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Improving Problem-Solving Skills With Problem-Based Learning Models in Optical Wave Courses

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ABSTRACT

Objective: Problem[5]olving skills are one of the skills one has to live in the 21st century. Therefore, t[13] research aims to explain the improvement in problem-solving skills using a problem-based learnin[1] model in optical wave courses. This research was carried out on 3rd-semester students majoring in undergraduate p[5]gram Science Education at the State University of Surabaya in two classes. Method: The research design used the one-group pretest-posttest design with one repetition—data collection techniques using observation and test techniques. Observations were made to review practical aspects and tests for rev[13]ing the effectiveness aspects. **Results:** The observation results indicate that the learning process is classified as practical. The average result of problem-solving skills in class U students is better than in class B. Based on their problem-solving skills, students can solve problems to completion. The knowle[16] test results are in the moderate range. A paired T-test in each class shows a significant difference between the results bef[16] and after learning. The achievement of knowledge and skills shows that the problem-based learning model effectively im[21]ves their problem-solving skills in the waves and optics courses. **Novelty:** The novelty of this research is the use of four indicators adapted to optical wave material under learning conditions after the COVID-19 pandemic.

INTRODUCTION

Problem-solving skills need to be possessed by elementary, middle, and high school students to support their thinking patterns. According to Lopez-Jimenez et al. (2021), steps to guide, monitor, and assis[13]students in solving problems can develop their critical thinking skills. Since being[1] the elementary and secondary school levels, the [44]overnment has designed lessons to train critical thinking and problem-solving skills. Difficulties in everyday life are unpredictable; therefore, practical and valuable [38]ills are needed in the current era (Muhlisin et al., 2022). The ability to solve problems plays an essential role in the survival of society (Nurjannah et al., 2021). Accor[1]ing to Haryani et al. (2021), as has been done by many other countries, in 2017, the Ministry of Education and Culture of the Republic of Indonesia began to p[27]mote curriculum integration in learning skills and innovation in the 21st century, known as the 4Cs: creativity and innovation, critical thinking and problem-solving, collaboration, and communication. Critical thinking has become one of the main goals of edu[22]ion in the 21st century because global market trends also require graduate[1] to apply their critical thinking skills to the work environment (Wijayati et al., 2022). Critical thinking skills can be develo[5]ed by integrating problem-based learning models into learning (Masruro et al., 2021). One of the thinking skills that can be developed is problem-solving skills needed in the 21st century (Batlolona et al., 2018).

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