IJEMS: Indonesian Journal of Education and Mathematical Science
2022 Vol. 3, No. 2, pp. 92–96
ISSN(e): 2715-985x
DOI : http://dx.doi.org/10.30596%2Fijems.v3i2.11096

THE DEVELOPMENT OF DISCOVERY LEARNING-BASED GEOMETRY TRANSFORMATION TEACHING MATERIALS TO IMPROVE STUDENT'S UNDERSTANDING AND INCREASE STUDENTS' INTEREST IN CLASS IX JUNIOR HIGH SCHOOL

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Article History
Received: 4
Revised:
Accepted:
Published:

Keywords
Teaching material, Discovery Learning, geometry transformation

ABSTRACT

This study aims to determine the procedure for developing Geometry Transformation Teaching Materials based on Discovery Learning to improve the understanding and learning interests of Class IX Junior High School Students. The model used in this study was a 4D development model that has been modified into 3D, which consisted of Definition, Design, and Development. Based on the validation results from lecturers and media experts, it was obtained 4.47 and 4.34. From these results, it was stated that discovery learning-based geometry transformation teaching materials were appropriate to be used as learning media.

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1. INTRODUCTION

Education is something that is needed for humans, which is an arranged human effort in the progress of a nation through guidance or teaching and learning activities. Education is included in the dynamic category, where every year it always changes, and develops and there are many improvements that exist because it follows the times. With the existence of good quality education, there is a guarantee in the formation of quality human resources (HR) which of course will result in a more developed nation.

Education is included in the category that has great urgency for a nation because most of the quality of human intelligence can be seen from how high the human is in education. So in order to become an advanced nation, the first thing that must be addressed is the quality of its human resources through education, where through education it will form educated, intelligent, and skilled human beings.

Every Indonesian citizen has a right to education, which is stated in the 1945 Constitution where the main thing is to have basic knowledge, which is mathematics. In "Law No. 20 of 2013 in Chapter II article 4 paragraph (5)", it is explained that the implementation of education is carried out by developing in the context of literacy and arithmetic for each citizen. Where the context of arithmetic is learning mathematics.

Mathematics has a great urgency in the progress of human civilization. This is because mathematics is a science by prioritizes reasoning thinking which is formed from the results of human thought that is related to processes, ideas, and reasoning power.

In the world of education, mathematics is an important subject where mathematics teaches about human ways of thinking and processing the logic used in solving problems in their daily lives. This opinion is in line with (Erman, 2003:298) where the use of mathematical skill can be used in the trading process, calculating the amount of currency, measuring land, astronomy, and even a basis for the development of other sciences. Someone who often studies mathematics, indirectly in their thinking is formed a structured, scientific, logical, and critical way of thinking so that their creative skills increase progressively. Therefore, mathematics must be taught as early as possible for school children starting from elementary school to obtain an achievement of the objectives of the educational unit in the 2013 Elementary School Curriculum, such as "knowledgeable, capable, critical, creative and innovative".

In learning mathematics, there are two kinds of knowledge categories which include 1) Procedural knowledge, which is knowledge related to using a symbol, language, and a rule in arithmetic operations. 2) Conceptual knowledge, which is understanding a basic concept in an arithmetic operation.

One of the chapters taught in mathematics lessons in the junior high school curriculum is Geometric Transformation, where the concept is about the transfer of a shape or formation from the image of a point or curve from the initial position (x, y) to another position (x',y').

Knowledge related to geometric transformations has great benefits for students' development in geometric reasoning, and spatial abilities to improve mathematical proof (Edward, 1997: 187). Where (Patterson 1973:90) reveals that mathematical ability can facilitate students in understanding congruence, parallel lines, similarity, and symmetry which will increase students' spatial abilities. In connection with this, students need to learn well about the concept of transformation geometry where in reality there are still many students who do not understand.

From the existing problems, appropriate teaching material is needed to support the continuity of learning. Teaching material is a subject matter that has been arranged in a structured manner which is then used by teachers and students to understand the direction to be achieved. So it is very helpful for teachers in explaining and easy for students to understand in lessons. This method requires a teacher who can harmonize learning with the material to be taught. In the way of teaching with the use of media can also increase willingness and good tendencies, thereby increasing students' learning determination.

Slameto (2003: 180) argues that "interest is a persistent tendency to pay attention and remember some activities". Safari in Wasti 2003: 30 argues that the will to knowledge factors are: 1) feeling happy 2) interest, 3) caring, and 4) student participation.

This is in line with the research of Cindy Krismayawati (2020: 2) who stated that in general, students' initial skills can be distinguished in mathematics subjects which are divided into several types of skills, such as 1) basic understanding, 2) problem solving, 3) thinking skills, 4) mathematical interrelationship skills, and 5) mathematical linking skills.

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In the Theory of J.S. Bruner, it will be very good if there are activities to complete mathematics such as questions and answers between students and teachers. Because starting from learning the basics of mathematics, you can understand quickly if activities directed at the basics are carried out by students independently between yesterday's learning and what is being done which must be related.

The same thing is also explained by Rosilawati & Alghadari (2018) in increasing understanding of geometric concepts which states that basic understanding is a demand for understanding the basis of the progress of a mathematical substance so that students are far from misconceptions, then knowledge can present transcendental learning and acceptance. So, it takes one way of acceptance that is used so that mathematics lessons can be more useful and can make students increase their understanding and increase interest in learning mathematics, especially in geometry transformation material.

The learning model creates, utilization is also the same in the use of mathematics lessons as learning with the concept of discovery. Discovery also arouses students in studying and problems that are being accepted at the end of the lesson. When finding problems, problem-solving skills are needed by all students so that students can familiarize their minds with being able to solve problems related to teaching materials, both in solving difficult form problems, or math problems in everyday life. Purwanto (2012) stated in Henny Yuliana who said that the use of discovery lessons as a way of discovery could advance students' serious thinking skills.

As a maximal, thinking skills by finding their own basic concepts can help students eliminate distrust of the basis because it refers to certainty and truth. Trianingsih, 2007 said that the development of guidance is a form of activity at the end of the lesson to justify and promote the type of learning process. With efforts to provide teaching materials that can advance students' serious thinking skills in mathematics lessons.

2. METHODOLOGY

The location in this research was Tarbiyah Islamiyah Junior High School (SMP). The research was carried out in the odd semester of the 2021/2022 academic year. Development research is a research method whose end result is a product which can be in the form of a new product or an improvement of the previous product which is then tested for the product effectiveness.

3. RESULT AND DISCUSSION

This study aims to develop a learning model that is related to audio-visual teaching materials. In this study, a 4-D development model that has undergone modifications was used, which previously had 4 stages reduced to 3 stages, such as the "define, design, and develop" stages. Based on the data obtained, the following analysis was obtained:

1. Define Stage, including several stages as follows:

    1) Front-end analysis, where the goal is to prove the basic problems needed in the development of teaching materials. At this stage, a problem was obtained, in which students need a teaching material that can attract their interest and is interactive in which students can be actively involved in learning process.
    2) Concept analysis, at this stage, a detailed identification was carried out which was then arranged in a structured manner regarding concepts relevant to the problem. Concept analysis has a great relationship with the analysis of the material to be taught by designing a concept map to facilitate students in understanding the learning material.
    3) Learning Objectives Analysis, which is intended to formulate the results of the analysis of assignments and concepts which are indicators in the achievement of student learning outcomes. From the several indicators that have been obtained, a lesson plan was made.

2. Design Stage Description, this stage aims to get a lesson plan result in the form of teaching materials using a contextual approach that can optimize students' understanding and interest in learning.

3. Development Stage, after the media design was completed, the next step was the process of making a teaching material where the contents contain the results of the analysis of the problems that have been obtained and then designing audio-visual-based teaching media which has previously received validation from media and material expert validators. In the validation test, the validator provides constructive input and suggestions for the content of teaching materials that have been developed where the existing inputs can be used as improvements for the creation of appropriate teaching materials.

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Based on the research results that have been described, the steps for developing teaching materials that are in accordance with the 4D development model that has been modified into 3D go through three stages, such as: defining, designing, and developing.

The first stage is defining which has the function to analyze the needs that exist in learning activities that have been carried out previously. This stage began with the front-end analysis process which is intended to identify the problems complained about during the learning process, then a task analysis was carried out which aims to detail the existing tasks based on core competencies, basic competencies, and grade point averages. Followed by analyzing the concept where the aim was the identification process of the basic concepts taught in the learning material and the last was the analysis of learning objectives where the purpose of this treatment was to formulate learning objectives that would be achieved by students when learning process takes place in accordance with the core competencies and basic competencies used.

The definition stage is a stage where the goal is to carry out a design that will later be developed. In this stage, media selection was carried out with the aim of identifying which media were relevant to the characteristics of the material and according to the required needs, the media in this study were teaching materials which were then selected for formatting in determining core competencies, basic competencies, and grade point averages which were then carried out by making the initial design of the teaching materials that would be modified.

The final stage in this research is a development where the aim is to test the validity of the teaching materials that have been made as well as to test the validity of the lesson plans to be used in the learning process where the testing was carried out by 3 validators, such as 2 expert lecturers and 1 mathematics teacher. At this stage of development obtained a result as follows:

a. Lesson plan validation, where the average value obtained was 4.47 which means that it meets the Valid standard.

b. Validation of teaching materials, which obtained a score of 3.85 which means that the teaching materials that have been developed were included in the valid category. Based on the results of the analysis described, it can be concluded that the Development of Geometry Transformation Teaching Materials Based on Discovery Learning to Improve Understanding and Learning Interest of Class IX Junior High School Students shows valid criteria.

4. CONCLUSION

Based on the final observations and studies described in Chapter IV, the conclusions are drawn:

i. Teaching materials are developed using a 4D development that is modified into 3D which consists of Define, Design, and Develop.

ii. Based on the analysis of lesson plans and teaching materials by 2 lecturer experts and 1 teacher expert, it shows that the results of the developed lesson plans and teaching materials are valid.

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