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HOW DOES STUDENTS' ENVIRONMENTAL LITERACY SUPPORT THE SUSTAINABLE DEVELOPMENT GOALS? A LITERATURE REVIEW

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Abstract

The importance of environmental literacy as a supporting factor for achieving the Sustainable Development Goals (SDGs), especially SDG 4 (Quality Education). Improving environmental literacy among students is necessary to be able to face global challenges such as climate change and environmental degradation. This study aims to evaluate the extent to which environmental literacy supports quality education related to sustainability issues through a literature review of scientific articles published in national journals. The research method involved a literature search using the keyword "literasi lingkungan" on Google Scholar, with article selection based on inclusion and exclusion criteria. Out of 2280 articles, the 10 most relevant articles were selected for analysis. The results showed that problem-based and experiential learning approaches proved effective in improving students' environmental knowledge and awareness, although cognitive abilities still need to be improved. Improved environmental literacy is also very important in shaping environmentally responsible behavior, which supports the achievement of other SDGs such as SDG 12 (Responsible Consumption and Production), 13 (Climate Action), 14 (Life Below Water), and 15 (Life on Land). The findings of this study emphasize the need for more strategic and effective programs to improve environmental literacy at the education level and its more focused analysis on achieving the SDGs targets.

Keywords: Environmental literacy, sustainable development goals, education, attitude.

INTRODUCTION

Sustainability principles need to be integrated in the education system to shape a generation that understands the importance of protecting the environment (Ferguson et al., 2021), using resources wisely (Turner et al., 2022), and contributing to social and economic well-being (Luna-Nemecio et al., 2020). Education for sustainable development (ESD) helps students develop critical, creative and collaborative thinking skills to solve global problems such as climate change, resource scarcity and inequality (Kopnina, 2020). This research is often linked to Sustainable Development Goals (SDGs) 4 (Quality Education), 12 (Responsible Consumption and Production), and 13 (Climate Action).

Fundamental in education to prepare human resources is good literacy (Siregar, 2024). Literacy in this context is not only limited to the ability to read and write, but also includes environmental, science literacy, which helps students analyze information, understand global challenges and take responsible action (Fakhriyah et al., 2024). Sustainability literacy enables students to understand important concepts such as climate change, resource preservation and social justice (Kumar et al., 2023). This supports SDG 4 (Quality Education) as it enhances students' ability to think critically and make decisions that positively impact the environment and society (Shava, 2020).

Current environmental issues, particularly in wetland ecosystems, include deforestation, land degradation and land conversion for plantations (Soboka & Gemechu, 2021; Mishra et al., 2021). Wetlands such as peat swamp forests play an important role in storing carbon, regulating the water cycle, and providing habitat for a variety of species (Bhowmik, 2022; Dharmono et al., 2022). However, draining peatlands for agriculture and plantations has led to recurrent forest fires, high greenhouse gas emissions and biodiversity loss (Murdiyarso et al., 2021). In addition, water pollution around the wetlands from industrial, agricultural and residential waste threatens the health of these ecosystems (Datta et al., 2022). Poor water management and land conversion reduce the ability of wetlands to serve as buffers against flooding, which is further exacerbated by climate change (Norman et al., 2022). Wetland conservation and restoration efforts are important to maintain the function of these ecosystems, which are closely linked to SDG 14 (Life Below Water) and SDG 15 (Life on Land).

The preliminary analysis above has explained that there is an indirect link between the SDGs, with the main focus in this research being SDG 4. Environmental literacy, as part of continuing education, helps individuals develop a deep understanding of environmental issues and skills to address them. An in-depth study needs to be conducted to analyze learners' environmental literacy as a support in achieving SDG 4, and how it relates to other goals through literature review. Through literature review, this study can evaluate the extent to which environmental literacy impacts on people's policies and behaviors related to sustainability issues, assisting policy makers and educators in designing more effective and strategic programs.

METHOD

This research method uses a type of literature review to analyze and integrate the results of previous research. The data sources used are relevant national scientific journal articles that have been published in the Google Scholar database. The research procedure began with a literature search using the keyword "*literasi lingkungan*", article selection based on the inclusion and exclusion criteria in Table 1, and data filtering through research quality analysis. The first search results found 2280 documents, and selected 10 articles that best fit the criteria and were most relevant to the research topic. The data collection technique was conducted by collecting key

information from each article based on the research findings. Furthermore, the data analysis technique used was descriptive analysis.

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
• Studies relevant to the topic	• Non-empirical studies
• Publication in the last 5 years	• Publications in non-English or non-Indonesian languages
• Studies with empirical methods	• Conference papers, dissertations, or research reports
• Full access	• Studies with small samples
• Publication in national journal	• Articles do not include necessary data

RESULTS AND DISCUSSION

Based on the search results on the Google Scholar page with the keyword environmental literacy, ten articles published in national journals were selected. The findings of the ten articles are detailed in Table 2.

Table 2. Details of Findings from Ten Articles Relevant to the Environmental Literacy Topic

Authors Name (Year)	Findings
Siddiq et al. (2020)	• Problem based learning improved environmental literacy knowledge significantly. • Cognitive attitude and skills did not show significant improvement. • Students responded positively to problem-based learning implementation.
Hayati (2020)	• Experiential learning enhances environmental literacy through practical engagement and reflection. • Field trips foster critical connections between abstract concepts and real-world scenarios. • Environmental education integrates multidisciplinary subjects for holistic learning experiences. • Experiential learning boosts environmental awareness, career insights, and professional networking.
Rokhmah & Fauziah (2021)	• Literacy skills: Knowledge 46.3%, Cognitive 36.7%, Attitude 79.5%, Behavior 79.0%. • Cognitive ability: Identifying, analyzing, and solving environmental problems rated low. • Positive relationship: Attitude and behavior towards the environment.
Maesaroh et al. (2021)	• Schools integrate environmental literacy with Islamic teachings for students' understanding. • Strategies include reducing paper use, digital tasks, and environmental training. • Schools awarded for environmental management show successful integration with education. • Emphasis on waste reduction, tree planting, and water conservation strategies.
Nugraha et al. (2021)	• Environmental literacy in Bogor's elementary students showed positive engagement levels. • No significant disparities in environmental literacy based on educational backgrounds. • Curriculum design impacts effective environmental literacy development in future teachers. • Only 20% of Indonesians show concern for environmental cleanliness.

Authors Name (Year)	Findings
Santoso et al. (2021)	• Average environmental literacy of junior high students: 58.48%. • Ecological knowledge: 8.71%, cognitive skills: 3.24%, environmental awareness: 89.11%. • Environmentally responsible behavior: 45.20%.
Fitri & Hadiyanto (2022)	• Low environmental literacy in early childhood observed in the study. • No significant difference in environmental literacy between genders. • Environmental literacy programs for children should focus on practical activities. • Special training needed for early childhood educators in environmental literacy.
Sriyati et al. (2022)	• Teaching materials had 81.66% feasibility and 70.92% readability. • Students' environmental literacy in experimental class increased with N-gain 3.8. • Local wisdom of Orang Rimba enhanced biodiversity teaching materials effectively.
Agustina et al. (2022)	• Video animation on energy-saving topics improved environmental literacy for students. • Feasibility and practicality tests showed positive responses from teachers and students. • Effectiveness test results rated the video as 'Very Effective' for learning.
Daniyarti (2022)	• Environmental literacy enhances moral education through character development. • Literacy and moral education support each other for environmental care. • Education integrates environmental literacy into formal schooling for character development. • Literacy involves knowledge, attitudes, skills, behaviors, and program development.

Based on the research findings in Table 2, there are various approaches that have proven effective in improving environmental literacy. The problem-based learning approach (Siddiq et al., 2020) showed significant results in improving environmental literacy knowledge, although students' cognitive attitudes and skills did not experience the same improvement. In contrast, students responded positively to the implementation of this method. On the other hand, experiential learning (Hayati, 2020) proved to be able to deepen environmental literacy by engaging students in practical activities, such as field trips that connect abstract concepts with real situations, as well as expanding students' environmental awareness and career horizons. Rokhmah & Fauziah (2021) showed that although students' knowledge and cognitive skills related to environmental issues were still low, there was a positive relationship between students' attitudes and behavior towards the environment.

The integration of environmental literacy with Islamic teachings in schools (Maesaroh et al., 2021) was successfully implemented through various strategies such as reducing paper use and environmental training. This reflects a holistic effort in creating a more environmentally friendly school environment. Meanwhile, research by Nugraha et al. (2021) found that although students in Bogor were actively involved in environmental literacy, there is still a big challenge in the curriculum to build environmental awareness at a broader level, especially considering that only 20% of the Indonesian population shows concern for environmental cleanliness. At the junior high school level, Santoso et al. (2021) reported variable environmental literacy, with high

environmental awareness (89.11%), but environmental responsible behavior only reaching 45.20%.

At the early childhood level, Fitri & Hadiyanto (2022) highlighted low environmental literacy, with recommendations that environmental literacy education programs should focus more on practical activities. In addition, local wisdom-based education (Sriyati et al., 2022) proved effective in improving environmental literacy through locally relevant teaching materials, such as the utilization of the wisdom of the Orang Rimba. Overall, this research shows that to effectively improve environmental literacy, an integrated approach is needed, both through formal teaching and practical activities, as well as special attention to the character and moral aspects of students (Daniyarti, 2022). The implementation of animated videos (Agustina et al., 2022) also proved effective in facilitating the understanding of environmental literacy, suggesting that the use of digital media can be a powerful tool in environmental education.

The enhancement of students' critical knowledge of environmental issues is in line with SDG target 4 which aims to promote education that is relevant and appropriate to the needs of the modern world, especially in terms of raising environmental awareness. Experiential learning also facilitates multidisciplinary learning that covers critical aspects relevant to the real world (Morris & König, 2020). Field activities and contextualized learning help students understand the connection between theoretical concepts and the environmental challenges at hand, which reinforces meaningful and relevant learning (Gebre et al., 2020). The importance of environmental literacy in building critical and analytical thinking skills is also part of quality education (Nurwidodo et al., 2020). While cognitive knowledge and skills on environmental issues are still low, improvements in positive attitudes and behaviors show that education can create a generation that cares more about sustainability.

The integration of environmental literacy with religious education also supports SDG 4's goal for an inclusive education that respects cultural and religious diversity. This approach shows that environmental literacy can be integrated with local and religious values, creating culturally relevant and sustainable learning. The importance of curriculum design that supports the development of environmental literacy also contributes to the achievement of quality education (Nugraha et al., 2022). Curriculum design that is inclusive and prioritizes environmental issues promotes a more holistic and relevant education for students, preparing them to face global challenges (Brennan & Widdop Quinton, 2020). In addition, low environmental literacy in early childhood emphasizes the importance of starting environmental education early (Ardoin & Bowers, 2020).

Effective environmental literacy, as detailed in the research findings, is highly relevant to achieving SDG 4 (Quality Education). SDG 4 aims to ensure inclusive, equitable and quality education and promote lifelong learning opportunities for all. In this context, teaching environmental literacy not only improves students' knowledge of the environment but also strengthens skills, attitudes and behaviors that support sustainable development. Overall, environmental literacy plays an important role in strengthening quality education, by preparing students to be environmentally responsible global citizens. It also supports SDG 4 to ensure all individuals have the knowledge and skills necessary to promote sustainable development, one of the key principles in quality education.

Environmental literacy not only improves the quality of education (SDG 4), but also supports SDGs 12, 13, 14, and 15 through the establishment of environmentally responsible awareness and behaviors related to resource consumption through reduced paper use, climate change through wiser energy use, protection of underwater life through an understanding of

environmental hygiene, and conservation of terrestrial ecosystems through the promotion of sustainable land management. Environmental literacy plays an important role in preparing future generations to face global environmental challenges more wisely and sustainably.

CONCLUSION

Based on the research findings, it can be concluded that it is important to improve environmental literacy which includes formal learning, practical activities, and the integration of character and moral values. Methods such as problem-based learning, experiential learning and local wisdom-based teaching have proven effective in building students' knowledge, attitudes and behaviors that are more environmentally responsible. The challenges in curriculum design and the low level of environmental literacy in early education point to the need for early and comprehensive intervention. Improving environmental literacy not only supports the achievement of SDG 4 (Quality Education) but also other SDGs, especially in aspects of sustainability, resource conservation and wiser environmental management.

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BAGAIMANA LITERASI LINGKUNGAN SISWA MENDUKUNG TUJUAN PEMBANGUNAN BERKELANJUTAN? SEBUAH TINJAUAN PUSTAKA

Abstrak

Pentingnya literasi lingkungan sebagai faktor pendukung pencapaian Tujuan Pembangunan Berkelanjutan (SDGs), khususnya SDG 4 (Pendidikan Bermutu). Peningkatan literasi lingkungan pada siswa diperlukan untuk mampu menghadapi tantangan global seperti perubahan iklim dan degradasi lingkungan. Penelitian ini bertujuan untuk mengevaluasi sejauh mana literasi lingkungan mendukung pendidikan bermutu terkait isu keberlanjutan melalui kajian pustaka terhadap artikel ilmiah yang dipublikasikan di jurnal nasional. Metode penelitian yang digunakan adalah pencarian pustaka menggunakan kata kunci "literasi lingkungan" pada Google Scholar, dengan pemilihan artikel berdasarkan kriteria inklusi dan eksklusi. Dari 2280 artikel, dipilih 10 artikel yang paling relevan untuk dianalisis. Hasil penelitian menunjukkan bahwa pendekatan pembelajaran berbasis masalah dan pembelajaran eksperiensial terbukti efektif dalam meningkatkan pengetahuan dan kesadaran lingkungan siswa, meskipun kemampuan kognitif masih perlu ditingkatkan. Peningkatan literasi lingkungan juga sangat penting dalam membentuk perilaku bertanggung jawab terhadap lingkungan, yang mendukung pencapaian SDG lainnya seperti SDG 12 (Konsumsi dan Produksi yang Bertanggung Jawab), 13 (Aksi Iklim), 14 (Kehidupan di Bawah Air), dan 15 (Kehidupan di Daratan). Temuan penelitian ini menekankan perlunya program yang lebih strategis dan efektif untuk meningkatkan literasi lingkungan di tingkat pendidikan dan analisis yang lebih terfokus pada pencapaian target SDGs.

Kata kunci: *Literasi lingkungan, tujuan pembangunan berkelanjutan, pendidikan, sikap.*