



Implementation of ESD (Education for Sustainable Development) in Climate Change Learning: A Literature Review

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ABSTRACT

Objective: Education for Sustainable Development (ESD) is an educational agenda that focuses on the quality of learning outcomes and the emphasis on learning content and its contribution to future environmental sustainability, one of which is tackling climate change. Education for Sustainable Development (ESD) can be integrated into curriculum and learning. This study aims to describe and conduct a literature review of the implementation of ESD in climate change learning. **Methods:** This research is a literature study by screening 370 Scopus-indexed papers in the 2017-2022 time frame into 20 papers for analysis. The analysis results show that journal publications on implementing ESD in climate change learning still need to be made available despite increased research trends. The implementation that has been carried out can be through formal / school and non-formal education with learning innovations and developing curricula and policies. There is a tendency for developing learning innovations is the most widely practiced form of implementation in climate change learning. Implementing ESD in climate change learning is vital in improving the understanding, skills, and awareness of climate change. **Novelty:** The study reveals an urgent need to develop the right innovations, methods, and designs to implement ESD in climate change learning, especially government policies. These findings invite researchers, practitioners, governments, and communities to be involved in developing innovations, methods, designs, and policies within a sustainable framework by implementing ESD in climate change learning.

INTRODUCTION

The decade's first year was disconcerting in human history. The "new normal" period after the COVID-19 pandemic, followed by the disruption of the war in Ukraine, has caused a food and energy crisis. It also impacts environmental risks, such as failure to mitigate and adapt to climate change (McLennan & Zurich, 2023). Based on NOAA (National Oceanic and Atmospheric Administration) analysis, the January 2023 global surface temperature is 1.57°F (0.87°C) above the 20th-century average of 53.6°F (12.0°C). It is ranked the seventh warmest in 174 years and January 47th in a row, and the 527th consecutive month with above-average temperatures in the 20th century (NOAA, 2023).

Climate change is an urgent global crisis dramatically changing Earth's life. Climate change results in significant environmental damage, and if no reduction in emissions will destroy the livelihoods of future generations (Powell, 2019). Natural processes cause climate change, but anthropogenic activity has accelerated, seriously threatening global biodiversity and the sustainability of natural resources for future generations (Mahmoud & Gan, 2018; Naeem et al., 2020). Sustainability itself is defined as meeting current needs without compromising the ability of future generations to meet their own needs (United Nations, 2022; Moretti et al., 2023). ESD (Education for Sustainable Development) is the key to solving the problem of unsustainability, one of which is climate change. Society and government are well aware that dependence on economic

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