

# Numeratic Literacy in Mathematics Learning Assisted of RME-Based Booklet Teaching Materials in Class V Elementary School Students

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## ABSTRACT

The aims of this study were (1) to examine the design of mathematics booklet teaching materials based on Realistic Mathematics Education (RME) for class V Elementary School Students, (2) to examine the feasibility of teaching materials for mathematics booklets in Realistic Mathematics Education (RME) based learning for class V Elementary School Students, (3) to examine the effectiveness of mathematics booklet teaching materials in learning based on Realistic Mathematics Education (RME) for class V Elementary School Students. The research design uses Research and development (R&D) with a 4-D model (Four-D Models). The results of this study 1) Design of teaching materials for mathematics booklets based on Realistic Mathematics Education (RME) for class V SD, 2) Feasibility Test for Realistic Mathematics Education (RME) based mathematics booklets for class V Elementary School Students, 3) Test the effectiveness of Realistic Mathematics Education (RME) based mathematics booklets) class V Elementary School Students

**keywords:** *literasi numerasi, bahan ajar booklet matematika, realistic mathematics education (RME)*

## INTRODUCTION

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 the skills needed by themselves, society, nation and state (Law No. .20 of 2003). Mathematics is one of the subjects taught at every level of education. By studying mathematics, it prepares students to be able to compete by using a creative, innovative and imaginative mindset (Utami, Mukhni, & Jazwinarti, 2014: 7). Based on data from the National Council of Teachers of Mathematics/NCTM Ratnaningsih (2008: 129) there are five standard processes for students in acquiring and using mathematical knowledge, namely: problem solving, reasoning and proof (reasoning and proof), communication (communication), connection (connection), and representation (representation). By paying attention to this, it is necessary to develop students' thinking and reasoning processes in learning mathematics for the self-development of students in the future (Efunsyah and Reni Wahyuni, 2018).

Mathematical literacy is one of the important components that students need to be able to successfully solve problems with the ability to analyze, give reasons, and convey ideas effectively, formulate, solve and interpret mathematical problems in various forms and situations. Activating student learning in learning activities is one way to animate and train student memory so that it works to develop optimally (Marno, 2018).

Mathematics subjects have an important role in education because they make students accustomed to thinking logically, analytically, systematically, creatively and critically. However, the importance and relevance of mathematics is in fact not directly proportional to the learning situation in the classroom. The lack of teacher knowledge in mastering the class makes the atmosphere of learning mathematics more rigid, unpleasant, and sometimes eliminates the power of creativity which is the soul of mathematics. Muchlis (2012: 136) in Efuansyah and Reni Wahyuni, (2018; 175) states that various kinds of efforts have been and are still being made by mathematics teachers and researchers to train students' mathematical reasoning abilities in junior high schools, one of which is by using the Realistic Mathematics Education (PMR). PMR or the foreign term is called Realistic Mathematics Education (RME) or in Indonesia it is better known as Indonesian Realistic Mathematics Education (PMRI). "Indonesian Realistic Mathematics Education" is a form of learning that uses the real world and learning activities that emphasize student activities to seek, discover, and build their own necessary knowledge so that learning becomes student-centered (Marno, 2018: 75).

Based on the results of interviews at SDN 02 Plosorejo, in the process of learning mathematics for Class V, data was obtained that: (1) the media used in learning included textbooks and LKS. Each student is given 1 textbook which is loaned; (2) Teachers have not utilized innovative learning media in class such as animation, videos etc. This is proven by reference sources only from textbooks; (3). The availability of LCD projectors is very limited, and is used by 6 classes; (4). Teachers have not used the library optimally, this is evidenced by minimal visits to the library. Usually 1 semester is only used once for learning.

These problems cause low mathematics learning outcomes. In class V there are 30 out of 40 students whose learning outcomes

are below the KKM (72). These data indicate that in learning mathematics there is a need for innovative teaching materials to improve the quality of learning mathematics.

Effective mathematics learning requires understanding what students know, their needs in learning, and then providing them with challenges and support to learn well. In other words, for mathematics learning to take place effectively, mathematics teachers need to understand their students well. Teachers need to know exactly what students know and do not know. One step that can be taken is to use a mathematics learning approach that emphasizes the real life of students, or better known as Realistic Mathematics Education (RME) (Rina and Zetriuslita, 2020).

Teaching materials are self-contained packages that include a series of systematically planned and designed learning experiences to help students achieve learning goals. Students who use teaching materials are expected to be able to learn on their own without the help of other people/teachers. The teacher only controls and motivates students to be enthusiastic in learning. Good teaching materials provide clear information and implementation instructions about what a learner must do, how to do it, and what learning resources must be used so as to achieve effective and efficient learning objectives.

The emphasis on learning mathematics in real life is very important, because mathematics is not a place to transfer mathematics from teachers to students, but rather a place for students to rediscover mathematical ideas and concepts through exploration of real problems. The RME approach is a mathematical approach that focuses more on learning activities on students and the environment and teaching materials that are arranged in such a way that students are more active in constructing or constructing their own knowledge to be acquired.

Students are directed to be more active in elaborating the abilities that exist in them,

so they need to have a clear guide and can guide them to develop their potential in a directed and maximum way. For this reason, teaching materials have a central role in their efforts to direct students to achieve and construct the knowledge they acquire methodically, systematically, logically, and rationally. In learning mathematics, the ability to apply number concepts and arithmetic operations skills in everyday life.

## **MATERIALS DAN METHODS**

This type of research was designed with a Research and development (R&D) design with a 4-G model (Four-D Models) consisting of four stages, namely the define stage, the design stage, the develop stage and the disseminate stage.

The research location is the place where the research takes place. This research was conducted at SDN 2 Plosorejo, Randublatung District, Blora Regency.

The subjects of this research are students, teachers, experts or experts. For the subject students and teachers come from SDN 2 Plosorejo. This research was carried out in semester I of the 2022/2023 academic year. The technique used in sampling is using purposive sampling technique, namely the technique of determining the sample with certain considerations.

The application of this technique is because not all samples have criteria that are in accordance with the problems and phenomena studied. Sampling criteria in the research to be conducted are: 1) Elementary schools that have implemented the 2013 curriculum as a whole, 2) teachers and fourth grade students of elementary schools in one cluster, 3) equality of achievement and academic ability of students, and 4) discovery of problems which tend to be the same in terms of numerical literacy.

## **RESULT DAN DISCUSSION**

### **Design of mathematics booklet teaching materials based on Realistic Mathematics Education (RME) for class V Elementary School Students**

Based on the design, this study uses 4-D (Four-D Models) which consists of four stages, namely the define, design, develop and disseminate stages.

#### **a. Define stage**

The analysis was carried out by distributing student needs questionnaires and conducting interviews with fifth grade teachers at SDN Plosorejo 2. The results of the analysis of teaching materials for fifth grade elementary school students found that the school provided teaching materials in the form of textbooks and worksheets to support the learning process. In this teaching material, it only provides information and examples in general, it has not yet connected with problems that occur in real life. Based on the results of a needs analysis questionnaire with elementary school student respondents, it was found that 57% of students still did not understand the math material.

#### **b. Design stage**

The booklet design is made in book form with A5 size with a total of 16 pages. The first page contains an opening cover consisting of the title of the material and the name of the author, the second page contains the Table of Contents, the third page contains Indicators and Basic Competency, the fourth to the twelfth page contains flat shape material and building space, the eleventh page contains questions, the sixteenth page contains a bibliography. The developed booklet contains materials and examples from everyday life related to flat shapes and the help of room V elementary schools.

#### **c. Develop stage**

The aim is to develop an RME-based booklet on mathematics with a validation test of material and media experts, and a feasibility test of teacher responses. The validity of the media was obtained from a lecturer at Raden Fatah University Palembang, a class V teacher at SDN Japerejo and a Class V teacher at SDN 2 Ringin. While the validity of the material was obtained from lecturers at the State University of Lambung, 2 expert teachers in the media field at SDN Bamban.

**d. Disseminate stage**

The researcher conducted a pretest and posttest to test the effectiveness of the booklet. After carrying out the pretest and posttest the researcher carried out the due diligence by giving a response questionnaire to the teachers and students of class V at SDN Plosorejo 2. Based on the responses of the teachers and students, the results obtained were 81% with feasible criteria. The final stage of the booklet is disseminating it to elementary school classes as a learning resource.

**Feasibility Test of Realistic Mathematics Education (RME) based mathematics booklet for class V SD**

Based on media expert validator scores, material experts and teacher and student responses. The media expert validator for math booklets is assessed based on 12 points of assessment. based on 3 media expert validators, a score of 82.6% was obtained with feasible criteria. The results of the acquisition of media expert scores are presented in table 1.1 below.

**Table 1 Results of Media Expert Validation**

Number	Grain	Validators		
		1	2	3
1	Systematics The order of presentation of the material	4	3	3
2	Summary	4	3	3
3	Problems example	4	4	3
4	Language readability	4	4	3
5	Use of communicative words/sentences	3	4	3
6	terminology	3	3	3
7	Spelling definition	3	3	4
8	Consistency in the use of symbols/symbols	3	3	3
9	The appearance and layout of the booklet is attractive	3	3	4
10	Titles, pictures and descriptions of pictures can be understood clearly	3	3	3
11	Use of color	3	3	4
12	Stimulate the interest of students	3	3	4
Amount		40	39	40
Average		83,3	81,25	83,3
	Percentage	82,6%		

The material expert validator for math booklets is assessed based on 19 points of assessment. based on 3 media expert validators, a score of 79.4% was obtained with the appropriate criteria. The following table presents the results of the expert validation of the mathematics booklet material.

**Table 2. Material Expert Validation Results**

Number	Items	Number Items		
		1	2	3
1	Suitability of material with KD & Indicators	4	3	3
2	Clarity of learning objectives	4	3	3
3	Material equipment	3	3	3
4	The truth of the concept / theory in teaching materials	3	3	3
5	Systematic order of presentation of material	3	3	3
6	Concept Map and Summary	3	3	3
7	Example questions and practice questions	3	3	3
8	Language readability	4	4	3
9	Use of communicative words/sentences	3	4	3
10	terminology	3	4	3
11	Spelling definition	3	4	3
12	Consistency in the use of symbols/symbols	3	3	3
13	Foster attitude attitude	3	3	3
14	Mathematical	3	3	3
15	Cultivate curiosity	3	3	3
16	Stimulating abilities	3	3	3
17	think critically	3	3	3
18	Conformity with the level of thinking of students	3	4	4
19	Student engagement	3	4	3
Amount		60	63	58
Average		78,9	82,9	76,3
	Percentage	79,4%		

After obtaining the feasibility assessment of the material and media expert validator, the next stage is the feasibility assessment through student and teacher responses. There were 20 students and 1 teacher as respondents. Students are given learning using the developed mathematics booklet. Giri and students were then given a response questionnaire sheet on the development of a mathematics booklet. Based on the results of this assessment, student and teacher response scores were obtained for the developed mathematics booklet as presented in Table 4.3 below.

Number	amount
1	65
2	66
3	72
4	70
5	71
6	70
7	76
8	65
9	66
10	63
Average	684
Percentage	81%

Test the Effectiveness of Realistic Mathematics Education (RME) based mathematics booklets for class V Elementary Schools  
Students' cognitive learning outcomes in this study were obtained from giving a pretest at the beginning of learning (first meeting) and a posttest at the end of learning (last meeting). The questions used for the pretest and posttest amounted to 20 multiple choice questions about geometric

### Homogeneity Test

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
HASILBELAJAR	Based on Mean	1.105	1	38	.300
	Based on Median	1.036	1	38	.315
	Based on Median and with adjusted df	1.036	1	32.621	.316
	Based on trimmed mean	1.387	1	38	.246

Based on Table 4.5, the results of the homogeneity test on the based of mean Pre Test show a significant value of 0.300, which means the data is  $> 0.05$ , so it can be concluded that the data is homogeneous.

material. Classical student learning outcomes are presented in Table 4.1

Number	Name	PRETEST	POSTTEST
1	U-1	70	80
2	U-2	65	75
3	U-3	75	85
4	U-4	75	80
5	U-5	70	85
6	U-6	60	75
7	U-7	65	80
8	U-8	60	75
9	U-9	65	85
10	U-10	65	85
11	U-11	75	80
12	U-12	60	75
13	U-13	50	75
14	U-14	45	75
15	U-15	65	95
16	U-16	75	85
17	U-17	75	85
18	U-18	60	80
19	U-19	65	85
20	U-20	70	90
	RT2	66	82

### Normality test

Tests of Normality						
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
PRETEST	.176	20	.106	.889	20	.026
POSTTEST	.182	20	.080	.877	20	.015

Based on table 4.4 it is known that the normality test for using Boolet has a significant value (Sig.). the Kolmogorov Smirnov normality test for the experimental class obtained a pre-test value of 0.106  $> 0.05$  and for the post-test group 0.008  $> 0.05$ . So it can be concluded that the Kolmogorov Smirnov normality test is normally distributed.

### N-gain test

No	Jumlah siswa	N-Gain	Ket.
1	20	0,45	sedang

Based on the N-Gain score above, it can be concluded that the average Gain score for the experimental class is 0.45 so that it can

be concluded that the application of the RME-based mathematics booklet is categorized as moderate.

### T test

		Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
Pair 1	PRETEST	-	7.18185	1.60591	Lower	-19.36121	-	.000
	POSTTEST	16.00000			Upper	12.63879	9.963	

Based on the output table above, it is known that the significance score (Sig) on Levene's Test for Equality of Variances is  $0.000 > 0.005$ , so it can be concluded that there is a significant difference.

### CONCLUSION

Based on the results of research development and discussion of RME-based mathematics booklets, it can be concluded as follows:

The RME-based mathematics booklet was developed in the form of an A5 sized book which aims to make it easier for students to understand the material. RME-based mathematics booklets are appropriate for use as learning media. This is based on the due diligence obtained from assessment sheets by Media Experts, Material Experts and the responses of teachers and students. Based on the results of the validation, it was concluded that the Pop Up Book based on multimedia is valid with revisions that do not require significant changes and are suitable for use as thematic learning media for class V SD. The RME-based mathematics booklet that was developed was effectively used. This hall is based on the effectiveness test in the form of an IN-gain score test and an independent sample t-test. The independent sample t test showed that there was a significant difference between the pretest and posttest values.

### Declaration by Authors

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### REFERENCES

1. Arifin, Zainal. 2013. *Evaluasi Pembelajaran Prinsip, Teknik, Prosedur*. Bandung : PT Remaja Rosdakarya.
2. Arikunto, Suharsimi. 2006. *Prosedur Penelitian Suatu Pendekatan Praktek*. Jakarta: PT Rineka Cipta
3. Arsyad, Azhar. 2014. *Media Pembelajaran*. Jakarta: Raja Grafindo Persada.
4. Bagaray, dkk. 2016. *Perbedaan efektivitas DHE dengan media booklet dan media flip chart terhadap peningkatan pengetahuan kesehatan gigi dan mulut siswa SDN 126 Manado*. Jurnal e-GiGi (eG). Vol 4 (2).
5. Creswell, John. 2018. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. London: Sage.
6. Imtihana, Mutia, dkk. 2014. *Pengembangan Buklet Berbasis Penelitian Sebagai Sumber Belajar Materi Pencemaran Lingkungan di SMA*. Unnes Journal of Biology Education. Vol 3 (2).
7. Indrawan, Rully & Yaniawati, Poppy. 2014. *Metodologi Penelitian Kuantitatif, Kualitatif, dan Campuran Untuk Manajemen, Pembangunan, dan Pendidikan*. Bandung: PT Refika Aditama.
8. Kurniasih, Imas & Sari, Berlin. 2014. *Panduan Membuat Bahan Ajar (Buku Teks Pelajaran) Sesuai Dengan Kurikulum 2013*. Surabaya: Kata Pena.
9. Meltzer, D.E. 2002. *The relationship between mathematics preparation and conceptual learning gains in physics: A possible "hidden variable" in diagnostic pretest scores*. Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011. Vol 70 (12)

10. Mullis, Ina V. S., & Michael, O. Martin. 2015. *TIMSS 2015 Assessment Frameworks*. United State: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.
11. Ngalimun. 2013. *Strategi dan Model Pembelajaran*. Banjarmasin: Aswaja Pressindo.
12. Prastowo, Andy. 2015. *Panduan Kreatif Membuat Bahan Ajar Inovatif*. Jogjakarta: DIVA Press.
13. Priyatno, Duwi. 2010. *Paham Analisa Statistik Data dengan SPSS*. Yogyakarta: MediaKom.
14. Sugiyono. 2015. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R&D)*. Penerbit CV. Alfabeta: Bandung.
15. Trianto. 2011. *Model-Model Pembelajaran Inovatif Berorientasi Konstruktivistik*.
16. Wisudawati, A.W & Sulistyowati, Eka. 2014. *Metodologi Pembelajaran IPA*. Jakarta: Bumi Aksara.

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