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The Effectiveness of Science Learning Tools Based on Education Sustainable Development (ESD) to Improve Problem-Solving Skills

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ABSTRACT

This study aims to determine the effectiveness of practicing problem-solving skills from ESD-based science learning tools. This research is development research with the ADDIE development model and a one-group pre-test post-test design. Data collection methods using validation and tests. Learning tools in all aspects are stated to be very valid so that they can be implemented. The pre-test average score was 52.96 and the post-test score was 79.84 with an N-gain score of 0.67 in the moderate category. This shows that students can be improve in problem-solving skills with ESD-based learning. Students can improved problem-solving skills in the Lapindo mud phenomenon by integrating the liquid pressure material (Archimedes Law and Bernoulli's Law) with the ESD concept (social, ecological, and economic). In terms of ecology, Lapindo mudflow can be overcome by applying Bernoulli's Law. In the economic sector, the overflowing Lapindo mud can be used as a building material. This is studied in the material of Archimedes Law. In the social point, students can communicate the results of problem-solving with the concept of ESD to the surrounding community.

PENDAHULUAN

Sustainable Development Goals (SDGs) are 17 goals with 169 measurable achievements and have a deadline set by the United Nations as a world development agenda for the benefit of humans and the planet until 2030. The concept of sustainable development is based on the concept of social and economic development in line with environmental constraints, the concept of necessity with redistribution of resources to ensure the quality of life, the concept of future generations (Danneberg, 2016).

Sustainable development goals which are the 21st-century agenda delegate part of the action to develop education. Sustainable education is believed to ensure that all people acquire knowledge, values , and skills for a better life and society in a sustainable way (Klarin, 2018). This Program called ESD (Education Sustainable Development). The purpose of ESD is to provide a balance of well-being between humans, the economy, and cultural traditions as well as to give honor to the universe (Parello-Marin, 2018). Particularly, the initial goal of ESD was the incorporation of ecological, economic, and social aspects throughout learnig process (Kolleck, 2017). These aspects are adjusted to the learning material and environmental problems that occur around them. ESD also reflects complexity by adopting multiple perspectives on education for inclusiveness (UNESCO, 2012). ESD has been seen as a generation of student competencies related to collaboration through critical thinking, decision making based on problem-solving, increased communication skills, collaboration, conflict management, and planning (Parello-Marin, 2018). Thus ESD-based learning results in a paradigm shift to build new learning perspectives based on the inclusion of students in

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