



## Development of Problem-Based Learning Model Physics Learning Tools to Improve Critical Thinking Skills of High School Students

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### ABSTRACT

**Objective:** This development research aims to produce physics learning tools with a quality Problem-Based Learning (PBL) model (validity, practicality, and effectiveness) to train students' critical thinking skills in Natural Resources and Environmental Conservation courses. **Method:** This research was carried out in several stages, namely developing tools using Thiagarajan's 4-D model and implementing learning tools during three meetings with 25 class A students and 26 class B students in the physics education study program of the Faculty of Natural Sciences. Mathematics and Natural Science State University of Surabaya's even semester program for the 2022/2023 academic year uses a one-group pretest-posttest design. **Results:** The research results were analyzed using descriptive analysis techniques. The feasibility of the learning plan in the good category is implemented. Student learning outcomes (knowledge, critical thinking, psychomotor, and attitudes) are completed classically. All students experienced increased critical thinking in the categories of unskilled-less skilled, then became unskilled-skilled, and rose again to unskilled-very skilled. Based on the results of learning observations in the form of student activities. **Novelty:** The novelty of this research lies in its new contribution to the field of education. Students gave positive responses to PBL model learning activities. This research shows that this approach is practical in developing it. Integrating critical thinking skills into problem-based learning provides essential added value in education. The research results show that physics learning tools use a valid, practical, and effective problem-based learning model to train students' critical thinking skills.

### INTRODUCTION

Information technology's rapid development and progress cannot be separated from people's lives. Society now lives in the 21st century. The rapid development of information technology is a challenge for every individual. This, of course, will impact aspects of daily life, including the educational aspect. Critical thinking skills are a requirement for students in the 21st century to be ready to face competition, work, academics, and life. Several indicators of critical thinking skills in the 21st century that students must master are interpretation, analysis, evaluation, interference, explanation, and self-regulation (Aulia & Fida, 2023). Education must be considered and has a vital role in efforts to improve the quality of human resources so that they can compete from time to time (Priyono & Sinurat, 2020). The 21st century implies that individuals must have 4C competencies, namely Critical Thinking and Problem Solving, Creativity, Communication Skills, and Ability to Work Collaboratively (Arzak & Prahani, 2023; Neswary & Prahani, 2022; Pristianti & Prahani, 2022; Qotrunnada & Prahani, 2022; H. V. Saphira & Prahani, 2022)

The fields of technology and science, which are experiencing rapid progress, especially in education, increasingly emphasize the need for students to learn new, relevant skills

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