

DEVELOPMENT OF LEARNING DEVICES USING THE MISSOURI MATHEMATICS PROJECT (MMP) MODEL ON STATISTICAL MATERIALS IN JUNIOR HIGH SCHOOLS

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Abstract. This development research aims to produce learning device products using a valid Missouri Mathematics Project (MMP) model. The learning device products developed to consist of the Learning Implementation Plan (RPP) and Student Worksheets (LKPD). The teaching material presented in this learning tool is statistics for class students in junior high school. This type of research is development research with the ADDIE model, which has been modified into four stages (Analysis, Design, Development, and Evaluation). The data collection instruments used in this study were validation sheets and teacher response sheets to measure the validity and practicality of learning devices. The data analysis used is descriptive data analysis which describes the level of validity and practicality of the product. The data was obtained from the validation results by two mathematics education lecturers and two mathematics education teachers. The results obtained in the form of RPP validation results are 83.33% with valid criteria, and LKPD validation results are 87.88% with very valid criteria, then the results of the practicality questionnaire for practical RPP with an average of 83.33% and LKPD in the category very practical with an average of 87.5%. Thus, it can be concluded that this development research resulted in learning tools (RPP and LKPD) that were tested for their validity and practicality.

Keywords: *Mathematics Learning Toolkit, Missouri Mathematics Project*

1. INTRODUCTION

According to [1] that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, and society. nation and state (UUSPN article 1 paragraph 1). This means that education has a very important role in human life. Because with education, humans will have a clearer and more focused view and direction of life. Therefore, good education is education that not only prepares students for a profession or position, but how education can prepare students to be able to solve problems they will face in everyday life and be able to apply them in any conditions.

According to Law no. 20 of 2003 stated:

The purpose of national education is to become a human being who believes and is devoted to God Almighty, has noble character, is healthy, knowledgeable, capable, creative, independent, and becomes a democratic and responsible citizen. Given the importance of education, the quality of education must be improved. To improve the quality of education in Indonesia, the Government has sought various ways and one way to do this is to improve the quality of learning [2].

Mathematics has a very important role in human life useful for everyday life. Mathematics is a basic science for the world of education because mathematics is very supportive for studying other sciences. This shows that mathematics is very important for students to learn. Therefore, mathematics needs to be taught to students so that they can face the development of science and are expected to master and understand mathematics. So far, mathematics is still considered a difficult subject for students to understand. According to [3] one of the reasons is because mathematics has abstract objects that cannot be seen in real form and are difficult to imagine by students directly and require a good understanding of concepts in understanding the material. According to [4] said that in general teachers only lecture in front of the class and after that they are asked to do practice questions. When the teacher asks questions, they are more silent, so students tend to be passive in opinion, doing questions or assignments from the teacher. In addition, after learning is complete, the teacher often gives homework (PR) as an exercise from the questions in the textbook, so that students have limited knowledge of what is in the book.

According to [5] said that to support the objectives of learning mathematics in the 2013 curriculum, learning tools are needed that can familiarize students with solving problems systematically and precisely. The success of students in learning, in addition to their interest in learning towards teachers in teaching, is a learning tool packaged by teachers in the field of study. Learning tools serve to guide the learning process. The tools are RPP and LKPD.

From the description above, it can be seen that teachers must have the ability to develop learning tools that are in accordance with the needs of students to achieve the objectives of learning mathematics. Learning tools are an important component that must be prepared by a teacher before starting the learning process so that the expected learning process can run effectively and obtain the desired results. Therefore, in carrying out the learning process the teacher should have prepared learning tools that have been developed

using learning models and learning media that can attract students' interest, so that the expected learning objectives can be achieved.

Based on the results of interviews conducted by researchers at SMP IT Al-Hafit Pekanbaru on November 4, 2019, regarding the available learning tools, information was obtained that schools were already using the Revised 2013 curriculum, however, namely: the implementation of learning still tends to be teacher-centered and learning activities based on the scientific approach, it has not been implemented entirely, teachers still rarely use learning media so that they do not build student interest in learning. In addition, the Learning Implementation Plan (RPP) used by teachers has not been fully implemented in the learning process, and the designed 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. In addition to the RPP, learning tools such as the LKPD used have not been adapted to the learning model or activity design in the RPP. This is because, 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 it is less interesting and has not aroused the interest of students in solving the problems that exist in the LKPD.

Based on the description above, researchers are interested in developing learning tools using the Missouri Mathematics Project (MMP) learning model to overcome these weaknesses. In accordance with the meaning of the innovative learning process, you can adapt a fun learning model using the Missouri Mathematics Project (MMP) model where this learning model the teacher presents a project task that is guiding and exploring students' understanding of the learning material by linking student understanding. In this study, the product developed was in the form of a Learning Implementation Plan (RPP) and Student Worksheet (LKPD) on statistical material. Therefore, the researchers conducted a study with the title "Development of Learning Devices with the Missouri Mathematics Project (MMP) Learning Model in Statistics Class VIII Junior High School".

2. RESEARCH METHOD

This type of research is research and development (Research and Development). According to [6], research and development (Research and Development) is a process or steps to develop a new product or improve an existing product that can be accounted for. According to [7] research and development is the process of developing and validating

educational products. With the development method (R & D) it is hoped that new products can be found and tested that are useful. This type of research is development research which aims to describe and produce valid and practical RPP and LKPD.

In this study, researchers only used 4 stages of the ADDIE development model which had been modified according to the opinion [8] namely; 1) Analysis; 2) Design; 3) Development; 4) Evaluation. In this study, the researchers did not use the implementation phase, namely the use or product trial phase. This was due to the unfavorable teaching and learning situation due to the covid-19 pandemic. The description of the development steps that have been modified, namely:

Table 1. ADDIE Research Flow

Activity Development	Stage
Analysis	Identify the product to be developed in accordance with the students' problems, the learning process, the learning environment, and the achievement of goals.
Design	<ol style="list-style-type: none"> 1. Designing the manufacture of learning media. 2. Create the concept of learning activities. 3. Make the concept of teaching materials to help the learning process.
Development	<ol style="list-style-type: none"> 1. Realizing the framework that has been designed into a product. 2. Create an instrument to measure/assess the product.
Evaluation	<ol style="list-style-type: none"> 1. Review the products produced by validating the product by an expert validator. 2. Measuring the achievement of product development goals and objectives.

The data analysis technique used is the analysis of the validation of learning devices and the analysis of the practicality of learning devices. The data used to assess the validity of the learning tools were obtained through validation sheets, while the data used to assess the practicality of the learning tools were obtained through teacher response questionnaires, qualitative descriptive data analysis techniques.

3. RESULTS AND DISCUSSION

A. RESULTS

Validation and Final Product of Learning Implementation Plan

The assessment by several validators of the RPP is to obtain a score covering 27 indicators of achievement. To determine the validity of each indicator, the average value obtained from the results of the assessment by all validators. The following will present the average validation results of the four RPPs, namely:

Table 1. Total Results of RPP Validation Analysis

Learning Device	Percentage	Category
RPP-1	83,33%	Valid
RPP-2	83,33%	Valid
RPP-3	83,33%	Valid
RPP-4	83,33%	Valid
Average total RPP	83,33%	Valid

Student Worksheet Validation and Final Product

The assessment by several validators of the LKPD is to obtain the average value of the results of the assessment by all validators. The following will present the average validation results of the three LKPDs, namely:

Table 2. Total Results of LKPD Validation Analysis

LKPD	Percentage	Category
LKPD-1	88,28%	Sangat Valid
LKPD-2	88,67%	Sangat Valid
LKPD-3	86,71%	Sangat Valid
LKPD-4	86,71%	Sangat Valid
Average total LKPD	87,88%	Sangat Valid

Based on the assessments of the four validators, the results of the validation of the learning tools developed by the researchers used the MMP model on statistical material, including valid criteria for lesson plans with an average of 83.33% and very valid criteria for LKPD with an average of 87.88%.

Teacher Response Questionnaire to RPP and LKPD

The teacher's response questionnaire was used to determine the practicality of the lesson plans and worksheets developed by researchers in learning. The following are the results of the analysis of the teacher's response to the developed RPP and LKPD:

Table 3. Results of the RPP Practicality Questionnaire (Teacher Responses)

No	Rated Aspect	Scoring Scale			
		4	3	2	1
1	The lesson plans presented are easy to apply in teaching and learning activities in the classroom	√			
2	Learning activities are structured according to the learning model used		√		
3	The language used in the lesson plans is clear and easy to understand		√		
4	RPP is described in detail and clearly	√			

5	The objectives presented in the lesson plan are in accordance with the competencies to be achieved by students	√
6	The time allocation given to the lesson plans is appropriate for each learning activity	√
7	The assessment instrument given is in accordance with the time in the closing activity of the lesson	√
8	The questions and alternative answers in the assessment are clear and make it easier to measure students' abilities	√
9	The development of this device is worth developing on other materials	√
Total Scores Obtained		30
Total Score		36
Average (%)		83,33%
Practicality Level		Very Practical

Table 4. Results of the LKPD Practicality Questionnaire (Teacher Responses)

No	Rated Aspect	Scoring Scale			
		4	3	2	1
1	The activity steps presented in the LKPD are very clear and easy for students to understand	√			
2	Students can easily understand the instructions or directions in the LKPD	√			
3	The presentation of writing on the LKPD is very clear and does not cause double meaning (ambiguous)		√		
4	The language used in the LKPD is in accordance with the level of students' knowledge		√		
5	The color presentation on the LKPD is very interesting	√			
6	The presentation of the LKPD is equipped with interesting pictures and illustrations	√			
7	The use of LKPD makes it easier for students to conclude learning material		√		
8	The LKPD presented helps students understand the learning material		√		
9	The material in the LKPD is presented systematically/coherently so that it makes students think in a structured way		√		
10	Learning by using LKPD makes the learning process more active	√			
11	The problems presented in the LKPD are in accordance with real problems in everyday life		√		
12	The time given in solving problems in the LKPD is sufficient	√			
Total Scores Obtained		42			
Total Score		48			

Average (%)	87,5%
Practicality Level	Very Practical

B. DISCUSSION

The products produced in this study are in the form of learning tools, namely Learning Implementation Plans (RPP) and Student Worksheets (LKPD). In the development of this product, researchers chose statistical material for students at the junior high school level. RPP and LKPD learning tools were developed based on the Revised 2013 Curriculum using MMP learning steps. This study uses the ADDIE development model with a sequence of stages, namely; 1) Analysis; 2) Design; 3) Development; 4) Implementation; 5) Evaluation; however, this study did not use the implementation phase, 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.

In the analysis phase, the researcher conducted interviews with the mathematics teacher of class VIII at SMP IT Al-Hafit Pekanbaru in order to adjust the problem to the product to be developed. The learning process carried out tends to be teacher-centered and still rarely uses LKPD. In addition, the lesson plans used still refer to conventional learning, so students are less active in the learning process. Therefore, researchers want to develop learning tools. The development of this product is expected to make the teacher's role wider. In addition, this learning tool is expected to help students learn better, so that students can understand the material more easily.

After analyzing the problems that exist in the school, the researcher then proceeds to the design stage. At this design stage, researchers design a product that can provide solutions to these problems. The products designed are, RPP and LKPD. After going through the design stage, then proceed to the development stage. The results of the product design that have been made are then realized into a new product that has been adapted to the purpose of product development.

In the next stage, namely evaluation (evaluation). At this stage, the resulting product must go through a validity test to see the feasibility of the resulting product. The validity test in this study was carried out by 4 expert validators, 2 lecturers of mathematics education at FKIP UIR, namely Dr. Hj. Sri Rezeki, S.Pd., M.Si and Mrs. Sari Herlina, S.Pd., M.Si, as well as 2 teachers of mathematics education namely Maike Triyani Putri, S.Pd as validator III and Mrs. Noni Sepriani, S.Pd . After conducting the validity test, the results of valid

learning device validation were obtained. The results of the combined validation of validators obtained an average validation for RPP as much as 83.33% with a valid category and for LKPD as much as 87.88% with a very valid category, then the results of the practicality questionnaire for practical RPP with an average of 83.33% and LKPD in very practical category with an average of 87.5%.

In this study, there are still several obstacles and weaknesses in its implementation, namely: The products developed by researchers have not been implemented, this is due to the condition of the school environment that has not been able to carry out face-to-face learning activities. This condition is based on government policies related to the COVID-19 pandemic.

4. CONCLUSION

Based on the results of the research data analysis and discussion, it was concluded that mathematics learning tools have been produced with the Missouri Mathematics Project (MMP) learning model in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD) that have been tested for validity. and practicality. With the details of the results of the analysis of RPP validation data 80.18% in the valid category and LKPD 82.81% in the valid category. The results of practicality analysis for practical lesson plans with an average of 83.33% and LKPD in the very practical category with an average of 87.5%. So it was obtained as a whole obtained information that the developed RPP and LKPD were tested for feasibility with the acquisition of quite valid RPP and LKPD and practical for RPP and very valid and very practical for LKPD.

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