterns. According to [5], PBL helps improve lifelong learning skills in an open mindset, reflection, crisis, and active learning.

The results of interviews and observations to mathematics teachers in class VIII.1 SMP Negeri 36 Pekanbaru, there are several problems, namely: The teacher has never used the PBL model, the lesson plans are made by the mathematics subject teacher himself following the 2013 curriculum but still includes KI.1 and KI .2 in the lesson plans while in the 2013 curriculum KI.1 and KI.2 are no longer given intra-curricular in learning mathematics, the material in the lesson plans is not clearly explained, the teacher does not attach knowledge assessments and skills assessments in the lesson plans, and there is no assessment rubric in the lesson plans, the teacher uses the Student Worksheet in the form of a publisher's book and only contains practice questions so that it does not show meaningful student activities and has never used LKPD, and the questions given by the teacher rarely relate to problems in real life.

Based on the results of the interviews and observations above, the researcher wants to overcome these weaknesses by developing mathematics learning tools, namely Learning Implementation Plans (RPP) and Student Worksheets (LKPD) with the research title "Development of Mathematics Learning Tools with Problem Based Learning (PBL) Models. on the Material of Building a Flat Side Room for Class VIII.1 SMP Negeri 36 Pekanbaru".

2. RESEARCH METHOD

This research is development research in the field of education that aims to produce a valid (valid) mathematics learning tool using the stages of 4-D development research [3], which consists of 4 stages, namely: Define (define), Design (plan), Develop (develop), and Disseminate (spread) which can be seen in Figure 1:

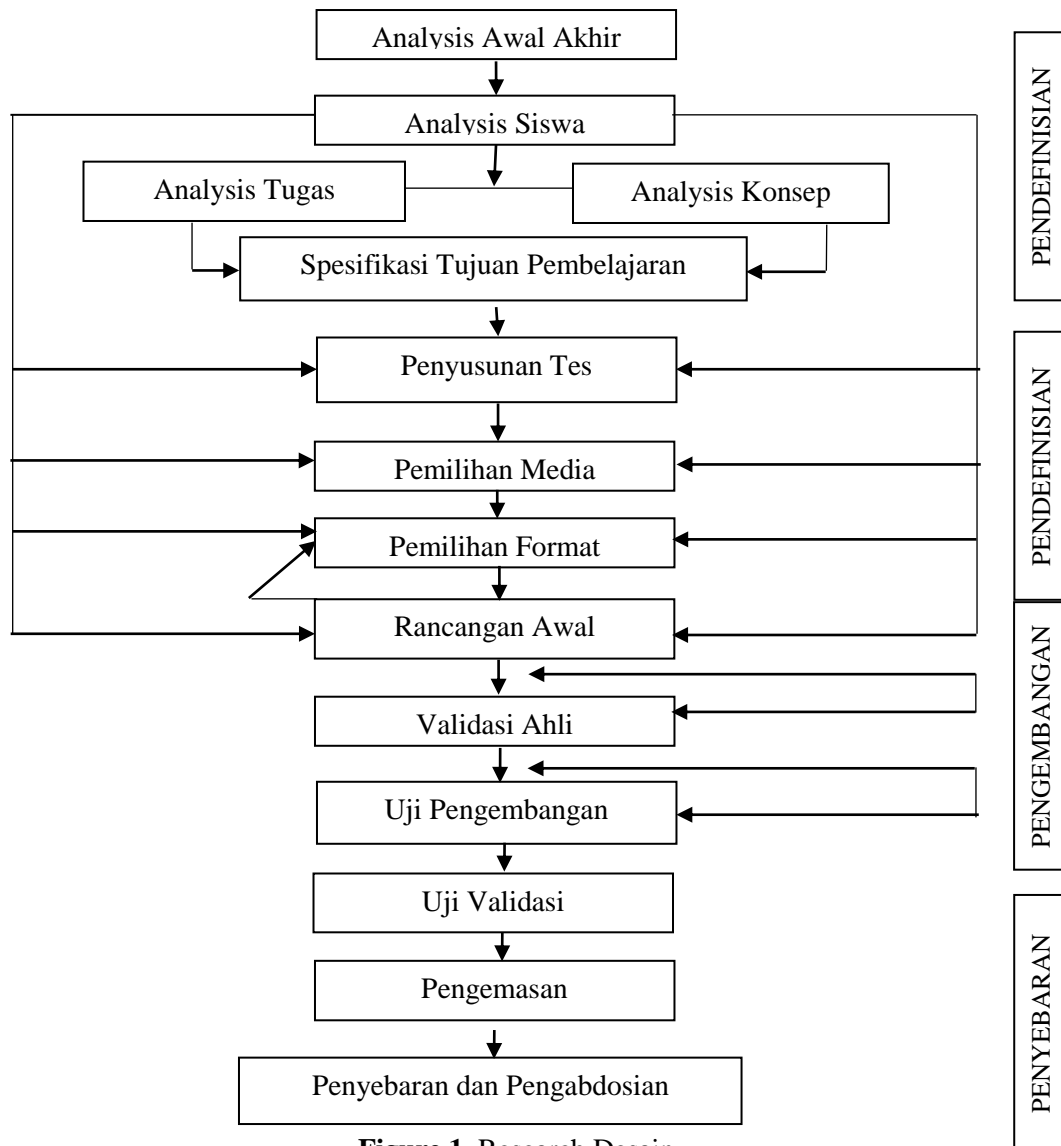


Figure 1. Research Desain

The data collection instrument used in this study was a validation sheet. The validation instrument in the form of a validation sheet is a sheet that is used to measure the validity of a product being developed. The data collection technique in this study was to fill out a validation sheet. The technique for filling out this validation sheet uses four answers, as shown in Table 1 below [6]:

Table 1. Assessment of Validation Sheet

No	Score	Category
1	4	Very Good

2	3	Good
3	2	Not Good
4	1	Poor

According to [7] states the level of validity analysis technique is descriptively determined by the formula:

$$V_a = \frac{Tse}{Tsh} \times 100\%$$

$$V_p = \frac{Tse}{Tsh} \times 100\%$$

$$V_c = \frac{Tse}{Tsh} \times 100\%$$

After the value of each validation test is known, the researcher can calculate the combined validity of the analysis results into the following formula:

$$V = \frac{V_{a1} + V_{a2} + V_{a3}}{3} = \dots \%$$

Description:

V = Combined Validity

V_{a1} = validity of the 1st expert

V_{a2} = validity of the 2nd expert

V_{a3} = validity of the 3rd expert

Tsh = Total Expected Maximum Score

Tse = Total Empirical Score (Validity Results from Validator)

The results of the validation of each validator and the combined analysis results after being obtained, the percentage level can be adjusted according to the validation criteria as shown in table 2 below.

Table 2. Validity Criteria According to Validator Assessment

Value Achievement	Validity Category	Description
25,00-40,00	Not Valid	It cannot be used
41,00-55,00	Poor	It cannot be used
56,00-70,00	Quite Valid	It can be used after a major revision
71,00-85,00	Valid	It can be used with minor revisions
86,00-100,00	Very Valid	Very good to use

3. RESULTS AND DISCUSSION

Research Results

Based on the results of the validation carried out by four validators, Table 1 is obtained below:

Table 3. Results of RPP Validation Analysis

RPP	Validity Percentage (%)				Average (%)	Validity Level
	Validator 1	Validator 2	Validator 3	Validator 4		
RPP-1	73,75	92,5	95	83,75	86,25	Very Valid
RPP-2	73,75	92,5	95	83,75	86,25	Very Valid
RPP-3	73,75	92,5	95	83,75	86,25	Very Valid
RPP-4	73,75	92,5	95	83,75	86,25	Very Valid
Average Total					86,25	Very Valid

Based on the validator's assessment, the lesson plans for each meeting have an average validation of 86.25%. The validation level is very valid so that the lesson plans can be used directly without having to be revised first.

Table 4. Results of LKPD Validation Analysis

LKPD	Validity Percentage (%)				Average (%)	Validity Level
	Validator 1	Validator 2	Validator 3	Validator 4		
LKPD-1	76,25	83,75	93,75	82,5	84,06	Valid
LKPD-2	76,25	83,75	93,75	93,75	84,06	Valid
LKPD-3	76,25	83,75	93,75	93,75	84,06	Valid
LKPD-4	76,25	83,75	93,75	93,75	84,06	Valid
Average Total					84,06	Valid

Based on the validator's assessment, the LKPD for each meeting has an average validation of 84.06%, and the validation level is valid so that the LKPD can be used but must be revised slightly first.

Discussion

The process of developing mathematics learning tools with the Problem Based Learning (PBL) model in this study refers to a modified 4-D model. This research only reaches the validation of the device at the learning device development stage. Researchers obtained information through interviews with mathematics teachers in class VIII1 of SMP Negeri 36 Pekanbaru and observations on the learning tools prepared by the teacher. Teachers have difficulty in compiling learning tools following the 2013 curriculum, especially RPP and LKPD. In preparing the lesson plans, the teacher does not describe the material in detail in the description of learning activities, does not attach an assessment of knowledge and skills, and does not include an assessment rubric. The teacher does not make LKPD and only uses LKS purchased through publishers so that it does not attract students' attention.

After getting the information needed, the researchers designed the learning tools, which included the preparation of the Learning Implementation Plan (RPP) and Student Worksheets (LKPD). In preparing this learning device, the researcher chose a suitable learning model that had never been used by a class VIII1 teacher at SMP Negeri 36 Pekanbaru, so the researchers chose to develop RPP and LKPD using the Problem Based Learning (PBL) learning model.

Then the researchers validated the learning tools that had been developed for two lecturers and two teachers. This validation is important to carry out so that researchers know the errors in the product and get suggestions so that the resulting product is tested for feasibility. The results of the RPP validation can be seen in table 3. The table shows that the product designed has an average validation of 86.25% with a very valid category. At the same time, the results of the LKPD validation can be seen in table 12. In the table, it can be seen that the product designed has an average validation of 84.06% with a valid category.

In the implementation of this research, there are still weaknesses, including:

- a) It is carried out in the 4-D implementation stages until the development stage. Still, until the validation is carried out and cannot be continued until the trial implementation, due to current conditions that do not allow to carry out research, namely the ongoing covid-19 virus pandemic, the device developed its effectiveness and practicality are not yet known.
- b) In this study, the device developed was not accompanied by media, so its distribution was hampered.
- c) The device that the researcher developed was only based on the problems of one math teacher and only in the one class he taught.

4. CONCLUSION

Based on the results of data analysis in the study, it can be concluded that learning devices with Problem Based Learning (PBL) models in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD) have been tested for validity.

REFERENCE

- [1] M. E. Yeni, "Kesulitan Belajar Matematika Di Sekolah Dasar," *J. Pendidik. Dasar*, vol. 2, no. 2, pp. 1–10, 2015.
- [2] Radeswandi, "Pengembangan Perangkat Pembelajaran Matematika Berbasis Problem Based Learning pada Materi Bilangan," *J. Ilmu Pendidik. Sos. Sains, dan Humaniora.*, vol. 2, no. 2, pp. 101–110, 2016.
- [3] Trianto, *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta: PT Fajar Interprata Mandiri, 2013.
- [4] Kunandar, *Penilaian Autentik (Penilaian Hasil Belajar Peserta Didik Berdasarkan Kurikulum 2013)*. Jakarta: PT Raja Grafindo Persada, 2014.
- [5] Rusman, *Model-model Pembelajaran (Mengembangkan Profesionalisme Guru)*. Bandung: PT Alfabet, 2016.
- [6] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: PT Alfabet, 2016.
- [7] S. Akbar, *Instrumen Perangkat Pembelajaran*. Bandung: PT. Remaja Rosdakarya, 2013.

