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Project-Based Learning in Indonesian Junior High School Science Education for SDG 4: Teachers' Perceptions, Practices, and Implementation Challenges

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ABSTRACT

Objective: To explore Indonesian junior high school science teachers' perceptions, practices, and challenges in implementing Project-Based Learning (PjBL) in science education, particularly in relation to the promotion of quality education as reflected in SDG 4. The study also examined the relationship between teaching experience, regional background, teachers' perceptions, and the frequency of PjBL implementation. **Method:** A survey was conducted involving science teachers from various regions of Indonesia with different teaching experiences. Data were collected using a questionnaire developed based on core PjBL indicators, including project planning, implementation, assessment, and reflection. The data were analyzed using descriptive analysis, chi-square tests, and binomial tests. **Results:** The findings showed that most science teachers had positive perceptions of PjBL and recognized its potential to enhance student engagement, collaboration, problem-solving, creativity, and critical thinking skills. However, positive perceptions did not automatically lead to frequent classroom implementation. Several challenges were identified, including limited time, varying student readiness, inadequate facilities, difficulties in project assessment, and limited understanding of inquiry-oriented and reflective PjBL practices. **Novelty:** The study highlights the gap between teachers' positive perceptions and actual PjBL implementation in Indonesian junior high school science education. It contributes to SDG 4 by emphasizing the need for sustained professional development to strengthen teachers' pedagogical competence and support more inclusive, meaningful, and quality science learning.

INTRODUCTION

The development of science and technology in the 21st century has brought about significant changes in the educational paradigm in various countries. Modern education is no longer solely oriented towards knowledge transfer but also emphasizes the development of 21st-century competencies, such as critical thinking, creativity, collaboration, communication, and problem-solving. (Aldowah et al., 2024; Avdiu et al., 2024; Fitrah et al., 2025; González-Pérez & Ramírez-Montoya, 2022; Thornhill-Miller et al., 2023; Yilmaz et al., 2021). Therefore, current educational practices are increasingly shifting from teacher-centered learning approaches to more student-centered and inquiry-based approaches.

The implementation of Project-Based Learning (PjBL) is also closely aligned with the achievement of Sustainable Development Goal (SDG) 4: Quality Education, which aims to ensure inclusive, equitable, and quality education while promoting lifelong learning opportunities for all. SDG 4 emphasizes learner-centered pedagogies that develop higher-order thinking, creativity, collaboration, and problem-solving competencies required to address increasingly complex global challenges. As one of the recommended student-centered instructional approaches, PjBL provides authentic learning experiences that encourage active participation, inquiry, and collaborative knowledge construction. Consequently, strengthening teachers' capacity to effectively implement PjBL is essential not