



## **PRACTICALITY OF MATHEMATICS MODULE DEVELOPED BY USING PROBLEM BASED LEARNING ON X GRADES STUDENTS AT SMA EKASAKTI PADANG**

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**Abstract.** Teaching and learning process in the school is still teacher-centered. As the effects, students are less active and the process is not effective. Based on the problem, teachers are expected to develop learning materials in the form of modules combined with Problem Based Learning approach. This study is aimed to develop teaching materials in the form of modules with Problem Based Learning approach on three dimensional space materials. This research is a development research using 4-D development model consisting of 4 stages: 1) Define (definition), 2) Design, 3) Development and 4) Disseminate. The stages are limited to three stages. The validation is done by experts and linguists and the practicality is derived from questionnaires filled by teachers and students. The result shows that the module is quite valid (82,5 %), practical (80,5%) from the teachers and (86%) from the students. It can be concluded that the module have an impact on improving student learning outcomes, especially in grade X SMA Ekasakti Padang.

**Keywords: Module, Problem Based Learning, Mathematics**

### **INTRODUCTION**

Mathematics is one of the basic subjects at every level of formal education plays a very important role. Mathematics is a science that can clarify and simplify a situation or situation through abstract, idealization, or generalization to be a study or problem solving. In the implementation in schools, improving students' learning outcomes are still facing many obstacles, especially on mathematics subjects that demand comprehension of the concept. As the result, the learning becomes less effective.

Generally, problems encountered at the school level including senior high school (SMA) is similar, they are the problem of competence, teaching skills, including the accuracy of selection of methods of approach, motivation, improvisation, and evaluation. Teachers are the factors that determine the success of student learning. The ability of teachers in conducting the teaching and learning process determines the level of student understanding. The teachers who use conventional learning models and lecture methods as a way to deliver the subject matter are still found. Through conventional learning model and lecture method, students get more knowledge, but the knowledge is only from the teacher. As the result, the learning becomes less meaningful because the knowledge gained by the students becomes easily forgotten.

In the process of teaching and learning, teachers must have certain teaching materials and strategies to make students learn effectively and efficiently in order to achieve the expected learning objectives. The teachers must master teaching method. The



materials must be delivered by using an appropriate method because different learning methods affect students in receiving lessons, especially math lessons.

Based on observations at SMA Ekasakti Padang, it was found that the learning strategy used is still teacher centered, due to the absence of teaching materials designed by the teacher themselves. In the classroom, teachers write and explain about the material and the students are still listening to what the teacher is saying. Students are less likely to follow the lesson, such as less active on asking questions or answering questions given by the teacher. Students just wait and hear the explanation given by the teacher without commenting on it and just being accepting the lesson given. When the assignment given by the teacher is different from the example, the student cannot do it by themselves. It means the students cannot learn independently.

Based on the problems, a solution that demands the ability of teachers to create a teaching material by combining a learning method that can improve student learning outcomes, and able to encourage students to identify their own problems without having to rely on explanations from teachers is needed. If the students already play an active role and active in the learning process, it will be easier to motivate students in understanding the subject matter independently. Teaching material that is appropriate to it is the teaching materials in the form of modules.

The module is a set of teaching materials that are arranged systematically with the aim that students can learn independently without or with teacher guidance. From the module developed also needed an approach that is able to create a student-centered learning environment and can help students find the relationship of learning with everyday life. The approach is a Problem Based Learning (PBL) approach.

According to Sugiharto, et al (2007: 81), learning is an effort made by teachers to convey science, organize, and create environmental systems with various methods so that students can perform learning activities effectively and efficiently and with optimal results. Learning also means every activity designed to help a person learn a new ability and value.

Mathematics is a discipline that studies about the ways of thinking and processing logic, both quantitatively and qualitatively (Suherman, 2003: 298). According Suwarsono, mathematics is a science that has a characteristic that is: the object is abstract, using symbols that are not widely used in everyday life, and the process of thinking is limited by strict rules. Mathematics learning is a process of interaction between teachers and students that involves the development of thinking patterns and processing logic in a learning environment deliberately created by teachers with various methods for mathematics learning programs to grow and develop optimally and students can perform learning activities effectively and efficiently.

Module is an self-contained print materials. According to Surahman (in Prastowo, 2011: 105) module is the smallest unit of learning program that can be learned by individual learners (self Instructional); after the learners complete one unit in the module, they can step forward and learn the next module unit.

One method that is widely used to support the learner centered learning and empower the learners is Problem Based Learning (PBL). According to Ward (in Ngalimun, 2012: 89), PBL is a learning model that involves students to solve a problem through the stages of scientific method so that students can learn knowledge related to the problem and also have the skills to solve the problem.

Seven steps of PBL Process (in Amir 2009: 24-25):

- a. Clarify unclear terms and concepts.
- b. Formulate the problem.
- c. Analyze the problem.
- d. Organize your ideas and systematically analyze them deeply.
- e. Formulate learning objectives.
- f. Seek additional information from other sources (outside of group discussions).
- g. Synthesize (combine) and test new information, and create reports.

Learning outcomes are the most important part of learning. According Dimyati and Mudjiono (2006: 3-4) learning outcomes are the result of an interaction of learning and teaching. From the teacher side, the teaching act ends with the evaluation process of learning outcomes. From the student side, the learning outcome is the end of teaching from the peak of the learning process.

## **METHOD**

Model of development in this research is 4-D model; Define, Design, Develop, and Disseminate. According to Trianto (2007: 66), this 4-D model was developed by S. Thagarajan, Dorothy S. Semmel, and Melvyn I. Semmel. The 4D development model consists of 4 main stages: (1) Define, (2) Design, (3) Develop and (4) Disseminate. In this study, researcher only does 3 stages, namely Define, Design, and Development.

The Define stage aims to define and define the learning requirements starting with the objective analysis of the material constraints developed by the device. This stage includes the beginning-end analysis, student analysis, task analysis, concept analysis, formulation of learning specifications/ objectives. Stage Design consists of four steps: media selection, format selection, preliminary design. Stage Development aims to test the validity of the product. This stage includes validity and practicality tests. Validation is done by experts and linguists and the practicality is derived from questionnaires filled by teachers and students.

The module validation test stage is intended to collect data that can be used as a basis for establishing the validity level of the developed module. The module is validated



by two material experts and one grammarian. The module practicality test stage is intended to see the practical level of the module being developed. Practicality test carried out in class X1 SMA Ekasakti Padang. The test subject for the test of practicality in this research is the students of class X1 at SMA Ekasakti Padang academic year 2017/2018.

The type of data in this study is primary data. Primary data is data obtained directly. Data was obtained through evaluation sheets and questionnaires filled by validators, practitioners, and students. The data collection instrument is a tool chosen and used by the researcher in the activity of collecting the data so that the activity becomes systematic and easier. Instruments used to obtain data on this research are: Validation Sheet, Practice Frequency Sheet, and Observation Sheet of Student Activity. Data analysis in this research is done with the aim to know the validity, practicality, and effectiveness of the resulting product.

Calculating the validity used validity level formula (Riduan, 2005:27):

$$\text{Validity} = \frac{\text{score of each item}}{\text{maximum score}} \times 100\%$$

Calculating the practicality used the formula Ppurwanto 2009:103):

$$\text{Practicality} = \frac{\text{score of each item}}{\text{maximum score}} \times 100\%$$

## RESULTS & DISCUSSION

### Validation Test Result

#### Learning materials

Based on the results of validation of teaching materials in the form of modules with Problem Based Learning approach by 3 people validator is according to 2 material experts obtained 82.5% percentage with a valid category. Meanwhile, according to linguists obtained percentage 87.5% with valid category. So, it can be concluded that the teaching materials in the form of a module with Problem Based Learning approach is valid in terms of language that is the use of words in the module. According to the material expert there are some additional variations in the module so that the module is valid that the module is in accordance with the characteristics of Problem Based Learning.

#### Practicality of instrument

The results of validation of the questionnaire filled by the teacher from 3 validators showed the percentage of 85% with valid category. While the result of validation of questionnaire filled by student from 3 validators showed the percentage of 86% with valid category.

#### Practicality of Problem Based Learning Module

The results of the questionnaire practicality of teaching materials to teachers obtained 80.5% percentage with the practical category. While the results of questionnaire practicality of teaching materials with Problem Based learning approach filled by 32



students showed the percentage of 86% with the practical category. It means that the teaching materials developed in the form of modules can help students learn independently. The result is in accordance with the characteristics of the Problem Based Learning stated by Tan (reported in Amir, 2009: 22), they are:

1. Problems are used as the beginning of learning.
2. Problem used is a real-world problem that is presented on a floating basis.
3. Problems require multiple perspectives. The solution requires learners to use and gain concepts from multiple material chapters or cross-disciplines to other fields.
4. Problems make learners challenged to gain learning in the new learning sphere.
5. Self directed learning.
6. Utilizing a variety of knowledge resources, not from a single source, searching, evaluating and using this knowledge become an important key.

### **Revision of Module Developed**

After testing, the teacher stated that the problems are the module is not colorful and not varied, also there are parts of writing are less clearly seen. Furthermore, researchers will adjust the color of writing and background to make it easy to read. Instructional materials in the form of module with Problem Based Learning approach after testing has undergone several changes. Contrast colors on the cloud to make it clear. On page 24 the floor plan section has changes in the question. In the example of problem page 25, exercise 3 no 2 pages 26 has change in the question command. And there are still some errors in writing.

### **CONCLUSION**

The result of validation of learning material in the form of Problem Based Learning module according to the material expert is 82,5% with valid category and can be used with little revision. The result of validation of learning materials in the form of Problem Based Learning module according to the linguist is included valid category with 87.5% percentage and can be used with little revision. The validation questionnaire validation results of learning materials in the form of Problem Based Learning modules by teachers according to 3 people validators is 85% with valid category. While the questionnaire of the practicality of the learning material in the form of Problem Based Learning module by students according to 3 validators is 86% with valid category.

The questionnaire results of practicality from questionnaires filled by teachers shows that the results of practicality percentage of instructional materials in the form of a module with a problem based learning approach is in the practical category with a percentage of 80.5%. The questionnaire results of practicality from questionnaires filled by 32 students shows that the percentage of practicality of teaching materials in the form of a

module with Problem Based Learning approach is 86%, and is included in the practical category.

Implications gained from practical learning materials in the form of module with Problem Based Learning approach are:

1. Can make the learning process is not centered on the teacher (teacher centered) but more centered on the students (student centered).
2. Can train students to learn independently.
3. Can make students understand the problems that exist first.
4. Can make students actively involved in the learning process

Based on the results obtained, it is suggested in the implementation of learning by using teaching materials in the form of modules with Problem Based Learning approach as follows:

1. Instructional materials in the form of modules with Problem Based Learning approach should be developed on other mathematics subject, because based on the results obtained, students have interest and positive response to this resource.
2. For students. The existence of learning materials in the form of modules with Problem Based Learning approach can motivate students to learn mathematics.
3. For teachers. Learning materials in the form of modules with Problem Based Learning approach should be use in the teaching and learning process to improve student learning outcomes.
4. For schools. It can be a reading or reference material for teachers to realize the importance of learning strategies in learning mathematics.
5. For researchers who wish to conduct research relevant to this research, should try to use other programs that are more interesting for students.

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