DEVELOPMENT OF MATHEMATICS MODULE WITH THE CONTEXTUAL APPROACH TO THE DISCUSSION RULES, PERMUTATION, AND COMBINATION THROUGH THINK PAIR SHARE STRATEGY

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ABSTRACT

Limitation of learning resources is one factor that makes students difficult to understand a subject matter. One of the teaching materials that can help students' learning activities is modules. This study aims to develop the mathematics module that uses the contextual approach in sub-material the counting rules, permutations and combinations through think pair share strategies and to determine the appropriateness of the modules developed. The development procedure is adopted from the research and development that developed by Borg and Gall in Sugiyono (2014) including the step of identifying the potential and problems, collecting information, product designing, validation of product design, revising the product design, the pilot phase of products and product revision. Mathematics module developed based on the principals of contextual approach on Muslich, Mansur (2008). These products have been through the steps of revision based on advice and suggestions of media and subject matter experts as well as students' response to the module. The results showed from validations criteria and students' responses to the module. Based on an assessment by subject matter experts obtained an average score of 84 which satisfies good criteria, media experts obtained an average score of 93 which satisfies good criteria and results of students' response to the module also satisfy good criteria with an average score that is 110,21. These results mean the mathematics module is appropriate to use in the learning of mathematics.

Keywords: Module, Contextual Teaching, and Learning Think Pair Share Strategy, Counting Rules, Permutations and Combinations.

INTRODUCTION

In essence, education is an effort to prepare students to deal with the environment that is always experiencing increasingly rapid changes. Mathematics is a fundamental science that is applied in everyday life. Mathematics is given through an educational process that starts from elementary school to college. Facts that occur in the field at this time, generally learning mathematics in schools still tend to focus on achieving the target material according to the curriculum or textbooks used, not on understanding the material being studied. As a result, students tend to only memorize mathematical concepts, without understanding their meaning.

The results of interviews conducted at SMA Negeri 1 Godean obtained information from mathematics teachers, that the uncertainty of the curriculum currently being used creates confusion in the use of teaching materials. Teachers cannot require students to buy certain books, whereas books from the government are not yet available due to sudden conversion. The teacher also does not have time to make teaching materials for students. While the teacher frees students to actively search for teaching materials independently. The librarian explained that the 2013 curriculum class XI mathematics book was not yet available. To meet the needs of students, other reference books are provided but the numbers are limited. Interviews were also conducted with some students and information was obtained that students only used the worksheet as a guide in learning in class. The material presented at the worksheet is very limited. Students feel they still need reference to teaching materials that help in understanding concepts. While the results of interviews conducted at SMA Negeri 1 Seyegan on mathematics teachers obtained information that teaching materials used in learning in class are LKS. Plus the activeness of students in finding other teaching materials is still lacking. Students tend to search if instructed by the teacher alone. The teacher plans to make modules for students but is constrained by time. Data from the librarian obtained that mandatory books from the

government in accordance with the 2013 curriculum did not yet exist. Books provided in the library are still in the 2004 curriculum. Books from other references are available, but the number is limited. Interviews of several students obtained information that students are still very limited in getting teaching material that can be used for learning. Students still need other teaching materials.

Class XI student learning outcomes of SMA Negeri 1 Godean and SMA Negeri 1 Seyegan on the subject matter of the subject of the principles of enumeration, permutation and combination are still many under the KKM. This happened due to several factors. In addition to the daily test score data, a pretest was conducted on the subject matter of permutation and combination on a small sample at SMA N 1 Godean and SMA N 1 Seyegan. The 10 pretest questions were given as a matter of identifying permutation and combination problems. Based on the pretest, an average value of 7.60 was obtained at SMA Negeri 1 Godean, while at SMA Negeri 1 Seyegan an average grade of 6.75 was obtained. From the results of the pretest, it can be seen that the ability to identify permutation and combination problems given to students in the two schools is different. The average in Godean 1 High School is good enough, but in Seyegan 1 High School it is still not good enough.

Based on the results of interviews, daily test data, as well as pretest conducted in both schools, the limited reference of teaching materials is one of the factors that make it difficult for students to understand learning material, in this context the material opportunities are subject to the principles of enumeration, permutation, and combination. Presentation of material in teaching materials used is also not good so students still rely a lot on teachers as educators. Therefore, students need learning resources that can help in understanding mathematical concepts and be able to implement them in everyday life. Learning resources used must, of course, be able to build student creativity, hone students' analytical skills, and contextual. So hopefully students can be more interested in mathematics and can construct meaningful knowledge with active independence.

Modules are one form of teaching material that is packaged intact and systematic, which contains a set of learning experiences that are planned and designed to help students master specific learning goals. Modules function as learning tools that are independent in accordance with their respective speeds (Daryanto, 2013: 9). From this understanding, researchers try to create modules with new innovations as one of the teaching materials that can motivate students to learn with a contextual approach and can strengthen the concept of material obtained with their friends through a think pair share strategy in which many will be given reinforcement of the concepts sought by themselves students without losing the main function of the module which is to facilitate independent learning. The think pair share strategy in the module will be given to the strengthening of the concept of the material after students have studied the material on the module themselves.

Based on this, researchers are interested in conducting research with the title "Mathematical Module with Contextual Approach to the Subject of Enumeration, Permutation, and Combination through Think Pair Share Strategies".

Based on the description, problems can be formulated, namely:

1. How is the development of a mathematical module with a contextual approach to the subject of enumeration, permutation and combination rules through a think pair share strategy?
2. How is the quality/feasibility of a mathematical module with a contextual approach to the subject of enumeration, permutation, and combination through a think pair share strategy?

Based on the above problem formulation, the objectives of this study are:

1. To develop a mathematical module with a contextual approach to the subject of enumeration, permutation and combination rules through a think pair share strategy.
2. To test the quality/feasibility of a mathematical module with a contextual approach to the subject of enumeration, permutation and combination rules through a think pair share strategy.
3. To find out the effectiveness of the use of modules as teaching material in terms of students' responses to modules and motivational sentences in modules for the formation of student characters according to KI 2 in the 2013 curriculum.

METHODS

Development Model

This research is one form of R&D (Research and Development). The researcher uses one of the R&D development models from Sugiyono's book titled Educational Research Methods Qualitative, Quantitative and R&D Approaches as well as guidelines for the development of teaching materials from the Ministry of National Education 2008. The product developed is a mathematical module with a contextual approach to the subject of enumeration rules, permutations, and combinations through strategies Think Pair Share (TPS).

Development Procedure

Research and development steps in R&D according to Sugiyono (2014: 298) consist of several steps, namely:

1. Potential and Problems
   The potential possessed at Godean 1 High School and Seyegan 1 High School is a high enough motivation to learn but there is a problem namely the limited learning resources used in understanding learning material. These problems are what researchers will try to correct.
2. Data Collection
   At this stage, researchers need to collect various data based on their potential to solve the problems faced as material for planning module products that are expected to solve problems in SMA Negeri 1 Godean and SMA Negeri 1 Seyegan.
3. Product design
   The product that will be produced in this research, namely the module teaching material needs to be done in advance. The design is needed so that in the process of making module teaching materials can be conceptualized properly so that the desired objectives can be achieved.
4. Design Validation
   At the design validation stage, the design or product design will be judged rationally effective or not. Validation is still based on rational thinking, not factual facts. Material experts and media experts assess product design to determine their weaknesses and weaknesses, as well as provide input to improve product design.
5. Design Revision
   The design of the module teaching material products that have been validated by the material experts and media experts are further improved or revised in the design. The revision was carried out in consultation with material experts and media experts until it was declared good before being tested on several students who would use the product.
6. Product Testing
   Modules that were declared feasible by media experts and material experts, were then tested on several students. The trial was only conducted on a few students taken randomly from class XI MIA SMA Negeri 1 Godean and SMA Negeri 1 Seyegan to determine the effectiveness of the module teaching materials produced.
7. Product Revision
   If product designs that have been tested on a small class are found to be flawed and lacked, then a second revision is made for improvements before printing the final product.

Product Trial

The study was conducted at Godean 1 High School and Seyegan 1 High School. The subjects in this study were grade IX students of SMA Negeri 1 Godean and SMA Negeri 1 Seyegan. Students will provide an assessment of the module in the learning process. In addition to assessment, students also provide input and suggestions for improvement to the module.

The instrument used to collect data in this study was a questionnaire. The type of questionnaire used was the checklist questionnaire. There were 3 questionnaires developed, namely the material expert assessment questionnaire, media expert assessment questionnaire, and student response questionnaire, based on the formative evaluation instrument of teaching materials published by the

Ministry of National Education in 2008. The questionnaire will be given at validation and trial activities. At the validation stage, the material expert assessment questionnaire is given to the material expert to provide an assessment of the module in terms of material and the media expert assessment questionnaire is given to the media expert to provide an assessment of the module from the aspect of the media. Whereas in the trial, the modules are searched by students within 2 weeks.

At the initial stage of the trial, students are given a Pre-Test that is useful for knowing the students 'initial abilities before using the module, while at the end of the trial, students are given a Post-Test that is useful for knowing the students' abilities after using the module. At the end of the trial, a questionnaire was also given to find out students' opinions about the module. The data analysis technique used is the first, quantitative data using the Likert scale in table 1**.**

Table 1. Likert Scale

Information	Score
Strongly agree	5
Agree	4
Doubt	3
Disagree	2
Strongly disagree	1

Sumber :(Sugiyono,2014:93)

Then calculate the average using the formula (Sukarjo, 2006: 55):

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

Information :

$\bar{X}$: score average

x_i : score from assessor to i

N : many evaluators/respondents

Next, determine the average criteria in the ideal rating criteria guideline in Table 2.

Table 2. Ideal Assessment Criteria

Score Range	Qualitative Criteria
$\bar{X}$ >(M*i* + 1,8 SB*i*)	Very good
(M*i* + 0,6 SB*i*) < $\bar{X} \leq$ (M*i* + 1,8 SB*i*)	Well
(M*i* - 0,6 SB*i*) < $\bar{X} \leq$ (M*i* + 0,6 SB*i*)	Pretty good
(M*i*–1,8 SB*i*) < $\bar{X} \leq$ (M*i*-0,6 SB*i*)	Less
$\bar{X} \leq$(M*i* - 1,8 SB*i*)	Very less

Sumber :(Sukarjo,2006:53

Information :

$\bar{X}$: score average

M_i : average ideal score

SB_i : ideal standard deviation

RESULTS AND DISCUSSION

Results

1. Preliminary Research

   At this stage, interviews were conducted with mathematics teachers at SMP Negeri 5 Yogyakarta and MTs Negeri Yogyakarta II teachers about the use of teaching materials in learning mathematics. Based on the results of interviews conducted, the following information was obtained:

a. Class IX students' mathematics books used in learning are less interesting and difficult for students to understand.

b. Mathematics modules are subject to the rules of enumeration, permutations, and combinations not yet available in schools.
c. There are learning difficulties on the subject of enumeration, permutation and combination rules for class IX.
d. Students have a high will to learn to use teaching materials.
e. The teacher wants to make teaching materials but is constrained by time.

2. Data collection

After studying and understanding the data obtained from preliminary research, it is necessary to develop a module teaching materials for high school students in grade XI. The researcher conducts a reference study on the approach, strategy, and scope of material to be presented in the module. The three components were discussed with supervisors and mathematics teachers in class XI of SMA N 1 Godean and SMA N 1 Seyegan. Based on the results of discussions conducted by researchers will develop a mathematical module with a contextual approach on the subject of the rules of enumeration, permutation and combination through a think pair share strategy with several considerations.

3. Preparation of Learning Modules

The steps of composing the module refer to the steps of composing the module based on Andi Prastowo (2014: 119-131), namely:

a. Curriculum Analysis
b. Determine the titles of Learning Activities in the module
c. Module Writing
d. In making the module the researcher consults with the supervisor. After making the module, the module is printed in the form of a book which then goes through the validation stage.

4. Product Validation

Module design validation is done in terms of material and media. The module design validation in terms of material was done by 2 material experts, namely UAD Mathematics Education lecturers and mathematics teachers at Seyegan 1 High School. Whereas media validation was carried out by Yogyakarta Mathematics P4TK staff. At this stage, the researcher submits the modules that have been made and the module research instruments to the material expert and the media expert. In this validation activity, the module's weaknesses and weaknesses are known and the researchers make revisions. After the revision, media experts and material experts then fill in the research instruments that have been made. From the results of the questionnaire, the eligibility of material experts obtained an average of 84 material expert assessment results which showed that the module included in both categories. While the results of the calculation of the eligibility questionnaire of media experts amounted to 93 which showed that the module was included in either category.

5. Product Testing

The module testing was conducted in two schools, namely Godean 1 High School and Seyegan 1 High School. Trials were conducted twice at each school by taking a sample of class IX students of 6 students from SMA Negeri 1 Godean and 6 students from SMA Negeri 1 Seyegan in a small class trial. Whereas in large classes with each school taking 20 students. Researchers guided directly the product testing process accompanied by mathematics teachers in both schools.

Due to time constraints, students do not study one module in full, but two students study one learning activity for one week. Product trial I went smoothly at both schools. During the second meeting on product trial I the researcher took back the modules that students had studied, then gave a post-test problem to measure students' understanding of the material in the modules that had been studied. While studying the module, respondents also work on the activities of the module, fill in the motivational sentences presented in the module, and work on the evaluation questions. Respondents were given questionnaires for student responses and provided input for module improvement. Then the inputs from students in the first product trial are followed up by improving the contents of the mathematical module products in accordance with the inputs provided by

students. In large class trials, the researchers also conducted an analysis of the contents of the modules to see their implementation in students. Some module contents analyzed are:

a. Analysis of motivational sentences
b. Analysis of the learning process using modules
c. Analysis of student learning outcomes (Pre-Test and Post-Test)

The second trial process ended by giving a questionnaire to students to determine students' responses to the modules that were developed. Based on the questionnaire responses of these students obtained an average score of 110.21 which is included in both categories.

6. Product Revision

Revisions were made to improve and perfect the product. Based on input from material experts and media experts, revisions were made to improve product design. The revised results are then shown back to the material experts and media experts. After the revision is correct, the module is then tested on students. after the trial, the module is then revised again. The results of this revision became the final product, the mathematics module with a contextual approach, the subject of enumeration, permutation and combination rules.

Data analysis

Based on the data analysis technique used, the data obtained from the expert material assessment, media expert assessment, and student response test were processed and the results are as follows:

1. Feasibility test by material experts

Product viability is assessed by two material experts. The first material expert was a mathematics education lecturer at Ahmad Dahlan University in the field of Opportunities / Statistics, Nur Arina Hidayati, M.Sc and material expert 2 was a mathematics teacher at Seyegan 1 High School namely Totok Triyadi, S.Sc. The assessment of the results of the questionnaire eligibility by material experts can be seen in the following Table 3:

Tabel 3. Results of Feasibility Calculations by Material Expert

No	Assessment	Total score	Qualitative Criteria
1	Material expert 1	87	Very good
2	Material expert 2	81	Well
Average		84	Well

Based on Table 3, it can be seen that the average score of material expert assessment results is 84 which shows that the product developed is seen in terms of material included in both categories.

1. Feasibility test by media experts

The feasibility of the product in terms of media is assessed by media experts. The referred media expert is the staff of PPPPTK Mathematics in Yogyakarta namely Dr. Sumardiyono. The assessment of the results of the eligibility questionnaire calculations by media experts can be seen in Table 4 as follows:

Table 4. Results of the Calculation of the Eligibility Questionnaire for Media Experts

No	Assessment	Total score	Qualitative Criteria
1	Material expert 1	93	Well
Rata-rata		93	Well

Based on Table 4 it can be seen that the average score of the results of the assessment of media experts is 93 which shows that the product developed is seen in terms of the media included in both categories.

2. Student Response Test

The student's response test to the product is known based on the results of the questionnaire given and filled out by students. The percentage of the results of the questionnaire responses of students to the product can be seen in the cake diagram as follows:

Diagram 1. Percentage Calculation of Eligibility for Small Class Student Response

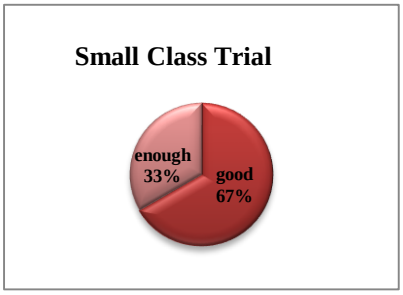
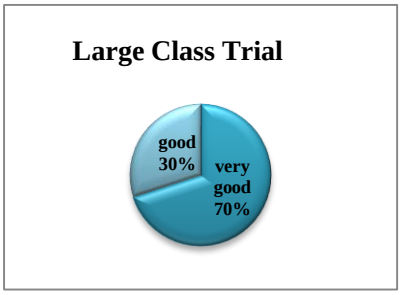


Diagram 2. Percentage Calculation of Eligibility for Large Class Student Response



Both diagrams show the percentage of student responses when testing small classes and large classes. While the average results of the assessment of student responses to the module can be seen in the following table 5:

Assessment	Average score	Category
Trial small classes SMA Negeri 1Seyegan and SMA Negeri 1 Godean	98,67	Well
Trial small classes SMA Negeri 1Seyegan and SMA Negeri 1 Godean	121,75	Very good
Average	110,21	Well

Based on Table 5 it can be seen that students' responses to modules in the good category are shown with an average score of 110.21 So, it can be concluded that the modules developed in the good category for use in learning.

CONCLUSION

This developmental research has succeeded in developing a mathematical module with a contextual approach to the subject of enumeration, permutation and combination rules for class XI high schools referring to the steps of preparing modules based on the research and development model of Research and Development (R & D) from Sugiyono's book and writing guidelines module from the Ministry of National Education 2008. In addition, the module content is based on learning steps with a contextual approach through the Think Pair Share (TPS) strategy.

Modules that have been developed are appropriate for use in learning based on the results of the assessment of media experts and material experts as well as the responses of students of class XI in SMA Negeri 1 Godean Sleman and SMA Negeri 1 Seyegan Sleman. The results of the module assessment by media experts obtained an average score of 93 with good criteria and material experts obtained an average score of 84 with good criteria. While the results of student responses to the module included in both categories with an average score of 110.21 questionnaire calculations.

Based on students' testing of the activities in the modules presented through the think pair share strategy, it was concluded that the strategy can further assist students in learning modules without much contribution from the teacher. In addition, students' opinions on motivational sentences can be concluded that students get the indicated motivation which influences their learning attitude.

While the assessment of media experts and material experts as well as students' responses to the module, it can be concluded that the mathematics module with a contextual approach to the subject of enumeration rules, permutations, and combinations through think pair share strategies for class XI high school is feasible to be used in learning in SMA Negeri 1 Godean and SMA Negeri 1 Seyegan.

Based on the students' opinion on the Himalayas it was concluded that the students received teachings about spiritual and social values through the wisdom story that was read. In addition, based on student response questionnaires, students think that learning by using algebra modules is good, modules have an attractive appearance, modules make it easy for students to learn algebra, and modules contain good questions and can attract students to learn algebra material.

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