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Feasibility of a Project-Based Electronic Module on Environmental Change to Promote Environmental Awareness and Support SDG 13

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ABSTRACT

Objective: *To evaluate the feasibility of the Project-Based Learning (PjBL) Environmental Change Electronic Module, known as E-Ling, as an interactive digital teaching material designed to support environmental change learning and improve students' environmental awareness improve students' environmental awareness and support SDG 13 (Climate Action).* ***Method:*** *Using a development approach with the ADDIE model, limited to the development stage. The feasibility of the E-Ling module was assessed through expert validation involving 12 experts in material, language, learning, and media. The instrument used was a validation questionnaire, and the data were analyzed using percentage-based feasibility criteria.* ***Results:*** *The expert validation results showed that the developed PjBL-based E-Ling module obtained positive feasibility scores, namely 92.33% from material experts, 80% from language experts, 84.71% from learning experts, and 86.33% from media experts. These results indicate that the module is categorized as good and requires no major revision.* ***Novelty:*** *The development of a PjBL-based electronic module that integrates environmental change materials, learning videos, interactive access through website or application platforms, and project activities to encourage students to learn independently and develop environmental awareness.*

INTRODUCTION

Climate change is worsening and has a significant impact on our lives. The weather has become very unstable, sometimes extremely hot, sometimes very cold, and natural disasters such as floods and storms occur frequently. In fact, according to the report by Rabecca & Lauann (2024), the year 2023 was recorded as the hottest year in history. The IPCC (2021) also reported that the global average temperature increased by 1.4 degrees Celsius, both on land and in the oceans. Fatawa et al. (2023) also stated that climate change is causing more extreme weather, with storms and floods occurring more frequently. In addition, rainfall patterns have become irregular, and the dry season is getting longer.

The urgency of climate change mitigation is closely aligned with Sustainable Development Goal (SDG) 13: Climate Action, which emphasizes the importance of strengthening awareness, education, and institutional capacity to address climate-related challenges. Education plays a strategic role in supporting SDG 13 by equipping students with environmental knowledge, awareness, and responsible behaviors. Therefore, innovative learning resources are needed to foster environmental literacy and encourage active participation in environmental protection among students.

One of the main causes of climate change is the increase in greenhouse gases in the atmosphere. One source of methane gas is produced from the decomposition of waste. The more waste that is disposed of, the more methane gas is generated. This methane gas is far more dangerous than carbon dioxide in causing global warming. In addition to waste, other human activities such as the burning of fossil fuels and deforestation also exacerbate this condition. If we do not take immediate action to reduce greenhouse gas emissions, the Earth's