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How to Design Problem-Based Learning for Reasoning Ability?

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ABSTRACT

Objective: To get around students' reluctance, learning media is needed, one of them is the development of mathematics teaching materials. The development of teaching materials is needed to actualize subject, especially mathematics as a contextual subject. This goal is none other than to improve students' reasoning abilities in understanding and solving the problems in daily life. The function of the model is as an intermediary between students' mathematical reasoning abilities and the questions presented in the development of teaching materials. More mathematical reasoning abilities are found in trigonometry material. Trigonometry is the science of measuring the angles and boundaries of triangles (used in astronomy and so on) in which there are solutions for other problems such as measuring the height of mountains, buildings, towers, and so on. **Method:** This research uses a qualitative method. **Results:** The teaching material Trigonometry research, valid for module material validation, graphics or media validation, and obtained from audience validation results. The three percentages are at a very valid validation level and can be used in schools. **Novelty:** After the application of this teaching material, the result was that students' mathematical reasoning abilities became better.

INTRODUCTION

Mathematics is very useful science for humans in carrying out their daily activities. This knowledge is one of the compulsory subjects starting from elementary school to university level. The National Education Standards Agency stipulates that starting from elementary school, students need to be equipped with logical, analytical, systematic, critical, creative, and cooperative skills. The ability to learn mathematics is classified into five main competencies namely understanding, problem solving, communication, connection and reasoning (Aguilar & Castaneda, 2021; Al-Mutawah et al., 2019; Hendriana & Soemarmo, 2014; Marasabessy, 2021) . The aim of learning mathematics in schools is to increase the sharpness of students' reasoning so that they can solve problems in daily life and improve thinking skills in using numbers as well as mathematical symbols.

Mathematical reasoning ability is the ability to understand patterns of relationships between two or more objects based on rules, theorems, or proven propositions (Hasanah et al., 2019; Kadarisma et al., 2019; Lawson et al., 2007; I. Lestari & Andinny, 2020; M. Lestari et al., 2022; Piraksa et al., 2014; Rizqi & Surya, 2017; Sandy et al., 2019; Saxton et al., 2019). This can be interpreted that mathematical reasoning skills really need to be developed. However, there have been many research results showing that students' low mathematical reasoning was caused by the teacher only providing subject with examples and routine problem exercises, but when given non-routine questions students experienced difficulties when they had to start determining the solution (Fuadi et al., 2016; Indriati, 2018; Izzah & Azizah, 2019; Napitupulu et al., 2016; Nasution et al., 2019; Putri et al., 2019; Zubainur et al., 2020).

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