

## DEVELOPMENT MATHEMATIC MODULE OF SET MATERIAL FOR STUDENTS IN GRADE VII SMP/MTs BASED ON CURRICULUM 2013

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### ABSTRACT

This research aims to develop a mathematical module on the set material for students of class VII Junior High School (SMP/MTs) based on the 2013 curriculum and know the feasibility of modules developed based on material experts, media experts, and student's responses. The type of this research is the development research, which refers to the model of ADDIE, namely Analysis, Design, Development, Implementation, and Evaluation. The instruments used in this study are an assessment sheet for material experts, assessment sheets for media experts, and a student response questionnaire to the module. The subjects of this study are material experts, media experts, and students of SMPN 15 Yogyakarta and MTs Muhammadiyah Karangakajen Yogyakarta. The results of this research and development show that the module The mathematics developed included in the category is a very well based questionnaire assessment by a material expert with a score of 137.667; Questionnaire assessment by expert media with a score 128,667; and average student response results in this study is 124,427. The assessment results show that the mathematics module, the set material for grade VII students of SMP / MTs based on the 2013 curriculum, is worthy of use in the learning process.

**Keywords:** Mathematics Module, Curriculum 2013, ADDIE, Sets.

### INTRODUCTION

Education has a vital role in human life because education is a basic need to develop human potential. According to Law No 20 Chapter I, article 1: Mathematics is the science of logic that is obtained by reasoning carefully, clearly, and accurately about the form, composition, amount, and concepts related to one another, which is divided into three fields, namely algebra, analysis, and geometry. School mathematics has been introduced, starting from elementary, middle, and high school. Many complicated things make students feel that mathematics is difficult. Therefore, one way for students to understand mathematics easily and fun is by the teacher being able to develop teaching material.

One of the teaching materials that can be used by teachers is a module. Modules will make it easier for students to learn because their shapes and properties are based in print. Modules that are well organized and developed can increase student involvement in the learning process because students will become active. The 2013 curriculum encourages students to be better able to observe, ask questions, gather information, process information, present results. In the 2013 curriculum, students are expected to have a much better attitude, skill, and knowledge competency. Students will be more creative, innovative, and more productive.

Based on the results of interviews conducted by researchers with Mrs. Dwi Rita Surawandari, S.Pd as a mathematics teacher at SMPN 15 Yogyakarta and Mrs. Fatim Isdiarti, S. Pd. Si, as a mathematics teacher at MTs Muhammadiyah Karangakajen Yogyakarta, obtained data that VII grade teachers in learning used textbooks published by the Ministry of Education and Culture as a guide, but the numbers were not sufficient. According to the teacher, the book published by the Ministry of Education and Culture has too much material to learn. It is difficult for students to understand the teaching material. According to the teacher, students experience difficulties in set notation material and set operation. At school, there are no teachers who develop teaching materials based on the 2013 curriculum. Some student learning outcomes are still below the Minimum Completeness Criteria (MCC).

Based on interviews with several SMPN 15 Yogyakarta and MTs Muhammadiyah Karangkajen Yogyakarta students, students feel less like math lessons because not all material can be understood easily. Students have difficulty learning mathematics because the calculations are too complicated. The enactment of the 2013 curriculum has many things that make students feel confused about mathematics. Especially in the set material, students have difficulty in the set operations section and notating the set. There are no modules used by students as a guide. Students want modules to learn mathematics in addition to material. Simultaneously, the school has not provided a mathematics module on the set material for class VII based on the 2013 curriculum.

Some of the studies that have relevance to the research under study are the first research conducted by Annisa and Retnawati (2016) entitled Development of Problem Based Learning Teaching Materials on Material Assemblies for Class VII Middle School Students. The second study was conducted by Fatikhah and Izzati (2015) entitled The Development of Mathematics Learning Module with Emotion Quotient in the Topics of the Association. Research conducted by the author entitled Development of Mathematical Modules on Material Assemblies for Class VII Students of SMP / MTs Based on 2013 Curriculum The 1st and second studies have relevance to this research, which is about teaching material on the set material and the ADDIE method.

The purpose of this study is to find out:

1. Results of developing a mathematics module on set material for VII grade students of SMP / MTs based on the 2013 curriculum.
2. The mathematics module's feasibility in the setting material for VII grade students of SMP / MTs based on the 2013 curriculum.

## METHODS

This type of research is development research using the ADDIE model. In this study, the focus will be on developing mathematical modules on set material for grade VII students of SMP / MTs based on the 2013 curriculum

Development Procedure is steps - steps ADDIE model according to Personal, (2014: 30)

1. Analysis. In this stage, the researcher analyzes the teaching materials, materials, and curriculum to provide an overview of the developed teaching materials. At this stage, the analyst was carried out in two schools, namely in SMPN 15 Yogyakarta and MTs Muhammadiyah Yogyakarta Karangkajen. In determining the analysis of the need for teaching materials, observations and interviews were conducted with mathematics teachers and students of class VII SMPN 15 Yogyakarta and MTs Muhammadiyah Karangkajen. The material that will be in this module is the set material because students have not mastered the material well. The selection of material was obtained from consultation and discussion with mathematics teachers at SMPN 15 Yogyakarta and MTs Muhammadiyah Karangkajen. Curriculum analysis conducted includes analysis of the subject matter, Core Competencies (CC), Basic Competencies (BC), as well as indicators that must be achieved by students in learning.
2. Planning (Design). The design phase is carried out to design teaching materials by the curriculum analysis that has been carried out in the previous stage. This stage is divided into three stages: making an outline of the contents of the module, designing the contents of the module, and compiling the module content assessment instrument.
3. Development. In the development process, the researcher translates the initial design into the actual display. This stage includes Collection gathering, Module Writing, Validation and assessment, Small class trials.
4. Implementation. The application is carried out by testing the modules for students to obtain student assessment data regarding the quality of the modules that have been developed. Then students fill in the questionnaire responses to the module.
5. Evaluation. Assessment is given on several parts, namely the module's quality based on aspects of the material, aspects of the media, and student responses to the modules developed.

Product Trial is:

1. Subject try. Subjects in this module development research consisted of experts in this research material were mathematics lecturers and grade VII mathematics teachers. The media experts in this study were mathematics education lecturers and ICT teachers. Grade VII students of SMPN 15 Yogyakarta and MTs Muhammadiyah Karangajen Yogyakarta Students
2. Data Collection Instruments used in this research development are
  - a. Interview. Interviews were conducted with mathematics teachers in class VII SMPN 15 Yogyakarta and MTs Muhammadiyah Karangajen Yogyakarta to find out more deeply the problems in the field and ask for opinions about good teaching materials.
  - b. Questionnaire. This study's questionnaire will be addressed to material experts, media experts, and VII grade students of SMPN 15 Yogyakarta and MTs Muhammadiyah Karangajen Yogyakarta. The questionnaire was filled to indicate product eligibility.
3. Technical Data Analysis. The data analysis technique used in describing the results of development in the form of a mathematical module.

Data obtained through a questionnaire by material experts, media experts, and student responses in the form of qualitative values will be converted into a quantitative value Likert scale from Sugiyono (2012: 134) with the table's provisions as follows.

**Table 1.** Likert scale

Information	Score
SS: Very agree	5
ST: I agree	4
C: Enough	3
TS: Disagree	2
STS: Strongly Disagree	1

The data collected based on the calculation of assessment instruments from material experts, media experts, and student responses. In Sukarjo (2006; 55), the average can be calculated using the formula:

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

With information

$\bar{X}$ : Average score.

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

n: assessment score.

Furthermore, the data obtained from the instrument's calculation will be converted into a qualitative value based on the ideal evaluation criteria of the voluntary (2006: 53). The criteria for ideal rating criteria are shown in the following table.

**Table 2.** Criteria for Ideal Rating Categories

Formula	Classification
$X > \bar{X}_l + 1,8 \times SB_l$	Very good
$\bar{X}_l + 0,6 \times SB_l < X \leq \bar{X}_l + 1,8 \times SB_l$	Well
$\bar{X}_l - 0,6 \times SB_l < X \leq \bar{X}_l + 0,6 \times SB_l$	Enough
$\bar{X}_l - 1,8 \times SB_l < X \leq \bar{X}_l - 0,6 \times SB_l$	Low
$X \leq \bar{X}_l - 1,8 \times SB_l$	Very low

Information:

$\bar{X}_l$ : Average Ideal

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

$SB_l$ : Ideal Standard Deviation

$$SB_i = \frac{1}{6} \times (\text{ideal maximum score} - \text{ideal minimum score})$$

X = Empirical Score

where :

Ideal maximum score: number of items criterion x highest score

Ideal minimum score: lowest number of criteria x score items

In analyzing the data to determine this product's feasibility, the highest score is five, and the lowest score is 1. After each aspect of the module is assessed by media experts, material experts, and grade VII students of SMPN 15 Yogyakarta and MTs Muhammadiyah Yogyakarta, then the data obtained is calculated and converted to a qualitative value using the ideal evaluation category criteria.

## RESULTS AND DISCUSSION

- 1) Test data. The trial date in this study includes Analysis (Design), Design (Development), Development (Development), Implementation (Implementation), and Evaluation (Evaluation).
- 2) Data Analysis. The data obtained is then processed quantitatively. The data is divided into material experts, media experts, and student responses. The results of the study will be explained as follows.
  - a) Product quality according to material expert

**Table 3.** Results of the Questionnaire Calculation of Material Expertise

No	Name	Score	Quantitative data criteria
1.	Dra. Sumargiyani, M. Pd	145	Very good
2.	Dwi Rita S, S. Pd	142	Very good
3.	Fatim Isdiarti, S. Pd. Si	126	Very good
Amount		413	
Mean		137.67	Very good

**Table 4.** Module Eligibility Criteria by Material Experts

No.	Score	Criteria
1.	$X > 126$	Very good
2.	$102 < X \leq 126$	Good
3.	$78 < X \leq 102$	Enough
4.	$54 < X \leq 78$	Less
5.	$X \leq 54$	Very less

- b) Product quality according to media experts

**Table 5.** Results of the Calculation of the Feasibility Questionnaire for Media Experts

No	Name	Score	Quantitative data criteria
1.	Dra. Sumargiyani, M.Pd	146	Very good
2.	Mauludy R, S. Kom	110	Good
3.	Andriyanto S.T	130	Very good
Amount		386	
Mean		128.67	Very good

**Table 6.** Module Eligibility Criteria by Media Experts

No.	Score	Criteria
1.	$X > 126$	Very good
2.	$102 < X \leq 126$	Good
3.	$78 < X \leq 102$	Enough
4.	$54 < X \leq 78$	Less
5.	$X \leq 54$	Very less

c) The quality of the product matches the students' responses to the modules developed.

**Table 7.** Results of Calculation of Student Responses in Small Class Trials

No	School	Average	Quantitative data criteria
1.	SMPN 15 Yogyakarta	130.2	Very good
2.	MTs Muhammadiyah Karangajen Yogyakarta	110.8	Good
Average		120,5	Good

**Table 8.** Module Eligibility Criteria by Student Responses to Small Class Trials

No.	Score	Criteria
1.	$X > 126$	Very good
2.	$102 < X \leq 126$	Good
3.	$78 < X \leq 102$	Enough
4.	$54 < X \leq 78$	Less
5.	$X \leq 54$	Very less

**Table 9.** Results of Calculation of Student Responses in Large Class Trials

No	School	Average	Quantitative data criteria
1.	SMPN 15 Yogyakarta	130.5	Very good
2.	MTs Muhammadiyah Karangajen Yogyakarta	126.21	Very good
Average		128.35	Very good

**Table 10.** Module Eligibility Criteria by Student Responses to Large Class Trials

No.	Score	Criteria
1.	$X > 126$	Very good
2.	$102 < X \leq 126$	Good
3.	$78 < X \leq 102$	Enough
4.	$54 < X \leq 78$	Less
5.	$X \leq 54$	Very less

Based on the calculation of the media expert material questionnaire and the response of students testing small and large classes, it shows that the learning module is in the Very Good category.

Development of mathematics modules on the set material for VII grade students of SMP / MTs based on the 2013 curriculum, using the ADDIE method. In the analysis phase of teaching materials, observations and interviews were conducted with mathematics teachers and students of SMPN 15 Yogyakarta and MTs Muhammadiyah Yogyakarta Karangajen. It aims to determine the teaching and learning process in class and teaching materials needed by students. After choosing what teaching material you want to develop, then next is choosing the material. The selection of material was obtained from consultation and discussion with mathematics teachers at SMPN 15 Yogyakarta and MTs Muhammadiyah Yogyakarta Karangajen. The material chosen is the set material because students have not mastered the material well.

Curriculum Analysis is carried out with a literature study that includes subject matter, Core Competencies (CC), Basic Competencies (BC), and indicators that students must achieve in learning. In the planning stage (Design) is carried out the initial stages in preparing the module, namely: Making the Module Content Outline, Designing the contents of the module, Arranging the module content assessment instrument. In the development phase (Development), the preparation is adjusted to the steps of the preparation and development of modules. These steps are Reference Collection, Module Writing,

Validation and assessment, small Trial classes. The application of the module to the actual classroom conditions is in the learning process. A broad class test is the last test in this development process.

This large class's trial was attended by 34 students from SMPN 15 Yogyakarta and 24 students from MTs Muhammadiyah Karangajen Yogyakarta. The trial is conducted by giving modules and questionnaires to students who are used to obtain student assessment data regarding the quality of the modules that have been developed. Evaluation is a process carried out by someone to assess something. In this case, the module's quality developed (Private, 2014: 133) assessment is given to several parts, namely the quality of mathematics learning modules based on aspects of the material, aspects of the media, and student responses to the modules developed. The assessment will be used as a reference in determining whether or not a learning module is developed.

## CONCLUSION

Based on the results of research and discussion as described above, it can be concluded that the learning modules developed are included in the Very Good category based on calculations from material experts, media experts, and student responses so that the mathematics learning modules for set material for Grade VII students of SMP / MTs are based on the curriculum 2013 is suitable for use in the learning process.

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