DEVELOPMENT OF MATHEMATICS MODULE WITH STUDENT TEAMS ACHIEVEMENT DIVISIONS (STAD) BASED ON SCIENTIFIC APPROACH IN SET MATERIAL FOR GRADE VII STUDENTS OF SMP / MTS

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ABSTRACT

Teaching materials are seen as fundamental instruments in the learning process and limited teaching materials with Curriculum 2013—modules and package books available, limited, and not easily understood by students. The mathematics module is one of the alternative teaching materials that can facilitate teachers and improve student ability. This development research aims to develop teaching materials in the form of Mathematics Module Set with Student Teams Achievement Divisions (STAD) Based Scientific Approach for Grade VII Students of Junior High School (SMP/MTs) and test the quality (feasibility) of the module. This development research uses Research and Development (R & D) method. Research subjects include material experts, media experts, students of two schools. Data collection techniques used were interviews, questionnaires. The research instruments are questionnaires that have been reviewed. The data analysis technique is done qualitatively and quantitatively to calculate the learning module's feasibility test result. The results of the material feasibility test are included in either criterion with an average score of 67. The module media feasibility test is included in either criterion with an average score of 67.67. Simultaneously, the result of the questionnaire of student response of small grade product trial stage included good criterion with an average score of 64,7. The results of the material experts with an excellent category with an average score of 79.67, in terms of media experts with a very good category with an average score of 74.33, the results of questionnaires student response test phase of large class products including very good criteria with an average score of 71.5. The results show that the mathematics module of the set matter with the STAD method based on the scientific approach for the students of grade VII SMP / MTs is feasible for the learning process.

Keywords: Mathematics Module, Set, STAD, Scientific Approach

INTRODUCTION

A teacher is expected in learning activities capable of creating a learning atmosphere that can stimulate students to learn actively. Teachers must act and think innovatively in teaching materials because teachers have an essential role in the learning process. 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 government began implementing the 2013 curriculum as a substitute for the education unit level curriculum. The 2013 curriculum aims to provide full knowledge to students and not be 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).

One of the learning resources teachers can use in carrying out mathematics learning activities in a class by a scientific approach 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 goals according to the 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 orientation initially centered on the teacher, turned into centered on the students' activities themselves.

The cooperative learning method is one of learning which has more potential in improving students' thinking abilities and learning outcomes. One suitable method, which is seen as the most straightforward method, is STAD (Student Team Achievement Division). The type of cooperative learning used by researchers is the STAD type developed in the mathematics module with the consideration that this type of learning is simple and easy to implement because it is not too complicated. Research and development of many mathematical modules are carried out. One of them is research conducted by Irma Mukaromah and Puspa Ratna Dewi (2015). It is known that the quality of the module is seen from the aspects of content and purpose, instructional quality, and technical feasibility aspects included in the useful classification.

Researchers conducted observations at two seventh grade junior high schools, namely SMP Negeri 1 Cilacap and SMP Muhammadyah 1 Yogyakarta. 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 tends to be still centered on the teacher, and students still lack an active role in the classroom. Researchers also conducted interviews with several students from the two 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 set's subject matter. This learning module's material is limited to the set's subject matter, including the notions of sets, subsets, universal sets, empty sets, set complements, and set operations. The module contains KD, objectives, concept maps, a preface, a material with steps by the scientific approach plus STAD method steps, sample questions, question exercises, answer keys, and feedback.

Based on the background and problem constraints described above, the problem can be formulated, namely: (1) How to develop a mathematical module with the STAD method based on a scientific approach to the set material for grade VII students of SMP / MTs? (2) How is the quality (feasibility) of the mathematics module using the STAD method based on a scientific approach to the set material for grade VII students of SMP / MTs?

The objectives of this study are (1) developing a mathematical module with the STAD method based on a scientific approach to set material for grade VII students of SMP / MTs (2) knowing the feasibility of a mathematics module with a STAD method based on a scientific approach to the set material for junior high school students / MTs class VII.

METHODS

This study uses a Research and Development development model. The product developed in this study is a mathematical module with the STAD method based on a scientific approach to the subject matter set for seventh-grade junior high school. The following stage of the module development procedure is performed. The objectives of this study are: (1) to develop a mathematics module with the STAD method based on a scientific approach on the set material for class VII SMP / MTs students (2) to determine the feasibility of a mathematics module using the STAD method based on a scientific approach on set material for junior high school students MTs class VII.

1. Potential and Problems

   Their potential is that the school has a student book used in the classroom's learning process. The problem is having students' difficulty understanding the material with books provided by the school when students are learning.

2. Data Collection

   After potentials and problems have been discovered, the next stage of data collection is used as material for product planning. The collection of various information about the material for the

seventh grade of the junior high school can be used as material for planning certain products expected to solve the problem.

3. Product Design

The final result of research and development activities is a new product design, complete with specifications.

4. Design Validation

Design validation is a process of activities to assess product design. The module products that have been arranged are in the form of initial produce validated by material experts and media experts 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 material experts and media experts carry out the product validation stage, the weaknesses and weaknesses are known. The researcher corrects the weaknesses and weaknesses of the validated product design.

6. Product Testing

Product design that has been revised by input and advice from experts has then carried out product trials. Product trials are conducted to determine whether the product being developed runs as expected or not and gather 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 shortcomings and weaknesses of module products 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) and media experts (mathematics education lecturers and ICT teachers) and test subjects, namely students. The types of data in this study are of two types, namely quantitative data and qualitative data. For 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 and then calculated using the formula:

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

Information:

M = average score of each criterion

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

n = number of evaluators

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

Table 1. Criteria for Ideal Rating Categories

No	Score	Criteria
1.	$X_k > \overline{X_i} + 1,80SB_i$	Very good
2.	$\overline{X_i} + 0,60SB_i < X_k \leq \overline{X_i} + 1,80SB_i$	Good
3.	$\overline{X_i} - 0,60SB_i < X_k \leq \overline{X_i} + 0,60SB_i$	Enough
4.	$\overline{X_i} - 1,80SB_i < X_k \leq \overline{X_i} - 0,60SB_i$	Less
5.	$X_k \leq \overline{X_i} - 1,80SB_i$	Very less

Information:

X_k : Actual / empirical score

$\overline{X}_i$: ideal average

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

SB_i : ideal standard deviation

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

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

Table 2. Conversion of the average acquisition of material expert scores into a qualitative category

No	Score	Criteria
1.	$X_k > 74,8$	Very good
2.	$61,6 < X_k \leq 74,8$	Good
3.	$48,4 < X_k \leq 61,6$	Enough
4.	$35,2 < X_k \leq 48,4$	Less

Table 3. Conversion of average acquisition of media expert scores and student responses into qualitative categories

No	Score	Criteria
1.	$X_k > 68$	Very good
2.	$56 < X_k \leq 68$	Good
3.	$44 < X_k \leq 56$	Enough
4.	$32 < X_k \leq 44$	Less

Information:

Ideal maximum score = 4

Ideal minimum score = 1

M = Average acquisition score

RESULTS AND DISCUSSION

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

Table 4. Results of Calculation of Questionnaire for Expert Material Evaluation

No	Evaluator	Score
1	Drs. Edi Pradjitno, M.Pd	80
2	Reni Angesti, S.Pd	80
3	Miftahul Cahyaningsih, M.Pd	79
	Average	79,67
	Criteria	Very Good

The above results indicate that the mathematics module is assessed in terms of material included in the criteria very well.

Table 5. Results of Questionnaire Calculation for Media Expert Rating

No	Evaluator	Score
1	Syariful Fahmi, M.Pd.	76
2	Siti Muslikhah, S.T.	75
3	Bektiyono, S.T.	78
	Average	76,33
	Criteria	Very Good

The above results indicate that the module is assessed in terms of media included in the criteria very well.

The school trial was conducted at SMP Negeri 1 Cilacap with 30 students as the test subjects. While the trials in SMP Muhammadyah 1 Yogyakarta with 29 students as the test subjects. The results of calculating student response questionnaires can be seen in the following table:

Table 6. Results of Calculation of Student Assessment Questionnaire

No	Evaluator	Average
1	SMP Negeri 1 Cilacap	71,30
2	SMP Muhammadiyah 1 Yogyakarta	70,24
	Average	70,77
	Criteria	Very Good

Based on the above table, an overall average of 70.77 is obtained. The mathematics module is stated in the excellent category.

CONCLUSION

The quality of the mathematics modules using the STAD method based on a scientific approach is measured based on the results of the assessment of the material expert and the media expert. The average score for material quality by material experts reached 79.67, which is included in the very good category. Simultaneously, media experts' average score reached 76.33, which was included in the very good category. Based on experts' assessment and advice, learning media developed and revised. The module is suitable for testing in the field. The average score of all aspects of the results of the student assessment questionnaire data at SMP Negeri 1 Cilacap and SMP Muhammadyah 1 Yogyakarta was 70.77 or included in the very good category. This shows that the mathematics module got a positive response from students. Students give an excellent response to the quality of the modules developed.

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