

DEVELOPING THE MATHEMATICAL MODULE FOR CLASS VIII STUDENTS ON ALGEBRA OPERATION USING GUIDED INQUIRY

Sri Wahyuningsih^a, Sunaryo^b

Program Studi Pendidikan Matematika Universitas Ahmad Dahlan
Jalan Ring Road Selatan, Tamanan, Banguntapan, Bantul Yogyakarta
sriwahyuningsih12051994@gmail.com, sunaryo.bener@yahoo.co.id

ABSTRACT

This research was based on the teacher's rule. The facilitator task requires a teacher to provide teaching materials appropriate to the learning process. The purpose of this research was to develop products that can be used in mathematics learning. This research is a module for grade VIII students of Junior High School (SMP) on Algebraic operations using guided discovery. This research used the Research and Development (R & D) steps. The steps included two aspects: (1) planning and making module (2) propriety. Planning and making module include: (a) Potency and problems, (b) data collecting, (c) Product Design, (d) Validation of design, (e) Revision of the design. The propriety module includes: (a) The product's test and (b) its revision. The instruments used in the module are: (1) The evaluation sheet of media experts, (2) the evaluation sheet of materials experts, and (3) The sheet of student response. Validation analysis of module is 83 (very good) for media expert, 80,333 (very good) for material expert, and 73,6256 (very good) for the student's response. The instrument from media experts, material experts, and student response showed that the average was 236,9586 in the very good category. Based on the combined analysis by media experts, material experts, and student response, the module for grade VIII of Junior High School on algebraic operation using guided discovery Principles is very good and proper for use.

Keywords: developing, module-based guided inquiry, algebraic operations

INTRODUCTION

The development of the times requires the existence of superior and quality human resources to compete in society. To produce superior and quality human resources, existing education must have good quality. Education is a human/student effort to foster his personality by the values in society and culture. To foster human/student personality, it will go through a learning process. Learning is a part or element that has a dominant role in creating quality, process, and graduate (output) education. According to Law Number 20, the Year 2003 article 1, paragraph 20. Learning is students (students) with educators (teachers) and learning resources in a learning environment.

In the learning process, the teacher as a facilitator is required to continually strive to provide teaching materials that are by the learning process and students' needs. One of them is teaching material used in learning mathematics. Mathematics is basic science and has an important role in everyday life. Directly or indirectly, many aspects and activities of humans require mathematical concepts and calculations, so that everyone must learn mathematics. According to the Ministry of National Education (2008: 13), mathematics is: Universal science that underlies the development of modern science and technology, has an important role in various disciplines and advancement of human thought. Mathematics subjects need to be given to all students starting from elementary school to equip students with the ability to think logically, analytically, systematically, critically, and creatively and the ability to cooperate.

Mathematics learning will be more effective and efficient when using teaching materials appropriate to students' needs, characteristics, and material requirements. The use of appropriate teaching materials will significantly affect the results of the study. According to the Ministry of National Education (2008: 6), teaching materials are All forms of materials used to assist teachers in carrying out teaching and learning activities. Forms of teaching materials can at least be grouped into

four, among others: printed teaching materials (printed), hearing teaching materials (audio), hearing teaching materials (audiovisual), and interactive teaching materials.

The most commonly used teaching materials are printed teaching materials. Printed teaching materials are written text teaching materials that are such that they are arranged systematically and well. Various printed teaching materials include books, handouts, modules, student activity sheets (LKS), brochures, leaflets, wall charts, photos/pictures. One of the teaching materials that can be used is the module. According to the Ministry of National Education (2008: 13), a Module is a book written to study independently without a teacher's guidance. The module contains at least learning instructions, competencies to be achieved, content or content, supporting information, exercises, and work instructions. It can be in the form of worksheets (LK), evaluations, and feedback on evaluation results.

Modules are one tool that can be used by teachers to increase student involvement in the learning process. Student involvement in the learning process is one of the factors that can optimize learning outcomes. Modules can also help students add information about concepts learned through systematic learning activities. Guided discovery-based modules are very suitable to help students to be able to learn independently, be guided, and be able to discover their concepts from the lessons being learned.

According to Markaban (2006: 15), guided discoveries are: The teacher shows students if needed. Students are encouraged to think for themselves to find general principles based on the teacher's material and to what extent students are guided depending on their abilities and the material being studied. In this guided discovery, students' role is quite large because learning is no longer centered on the teacher but the student. The teacher starts the teaching and learning activities by explaining the students' activities and organizing the class for problem-solving, investigations, or other activities. Problem-solving is an essential and decisive step. This can be done individually or in groups. Getting used to students in problem students' activities improves students' abilities to work on math problems because of problem-solving involved in thinking mathematics at the Problem-solvation, essentialization, and problem-solving.

To find out the use of mathematics modules in junior high schools, an interview was conducted with mathematics teachers in class VIII of SMP Muhammadiyah Bantul. They revealed that schools use LKS (Student Worksheets) and mathematics books from publishers in the learning process. The use of available teaching materials (worksheets and mathematics books from publishers) is less than optimal. The appearance and the material presented are less attractive to students to read and learn. Limited learning resources have an impact on student achievement. This can be seen in the Mathematical Deuteronomy of Operational Chapters in the form of algebra in 2016. Students' scores are not all complete. Many students score below the Minimum Completeness Criteria (MCC), which is 75.

To complete the information about the mathematics module users, interviews were conducted with the mathematics teachers of Class VIII of SMP Muhammadiyah Imogiri Bantul. From the interview results obtained information that schools have not used the module as teaching material. Students only use LKS (Student Worksheets), and teachers to use math books from publishers. The limitations of teaching materials resulted in students not being able to learn optimally. The teacher must explain in front of the class, so students understand and understand the material being known. The limitations of teaching materials outlined above also impact student achievement, as in the mathematics test chapter of the algebraic form operation in 2016. The value obtained by students is below the MCC is 73.

To determine the need for learning resources, interviews were also conducted with some VIII grade students of SMP Muhammadiyah Imogiri Bantul. The school source was inadequate, only available LKS (Student Worksheets) and books from publishers. The worksheet used for writing the images is also unclear and difficult to understand. They want to teach materials with a more concise appearance, not thick, and easier to understand.

Based on the description above, the researcher considers that developing a guided discovery-based module on the Operations Form of Algebra is very necessary, especially for students. Students are

expected to study more independently with this module and be guided in finding the mathematical concept. The systematic presentation of material, examples of questions, and practice questions presented with more variety will be more enjoyable for students to learn. So that students find it easier to learn the Operations Form of Algebra.

Based on the description above, the following problems can be identified: 1) Mathematics textbooks and Grade VIII mathematics worksheets in their use are less than optimal because the appearance and the material presented are less attractive to students to read and study them. 2) The absence of a discovery-based mathematical module guided in the material Operations in the Form of Algebra in schools. 3) There are learning difficulties in the Algebra Form Operations material for class VIII. 4) Mathematics learning outcomes of grade VIII students are still below the MCC.

Based on the identification of the problems that have been described, the questions formulated in this study are: 1) How to compile and develop a guided discovery-based mathematics module in the Material of Operation Algebra for Class VIII students in SMP / MTs? 2) How is the feasibility of a guided discovery-based mathematics module on the Material of Operation Algebra for Class VIII students in SMP / MTs?

METHODS

This research is a research and development or so-called Research and development (R&D). Research and development (R&D) methods are research methods used to produce specific products and test their effectiveness, Sugiyono (2014: 297). This development research is focused on the development of mathematics learning media in the form of guided discovery-based mathematics modules on algebraic form operating materials for grade VIII students of SMP / MTs. In this research development, researchers will use the Sugiyono development procedure (2014: 298). The research and development steps are as follows:

1. Conduct preliminary research (potential and problems)
2. Data collection (information)
3. Compilation of products (modules)
4. Product validation (module)
5. Product revision (module) I
6. Trial the product in small classes
7. Product revision (module) II
8. Trial of products in large classes
9. Product revision (module) III
10. Final product

RESULTS AND DISCUSSION

The subjects in the research development of the mathematics module based on the guided discovery of algebraic operations material for students of class VIII SMP / MTs consisted of material experts, media experts, and students class VIII SMP / MTs.

a. Material expert

The research material experts are UAD mathematics lecturers and mathematics teachers at the junior high school. The material expert will assess the module teaching materials made, especially in terms of the material. The material expert will provide an assessment and input to improve the module teaching materials.

b. Media expert

The research media experts are lecturers who are experts in media learning at UAD and the junior high school mathematics teacher. Media experts will assess the module teaching materials that have been explicitly made in terms of appearance and module design. Media experts will give an assessment and input on how to improve teaching modules.

c. Students informal education

The test subjects in the small class trial phase and the large class trial module are still studying informal educational institutions. Related to the module material, namely algebraic form operations in class VIII SMP / MTs, the subject of product trials and usage trials are grade VIII SMP / MTs students with a limited number from each school.

Associated with data collection, this study uses interviews and questionnaires. Interviews were conducted by giving some questions relating to the use of modules and the difficulties experienced in learning. The questionnaire was compiled based on the guidelines on developing teaching materials from the Ministry of National Education.

The data that has been obtained will be analyzed through the data reinforcement preparation. This step converts qualitative data from questionnaires to quantitative data. This step can be done if there is a measurement scale. One scale that can be used for this type of research is the Likert scale. The next step is to calculate the average data obtained. From the data that has been collected, then calculate the average of each assessment using the formula:

$$\bar{X} = \frac{\sum x_i}{n}$$

Information:

\bar{X} : Average score

$\sum x_i$: Total score

n: Number of Rating Points

After obtaining the module's assessment's average value, the module eligibility criteria are then determined using the ideal assessment criteria guidelines.

Table 1. Ideal Assessment Categories

Range of scores (i) quantitative	Classification
$X > \bar{X}_i + 1,8 SB_i$	Very good
$(\bar{X}_i + 0,6 SB_i) < X \leq (\bar{X}_i + 1,8 SB_i)$	Good
$(\bar{X}_i - 0,6 SB_i) < X \leq (\bar{X}_i + 0,6 SB_i)$	Edy good
$(\bar{X}_i - 1,8 SB_i) < X \leq (\bar{X}_i - 0,6 SB_i)$	Less
$X \leq (\bar{X}_i - 1,8 SB_i)$	Very less

Info:

\bar{X} : Empirical score (average score)

M_i : Ideal average

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

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

SB_i : Ideal standard deviation

Ideal maximum score: number of questionnaire items \times the highest score

Ideal minimum score: number of questionnaire items \times the lowest score

CONCLUSION

The conclusions that can be drawn from this research development are as follows:

1. This research has developed a guided discovery-based mathematical module on algebraic form operating material for eighth-grade students of SMP / MTs using the Research and Development (R&D) development model from Sugiyono. This development goes through the following stages:
 - a. Determine the potential and problems
 - b. Data Collection (Information)
 - c. Designing Module Products for Grade VIII SMP / MTs students.
 - d. Perform product validation.
 - e. Revising Product Design

- f. Trial
2. Module Feasibility
- Based on the combined calculation results of the assessment questionnaire from material experts and media experts as well as student response questionnaires, the mathematics module is based on the guided discovery of algebraic form operating materials for students of class VIII SMP / MTs that have been produced, including in very good criteria and very feasible to be used in the learning process.

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