THE VALIDITY OF CUBE AND BLOCK MATERIAL LEARNING DEVICES USING A REALISTIC MATHEMATICS EDUCATION (RME) APPROACH

Eka Fuji Astuti[1*)], Sri Rezeki[2]
[1,2]*Universitas Islam Riau*
sri_rezeki@edu.uir.ac.id

Received: 5-02-2023; **Accepted**: 30-02-2023 ; **Published**: 30-04-2023

Abstract. Learning devices are tools designed by teachers to facilitate teachers in carrying out the learning process so that they can support the achievement of the expected success of learning activities. The purpose of this development research is to produce learning device products in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD) on valid flat-sided geometric shapes using the Realistic Mathematics Education (RME) approach. This type of research is development research with the ADDIE model, which has been modified into three stages (Analysis, Design, and Development) without the Evaluation and Implementation stages. The instrument for collecting research data is learning device validation sheets in the form of lesson plans and worksheets. The data analysis used is descriptive data analysis which describes the level of validity of the product with data obtained from the results of validation by four experts. Validation activities were carried out in Pekanbaru City from August 5, 2020, to September 2, 2020, with the research results obtained in the form of an RPP validation result of 96.09 with very valid criteria and an LKPD validation result of 90.52 with very valid criteria.
Keywords: *product development, learning advice, cube and block material*

1. INTRODUCTION

Completion of the curriculum is one way or effort to improve the quality of education. As was done by the government, namely updating the curriculum from the Learning Unit Level Curriculum (KTSP) to the new curriculum, namely the 2013 curriculum. The 2013 curriculum is a curriculum full of character education [1]. The 2013 curriculum aims to form students to be able to make observations/observations, ask questions and reason about the knowledge being taught [2]. Teachers as the spearhead for implementing the curriculum are required to be able to formulate the 2013 curriculum properly.

Mathematics studies order, organized structure, mathematical concepts which are arranged hierarchically, as well as structured and systematic, starting from the simplest concepts to the most complex concepts [3]. Mathematics is one of the fields of study taught in formal education institutions which is one of the most important parts in efforts to improve the quality of education [4].

In the process of learning mathematics, more emphasis should be placed on activities to build knowledge that must be carried out by the students themselves, and the teacher only acts as a facilitator to control the activities of students in constructing their

Mathematics Research and Education Journal, Vol. 7, No.1, April 2023, 1 – 7
ISSN: 2620-4129
E-ISSN: 2621-3885

knowledge [5]. Mathematics learning is an effort made to make students want to learn or an activity to teach students about knowledge obtained through thinking activities [6]. Now to achieve optimal mathematics learning processes or activities, teachers are required to be able to create a learning atmosphere that can build students' abilities to be active, creative and innovative, as well as provide teaching materials that are in accordance with the characteristics and environmental conditions of students.

Government Regulation Number 32 of 2013 article 19 relating to process standards, suggests that teachers are expected to be able to develop lesson plans [7]. From Government Regulation Number 32 of 2013 teachers must have the ability to develop learning tools according to student needs so that learning objectives can be achieved properly. But in reality the mathematics learning tools made by the teacher are still not in accordance with the implementation in the classroom.

Based on the results of interviews at An-Namiroh Pekanbaru Middle School on December 2 2019 related to the implementation of the 2013 curriculum, there are several problems in teaching and learning activities, including: (1) The teacher takes lesson plans from the internet which are in accordance with the 2013 curriculum which cannot fully make participants students are motivated in the learning process; (2) The teacher is familiar with the Realistic Mathematics Education (RME) approach, but the teacher has never tried to develop lesson plans by adding other approaches to the learning process; (3) LKPDs imported from publishers contain a summary of the material and questions that are done as exercises so that it makes it difficult for students to understand the concept to be achieved. In addition, LKPD is less attractive and has not aroused students' interest in solving the problems that exist in the LKPD.

From the statement it is clear that teachers are still having difficulties developing lesson plans and worksheets which are learning tools based on the 2013 curriculum. Not only that, in carrying out the learning process, students only know formulas and work on questions related to these formulas only, as well as in terms of LKPD presentation looks less attractive so that it makes students experience boredom and boredom in the implementation of the learning process.

One approach that is expected to foster student activity in the learning process is the Realistic Mathematics Education (RME) approach. The RME approach is not only about teaching teacher activities, but rather focuses on student learning activities, and the teacher's role as a guide for students to conclude learning correctly [8].

Realistic Mathematics Education (RME) is an approach that has the goal of motivating students to understand mathematical concepts by associating the concepts studied with problems that exist in everyday life or real life [9]. The RME approach is learning mathematics that utilizes students' activities in their environment to be able to solve problems with the help of everyday life and then be transformed into problem solving. With the RME steps that have been modified by researchers, namely: (1) Understanding contextual problems; (2) Explanation of contextual problems; (3) Solving contextual problems; (4) Comparing and discussing the results of answers from students; and (5) Conclusion.

ISSN: 2620-4129
E-ISSN: 2621-3885

Based on the description above, this study aims to develop and produce learning device products in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD) on valid flat sided geometric shapes using the Realistic Mathematics Education (RME) approach.

2. RESEARCH METHOD

Based on the intended aims and objectives, this research is classified as development research, namely research that intends to develop learning tools so that they can help facilitate students in understanding mathematics learning materials.

The implementation of this research was planned at SMP An-Namiroh Pekanbaru City for class VIII students, but this research did not conduct product trials and only reached the development stage, namely in the form of testing the validity of the product. This was done based on government policy against the Covid-19 pandemic which required students to study online, making it impossible for researchers to conduct product trials. When this research was carried out in odd semesters, namely to test the validity of the product. This research started on August 5 2020 by submitting a validator to be asked for their willingness to assess the products that have been developed. Product validity test starts on August 5 2020 until September 2 2020.

In this development research, the instrument used was the validity test given to the validators (lecturers and teachers). This validator consists of 4 experts, namely 2 lecturers from the Mathematics Study Program FKIP UIR and 2 mathematics teachers from SMP An-Namiroh Pekanbaru. The validity test questionnaire aims to measure whether the developed device is valid or not.

The data analysis technique used in this study is descriptive analysis, namely the technique used to describe the state of objects quantitatively. Descriptive data analysis was carried out in order to analyze the data by describing the data that has been collected as it is [10]. Descriptive data analysis was carried out by describing the meaning contained in the acquisition obtained at these values. The use of descriptive data analysis depends on the type of data to be analyzed.

In this study, the type of data to be analyzed is in the form of intervals, so the technique used is by calculating the average value on each validation sheet result. Then, proceed by adding up the values for each indicator on the validation sheet with the criteria used. The validity criterion must show compatibility between the development goals and the product being developed, namely the product that has been validated is feasible (valid).

3. RESULTS AND DISCUSSION

Results Preliminary Research

The process of developing mathematics learning tools on cube and block material for class VIII SMP An-Namiroh Pekanbaru with a Realistic Mathematical Education (RME) approach using the ADDIE development model without Evaluation and Implementation stages which is described as follows.

Analysis

ISSN: 2620-4129
E-ISSN: 2621-3885

In this study, the researcher used the analysis stage as a first step to obtain information about the learning tools to be used by mathematics teachers at SMP An-Namiroh Pekanbaru with several results, namely: (1) The mathematics learning tools developed were adapted to the revised 2013 curriculum; (2) The mathematics learning tools developed are capable of motivating and increasing students' interest in learning because there are lesson plans that use the RME approach, because the RME approach is learning mathematics that is based on real problems or about what is in students' daily lives; (3) The LKPD developed refers to the RPP which was developed using the RME approach so that the LKPD used by students for learning also contains contextual or based problems that exist in everyday life and contains attractive pictures or designs to increase interest. learn students.

Design

At the design stage, researchers designed learning tools that were developed in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD). Learning Implementation Plans (RPP) are prepared according to the syllabus and Student Worksheets (LKPD) are prepared according to the RPP that has been developed by researchers. At the design stage the researcher also made instruments in the form of RPP validation sheets and LKPD validation sheets to obtain the feasibility value of the prepared RPP and LKPD.

In this study the RPP that was developed by the researcher used the Realistic Mathematical Education (RME) approach with four meetings, namely: the lesson plan for the first meeting the material to be studied was the surface area of a cube, the lesson plan for the second meeting the material to be studied was the material for the surface area of a block, The RPP for the third meeting of the material to be studied is the material for the volume of cubes, the RPP for the fourth meeting the material to be studied is the material for the volume of blocks.

In this study, the LKPD developed by the researcher contained problems that existed in the student's environment so that it was easier for students to understand the material provided by the teacher. Before students work on the LKPD provided by the teacher, students will receive information about the LKPD so that students are more interested in the material to be studied. The LKPD that will be developed is a learning guide for students with cube and block material and there are four meetings adapted to the lesson plan.

Development

Develop learning tools and create product assessment instruments. At this stage, the framework that is still conceptual is realized or transformed into a product that is ready to be implemented.

The validator assessment for the RPP that has been made includes several indicators. To see the validity of all indicators obtained from the average of each RPP which will be described as follows.

Table 1. Average of Each RPP Indicator

ISSN: 2620-4129
E-ISSN: 2621-3885

Indicator	RPP Based on the Meeting				Average (%)	Description
	1	2	3	4		
Aspects of Material/Content	83.33	87.5	83.33	83.33	84.37	Very Valid
Aspects of Language	100	100	100	100	100	Very Valid
RPP Format	100	100	100	100	100	Very Valid
Curriculum suitability	100	100	100	100	100	Very Valid
Total Average Results for Each Indicator (%)					96.09	Very Valid

The table above shows the data from the RPP validation results which are assessed based on indicators. The material/content aspect indicator has the lowest percentage. With a percentage of 15.63% that needs to be revised. As for other indicators, namely the aspect of language, lesson plans format and curriculum suitability, they obtained a perfect percentage of 100%. The validator's assessment of LKPD includes several indicators. The following presents the average of each LKPD indicator obtained from the validator's assessment:

Table 2. Average of Each LKPD Indicator

Indicator	RPP Based on the Meeting				Average (%)	Description
	1	2	3	4		
Didactic Terms	67.86	67.86	62.29	62.29	65.08	Very Valid
Construction Terms	100	100	100	100	100	Very Valid
Terms of Material/ Content	100	100	75	75	87.5	Very Valid
Terms of Service	100	100	100	100	100	Very Valid
Time Terms	100	100	100	100	100	
Total Average Results for Each Indicator (%)					90.52	Very Valid

The table above shows the data from the LKPD validation results which are assessed based on indicators. The didactic requirements indicator has the lowest percentage. With an average percentage obtained 34.92% which needs to be revised. Followed by an indicator of material/content requirements with an average percentage obtained of 12.5% which needs to be revised. Then for indicators of construction requirements, presentation requirements, and time requirements obtain a perfect percentage by obtaining a percentage of 100%.

Discussion

The products produced in this study are learning tools in the form of Learning Implementation Plans (RPP) and Student Worksheets (LKPD). The RPP and LKPD learning tools developed are adapted to the revised 2013 curriculum using the Realistic Mathematics Education (RME) approach. This study uses the ADDIE development model with the sequence of stages namely; 1) Analysis; 2) Design; 3) Development; 4) Evaluation; and 5) Implementation; however, the Evaluation and Implementation stages could not be carried out in this study, this was due to the government's policy to carry out

learning activities online due to the co-19 pandemic, so that the products that had been developed could not be tested through these learning activities.

In the analysis phase, the researcher conducted interviews with the eighth grade mathematics teacher at An-Namiroh Pekanbaru Middle School to adjust the problems that existed in the school with the products that the researchers would develop. Based on the results of interviews conducted by researchers, the school had never used the Realistic Mathematics Education (RME) approach so that the learning carried out did not appear to vary.

Then the researcher continued the interview related to the learning device. The learning process that is carried out tends to be more teacher-centered and still rarely uses LKPD. In addition, the lesson plans used still refer to conventional learning and are obtained from the internet, so that students are less active in the learning process. Therefore, researchers want to carry out the development of learning devices. The development of this product is expected to make the teacher's role wider.

After analyzing the problems that exist in the school, then researchers proceed to the design stage. At this design stage, researchers design a product that is able to provide solutions to the problems they face. The products designed are in the form of lesson plans and worksheets. After going through the design stage, it will then proceed to the development stage.

The product design results that have been made will be realized into a new product that has been adapted to the product development objectives. At this stage, the product produced must go through the validity test stage to see how the feasibility of the product produced is. The validity test in this study was carried out by 4 expert validators, 2 lecturers from the UIR FKIP mathematics education study program, namely Ms. Aulia Stephanie, S.Pd., M.Pd and Mrs. Agus Dahlia, S.Pd., M.Sc, and 2 mathematics teachers from SMP An-Namiroh Pekanbaru, namely Mrs. Sindi Sepastika S.Pd and Mrs. Cici Hasanah S.Pd. After testing the validity, the results of product validation are obtained in the form of learning devices that are valid.

RPP assessment is carried out for each meeting, so there will be 4 validation results. The average validation result for all meetings by the validator is that it has a value of 96.09 which is categorized as very valid. LKPD assessment is carried out for each meeting, the LKPD developed has been adjusted to the RPP, so there will be 4 validation results. The average validation result for all meetings by the validator is that it has a value of 90.52 which is categorized as very valid.

4. CONCLUSION

Based on the results of data analysis on the results and discussion, it can be concluded that a mathematics learning tool with the Realistic Mathematics Education (RME) approach has been produced in the form of Student Worksheets (LKPD) adapted to lesson plans that have been tested for validity. There are 2 stages that cannot be carried out in this research due to the government's policy to carry out online learning as a result

ISSN: 2620-4129
E-ISSN: 2621-3885

of the Covid-19 pandemic, so other researchers who wish to continue this research are welcome at the evaluation and implementation stages (trial use of the product).

REFERENCES

[1] Zaini, H. 2020. Karakteristik Kurikulum 2013 dan Kurikulum Tingkat Satuan Pendidikan (KTSP). *Jurnal Idaroh*. *1*(1).

[2] Marlina, M.E. 2013. Kurikulum 2013 yang Berkarakter. *JUPIIS. 5*(2).

[3] Hasratuddin. 2020. Membangun Karakter Melalui Pembelajaran Matematika. *Jurnal Pendidikan Matematika Paradikma*. *6*(2).

[4] Novitasari, D. 2016. Pengaruh Penggunaan Multimedia Interaktif terhadap Kemampuan Pemahaman Konsep Matematis Siswa. *Jurnal Pendidikan Matematika*. *2*(2).

[5] Siagian, M.D. 2017. Pembelajaran Matematika dalam Persfektif Konstruktivisme. *Nizhamiyah Jurnal Pendidikan Islam dan Teknologi Pendidikan*. *7*(2).

[6] Siagian, M.D. 2016. Kemampuan Koneksi Matematik dalam Pembelajaran Matematika. *MES (Journal of Mathematics Education and Science)*. *2*(1).

[7] Peraturan Pemerintah Republik Indonesia Nomor 32 Tahun 2013. *Standar Nasional Pendidikan.* Jakarta.

[8] Chotimah, S. 2015. Upaya Meningkatkan Kemampuan Komunikasi Matematika Siswa SMP di Kota Bandung dengan Pendekatan *Realistic Mathematics Education* pada Siswa SMP di Kota Bandung. *Jurnal Ilmiah STKIP Siliwangi Bandung*. *1*(9).

[9] Ningsih, S. 2014. *Realistic Mathematics Education*: Model Alternatif Pembelajaran Matematika Sekolah. *JPM IAIN Antasari*. *1*(2).

[10] Sholikhah, A. 2016. Statistik Deskriptif dalam Penelitian Kualitatif. *Komunika. 10*(2).

ISSN: 2620-4129
E-ISSN: 2621-3885