DEVELOPMENT OF TRIANGGLE AND RECTANGULAR SUBJECT OF MATHEMATICAL POCKETBOOK FOR CLASS VII STUDENTS OF SMP / MTs

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ABSTRACT

The background of this study due to the unavailability of the pocketbook as a source of learning. This study aims to prepare and develop teaching material in the form of a mathematics pocketbook for subject matter triangles and rectangular to class VII Junior High School (SMP/MTs) to determine the feasibility of teaching materials. The research was carried out using a model of the development of Research and Development (R & D). The measures include the development of two aspects, namely the development of mathematics and pocketbooks' feasibility. The development of a mathematical pocketbook covers the preparation, implementation, testing, and revision. The feasibility of mathematics includes both material and media worthiness. Instruments used questionnaire matter experts, media experts, and student responses to assess the feasibility of pocketbooks. They were analyzed using qualitative descriptive. Research Subjects are subject VIIIth grade students SMP Negeri 3 Kasihan and MTs Muhammadiyah Karangkajen. Results of research development of mathematics pocketbook for subject matter triangle and rectangular in class VII SMP / MTS obtained from the analysis of the average valuation matter experts by 69,67 with the category is very good, the average valuation by media expert is 90, 33 with the category is very good, and the average valuation student responses is 83.07 with the excellent category. It can be concluded that mathematics pocketbook with an excellent category, so it is feasible to use in the learning process.

Keywords: development, pocketbook, triangles, and rectangular.

INTRODUCTION

Education is the central pillar that shows the ability of a nation. With the existence of advanced Education, quality human beings can be created to build this nation. In the Law of the Republic of Indonesia Number 20 of 2003 concerning National Education System article 1, explains that Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential. To have spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by himself, the community, the nation, and the State. Obtain changes in certain behaviors, both those that can be directly observed or cannot be directly observed as experiences (exercises) in interactions with the environment. Things that cannot be separated into learning are learning resources. Because learning resources will add or provide knowledge related to what will be learned, some criteria that must be considered in choosing a learning resource include economical, practical, comfortable, flexible, and objective. One source of learning is teaching material. Teaching materials are all forms of materials used to assist teachers in carrying out teaching and learning activities. Teaching materials can be grouped into four categories: printed teaching materials, hearing teaching materials, hearing sight teaching materials, and interactive multimedia teaching materials.

To determine the use of learning resources among students, observations and interviews were conducted at Kasihan Bantul State Middle School on October 9, 2015, and MTs Muhammadiyah Karangkajen on October 17, 2015.

Table 1. Observation Results Data Number of Mathematics Learning Facilities for Class VII of SMP Negeri 3 Kasihan 2015/2016

	Sum	Information
Book Package	13	-
Worksheet	-	Students Buy Themselves
Module	-	-
Pocketbook	-	-

Source: SMP Negeri 3 Kasihan

Based on the above table, it can be concluded that schools using textbooks and worksheets as a learning resource can be concluded.

Based on the results of interviews with Ir. Hj Winarni Rahayu (Mathematics Teacher at SMP Negeri 3 Kasihan Bnatul) on October 9, 2015, obtained information that schools have not used a pocketbook as a source of learning due to the unavailability of a pocketbook. Furthermore, based on the results of interviews with Kasihan Middle School 3 students. Students have difficulty working on the questions given as homework (homework) because students do not have learning resources that can be carried anywhere. One of the materials that are considered problematic by students is triangle and quadrilateral. Also, because students do not study at home, do not do homework (homework), and do not do math assignments. As a result, students' mathematics learning outcomes are below the MCC (Minimum completeness criteria) set for mathematics subjects in SMP Negeri 3 Kasihan Bantul is 75.

Table 2. Observation Results Data Value of Midterm Repeat Results Odd Semester Class VII of SMP Negeri 3 Kasihan 2015/2016

Class VII	Highest score	Lowest Value	< 75	≥ 75	Average	Sum
A	72,5	42,5	26	0	55,2	26
B	65,0	25,0	27	0	48,7	27
C	62,5	32,5	26	0	48,2	26
D	60,0	25,0	27	0	46,7	27
E	57,5	25,0	26	0	43,4	26
					46,9	132

Source: SMP Negeri 3 Kasihan

Table 3. Observation Results Data on Number of Mathematics Learning Facilities for Class VII of MTs Muhammadiyah Karangkajen 2015/2016

	Sum	Information
Book Package	35	-
LKS	-	Students Buy Themselves
Module	-	-
Pocketbook	-	-

Source: MTs Muhammadiyah Karangkajen

Furthermore, based on the results of an interview with Mrs. Vika Rosana Alpha, S.Pd (Mathematics Teacher of MTs Muhammadiyah Karangkajen) on October 17, 2015, information was obtained that teaching materials in schools were still limited so that students could not take teaching materials home. Also, schools do not yet have a pocketbook as a learning resource. Based on interviews with MTs Muhammadiyah Karangkajen students, they considered mathematics difficult. Students get facilities in the form of textbooks only at school and not brought home. Students complain about the lack of learning resources available at school, so students sometimes find it difficult if there is homework because they only rely on their notebooks. Also, students think that the school's textbooks presenting the material are difficult to understand, so they have to wait for the teacher to explain.

Observation results at MTs Muhammadiyah Karangkajen, it was found that MCC (Minimum Completeness Criteria) were set for mathematics subjects in MTs Muhammadiyah Karangkajen.

Table 4. Observation Result Data Value of Midterm Test Results Odd Semester Class VII MTs Muhammadiyah Karangkajen 2015/2016

Class VII	Highest score	Lowest Value	< 75	≥ 75	Average	Sum
A	84,0	40,0	27	2	55,07	29
B	86,0	32,0	31	1	53,28	32
C	76,0	32,0	29	1	51,67	30
D	80,0	24,0	30	2	47,00	32
E	92,0	34,0	27	7	60,12	34
					54,03	157

Source: MTs Muhammadiyah Karangkajen

Teaching material that is deemed appropriate to develop is teaching material in the form of a pocketbook. Pocketbooks are expected to facilitate students in learning mathematics. Pocketbooks developed in this case are devoted to triangular and rectangular material. This was the background for researchers to develop teaching materials in pocketbooks through a study entitled Development of Mathematical Pocketbooks for Triangle and Quadrilateral for Class VII Middle / MTs Students. The objectives to be achieved in this study are: 1) Develop a triangle and rectangular material pocketbook for grade VII students of SMP / MTs. 2) Knowing the quality of the mathematics pocket book of triangles and quadrilateral material for grade VII students of SMP / MTs in terms of content worthiness, language feasibility, presentation feasibility, and graphics feasibility.

Learning mathematics, according to Suherman, Erman et al. (2003: 57), namely Learning mathematics, is the formation of a mindset in understanding an understanding and in reasoning a relationship between understanding-understanding. Meanwhile, according to Uno, Hamzah (2012: 130), The nature of learning mathematics is mental activity to understand the meaning and relationships as well as symbolic, then it is applied to real situations. According to Gagne in Suherman, Erman et al. (2003: 33), in learning mathematics, there are two objects, namely direct objects and indirect objects. Indirect objects include investigating and solving problems, learning to attend, being positive about mathematics, and learning. While the direct object in the form of facts, skills, concepts, and rules. From some of the opinions of the experts, it can be concluded that learning mathematics is mental activity to understand something abstract, which includes the activities of learning facts, learning skills, learning concepts, and learning rules with reasoning and understanding which each object is used in deciding to solve problems in real situations.

According to the Association for educational communications and technology (AECT, 1977) in the Ministry of National Education (2008: 5), namely: Learning resources are all things or resources that can be utilized by teachers, both separately and in a combined form, for the benefit of teaching and learning to increase effectiveness and the efficiency of learning objectives. According to Sanjaya, Wina (2013: 174), Learning resources are things that students can use to learn materials and learning experiences by achieving the objectives. From some expert opinions, it can be concluded that teachers' learning resources are all things that teachers can utilize in teaching and learning activities to improve the effectiveness and efficiency of the learning process.

Understanding teaching materials, according to the Ministry of National Education (2008: 6): all forms of material that will be used to help teachers/instructors in carrying out teaching and learning activities. Teaching materials also have functions, the functions of teaching materials, according to the Ministry of National Education (2008: 6), are as follows: 1) Guidelines for teachers who will direct all their activities in the learning process, as well as being the substance of competencies that should be taught to students. 2) Guidelines for students who will direct all their activities in the learning process and the substance of competencies should be learned or mastered. 3) Evaluation tool for achievement or mastery of learning outcomes. Based on the technology used, the Ministry of National Education (2008: 11) teaching materials are grouped into four categories: 1) Printed Teaching Materials. 2) Hearing Material (Audio). 3) Hearing Instructional Materials (Audio Visual). 4) Interactive Multimedia Teaching Material.

In the Ministry of National Education (2008: 9), Teaching materials are prepared with the aim of 1) Provide teaching materials that are tailored to the demands of the curriculum by considering the needs of students, namely teaching materials that are appropriate to the characteristics and settings or social environment of students. 2) Assist students in obtaining alternative teaching materials in addition to textbooks that are sometimes difficult to obtain. 3) Facilitating the teacher in carrying out learning. According to the Encharta dictionary, the meaning of a pocketbook is a pocketbook. It is a small book that is easy to carry. According to the Big Indonesian Dictionary, a Pocketbook is a small book that can be put in a pocket and easily carried anywhere. Pocketbooks are expected to increase students' understanding of mathematics because their small size and practicality can easily carry around in an opportunity interruption. The sentences used in the pocketbook are exciting and concise so that students easily understand them.

A pocketbook's advantages are that it can present material in a practical and simple form, easy to carry anywhere, interesting, equipped with pictures and colors, and can be learned anytime and anywhere. The steps for preparing the pocketbook are adapted from the steps for preparing the textbook. Based on Prastowo, Andi (2012: 176-202), the preparation steps are as follows: 1) Pay attention to the curriculum by analyzing it. 2) Determine the title of the book to be written by the competency standards that will be provided by the compiled book. 3) Design a book outline so that the complete book content covers all aspects needed to achieve competency. 4) Gathering references as writing material. 5) Writing a book is necessary by paying attention to the presentation of sentences tailored to the reader's age and experience. 6) Evaluate or edit the results of writing by rereading.

METHODS

In developing teaching materials in the form of pocketbooks, development models or development procedures are needed that aim to produce a quality pocketbook. The development of teaching materials in the form of pocketbooks uses the R&D development method. According to Sugiyono (2015: 409), steps for using research and development (R & D) methods are:

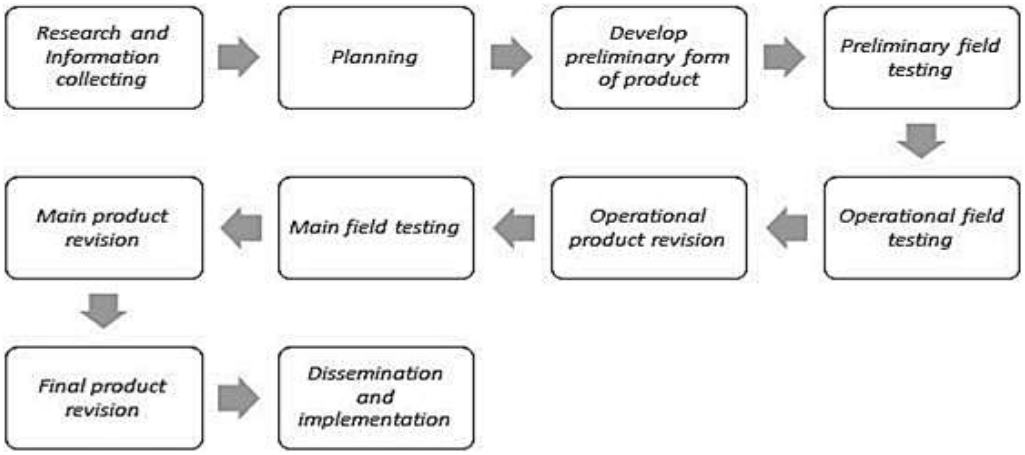

Figure 1. Steps for Using the Research and Development (R&D) Method

The severity of the research problem is limited to the product trial phase. Data obtained from the product trial stage in the form of a material expert questionnaire, media expert questionnaire, and student response questionnaire were then analyzed. The instruments used in this research development were interviews and questionnaires. In this study, a questionnaire containing research instruments aims to assess the feasibility and quality of teaching materials developed. Filling out the questionnaire using a Likert Scale with a positive statement.

Table 5. Statement for Research Instrument Sheets

Percentage of Research Indicators	Research Criteria
81% −100%	5
61% − 80%	4
41% − 60%	3
21% − 40%	2
0% − 20%	1

Source:Riduwan (2013:89)

The data analysis technique used in this study is

a. Quantitative data. Quantifying data is a step to change qualitative data from questionnaires to quantitative data by giving a score.

Table 6. Likert Scale

Information	Score
SS (Strongly Agree)	5
ST (Strongly Disagree)	4
RG (Doubtful)	3
TS (Disagree)	2
STS (Strongly Disagree)	1

Source: Sugiyono(2015:135)

b. Determine average. After the data is collected, the next step is to determine the average using the formula:

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i}{N}$$

Information:

$\bar{X}$: average score

$\sum_{i=1}^{n} x_i$: total score

N: number of assessors

c. Ideal Assessment Criteria Guidelines. Furthermore, after all, data has been converted to quantitative using the ideal assessment criteria guideline table with the following conditions:

Table 7. Criteria for Ideal Rating Categories

No	Quantitative Score Range	Qualitative Category
1	$\bar{X} > \bar{X}_i + 1{,}8\ SB_i$	Very good
2	$\bar{X}_i + 0{,}6\ SB_i < \bar{X} \leq \bar{X}_i + 1{,}8\ SB_i$	Well
3	$\bar{X}_i - 0{,}6\ SB_i < \bar{X} \leq \bar{X}_i + 0{,}6\ SB_i$	Pretty good
4	$\bar{X}_i - 1{,}8\ SB_i < \bar{X} \leq \bar{X}_i - 0{,}6\ SB_i$	Not good
5	$\bar{X} \leq \bar{X}_i - 1{,}8\ SB_i$	Very bad

Source: Sukarjo, (2006:53)

information:

$\bar{X}_i$: the ideal average that can be searched for by the formula

$\bar{X}_i = \frac{1}{2} \times$ (ideal maximum score + ideal minimum score)

SB_i: the ideal average that can be searched for by the formula

$SB_i = \frac{1}{6} \times$ (Ideal Maximum Score - Ideal Minimum Score)

Ideal maximum score: number of items criterion x highest score

Ideal minimum score: lowest number of criteria x score items

In this data analysis, the highest score is five, and the lowest score is 1. The feasibility of teaching materials is determined by calculating the average score of each assessment component obtained from the validation of the material experts and media experts

RESULTS AND DISCUSSION

The product design is reviewed first; after that, the product's skin assessment is carried out by three material experts and three media experts. The details are three material experts consisting of 1 material expert lecturer and two school mathematics teachers concerned. The next three media experts consisted of 1 media expert lecturer and two teachers from the school concerned. Validation is carried out by each expert, material experts, and media experts by filling out the pocketbook assessment sheet. Limited class trials are conducted to determine the level of response and input from students before being used in large classes. Field trials were conducted to determine student response levels and carried out trials conducted in one class. Three mathematicians assessed the Mathematics Triangular and Quadrilateral Pocketbook material for Class VII Students of SMP / MTs. The results of the material expert questionnaire can be seen in Table 8 below:

Table 8. Results of the Calculation of Eligibility Instruments by Material Experts

Assessment	Total score	Qualitative Criteria
Material expert 1	68	Very good
Material expert 2	76	Very good
Material expert 3	65	Good
Total score	209	-
Average score	69,67	Very good

Based on the results of the validation analysis of the material, experts obtained an average of 69.67 eligibility with an ideal percentage of 87.09% so that it can be concluded that in terms of this material is classified in the category of very good, so it is very feasible to be used as teaching material in mathematics learning. Three media experts assessed the Pocketbook media with temporal relations and functions for Class VIII students of SMP / MTs. The results of the material expert questionnaire can be seen in Table 9 below:

Table 9. Results of the Calculation of Eligibility Instruments by Material Experts

Assessment	Total score	Qualitative Criteria
Material expert 1	96	Very good
Material expert 2	95	Very good
Material expert 3	80	Good
Total score	271	-
Average score	90,33	Very good

Based on the results of the validation analysis of the media, experts obtained average eligibility of 90.33 with an ideal percentage score of 90.33% so that it can be concluded that in terms of this media classified in the category of Very good, so it is very feasible to be used as teaching material in mathematics learning. To find out the students' responses to the Triangular and Quadrilateral Mathematics Pocketbook for Class VII, Students of SMP / MTs can be seen from the results of the instruments provided and filled out by students during small class or large class field trials after the design revision phase is carried out. The results of calculating student response questionnaires can be seen in the following table 10:

Table 10. Recapitulation of Student Response Questionnaire Calculations

No	Assessment	Total score	Qualitative Criteria
1	SMP Negeri 3 Kasihan		
	Test I	79,6	Good
	Test II	85,39	Very Good
2	MTs Muhammadiyah Karangkajen		
	Test I	81,4	Good
	Test II	85,89	Very Good
Total score		332,28	-
Mean		83,07	Very Good

The complete field test results assess the two schools' first and second tests were 83.07, with an ideal percentage score of 83.07% and included in both categories.

Determination of the quality of mathematics teaching materials is based on the assessment of 3 material experts, three media experts, five students in limited trials, and 53 students in large class trials taken from two schools. The data obtained were analyzed to determine the quality of the teaching material that was created. The results of calculating the feasibility of teaching materials can be seen in the following Table 11:

Table 11. Overall calculation results for teaching material eligibility

No	Aspect	Mean Score	Ideal Maximum Score	Ideal percentage	Qualitative Category
1	Material	69,67	80	87,08%	Very Good
2	Media	90,33	100	90,33%	Very Good
3	Student response	83,07	100	83,07%	Good
Total		243,07	280	86,83%	Very Good

The final assessment score obtained for mathematics teaching materials is 243.07, from a maximum score of 280 with an ideal percentage of 86.83% with a very good category. It is declared very feasible as a source of mathematics learning triangles and quadrilateral for VII grade students of SMP / MTs. This is inseparable from the input and advice of supervisors, material experts, media experts, and students' responses to both small and large classes.

CONCLUSION

The development of teaching materials in the form of pocketbooks uses the Research and Development (R&D) development method. Stages of development are (1) potential and problems, (2) data collection, (3) product design, (4) design validation, (5) design revision, (6) product trials.

Based on the quality of the Triangular and Quadrilateral Mathematics pocketbook for Grade VII students of SMP / MTs both (SB) based on the assessment of 3 material experts with an average per an aspect of 69.67 with an ideal percentage of 87.08%, very good (SB) based on an assessment of 3 media experts with an average per an aspect of 90.33 with a percentage of ideals of 90.33%, and good (B) based on students' responses of 83.07 with a percentage of ideals of 83.07%. The final assessment score for mathematics teaching materials is 243.07, from a maximum score of 280 with an ideal percentage of 86.83% with a very good category and declared to be very feasible.

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