

# DEVELOPMENT OF MATHEMATICS LEARNING TOOLS WITH THE POWER OF TWO STRATEGY IN BUILDING SIDE SPACES FLAT

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**Abstract.** This study aims to produce mathematics learning tools in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD) with The Power Of Two strategy in Junior High Schools, which have been tested to be very valid. The development of learning tools in this study uses the R&D development method using the ADDIE model, namely: 1) Analyst, 2) Design, 3) Development, 4) Implementation, 5) Evaluation. The research data collection instruments were the RPP validation sheet, LKPD validation sheet, and teacher response questionnaires. The data collection technique used was validation data from 2 Lecturers of Mathematics Education FKIP UIR and two mathematics teachers at SMP Negeri 6 Siak Hulu. The technique used is validation data analysis. From the study results, the results of the RPP validation were 87.67 with a very valid category and LKPD 86.26 with a very valid category. Based on this research, it was obtained that the mathematics learning device with The Power Of Two strategy on the flat-sided geometry material in Junior High School was very valid, so the learning device could be diagnosed as a valid device to use.

**Keywords:** *Learning Devices, Build a Flat Sisis Space, The Power of Two*

## 1. INTRODUCTION

Education is one of the sectors of national development in an effort to educate the nation's life in order to produce quality human resources. According to [1] education is a conscious effort and aims to develop human qualities, an activity that is conscious of goals. At this time the development of science and technology has a major influence on the world of education. As science develops, the more important it is to improve the quality of education.

According to [2] that mathematics is one component of a series of learning that has an important role in education. With mathematics, humans can progress and develop into modern humans. According to [3] Endang Istiqomah, Rezi Ariawan., & Zakiah Anasari NST (26: 2019) said that teaching mathematics needs to have a strategy in such a way that mathematics can be understood easily by students.

According to [4] said that The Power Of Two requires students to study in pairs so that students look more active and understand the concept of material taught by teachers in an effort to improve the quality of education in schools. According to [5] said that the more often students get direct experience in learning mathematics, the mathematical concepts and understanding of mathematics itself will be well formed.

Based on the results of the researcher's interview on December 7, 2019 with the VIII grade mathematics teacher of SMP Negeri 6 Siak Hulu, information was obtained that: 1) the learning tools used by the mathematics teacher at SMP Negeri 6 Siak Hulu were already referring to the 2013 Curriculum; 2) The Learning Implementation Plan (RPP) used by teachers has not been fully implemented in the learning process, and learning activities have not been prepared in detail at each step of the activity based on a scientific approach that supports the revised 2013 curriculum; 3) The components presented by the teacher in the lesson plans are not complete, there are still no details on the time allocation for each activity and there is no method used in each lesson; 4) RPP on the teacher's hand there is a discrepancy between the material and indicators of competency achievement; 5) The learning model contained in the lesson plans is not in accordance with the model used during the learning process; 6) The LKPD used has not been adapted to the learning model or activity design in the RPP; 7) The components contained in the LKPD are incomplete, namely the absence of KI and KD in the LKPD. 8) In LKPD the questions used do not use real problems that occur in students' daily lives; 9) The LKPD used is in the form of teaching materials that have been provided by the publishers which are arranged in the form of a book for each semester, so that students find it difficult to understand the concepts in the LKPD; 10) LKPD does not contain pictures/illustrations and is plain white so that it has not aroused student interest in solving problems that exist in the LKPD.

Based on the results of interviews by researchers with mathematics teachers in class VIII of SMP Negeri 6 Siak Hulu to overcome the problems faced by mathematics teachers at SMP Negeri 6 Siak Hulu related to learning tools, the researchers wanted to conduct development research to produce effective learning tools using the The Power Of Two strategy. in order to improve student understanding.

## 2. RESEARCH METHOD

The form of research conducted by researchers is research and development. [6] Research development research and development is a research method used to produce certain products, and test the effectiveness of these products.

This research is a development research, namely the development of mathematics learning tools using the ADDIE (Analysis-Design-Implement-Evaluate) model which was carried out by the researcher [7]. The validation sheet grid is based on [8] [9], namely:

**Table 1. RPP Validation Sheet Grid**

No	Rated aspect	Achievement Indicator	Number Statement	Number of Items
1	Formulation of Learning Objectives	Conformity of learning objectives with KI, KD and Indicators	1,2	2
		Suitability of learning objectives with the level of development of students	3	1

		The suitability of the learning objectives to be achieved in accordance with the time provided	4	1
2	Learning materials	The suitability of the material with the learning objectives and KD	5	2
3	Learning Activities	The suitability of the sequence of activities with the strategy of The Power Of Two	6	1
		Clarity of learning stages	7	1
		Activities that involve students	8	1
4	Learning Resources	Time allocation accuracy	9	1
		Suitability of learning resources	10, 11, 12, 13, 14	5
5	Assessment Instrument	Appropriateness of assessment with learning objectives	15, 16, 17, 18,19, 20	6
6	Language	Use of Language according to EYD	21, 22	2
		Language facilities used	23, 24	2
7	Time	Time compatibility	25, 26, 27	3
<b>Number of Items</b>				<b>27</b>

LKPD validation sheet made based on good LKPD criteria according to [8] with aspects namely: content, didactic, construct, technical, and time. The LKPD validation sheet grid is as follows:

**Table 2. Grid of LKPD Validation Sheets**

No	Rated aspect	Achievement Indicator	Number Statement	Number of Items
1	Quality of LKPD material content	The suitability of the material with KI and KD	1,2	2
		Material presentation	3,4,5,6,7	5
2	LKPD conformity with didactic requirements	Activities that stimulate students	8,9,10	3
		Suitability with the ability of students	11	2
3	Kesesuaian LKPD dengan syarat konstruk	Accurate use of language and sentences	12,13,14	3
		There is enough space		
4	LKPD conformity	Text size	15	1

	with technical requirements	Colors and pictures	16	1
		Neatness	17	1
		Motivation	18	1
5	LKPD conformity with time	Time compatibility	19	1
<b>Number of Items</b>			<b>19</b>	

### Data Analysis Technique

The data analysis technique used in this research is descriptive analysis, namely the technique used to describe the state of the object quantitatively.

#### 3.1.1 Analysis of the Validity of Mathematics Learning Devices

The data obtained were analyzed descriptively quantitatively. Researchers revise based on notes from the validator. The validation of the assessment instrument is determined by the average score given by the validator. Meanwhile, descriptive analysis of the level of validity according to [10] can use the following formula:

$$Va_1 = \frac{TSe}{TSh} \times 100 \%$$

$$Va_2 = \frac{TSe}{TSh} \times 100 \%$$

$$Va_3 = \frac{TSe}{TSh} \times 100 \%$$

$$Va_4 = \frac{TSe}{TSh} \times 100 \%$$

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

$$V = \frac{Va_1 + Va_2 + Va_3 + Va_4}{4} = \dots \%$$

Description:

V = Combined validity

Va<sub>1</sub> = Validity of the 1st expert

Va<sub>2</sub> = Validity of the 2nd expert

Va<sub>3</sub> = Validity of the 3rd expert

Va<sub>4</sub> = Validity of the 4rd expert

TSh = Maximum expected total score

TSe = Total empirical score (validation result from validator)

**Table 3. Criteria for Validation of RPP and LKPD**

No	Validity Criteria	Validity Level
1	85,01 % - 100,00 %	Very valid, or can be used without improvement.
2	70,01 % - 85,00 %	Fairly valid, or usable but needs minor fixes.

3	50,01 % - 70,00 %	Quite valid, it is recommended that it cannot be used because it needs major improvements.
4	01,00 % - 50,00 %	Invalid, or unusable

Source: [10]

### 3. RESULTS AND DISCUSSION

#### Research Results

The results of this study were compiled based on the stages of developing the ADDIE model. The resulting product is a learning device using The Power Of Two strategy for junior high school students on the flat side space building material. The analysis stage is the initial stage of research on the development of learning devices. One of the problems that exist in schools today is the limited number of learning tools, especially mathematics learning tools that facilitate students to build their knowledge and the components of the learning tools presented are incomplete. The textbooks provided by the government and used in learning are difficult to understand even though they are accompanied by explanations from the teacher. So that other media are needed to assist students in learning such as LKPD. In addition, the use of the lecture method still dominates in learning mathematics.

Students more often imitate what the teacher writes, even the words used are exactly the same as those given by the teacher. In the LKPD that has been prepared by the teacher, there are also several weaknesses, namely the LKPD which plans activities in the RPP, the components in the LKPD are not complete, the questions contained in the LKPD do not use problems that occur in everyday life so that it is difficult for students to understand, In addition, the LKPD used is in the form of teaching materials that have been provided by publishers which are arranged in the form of a book and presented only in plain white so that it is less attractive or arouses student interest.

Based on the explanation described above, it is known that the role of students in finding new concepts in the learning process is very lacking so it is necessary to develop learning tools in the form of RPP and LKPD with The Power Of Two strategy that can facilitate students to play an active role in finding concepts and building his knowledge. Therefore, it is necessary to conduct research on the development of mathematics learning tools using The Power Of Two strategy.

**Table 4. Results of RPP Validation Analysis**

RPP	Validation Percentage (%)				Average (%)	Validity Level
	V1	V2	V3	V4		
RPP 1	76,85	76,85	99,07	98,15	87,73	Very Valid
RPP 2	76,85	76,85	99,07	98,15	87,73	Very Valid
RPP 3	75,92	76,85	99,07	98,15	87,5	Very Valid
RPP 4	75,92	77,78	99,07	98,15	87,73	Very Valid
Average Total					87,67	Very Valid

Based on the explanation described above, it is known that the role of students in finding new concepts in the learning process is very lacking so it is necessary to develop learning tools in the form of RPP and LKPD with The Power Of Two strategy that can facilitate students to play an active role in finding concepts and building his knowledge.

Therefore, it is necessary to conduct research on the development of mathematics learning tools using The Power Of Two strategy.

**Table 5. Results of LKPD Validation Analysis**

LKPD	Validity Percentage				Average (%)	Validity Level
	V1	V2	V3	V4		
LKPD 1	77,63	68,42	98,68	96,05	85,19	Very Valid
LKPD 2	78,94	67,11	98,68	96,05	85,19	Very Valid
LKPD 3	78,94	76,32	98,68	96,05	87,5	Very Valid
LKPD 4	78,94	75	98,68	96,05	87,17	Very Valid
<b>Average Total</b>					<b>86,26</b>	<b>Very Valid</b>

Based on the results of the LKPD validation analysis in table 5. the average LKPD validation is 86.26, the LKPD is included in the Very Valid category. These results were obtained after revisions according to the validator's suggestions.

## Discussion

In this study, the development of mathematics learning tools on the material of flat side space for class VIII SMP students using The Power Of Two learning strategy was carried out. The development of statistical learning tools using The Power Of Two strategy was developed through the ADDIE model which consists of the analysis, design, development, implementation and evaluation stages, but this study did not use the implementation and evaluation stages, this is due to the government's policy to conduct online learning activities due to the covid-19 pandemic, so the products that have been developed cannot be tested through these learning activities. The description of the research results that have been described previously describes the steps for developing learning tools and the results obtained. The results of the development in the form of a final product have been tested for validity and practicality.

The results of the RPP validation analysis with The Power Of Two strategy from each validator have a very valid validation level with a percentage of 87.67%. While the results of the discovery learning model worksheet validation analysis from each validator have a very valid validation level with a percentage of 86.26%. Although all of the developed mathematics learning tools in the form of RPP and LKPD have met the criteria for validity, there are several components that need minor revisions to improve the RPP and LKPD.

## 2. CONCLUSION

Based on the results of the research and discussion in chapter 4, it can be concluded that the development of mathematics learning tools with the The Power Of Two strategy in junior high schools on the material of building flat sides in the form of RPP and LKPD is valid. The average value of RPP validation is 87.67% with a **very valid** validation level and the results of the LKPD analysis are 86.26% with a **very valid** validation level.

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