

DEVELOPMENT MATHEMATIC MODULE OF LINEAR EQUATION AND INEQUALITIES OF ONE VARIABLE MATERIAL FOR STUDENTS IN GRADE VII SMP/MTs

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ABSTRACT

This research is motivated by curriculum changes that require students to play a more active role in the learning process and the lack of mathematics teaching materials based on the curriculum of 2013, especially on linear equations and inequalities of one variable subject. This development research aims to develop teaching materials in the form of Mathematics Module for linear equation and inequality one variable subject for Grade VII Students of Junior High School (SMP / MTs) Based on Curriculum 2013. This research also aims to know the feasibility of modules developed based on material experts, media experts, and student responses. This study was conducted using the ADDIE development model. The development steps include Analysis, Design, Development, Implementation, and Evaluation. Mathematical Module Material for linear equations and inequalities one variable for grade VII students SMP / MTs is developed based on the 2013 curriculum. This product has gone through a revision phase based on suggestions and input from material experts and media experts. The results showed that the teaching materials of mathematics module material of linear equations and inequality one variable for grade VII students of SMP / MTs based on the curriculum 2013 have excellent quality, seen from the validity criteria. Based on the expert assessment of the material obtained an average score of 139 that meets the criteria very well, and based on the assessment of media experts obtained an average score of 129 that meets the criteria very well, based on student responses obtained an average score of 123.43 that meets the criteria very well. Based on the research result, the mathematics module matter of linear equation and inequality one variable for grade VII students of SMP/MTs based on curriculum 2013 is suitable for mathematics learning.

Keywords: Mathematical Module, Curriculum 2013, ADDIE, Linear Equations and Inequality One Variable.

INTRODUCTION

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 themselves, society, nation, and state (UU nomor 20 of 2003). Education is a vital element in building a nation. A good education will create human resources that have high competence in responding to the era of globalization, which is full of challenges and competition. The right to education is one of the rights that must be fulfilled by a country to achieve the welfare of the people. As in article 31 of the 1945 Constitution paragraph (1), it is stated that everyone has the right to education. The article means that the state is obliged to fulfill the right to education for each of its citizens without exception without regard to ethnicity, race, religion, or even socio-economic conditions.

The development of the times requires the world of education always to develop its quality, one of which is by changing the curriculum. According to Fadlillah (2014: 15), the definition of curriculum contained in Act Number 20 of 2003 concerning the education system. The Act stated that the curriculum is a set of plans and arrangements regarding the content and learning materials and the methods used as guidelines for implementing teaching and learning activities. Based on this definition, the curriculum becomes very important in determining the direction of education because it is a container in implementing educational activities. This is why the curriculum is regularly updated by developing aspects that are considered better and minimizing the previous curriculum's weaknesses or weaknesses.

The 2013 curriculum is the development of the previous curriculum, namely, KTSP. The development of the 2013 curriculum is by future competencies that are by the development of science and technology in the current global era. This curriculum does not only emphasize knowledge but also ability in attitude and skills to create productive, creative, innovative human resources and also have noble character. With curriculum changes, there are several changes: changing the learning model where students must play an active role in discovering the concepts of the lessons they are learning and the teacher as a facilitator in the learning process.

Mathematics has a vital role in daily life. Many human activities require mathematical concepts and calculations. Everyone must learn mathematics because mathematics underlies almost every science. Mathematics also underlies the development of technology in the present or the future. Mathematics must be learned at all school levels because mathematics trains students to think critically, logically, analytically, systematically, and creatively. Difficulties in learning mathematics become essential things to note because it can influence the success of mathematics's learning objectives. According to Runtukahu and Kandou (2014: 28-29), learning difficulties involve deficiencies in development patterns such as language development, physical development, academic development such as mathematics and perceptual development. Like what happened with most of the VII grade students at SMPN 15 Yogyakarta and the VII grade students of MTs Muhammadiyah Karangkajen in interviews conducted on August 1, 2017, and July 31, 2017, students felt difficulties when calculating this resulted in mathematics being less attractive to students. Mathematical books based on the 2013 curriculum used are difficult to understand, especially in challenging problems. Students want books whose problems are easier to work on.

Difficulties in one of the materials, namely Linear equality and inequality of Variables, were also experienced by students at SMPN 15 Yogyakarta and MTs Muhammadiyah Karangkajen. Students at SMPN 15 Yogyakarta and Muhammadiyah Karangkajen MTs have difficulty in operating the algebraic form and determining the set of resolutions from an inequality. This causes the learning outcomes achieved are less than the maximum. Facilities and infrastructure are essential in supporting the learning process. Based on interviews conducted with mathematics teachers at SMP Negeri 15 Yogyakarta and MTs Muhammadiyah Karangkajen on August 1, 2017. July 31, 2017, the lack of teaching material that is one of the supporting facilities for the learning process can make the learning process less optimal. Teaching materials used when learning mathematics at SMP Negeri 15 Yogyakarta and MTs Muhammadiyah Karangkajen are mathematics books for the 2013 Revised Ministry of Education and Culture curriculum. Book teaching materials are sufficient in number, but specifically for teaching materials in modules based on the 2013 curriculum for equality and inequality material, one variable does not exist yet.

Based on the description above, the researcher deems it necessary to develop modules for grade VII students on the Equal Linear and Inequality System Variables based on the 2013 curriculum, which is expected to help the junior high's learning process schools so that learning outcomes improve.

Based on the background of the problems outlined above, the problems that can be identified are: 1) Most students do not like math. 2) Most students have difficulty doing math calculations and understanding mathematics books based on the 2013 curriculum. 3) Students' difficulties in mathematics in the linear equation and inequality of one variable result in less than optimal learning outcomes. 4) There is no mathematical module based on the 2013 curriculum specifically on the subject matter of linear inequality and one variable in SMP 15 Yogyakarta and MTs Muhammadiyah Karangkajen. Considering the limitations of research in many ways, this research is limited to developing mathematics books on the Equal Systems and Linear Inequalities Variable system for VII grade students of SMP based on the 2013 curriculum.

Based on the background of the problem and the limitation of the problem, the formulation of the problem in this study is: 1) How to develop a mathematical module of the linear equality and inequality material for VII grade students of SMP based on the 2013 curriculum? 2) How is the feasibility

of the Mathematics module in the Linear equality and inequality of one variables for VII grade students of SMP based on the 2013 curriculum?

By the title of the research and based on the problems that have been formulated, the objectives of this study are 1) To develop a mathematics module of the Equal Linear Equality and Inequality material for VII grade students of SMP based on the 2013 curriculum. 2) To find out the feasibility of the mathematics module of the Equal Linear Equality and Inequality material for VII grade students of SMP based on the 2013 curriculum. The product being developed is a mathematics module for grade VII students on the linear equation and inequality of one variable whose composition is based on the 2013 curriculum.

METHODS

This research is a research development (Research and Development) using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). According to Benny Pribadi (2014: 23) The ADDIE system design model is simple and can be done in stages or systematically. This research is focused on the Development of Mathematics Modules for linear equation material and inequality of one variable for class VII SMP / MTs based on the 2013 curriculum. The development procedure is the steps that must be taken to produce a product. In this research development, the researcher will develop a product in the form of a mathematics module of linear equation and inequality of one variable linear for class VII SMP / MTs based on the 2013 curriculum. This module was developed with the ADDIE development model, namely: Analysis, Design, Development, Implementation, Evaluation.

The trial design is intended to get direct feedback from users about the product's feasibility being developed. Before testing, the product must be consulted with supervisors, material experts, and media experts. From the consultation, results will get product validation. The next step is to test a small class of 5 students randomly selected to determine the module's feasibility to continue with the next stage. The subjects of this research are:

1. In this study, Ahmad Dahlan University mathematics education lecturers and two junior high school mathematics teachers were material experts. Material experts provide an assessment of the module development products made. Assessment is not only in terms of material, but also includes several other aspects through instruments that have been made by researchers. The assessment of the material experts is input for researchers as input in revising the module products.
2. In this study, the media experts were Ahmad Dahlan University mathematics education lecturer in media and two ICT teachers. Media experts provide an assessment of the module development products made. The assessment is not only in terms of the media, but also includes several other aspects through instruments that have been made by researchers. The assessment of the media experts is input for researchers as input in revising module products.
3. The learning media subjects were VII grade students of SMP Negeri 15 Yogyakarta and MTs Muhammadiyah Karangajen. In testing product development, students are asked to use development products in the form of modules. After using these modules, students are asked to provide responses or responses to the modules used.

The type of data used in this research development are qualitative data and quantitative data as follows:

1. Qualitative data is a type of data used in a study to measure a product and is not stated in numerical form. In this study, qualitative data in the form of images of products assessed by material experts, media experts, and students are used. Qualitative data in this study uses five categories: Very Good, Good, Enough, Less, and Very Less.
2. Quantitative data is data used to measure a product and is expressed in a research score. In this study, quantitative data was used to assess products stated in scores by material experts, media experts, and students. Quantitative data used in this study is in the form of a range of assessment scores of each indicator statement: 5,4,3,2,1.

Data collection techniques used in this study are:

1. Interview Guidelines. Interviews were conducted with some students and teachers at SMP Negeri 15 Yogyakarta and MTs Muhammadiyah Karangakajen to gather information on issues relating to the development of modules for seventh-grade students on equality material and one variable linear inequality.
2. Questionnaire. A questionnaire is used to obtain data relating to the quality of teaching materials in terms of material and media. The questionnaire was filled by media experts, material experts, and seventh grade junior and senior high school students. The assessment questionnaire is filled by choosing one alternative answer that has been provided. In the assessment sheet, there are two types of qualitative and quantitative data.

This study's data analysis technique is a qualitative descriptive analysis technique that describes product development results in the form of a mathematical module of equality material and linear variable one variable based on the 2013 curriculum.

1. Descriptive Analysis Process

- a. Collecting data. The process of collecting data aims to separate useful data from useless data and select data suitable for the research objectives.
- b. Showing data. Researchers arrange data correctly and adequately. All data obtained in the form of assessment results and expert input are displayed descriptively. This aims to make it easier for readers to understand the flow of thinking during the research process.
- c. Data reduction. Reduction activity is a step in research to focus and simplify the data obtained.
- d. Verification and interpretation of data. Verification of the data referred to in this study is the activity of drawing conclusions based on data obtained so that the meaning of the data obtained is exact.

Module assessment data obtained through a questionnaire by material experts, media experts, and students in qualitative scores will be changed to quantitative.

From the data that has been collected, in Sukarjo (2006: 55), the average can be calculated 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 evaluators

Furthermore, the data obtained from both media experts, material experts, and students are converted into qualitative values based on ideal evaluation criteria from Widoyoko, Eko Putro (2009: 238). Provisions for the ideal evaluation criteria are shown in Table 1 below.

Table 1. Criteria for Ideal Rating Categories

Formula	Classification
$X > \bar{X}_1 + 1,8 \times sb_i$	Very Good
$\bar{X}_1 + 0,6 \times sb_i < X \leq \bar{X}_1 + 1,8 \times sb_i$	Good
$\bar{X}_1 - 0,6 \times sb_i < X \leq \bar{X}_1 + 0,6 \times sb_i$	Enough
$\bar{X}_1 - 1,8 \times sb_i < X \leq \bar{X}_1 - 0,6 \times sb_i$	Low
$\bar{X} \leq \bar{X}_1 + 1,8 \times sb_i$	Very Low

The analysis results of the data obtained are used to know the quality of the products produced. Module products are said to be eligible for teaching material if the modules' overall quality is in the minimal category of good.

The trial data in developing a mathematical module of the material for linear equations and inequality one variable for grade VII students of SMP / MTs based on the 2013 curriculum is as follows:

1. Analysis. The analysis aims to provide an overview of the teaching material to be developed. In this stage, there are three analyzes, namely:

- a. Analysis of teaching material requirements
- b. Material analysis
- c. Curriculum analysis
2. Design. After conducting interviews, observations, and gathering information, the next stage is the planning/design stage. This stage consists of 3 steps:
 - a. Outline the contents of the module
 - b. Module content design
 - c. Develop module assessment instruments.
3. Development. The development of teaching materials is the process of translating designs / initial designs in actual appearance. This stage includes:
 - a. Data collection
 - b. Module writing
 - c. Validation and valuation
 - d. Trial small classes.
4. Implementation. After the learning module's development phase is completed, the next step is applying the learning module to the actual classroom conditions in learning mathematics. A large class test is a final test in this development process.
5. Evaluation. The final step in the ADDIE learning system design model is evaluation. Evaluation is a process carried out by someone to provide an assessment of something; in this case, it is the quality of the learning module (Benny Pribadi, 2014: 133). Assessment is given to some parts of the learning module's quality based on aspects of the material, aspects of the media, and students' responses to the learning module. The assessment will be used as a reference in determining whether or not the learning module is developed.

The assessment based on the material aspects was carried out by three material experts, namely the material expert lecturer, the mathematics teacher at SMPN 15 Yogyakarta, and the mathematics teacher at MTs Muhammadiyah Karangajen with the following calculation results:

Table 2. Results of the calculation of the material expert questionnaire

No	Evaluator	Sore	Quantitative data criteria
1	UAD mathematics education lecturer	145	Very Good
2	Mathematics teacher at SMP Negeri 15 Yogyakarta	146	Very Good
3	Mathematics teacher MTs Muhammadiyah Karangajen	126	Good

Based on the product quality assessment results by material experts, it shows that the product is included in the excellent category by two assessors and the good category by one assessor. The mathematics module is appropriate for use in the learning process.

The assessment based on material aspects was carried out by three media experts, namely media expert lecturer, ICT SMP 15 Yogyakarta teacher, and ICT MTs teacher Muh Karangajen with the following calculation results.

Table 3. Results of the Calculation of the Questionnaire for Media Experts

No	Evaluator	Sore	Quantitative data criteria
1	UAD mathematics education lecturer	146	Very Good
2	ICT teacher at SMP Negeri 15 Yogyakarta	104	Good
3	ICT teacher MTs Muhammadiyah Karangakajen	137	Very Good

Based on the results of product quality assessment by media experts, it shows that the product is included in the excellent category by two assessors and the good category by one assessor. The mathematics module is appropriate for use in the learning process.

Assessments based on student responses were carried out in two schools, with the following results:

Table 4. Results of Calculation of Student Response Questionnaire

No	School name	Average	Quantitative data criteria
1	SMP Negeri 15 Yogyakarta	127,89	Very Good
2	MTs Muhammadiyah Karangakajen	128,97	Very Good
Average Score		128,43	Very Good

Based on students' questionnaire responses showed that the product included in the category is perfect so that the mathematics module is appropriate for use in the learning process.

Product Revision. The Mathematics Module for Grade VII students on the Linear Equality and Inequality System Variable material based on the 2013 curriculum, assessed by the material expert and the media expert, was then revised according to the given improvement input.

Final Product Review

Mathematical modules for grade VII students on the Material Linear equality and inequality System Variables based on the 2013 curriculum developed in this study include material linear equality and inequality of one variable as an introduction to Basic Competencies (BC) 3.3 and BC 4.2. The module was developed into two parts, namely:

1. The initial part
The initial part includes cover / front cover, title page, module identity, preface, presentation of module contents, table of contents, IC and BC, concept map, and introduction.
2. The core part
The core sections include learning activities, project assignments, summaries, and evaluations.
3. The final part
The final section includes: answer key, bibliography, glossary, and cover/back cover.

CONCLUSION

Based on the research results of developing a mathematical module of material linear equations and inequality one variable for grade VII students of SMP / MTs based on the 2013 curriculum, the following conclusions are obtained:

1. This development research was conducted using the ADDIE development model with the steps, namely:
 - a. The analysis consists of analyzing the need for teaching materials, material analysis, and curriculum analysis.
 - b. Design by making a preliminary design consisting of 3 steps, namely compiling the module contents outline, module content design, and compiling module assessment instruments in the form of a questionnaire consisting of the material expert questionnaire, media expert

- questionnaire, and student response questionnaire module. Before being used as an assessment instrument, the three questionnaires were validated by the validator first.
- c. Development or module development is where the learning module's initial design is translated on the actual display. The researcher collects references, writes modules, validates modules, evaluates modules, and tests small classes. The final design of the learning module includes cover/cover, title page, preface, presentation of the module content, table of contents, Core Competency (CC) and Basic Competency (BC), concept map, learning activities 1 to 4 (consisting of material, example problems, conclusions, and exercises), project assignments, summaries, evaluations, answer keys, bibliography, and glossary. In this stage, module validation is carried out by material experts, media experts, and small class trials to determine students' responses to the product being developed.
 - d. Implementation of learning modules to class conditions in schools used as the implementation of large class trials. Large class trials are the final trials in this development process.
 - e. Evaluation is the final stage in this development. Assessment is given on several parts, namely aspects of the material, aspects of the media, and student responses. The assessment is used as a reference to determine whether or not the learning modules developed.
2. Relating to the feasibility of the mathematical modules of the material in linear equation and inequality of one variable for grade VII students of SMP / MTs based on the 2013 curriculum.
 - a. The feasibility of the mathematics module in the material for linear equation and inequality of one variable for VII grade students of SMP / MTs based on the 2013 curriculum was developed based on an average calculation of material experts at 139 and included in the excellent category.
 - b. The feasibility of the mathematics module in the material of linear equation and inequality of one variable for VII grade students of SMP / MTs based on the 2013 curriculum was developed based on an average calculation from media experts of 129 and included in the excellent category.
 - c. The feasibility of the mathematical modules of the material for linear equation and inequality of one variable for VII grade students of SMP / MTs based on the 2013 curriculum was developed based on an average calculation of student questionnaire responses of 128.43 and included in the excellent category.

Thus, the mathematics module of linear equality and inequality of one variable for VII grade students of SMP / MTs based on the 2013 curriculum is suitable for the learning process.

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