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**THE DEVELOPMENT OF THE MODULE GEOMETRY TRANSFORMATION TO IMPROVE THE
MATHEMATICAL UNDERSTANDING OF STUDENTS**

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Abstract. *This research is motivated by the problems faced by students, namely the lack of understanding of the geometry transformation material and the lack of teaching materials used by students in understanding the material. From these problems, a solution is needed, namely by developing interesting learning modules that can be used to support existing teaching materials. Therefore, the researcher aims to develop learning modules that can be used to increase students' understanding of the geometry transformation material. The method used in this research is the method of development or Research and Development (RD). The model used in this research is the Analysis, Design, Development, Implementation, Evaluation (ADDIE) model. From the results of this study, researchers have produced a learning module on geometry transformation material for class XI SMA/MA students. Modules are tested by material and language experts with an average score of 85,06%, and by media experts with an average of 89%. From the results of the teacher's questionnaire with an average score of 88,46% and the student response questionnaire with an average of 79,47%. It can be concluded that the learning module is categorized deserve to be used and can improve understanding of the material of geometric transformation.*

Keywords Module; Geometry Transformation; Concept Understanding; Education

A. INTRODUCTION

On the current conditions due to covid-19 led the government of Indonesia issued several policies, one of which is the imposition of restrictions on the activities of the community or PPKM. Policy PPKM this made the government so that all Indonesian people restrict the activities in the community as an effort to break the chain of spread of the virus covid-19 so as not to increasingly widespread. Not only the industrial world that are affected by the pandemic, the world of education is also affected. The pandemic is making school activities in the whole world is disturbed. UNESCO director-General Audrey Azoulay in a statement quoted by CNBC said, the global scale and speed of the disruption of the education of the current range and, if extended, could threaten the right to education.

The efforts of the government in addressing the problems caused by the disruption of teaching and learning activities in the world of education is SFH (study for home) or learning at home. This is done in the government to break the chain of spread in the world of education. In addition, the government has started to allow for the learning of face-to-face in school, learning face-to-face limited was conducted with the terms of the school should refer to the SKB 4 minister.

With the learning face-to-face limited and the distance learning is an effort that can be done is to create a medium of learning. There are a lot of learning media that can be used, one of which is a module of learning. According to Anwar (2010:135) learning module a learning media which are arranged in interesting in it include the content of the material to the evaluation.

This study aims to produce learning modules for students of class XI SMA/MA, especially in the material transformation of the geometry that can help the process of learning activities face-to-face limited or learning done by students at home. The use of the learning modules is expected to help the students in understanding the material, so that students will be able to achieve the learning objectives that have been determined.

B. METHODS

The research method used in this research is research and development or Research and Development (R&D), which aims to produce a learning modules through the development process. Making learning module using this model ADDIE namely Analysis, Design, Development, Implementation and Evaluation. Stages are carried out in the development: 1) Analysis : was done to collect a variety of information used in the planning of the modules that will be developed. In this stage includes the analysis of the needs of students, analysis of teaching materials and the analysis of the current curriculum, 2) Design : researchers develop framework of learning modules based on the results of the analysis that has been done, then what elements to be inserted in the module. Design in the form of front cover, design the contents of the module, and the design of the back cover, 3) Development : at this stage of development, the draft has been prepared will be realized. Learning modules will be validated by the validator/expert before tested. The Validator will assess the validity of the module developed is it worth or not, as well as provide suggestions and comments used to revise the product, 4) Implementation : at this stage the module is tested to the students, then the researcher distributed the questionnaire responses of students on the module, 5) Evaluation : the last stage of the whole procedure is the evaluation of the product. The products are developed, researchers revised based on suggestions from experts and student questionnaire responses. Evaluation is done so that the modules are developed in accordance with the objectives to be achieved and can be used widely.

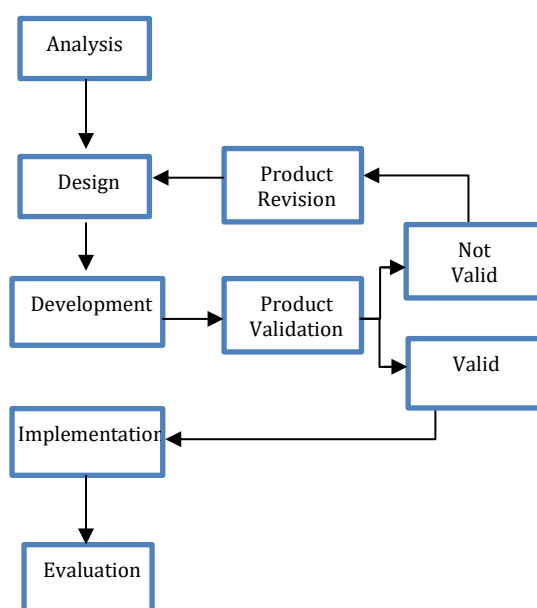


Figure 1. Procedure research ADDIE

Data collection techniques used in this research, namely the collection of data through the instrument of validation of the learning modules by the validator and student questionnaire responses. To analyze the data applied in this research is by using the technique of descriptive data analysis. Descriptive analysis technique was used to analyze the data to describe or illustrate how data has been collected as is without intending to make a conclusion that applies to the public or generalization (Sugiyono, 2012:148). The formula used in data analysis techniques according to the (Christian, Discourse, & Andress : ≤2018) as follows.

$$P = \frac{\text{a total score of questionnaire answers}}{\text{total score choice questionnaire}} \times 100\%$$

P = percentage of ideal

With the validation criteria as follows.

Table 1. Eligibility Criteria Module

The Level Of Tiredness (%)	Category Eligibility
$75 < p \leq 100$	Very Worth/Without Revision
$50 < p \leq 75$	Worth/Revision
$25 < p \leq 50$	Not Worth It/Revision
$0 < p \leq 25$	Very Not Worth It/Revision Total

Table 2. The Criteria Of Response Students

The Level Of Tiredness (%)	Category Eligibility
$80 < p \leq 100$	Very Worth It
$60 < p \leq 80$	Worth
$40 < p \leq 60$	Pretty Decent
$20 < p \leq 40$	Not Worth It
$0 < p \leq 20$	Very Not Worth It

C. RESULT & DISCUSSION

The results of the analysis have been obtained that a lack of understanding about the material transformation of the geometry and the lack of teaching materials that students understand the material. So the required solution, namely with the development of learning modules and can be used as a support to the teaching materials that already exist. Module learning material transformation geometry contains cover, table of contents, map concepts, introduction, sub material, example problems, exercises, evaluation, and bibliography.

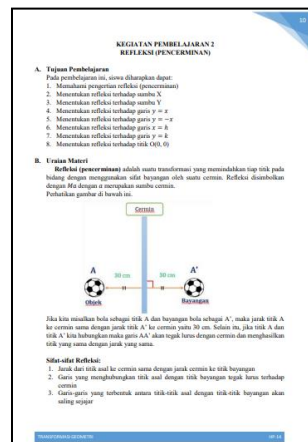


Figure 2. Learning Activity 2

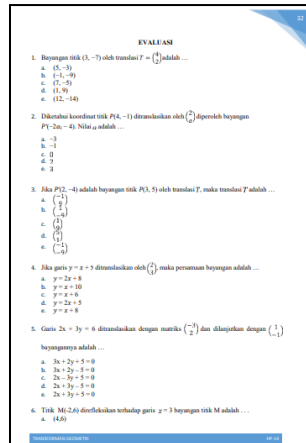


Figure 3. Evaluation Module

Validation is done by the teacher MAN 1 Tangerang Selatan as a validator matter experts, language, and media experts is to fill a questionnaire.

Table 3. Table Validation Of Material Experts

No	Aspects assessed	Achievement rate (%)	Criteria
The Feasibility Of Contents			
1	The suitability of the material with KD	91,6%	Decent and Not Revised
2	The accuracy of the material	90%	Decent and Not Revised
3	Recency material	75%	Decent and Revised
4	Encourage curiosity	75%	Decent and Revised
Feasibility Presentation			
5	Presentation techniques	100%	Decent and Not Revised
6	Supporting the presentation	89,22%	Decent and Not Revised
7	Presentation of learning	75%	Decent and Revised

The Feasibility Of The Language			
8	Straightforward	100%	Decent and Not Revised
9	Communicative	75%	Decent and Revised
10	Dialogic and Interactive	75%	Decent and Revised
11	Conformity with the Development of the Students	75%	Decent and Revised
12	Conformity with the Rules of the Language	100%	Decent and Not Revised
	Total Average	85, 06%	Decent and Not Revised

Table 4. Table Validation Of Media Experts

No	Aspects assessed	Achievement rate (%)	Criteria
1	Module Size	87,5%	Decent and Not Revised
2	Design The Cover of The Module (Cover)	88,88%	Decent and Not Revised
3	Design The Contents of The Module	90,62%	Decent and Not Revised
	Total Average	89%	Decent and Not Revised

From the results of the validation test experts obtained an average score for the material and the language of 85,06%, and for the validation of media by 89%. Then from the results of the analysis of the questionnaire responses of teachers of 88,46% and the results of the analysis of the response of students with an average of 79,47%. These results indicate that the learning modules to be used.

Overall, the trials conducted learning module is categorized as a product that is feasible to use in learning activities. Based on the trials that have been carried out excess learning modules are easy to understand and have an attractive appearance so that it can improve students ' understanding of the material transformation of the geometry, especially on students of class XI.

D. CONCLUSION

Based on the results of data analysis conducted by the researchers and also test learning module for students of class XI SMA/MA, from the test results it can be concluded that the student was helped by the learning module is in the middle of the conditions of learning face-to-face limited and distance learning is done at home.

While in the design phase, researchers create a design with the help of app Canva, Adobe Photoshop, and Microsoft Word to create a learning module for this. Researchers hope that teachers and students can use the learning module as the supporting teaching materials in the process of learning activities, and can help students of class XI SMA/MA in improving the understanding of the material, especially in the material transformation of the geometry.

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