

DEVELOPMENT OF MATHEMATICS MODULE FOR CLASS VII WITH SCIENCE APPROACH IN PROPORTION MATERIAL

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ABSTRACT

Students must be active and independent in the learning process and understand the material studied in learning mathematics. The mathematical module is one of the alternative learning resources that can be used in the learning process. The research aims to develop a mathematical module of comparative material with a scientific approach for grade VII students of Junior High School (SMP / MTs) applied correctly in mathematics learning. This development research uses Research and Development (R & D) method. Such research subjects include material experts, media experts, students from 2 schools. Data collection techniques used are interviews and questionnaires. The research instruments are questionnaires, which have been reviewed. Types of data used are qualitative and quantitative data. The result of mathematics-module research and development of proportion material with a scientific approach for class VII SMP students. The results of the material feasibility test included the right criteria, with an average score of 67. The media feasibility test module media included in the right criteria with an average score of 67.67. Simultaneously, the small-class product trial stage's student response questionnaire was included in the right criteria, with an average score of 64,7. The student response questionnaire of the big-class product's trial stage includes perfect criteria, with an average score of 70,2. These results indicate that the mathematics module of comparative material with a scientific approach for grade VII students of SMP/MTs is feasible for the learning process.

Keywords: Module, Scientific Approach, Proportion.

INTRODUCTION

The teacher has an important role in the learning process. So that teacher are required to act and think innovatively in the use of teaching materials. Teachers can use a variety of teaching materials. However, the use of teaching materials must be by the applicable curriculum and by student needs so that the implementation of learning activities will run better.

The 2013 curriculum is a curriculum that is implemented as a substitute for the education unit level curriculum. The 2013 curriculum aims to provide full knowledge to students and is not fragmented. This curriculum emphasizes students' activeness to find the concept of learning with the teacher as a facilitator. The approach used in the 2013 curriculum is scientific. Learning with a scientific approach is a learning process designed in such a way that students actively construct concepts, laws or principles through stages of observing (to identify or find problems), formulate problems, propose or formulate hypotheses, collect data with various techniques, analyze data, draw conclusions, communicate concepts, laws or principles found (Daryanto: 2014).

According to a scientific approach, teachers can use one of the learning resources in carrying out mathematics learning activities in class is the mathematics module. A module is a book written with the aim that students can study independently without or with the guidance of the teacher. The module contains a set of learning experiences arranged systematically and designed to help students master the learning objectives according to indicators of achievement of learning outcomes taken (Ministry of National Education, 2008: 13). Learning with a module system allows students to explore more based on their abilities to create more independent learning. This will change the learning-centered orientation initially on the teacher, turned into centered on the students' activities themselves.

Research and development of mathematical modules are widely carried out. One of them is a study conducted by Landhreta and Suwito (2016). It is known that the quality of the module is seen

from the aspects of the feasibility of the contents and objectives, the instructional quality, and the technical feasibility aspects are included in the goods classification.

Researchers conducted observations in two seventh grade junior high schools, namely SMP N 15 Yogyakarta and MTs Muhammadiyah Trucuk, Klaten Regency. Based on the results of researchers' interviews with mathematics teaching teachers in grade VII, in both schools, teaching and learning activities in mathematics subject matter used in the form of mathematics textbooks from the Ministry of Education and Culture. For reference, other books that are by the 2013 curriculum are still not available. The classroom's learning process is still centered on the teacher, and students still lack an active role in the class. In learning activities in class, students can not be released by themselves to understand the material. When students are given an exercise, they find it difficult to be asked to do it alone and assist the teacher. In addition to conducting interviews with teachers, researchers also conducted interviews with students from both schools. Based on the results of researchers' interviews with students, it is known that students are not interested in mathematics. According to students, mathematics is complicated, difficult, confusing, and not easy to understand. Then the textbooks from school are difficult to understand.

Based on the description above, researchers are interested in developing a mathematical module as teaching materials. The developed module is a printed module with a scientific learning approach on the subject of proportion. This learning media material is limited to proportion, including the meaning of proportion, scaled drawings, value proportion, and value reversal proportion. The module contains Basic competence (BC), objectives, concept maps, a preface, a material with steps by the scientific approach, sample questions, question exercises, answer keys, and feedback.

Based on the background and problem constraints outlined above, the problem can be formulated, namely: (1) How to develop a mathematics module for grade VII students of SMP / MTs with a scientific approach to the subject of proportion? (2) Is the mathematics module for grade VII students of SMP / MTs with a scientific approach on the subject of proportion appropriate?

The objectives of this study are: (1) developing a mathematics module for grade VII students of SMP / MTs with a scientific approach on the subject of proportion (2) knowing the feasibility of a mathematics module for grade VII students of SMP / MTs with a scientific approach to the subject of proportion.

METHODS

This study uses a Research and Development development model. The product developed in this study was a mathematical module on the subject matter of proportion with a scientific approach for seventh-grade junior high school. The following stage of the module development procedure is carried out, namely:

1. Potential and Problems

The potential that is owned is that the school has student books that can be used in the classroom's learning process. The problem is having students' difficulty understanding the material with books provided by the school when students study.

2. Data Collection

The collection of various information can be used to plan certain products expected to solve the problem. After potentials and problems have been discovered, the next stage of data collection is to strengthen curriculum analysis in the first stage.

3. Product Design

The final results of research and development activities are in the form of new product designs, complete with specifications.

4. Design Validation

Design validation is a process of activities to assess product design. Product validation is done by presenting several experts or experts. Each expert is asked to assess the design so that the weaknesses and weaknesses can be identified. Validation is adjusted to the evaluation. The

evaluation in question is by the evaluation component of the Ministry of National Education.

5. Design Revision

After experts and known weaknesses and weaknesses have validated the design, the researchers then corrected the validated product designs' weaknesses and weaknesses.

6. Product Testing

Product trials are conducted to find out whether the product being developed runs as expected or not. Through this activity, the researcher also collects information for product improvement. Product trials are conducted twice, namely in small classes and large classes.

7. Product Revision

Product revision aims to overcome the module products' weaknesses and weaknesses tested in the first trial with limited samples and improve the module to be more effective.

In this development, the test subjects are validation test subjects consisting of material experts (mathematics education lecturers and mathematics teachers), media experts (mathematics education lecturers and ICT teachers), and test subjects. The types of data in this study are of two types, namely quantitative data and qualitative data. The research instruments and data collection techniques used were questionnaire sheets. The data analysis technique used in this study is quantitative data analysis. Data obtained through a questionnaire by material experts, media experts, and students are collected, then calculate the average using the formula:

$$x = \frac{x_{i=1}^n}{n}$$

Information:

x = average score

$x_{i=1}^n$ = number of scores

n = number of assessors

Then changed to qualitative criteria, referring to the ideal assessment criteria (Sukarjo, 2006: 53) as in Table 1.

Table 1. Criteria for Ideal Rating Categories

No.	Range of scores (i) quantitative	Category
1.	$\bar{X} > \bar{M}_i + 1.8 SB_i$	Very Good
2.	$\bar{M}_i + 0.6 SB_i < \bar{X} \leq \bar{M}_i + 1.8 SB_i$	Good
3.	$\bar{M}_i - 0.6 SB_i < \bar{X} \leq \bar{M}_i + 0.6 SB_i$	Enough
4.	$\bar{M}_i - 1.8 SB_i < \bar{X} \leq \bar{M}_i - 0.6 SB_i$	Less
5.	$\bar{X} > \bar{M}_i - 1.8 SB_i$	Very Less

(Sukarjo, 2006:53)

Information:

M_i = ideal average

$M_i = \frac{1}{2}$ (maximum score + minimum score)

SB_i = ideal standard deviation

$SB_i = \frac{1}{6}$ (maximum score – minimum score)

Furthermore, the conversion of actual scores into qualitative categories for intervals 1 to 4 is presented in Table 2.

Table 2. Conversion of average score acquisition into qualitative categories

$X > 68$	Very Good
$56 < X \leq 68$	Good
$44 < X \leq 56$	Enough
$32 < X \leq 42$	Less

Information:

Ideal maximum score = 4

Ideal minimum score = 1

X = Average score

RESULTS AND DISCUSSION

The results of the calculation questionnaire assessment by material experts and media experts can be seen in the following table:

Table 3. Results of Calculation of Questionnaire Expert Material Assessment

No	Assessment	Score
1	Drs. Sunaryo, M.Pd	71
2	Sri Hartati, S.Pd	69
3	Indri Risqi, S.Pd	61
Average		67
Criteria		Good

Table 3 indicates that the mathematics module is assessed in terms of material included in both criteria.

Table 4. Results of Questionnaire Calculation for Media Expert Rating

No	Assessment	Score
1	Anggit Prabowo, M.Pd.	68
2	Taufik Ruyadi, S.Pd.	66
3	Dina Nur Hidayati, S.Pd.	69
Average		67,67
Criteria		Good

Table 4 indicates that the module is assessed in terms of media included in both criteria. Trials at schools were carried out at SMP Negeri 15 Yogyakarta with 20 student trials. At the same time, the trials in MTs Muhammadiyah Trucuk with the subjects of the trials were 20 students. The results of the calculation of student questionnaire responses can be seen in the following table:

Table 5. Results of Calculation of Student Assessment Questionnaire

No	Assessment	Average
1	SMP Negeri 15 Yogyakarta	71,8
2	MTs Muhammadiyah Trucuk	68,6
Average trial score		70,2
Criteria		Very Good

Based on the above Table 5, an overall average of 70.2 is obtained. The mathematics module is stated in the excellent category.

CONCLUSION

The quality of mathematics modules with a scientific approach is measured based on material experts and media experts' assessment. The average score for material quality by material experts reached 67, including the category of good. Simultaneously, media experts' average score reached a score of 67.67, which is included in the good category. Based on experts' assessment and advice, learning media that have been developed and revised, the module is suitable to be used and tested in the field. The average score for all aspects of the results of the student assessment questionnaire data at SMP Negeri 15 Yogyakarta and MTs Muhammadiyah Trucuk was 70.2 or included in the very good category. This shows that the mathematics module gets a positive response from students. Students respond well to the quality of the modules developed.

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