DEVELOPMENT OF MATHEMATICS LEARNING MODULE WITH CONTEXTUAL APPROACH ON POLYHEDRON MATERIAL FOR JUNIOR HIGH SCHOOL STUDENTS CLASS VIII

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ABSTRACT

Teacher-centered learning causes passive students and can not learn independently using teaching materials. Students consider the material on the teaching materials used still abstract. A contextual approach is expected to help students understand the material because it is associated with real life. So the development of a learning module with a contextual approach helps students understand the material and learn independently. The method used is Research and Development with the steps is potential and problems, data collection, product design, design validation, design revision, product testing, product revision, product usage trial, and revision. The subjects of this study are teachers and students of State Junior High School 3 Depok (SMPN 3 Depok) and Tahfidzqu Junior High School. The object of research is the use of a learning module of the polyhedron material with a contextual approach. Data collection techniques used non-tests with interview sheet and questionnaire instruments, which have been validated by lecturers. Data analysis using questionnaire analysis and module feasibility analysis. The results showed that the polyhedron module with a contextual approach for students of SMP / MTs class VIII is feasible. This is based on the result of the assessment by three validators indicating that the module included in the category is very good, with a score of 135.55 for media validation and 134.67 for material validity. The student test results also show an average score of 115.

Keywords: learning module, contextual, student's independence

INTRODUCTION

Mathematics is an abstract and complicated science of arithmetic. However, many problems in life can be solved by mathematics; mathematics is also a science that underlies other sciences. Therefore mathematics is taught to all levels of education, ranging from elementary school to college. In teaching mathematics, we need a learning media that functions to bridge the teacher in delivering good and correct material. In the learning process teachers are expected to develop their learning material, this is by PP No. 19 of 2005 Article 20 and confirmed through the Minister of National Education Regulation (Permendiknas) number 41 of 2007 concerning Process Standards, which among others regulates the planning of the learning process that requires educators in education to develop a lesson plan. One element in the lesson plan is a learning resource. It is expected that teachers can develop teaching materials as a source of student learning.

The teaching material in the form of modules is a book written with the aim that students can study independently at school and at home. A module not only contains learning material but also contains learning objectives, competencies to be achieved, study instructions, and evaluation questions. Modules are also sources of learning or learning media used in teaching and learning and help students and teachers improve learning processes and outcomes. By Permendiknas No. 22 of 2006 concerning elementary and secondary school content standards, which explain the objectives of mathematics learning including (1) Students can understand mathematical concepts, explain the interrelationships of concepts and apply concepts/logarithms, flexibly, accurately, efficiently and precisely in problem-solving, (2) Using reasoning on patterns and properties, doing mathematical manipulation in making generalizations, compiling evidence or explaining mathematical ideas and statements, (3) solving problems that include the ability to understand problems, mathematical design models, solve models and interpret the solutions obtained, (4) Communicating ideas with symbols, tables, diagrams or other

media to clarify the situation or problem, namely having curiosity, attention, and interest in learning mathematics, as well as tenacity and confidence in problem-solving.

To achieve these math learning goals, an appropriate learning approach is needed to optimize student learning outcomes. One new learning strategy is learning that uses real content in everyday life, namely the contextual learning approach. A contextual approach is an approach to learning mathematics oriented to real life and the application of mathematics in everyday life. Student's mathematical knowledge will be meaningful to students if the learning process is carried out in learning using real problems. The characteristics of this contextual approach are by the learning objectives of mathematics contained in Permendikana No. 22 of 2006. Based on interviews with Tahfidzqu Middle School students and mathematics teachers on March 1 and 2, 2017, information was obtained that in the learning activities, some students did other activities while the teacher was explaining, for example talking to friends who were beside him and playing with the instruments write it. When the teacher allows asking questions, only a few students are active to ask questions, and also, when allowed to solve problems in front of the class, only a few students are active going forward to answer questions. From the description above, it can be concluded that a student's interest in learning mathematics is still lacking.

In the learning process that takes place, teachers more often use the lecture method and take notes. Textbooks owned by students are more often used in doing exercises or in-depth material learning, not as a primary learning resource for students. Therefore students become passive, and the teacher plays a more active role in the learning process. In learning, teachers have already developed teaching materials in the form of worksheets. They have never developed modules as teaching materials, so in the learning process, teachers and students do not use modules as learning resources. Besides textbooks and worksheets in schools that do not use a contextual approach, the material in mathematics will be more interesting if made using a contextual approach, for example, in the material to build flat side spaces—so many examples in life that can be applied in the material to build flat side space. Students can also develop their imagination in solving various problems so that students can find their concepts and understandings according to their thinking patterns.

On March 6 and 7, 2017, researchers conducted interviews with mathematics teachers and students at SMPN 3 Depok, Sleman. Information was obtained that in learning activities, students have not been able to study independently to understand the concept of learning material. In the learning process, the teacher is still active in delivering the material. The teacher still has to take notes in front of the class to help students to understand concepts and practice exercises by the learning material. In learning worksheets and textbooks used by students are only used as homework material or exercises. In learning activities, students also have difficulty understanding the material to build a flat side space because, in the material to build a flat side space, imagination is needed to understand some of the material's concepts. When completing the questions given by students, it is still difficult to remember the differences between several shapes. Therefore the teacher often gives several examples of building space found around students.

Some students at SMPN 3 Depok, Sleman often have difficulty in understanding the concepts contained in VIII grade mathematics textbooks. Concepts and examples presented in textbooks owned by students are considered to be too difficult to understand (abstract) by students. They are less interesting because the books used have a monotonous display color, and the images presented are considered boring. The abstract concept and the unattractiveness of books in schools still cause a lack of interest in student learning using teaching materials. To attract students' interest in learning, attractive teaching material is needed, with a variety of color displays, and in the picture also the material contained in teaching materials is made more diverse by using examples in everyday life to facilitate students in understanding the material independently. Seeing such conditions, researchers are interested in developing modules as one of the teaching materials. The module was developed as a flat side building module with a contextual approach for eighth-grade junior high school students. The module to be compiled contains instructions for use, learning objectives, the presentation of coherent material,

concise and clear, and examples of questions and exercises. The modules produced in this research are expected to be able to help students understand the material to build flat side spaces well and make it easier for teachers to attract student's attention to learn independently.

Based on the background and problem constraints above, the problem can be formulated as follows:

1. How to develop a mathematics learning module with a contextual learning approach to the material for building flat side spaces for junior high school students in class VIII even semester?
2. How is the quality of the mathematics learning module with flat side space material for the eighth-grade junior high school students to be developed?
3. What is the response of students to the mathematics learning module on the material in the flat side space for junior high school students grade VIII based on a contextual approach?

The objectives of developing teaching material in the form of a mathematics learning module are:

1. Develop relevant modules as teaching materials for mathematics learning in the material to build flat side spaces with a contextual approach for even semester VIII junior high school students.
2. It knows the quality of modules developed with a contextual approach in terms of content worthiness, presentation worthiness, language feasibility, and compatibility with contextual learning characteristics.
3. It knows the students' responses to the mathematics learning module with the contextual learning approach to the material of flat side spaces for seventh-grade junior high school students.

METHODS

This research uses an approach known as Research and Development (R&D). R&D is a research method used to produce specific products and test the effectiveness of those products. According to Sugiyono (2015: 298), in the world of education and social many products can be developed through Research and Development. This method can be used in the development of teaching materials. R&D consists of a series of cycles with a series of interrelated steps, in which each step to be developed always refers to the results of the previous steps until a learning product is obtained. This study aims to look at the feasibility of developing a mathematics learning module with contextual learning models that will be used by students of class VIII even semester, with learning material to build flat side spaces.

The subjects in this development research were material experts, media experts, and students. The material expert consists of one mathematics lecturer and two junior high school / MTs mathematics teachers, the material expert is tasked with examining the material contained in the module to determine the validation of the material that has been selected, flat side space, about the truth of the material concept and the suitability of the material with the basic competencies that will be achieved. The media expert consists of one mathematics lecturer and two junior high school / MTs teachers. The media expert must review and evaluate the quality of the media that has been arranged in terms of appearance, appeal, and truth of the media concept, and so on. At the same time, students as the subject of the learning media trial are students of class VIII SMP / MTs.

The type of data obtained from this research is qualitative data and quantitative data. Data collection instruments in this study were questionnaire and interview guidelines. There are three questionnaires used in this study. Namely, questionnaires addressed to material experts, media experts, and students. The data analysis technique used in this study is to analyze the questionnaire material experts, media experts, and students. The data obtained in this study will be analyzed through the stages of quantitative data, calculating the average, and determining the average score criteria in the guideline for the ideal assessment criteria, at this stage, changing the average score of each assessment to a qualitative value according to the criteria for rating the scale at every questionnaire. Guidelines for assessment criteria can be seen in the table below:

Table 1. Guidelines for Assessment Criteria

Value	Range score	Quantitative Criteria
A	$\bar{X} > 105$	Very Good
B	$85 < \bar{X} \leq 105$	Good
C	$65 < \bar{X} \leq 85$	Pretty good
D	$45 < \bar{X} \leq 65$	Less
E	$\bar{X} \leq 45$	Not good

RESULTS AND DISCUSSION

Trial data in the development of flat side space modules for grade VIII SMP / MTs students includes needs analysis, formulation of learning objectives, topic development, drafting, production of prototype 1, prototype validation, and prototype testing. Data obtained from the results of interviews conducted with mathematics teachers at SMP Negeri 3 Depok, Sleman, and TahfidzQu Middle School on March 6, March 7, and 1, March 2, 2017. The contents of the interviews include matters relating to learning methods and the use of teaching materials. After understanding and studying the competencies that have been determined in the needs analysis, formulate learning objectives to know the competencies that students must achieve in the construction of flat side space. At this development of topics, an outline of the material contents will be explained in the module. The following is an outline of the material to build flat side spaces:

1) Cube. Definition of a cube, Parts of a cube, Properties of a cube, Cube webs, Surface area of a cube, Volume of a cube
2) Beam. Beam definition, Beam parts, Beam properties, Beam nets, Beam surface area, Beam volume
3) Prism. Prism Definition, Prism Parts, Prism Properties, Prismatic Nets, Prismatic Surface Area, Prism Volume
4) Pyramid. Definition of the pyramid, Parts of the pyramid, Properties of the pyramid, Pyramid net, Surface area of the pyramid, Volume of a pyramid
5) Drafting. The preparation steps refer to the steps of the module preparation according to Rowntree in Andi Pastowo (2013), namely:
   a) Identifying learning objectives
   b) Arrange the material outline
   c) Writing material
   d) Determine the format and layout
6) Prototype production 1. The data collected will be a reference in making prototype one modules build flat side spaces with a Contextual approach and making this prototype using Microsoft Word 2010, Corel Draw X5, and Geogebra 5.0.

   7) Prototype validation. Before the module validation phase is conducted, the researcher prepares an instrument to assess the module's feasibility in terms of material and media. Module validation will be carried out by competent material experts and media experts. Also, researchers made a student response questionnaire that aims to determine student responses to the modules that have been made. The material expert and media expert questionnaire was conducted by Ahmad Dahlan University mathematics education lecturer and two junior high school mathematics teachers. The material expert and media expert in question is Dra. Sumargiyani, M.Pd. Who is a UAD mathematics education lecturer, Endang Wahyuti Ningsin, S.Pd. Who is a mathematics teacher at SMP N 3 Depok, Sleman, and Tugiman, S.Pd.Si. Who is a math teacher at TahfidzQu Middle School. The module evaluation questionnaire was given to Dra. Sumargiyani, M.Pd. As a validator, I on July 4, 2017, and evaluation of material and media was completed on July 6, 2017. For validator II, a questionnaire was given to Endang Wahyuti Ningsih, S.Pd. On July 10, 2017, and evaluation of material and media was completed on July 13, 2013. While for validator III the assessment questionnaire was given to Tugiman, S.Pd.Si. On July 11, 2015, and an evaluation of the material and media was completed on July 15, 2017.

Based on the data analysis technique used, the following is the result of the module validation data analysis.

Table 2. Validation results by material experts

Assessment	Score	Quantitative Data Criteria
Validator 1	131	Very Good
Validator II	141	Very Good
Validator III	134	Very Good
Total	406	
Mean	**135,55**	**Very Good**

Table 3. Results of validation by media experts

Assessment	Score	Quantitative Data Criteria
Validator 1	130	Very Good
Validator II	140	Very Good
Validator III	134	Very Good
Total	404	
Mean	**134,67**	**Very Good**

After the validation is done, the material expertly and the media expert will provide some input related to the module. The first revision of the module is based on input from material experts and media experts before testing the module. The following are suggestions from material experts:

1. Dra. Sumargiyani, M.Pd. who is a lecturer in mathematics education at UAD
   a) Adjusting the writing of the material with the learning approach used in the module
   b) Adding questions and examples of questions that fit the contextual approach
   c) Adding practice questions and answer keys for each exercise contained in the learning module
2. Endang Wahyuti Ningsih, S.Pd. who is a mathematics teacher at SMP N 3 Depok, Sleman
   a) Add multiple-choice questions.
   b) Add a matter of area and Volume of the combined chamber.
3. Tugiman, S.Pd. Si Who is a TahfidzQu Middle School math teacher.
   a) It was Clarifying the parts of the material using a contextual approach.
   b) Module materials are adapted to indicators of contextual approaches.
   c) On the material writing material and formulas in the module checked again.
   d) In the questions contained in the multiply questions module that uses images.

While the following are suggestions from media experts:

1. Dra. Sumargiyani, M.Pd. who is a lecturer in mathematics education at UAD
   a) Replacing some sentences that are not standard and difficult for students to understand
   b) The size of each image by one another
   c) Color clarity on several displays in the module
   d) The suitability of the image contained on the cover with the material to be conveyed in the module.
2. Endang Wahyuti Ningsih, S.Pd. who is a mathematics teacher at SMP N 3 Depok, Sleman
   a) Several words need to be corrected.
   b) Clarify the drawing of webs on the module
   c) Clarify the tables contained in the module
3. Tugiman, S.Pd. Si Who is a TahfidzQu Middle School math teacher.
   a) The images contained in the module avoid images from the print screen.
   b) Coloring and font titles of sub-chapters are sharper.
   c) All images contained in the module are numbered.

8) Prototype testing. Trials to students were carried out to know students' responses to prototype II. Trials were conducted at two schools, namely SMP N 3 Depok, Sleman, and TahfidzQu SMP, trials were conducted twice at each school. The first trial was conducted in a small class by taking five students from each school, for students of SMP N 3 Depok, Sleman. Small class trials were conducted on July 21, 2017, which took place in a classroom. Whereas in Tahfidzku Middle School students, a small class trial was conducted on July 27, 2017, which took place in a classroom. The trial of a large class at SMP N 3 Depok, Sleman, was conducted on August 2, 2017, in a classroom. While the trial at SMP TahfidzQu was conducted on August 3, 2017, in the class. In the large class trials, 20 students were taken from each school.

Based on the data analysis technique used, the following is the result of the module validation data analysis.

Table 4. Results of student questionnaire calculations in small class trials

School	Mean	Quantitative Data Criteria
SMP N 3 Depok	111	Very Good
SMP Tahfidzqu	105	Good
Mean	**108**	**Very Good**

Based on the table above in the small class trials, the module is included in the excellent and feasible category to use. However, there is still some input from students, so revising the module based on student input before the module is used again in large class trials. The following are some suggestions and suggestions from students:

a. The image on the cover is still not very attractive
b. Some of the material presented is still unclear to understand
c. Color and font variations still need to be added
d. The images in the module are even more varied

Table 5. The results of student questionnaire calculations on large class trials

School	Mean	Quantitative Data Criteria
SMP N 3 Depok	125	Very Good
SMP Tahfidzqu	118	Very Good
Mean	**122**	**Very Good**

Based on the table above in the large class test module, included in the category, is very good and feasible to use. However, there is still some input from students, so the revised module is based on students' input. After the revision is made, the module is feasible to use in learning. The following are some suggestions and input from students in large class trials:

a. The material presented is further summarized.
b. Clarify some of the images contained in the module
c. Add several color combinations in the module.
d. Does not include an answer key in the module
e. Correct a few words in the module
f. Added a few questions taken from last year's UN questions

The revised flat side building module for revised grade VIII, SMP / MTs students, can be seen in Appendix 7. The revised flat structure building module is:

1. Display the front cover and back cover
2. Before giving material
    a. Title page
    b. Foreword
    c. Book identity
    d. Serving the contents of the book

e. Table of contents
f. List of Figures
g. Competency Standards, Basic Competencies, and learning objectives
h. Concept maps

3. When giving material. The module contains four learning activities, and each learning activity contains:
   a. Title of material to be delivered
   b. Description of the material that adjusts to the steps of the contextual learning approach. The material provided in the module has been adapted to the contextual approach associated with real life.
   c. Examples of problems or problems
   d. Exercise
   e. Important notes material
   f. Evaluation problem
4. After giving the material
   a. Loading material summary
   b. Contains competency test questions
   c. Loading bibliography
   d. Loading answer key

CONCLUSION

This flat side building module with a contextual approach for grade VIII SMP / MTs students is suitable to be used as a reference for educators and students in learning activities. This is based on the assessment of 3 assessors who are mathematics lecturers at Ahmad Dahlan University and two junior high school mathematics teachers. The results of the assessment by three validators showed that the module was included in the excellent category with a score of 135.55 for media validation and a score of 134.67 for material validation. The results of trials on students also showed an average score of 115 with a very good category.

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