CLIMATE CHANGE AND ENVIRONMENTAL SUSTAINABILITY IN EDUCATION

NAWALA

Volume 3, Number 1, 2024

Environmental Literacy in Secondary Schools: Barriers and Strategies Towards Sustainable Education

Indriani Agustina[1]

[1] Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Abstract

Article history:
Received: January 12, 2024
Revised: February 23, 2024
Accepted: April 27, 2024
Published: June 30, 2024

Keywords:
Caring Attitude,
Contextual Learning,
Environmental Literacy,
Secondary School,
Sustainable Education.

Identifier:
Nawala
Page: 46-62
https://nawala.io/index.php/ccese

Environmental issues such as climate change, pollution, water crises, deforestation, and biodiversity loss increasingly highlight the importance of environmental literacy as a foundation for building ecological awareness from an early age. Secondary schools play a strategic role in fostering understanding, critical thinking skills, caring attitudes, and real behaviors that support environmental sustainability. However, the practice of environmental literacy education in Indonesia still faces significant challenges, including the lack of cross-subject integration, the dominance of theoretical instruction without practical application, students' low motivation, and limited contextual approaches. This article aims to examine the role of environmental literacy in secondary schools, identify barriers to its implementation, and propose more applicable and interactive learning strategies. By employing a literature review method, this study emphasizes that strengthening environmental literacy requires the integration of knowledge, cognitive skills, attitudes, and responsible actions among students. Through participatory and experiential approaches, environmental literacy education can become an essential instrument in shaping a generation that is environmentally aware, caring, and accountable for sustainability.

1. Introduction

The current global environment is facing a multidimensional crisis that is becoming increasingly complex and urgent to address. The phenomena of climate change due to global warming, air, water, and soil pollution, plastic waste, loss of biodiversity, deforestation, clean water crisis, and waste problems have become serious threats to the sustainability of human life and ecosystems. These issues are interconnected and transcend national boundaries, thus demanding the attention and collective action of all levels of global society. The Intergovernmental Panel on Climate Change report even confirms that the rate of climate change is accelerating and has a direct impact on health, food security, and socio-economic sustainability (Patel et al., 2021). This situation reinforces the urgency of systematic efforts to increase public awareness and competence through education, one of which is by instilling environmental literacy from an early age. Environmental literacy is understood as an individual's ability to recognize, understand, interpret, and make wise decisions in facing environmental problems.

According to Masemene and Msezane (2021), environmental literacy includes three main aspects: knowledge of ecological issues, an attitude of care for the environment, and the skills to take concrete actions to maintain sustainability. In line with that, Javaid et al. (2023) emphasize that environmental literacy is not just cognitive understanding, but also involves critical thinking skills, active participation, and pro-environmental behavior. In other words, environmental literacy serves as a bridge between knowledge and real action in responding to increasingly complex environmental challenges. In the context of secondary education, environmental

literacy has very high relevance. Middle school students are in a phase of cognitive and affective development that allows them to build awareness, develop higher-order thinking skills, and form a character that cares for the environment.

Environmental literacy education at this level can help students understand the connection between human activities and their impact on nature, as well as foster skills in seeking solutions to environmental problems. In addition, environmental literacy also serves as a means of forming the next generation who can make wise decisions and participate actively in preserving nature. However, the practice of environmental literacy in middle schools still faces various obstacles (Nurwidodo et al., 2020). Many studies show that learning is still theoretical and lacks practical application. Students are more often asked to memorize concepts or theories rather than connecting them with real-world practices. This condition causes their understanding of environmental issues to be partial and not in-depth.

In addition, environmental literacy is generally only integrated into certain subjects, such as Biology or Science, while the opportunity for integration with other subjects is still minimal (Eliam, 2022). The low motivation and concern of students for environmental issues are also a significant hindering factor. The lack of interactive and contextual learning methods makes students not encouraged to develop interest and active involvement in pro-environmental activities. Therefore, environmental literacy education in middle schools needs to be developed through a more interactive, contextual, and applicable approach. Real-world experience-based school projects, such as gardening activities, tree planting, waste management,

or environmental cleanup movements, can be an effective strategy to connect theory with practice.

In this way, students not only gain understanding but are also trained in critical thinking skills, problem-solving, and real decision-making that is relevant to daily life. The urgency of research related to environmental literacy in middle schools lies in the pressing need to address global challenges while building the foundation for sustainable education. This article aims to comprehensively examine the concept of environmental literacy, review the actual state of its implementation in middle schools, and identify the obstacles faced in the learning process. In addition, this paper also offers a perspective on alternative strategies that can be used to strengthen environmental literacy, so that education not only shapes students who understand cognitively but also act concretely in maintaining environmental sustainability.

2. Literature Review

The literature review on environmental literacy shows that this concept has developed as one of the important foundations in sustainable education. Masemene and Msezane (2021) was one of the early figures who defined environmental literacy as an individual's ability to understand the relationship between humans and their environment and to act responsibly in managing natural resources. This definition was later expanded by Javaid et al. (2023) who emphasized the interconnected cognitive, affective, and behavioral aspects. Environmental literacy is not only about basic ecological knowledge, but also involves critical thinking skills, a caring attitude, and concrete actions to deal with environmental problems. Several international

studies show the importance of environmental literacy in building the awareness of the younger generation.

According to the Vargas et al. (2023), the integration of environmental literacy in formal education can encourage students to understand global environmental issues while developing 21st-century skills, such as complex problem-solving and data-based decision-making. This is in line with the Education for Sustainable Development (ESD) agenda launched by UNESCO, which emphasizes that environmental literacy is a prerequisite for achieving sustainable development. In the Indonesian context, studies on environmental literacy show that its implementation still faces challenges. A study by Kinslow et al. (2019) revealed that environmental literacy learning in middle schools is still dominated by theoretical methods, so students tend to memorize without linking it to the surrounding environmental reality. This is exacerbated by the low integration across subjects, so environmental issues are more often seen as the domain of Science or Biology.

Another obstacle that is also widely found is low student motivation. According to Sagita et al. (2023), the lack of project-based learning methods causes students to not be actively involved in environmental issues. The minimal exposure to real activities, such as waste management or school greening, makes students unable to link knowledge with action. This situation shows a gap between cognitive knowledge and applicable skills. The literature review also highlights the main components of environmental literacy that need to be developed in secondary education, namely: knowledge, which includes ecological, social, political, and economic aspects;cognitive skills, in the form of the ability to analyze and solve

environmental problems; attitude, in the form of values, awareness, and sensitivity; and behavior, in the form of active participation and responsible action (Amin et al., 2020).

By integrating these four components, environmental literacy can shape students who are not only aware but also able to take concrete action. Thus, the literature shows that environmental literacy in middle schools is an important key to building a generation that cares for the environment. However, the implementation challenges in Indonesia demand a new approach that is more contextual, applicable, and participatory. This study serves as a foundation to further examine strategies for strengthening environmental literacy through formal education at the middle school level.

3. Methods

This study uses the literature review method as the main approach in analyzing the issue of environmental literacy in middle schools. The literature review was chosen because it provides an opportunity to explore, compare, and synthesize findings from various previous studies to obtain a comprehensive overview of the concepts, implementation, obstacles, and strengthening strategies for environmental literacy. This approach also allows the author to identify research gaps and offer alternative solutions based on evidence that has been produced by previous research. The stages of the literature review begin with the process of searching for relevant academic sources. The search was conducted through academic databases Google

Scholar as well as national portals containing education and environmental articles Natinonal or International.

Inclusion criteria in the literature search included research related to environmental literacy, middle school education, sustainable education, and environment-based learning. Articles published were prioritized to ensure the relevance and novelty of the data, although classic literature that is fundamental was maintained. The next stage is the selection and content analysis process. The articles obtained were analyzed qualitatively by emphasizing the definition of environmental literacy, the main components contained in it, the implementation methods in middle schools, and the obstacles faced in practice. Content analysis was carried out with a thematic approach to group research findings into certain categories, such as aspects of knowledge, attitude, skills, behavior, and factors hindering implementation.

To ensure the validity of the analysis, the author compared findings from various sources and triangulated the literature. This was done by examining the consistency of findings between studies, identifying patterns of similarity, and highlighting differences or contradictions. In addition, international and national literature were combined to provide a balanced perspective on global and contextual conditions in Indonesia. The results of this literature synthesis were then used as the basis for compiling the results and discussion section. Thus, the literature review method allows this study to not only describe the conceptualization of environmental literacy but also to offer alternative strategies for strengthening environmental literacy in middle schools as part of sustainable education efforts.

4. Results and Discussion

4.1 The State and Obstacles of Environmental Literacy in Middle Schools

The results of the literature review show that environmental literacy in middle schools has a very high urgency in the context of sustainable education, but its implementation to date still faces various significant obstacles. The actual condition in many middle schools shows that students' understanding of environmental issues is still partial, tends to be theoretical, and has not been fully integrated into their daily lives. This incomplete understanding has implications for the low environmental awareness that should be reflected in concrete and sustainable actions. In other words, although students know various environmental problems conceptually, that knowledge has not been widely manifested in real behavior that supports environmental preservation (Shutaleva et al., 2021). One of the main obstacles that is often found is the limited scope of environmental literacy in the school curriculum.

In Indonesia, environmental literacy is still positioned more in Science or Biology subjects only. This causes environmental issues to be perceived as if they are only part of ecological studies, even though environmental literacy is essentially multidisciplinary and can and should be integrated into various subjects. For example, in Social Studies, environmental literacy can be linked to the social and economic impacts of environmental damage, in Language subjects it can be expressed through the creation of essays or poems with environmental themes, while in Civics it can be linked to the rights and obligations of citizens towards environmental sustainability (Xie, 2023). This minimal integration across disciplines is what makes students unable to see the close connection between environmental

issues and the social, cultural, political, and economic aspects that surround them. As a result, the knowledge they have tends to be fragmented and difficult to apply holistically in real practice.

Another very dominant obstacle is the nature of learning that is still oriented towards memorizing environmental concepts. In practice, teachers more often emphasize the delivery of factual and theoretical information rather than giving students the opportunity to think critically, explore problems, or propose solutions. This situation makes students less able to develop analytical skills, problem-solving, and data-based decision-making, even though these skills are very essential in dealing with environmental problems that are complex and multidimensional. This condition is reinforced by Kinslow et al. (2019) research which shows that most students are indeed able to mention the impact of pollution or environmental damage, but great difficulty arises when they are asked to link this knowledge with relevant and applicable actions in daily life.

The motivation factor is also an obstacle that cannot be ignored. Many students show low interest in environmental issues, mostly because the learning they receive is not contextual and does not touch on direct experience. Sagita et al. (2023) noted that this condition is exacerbated by the lack of project-based activities that actively involve students, such as managing plastic waste through recycling, school greening, water conservation, or creating school gardens. Without direct experience that allows them to feel the impact of small actions on the environment, students tend to view environmental issues as something far from their daily lives. As a result,

the active participation that should be a characteristic of environmental literacy is difficult to grow.

The limitations of school facilities and infrastructure also weaken the implementation of environmental literacy (Sumirat et al., 2023). Many schools do not yet have adequate facilities to support contextual learning, such as school gardens, environmental laboratories, waste banks, or integrated waste management systems. These facility limitations make efforts to connect theory with direct practice difficult to carry out. This is in stark contrast to Algurén (2021) recommendation that emphasizes the importance of experiential learning as the main key to building complete, in-depth, and applicable environmental literacy. In addition to internal school factors, there are also external obstacles in the form of a lack of support from the community and the environment around the school. In some areas, environmental issues are not yet seen as a priority so students do not get a real example from their families or the communities where they live.

This condition causes the environmental literacy that students get at school to not receive additional reinforcement at home or in the community. Without a conducive social ecosystem, it is very difficult for environmental literacy to develop into a habit that is deeply rooted in students (Wu et al., 2019). Thus, it can be concluded that the condition of environmental literacy in middle schools still faces complex and multidimensional challenges. These obstacles include aspects of the curriculum that are not yet integrated across disciplines, learning methods that tend to be theoretical, low student motivation, limited facilities and infrastructure, and a lack of external support from the community. All of these challenges need to be

addressed immediately through a systematic, innovative, and integrated approach so that environmental literacy education not only shapes cognitive knowledge but is also able to produce changes in attitudes and real behavior among students that support environmental sustainability.

4.2 Strategies to Strengthen Environmental Literacy in Sustainable Education

In response to the obstacles that have been outlined, the literature emphasizes the importance of a strategy to strengthen environmental literacy in middle schools through a more contextual, applicable, and interactive approach. This strategy must be based on the integration of the four main components of environmental literacy, namely knowledge, cognitive skills, attitude, and behavior. Only with a balanced combination can environmental literacy shape students who not only understand ecological issues but also take concrete action to maintain sustainability. Strengthening can be done through the integration of environmental literacy into various subjects. Teachers need to develop an interdisciplinary approach so that environmental issues are not only the domain of Science or Biology (Van den Beemt et al., 2020). For example, in Indonesian Language class, students can write essays about solutions to pollution, in Social Studies students can analyze the social impact of the water crisis, or in Art students can create works that raise environmental themes. This approach will broaden students' horizons while fostering awareness that environmental issues touch all aspects of life.

Project-based learning is an effective strategy to increase student involvement. Through real projects, students not only learn to understand concepts but are also

directly involved in field practice. Examples of projects that can be developed include plastic waste recycling programs, organic compost management, creating a school garden, water conservation, and energy saving campaigns. By being actively involved, students will be more motivated and able to link knowledge with action. This learning model is also in line with Cheng et al. (2019) recommendation that emphasizes the need for experience-based education to foster environmental awareness. The strengthening strategy also needs to use a critical pedagogy approach. Teachers must encourage students to think critically about complex environmental issues, including examining the economic, political, and social factors behind the problem. Through discussions, debates, or case studies, students can be trained to analyze problems in depth and formulate realistic solutions. This approach will strengthen higher-order thinking skills while fostering social concern.

Use of digital technology can be an innovative means in environmental literacy learning. Interactive media, simulation applications, or online learning platforms can be used to enrich students' understanding of global environmental issues. For example, the use of climate change simulation applications can help students understand the long-term impact of greenhouse gas emissions. In addition, social media can also be used for environmental campaigns initiated directly by students, so they feel more relevant and empowered to take concrete action. Involvement of the school community and the wider community is also important (Hilder & Collin, 2022). Partnership programs with environmental organizations, local governments, or local communities can strengthen students' experience. Through collaborative activities, such as joint tree planting or integrated waste

management, students can directly feel that their small actions have a real impact. The involvement of parents is also needed so that environmental literacy at school gets reinforcement at home.

Finally, the strengthening strategy needs to pay attention to the evaluation aspect. The evaluation of environmental literacy not only assesses the aspect of cognitive knowledge but also the attitude and real behavior of students. Teachers can develop authentic assessment instruments such as project portfolios, reflection journals, or observation of daily behavior. A comprehensive evaluation will ensure that environmental literacy is truly internalized in students. By implementing these strategies, environmental literacy in middle schools can develop into a holistic education, not only producing students who understand concepts but also shaping a generation that is aware, caring, and responsible for the sustainability of the earth.

5. Conclusion

Environmental literacy in middle schools has a strategic role in shaping a generation that is aware, caring, and responsible for environmental sustainability. The literature review shows that environmental literacy is not only related to the aspect of knowledge but also includes critical thinking skills, a caring attitude, and real behavior in preserving nature. However, the condition of its implementation in schools still faces various obstacles, such as limited integration across subjects, the dominance of theoretical learning without real practice, low student motivation, limited facilities and infrastructure, and a lack of support from the surrounding

environment. These obstacles cause students' environmental literacy to be partial and not fully realized in pro-environmental actions.

To address these challenges, the strategy to strengthen environmental literacy needs to be directed at a more interactive, applicable, and contextual approach. The integration of environmental literacy into various subjects, project-based learning, critical pedagogy, the use of digital technology, and the involvement of the school and wider community are important steps in building student awareness and participation. Evaluation that emphasizes the aspects of attitude and behavior is also key to ensuring that environmental literacy is truly embedded in students' daily lives.

Thus, environmental literacy in middle schools is not just an educational effort but also a long-term investment in producing the next generation who can face the global environmental crisis. Through holistic and sustainable environmental literacy education, schools can contribute concretely to building a greener, healthier, and more sustainable future.

References

Algurén, B. (2021). How to bring about change a literature review about education and learning activities for sustainable development. *Discourse and Communication for Sustainable Education*, *12*(1), 5-21.

Amin, S., Utaya, S., Bachri, S., Sumarmi, S., & Susilo, S. (2020). Effect of problem based learning on critical thinking skill and enviromental attitude. *Journal for the education of gifted young scientists*, *8*(2), 743-755.

Cheng, S. C., Hwang, G. J., & Chen, C. H. (2019). From reflective observation to active learning: A mobile experiential learning approach for environmental science education. *British Journal of Educational Technology*, *50*(5), 2251-2270.

Eilam, E. (2022). Climate change education: The problem with walking away from disciplines. *Studies in Science Education*, *58*(2), 231-264.

Hilder, C., & Collin, P. (2022). The role of youth-led activist organisations for contemporary climate activism: the case of the Australian Youth Climate Coalition. *Journal of Youth Studies*, *25*(6), 793-811.

Javaid, M., Kumari, K., Khan, S. N., Jaaron, A. A., & Shaikh, Z. (2023). Leader green behavior as an outcome of followers' critical thinking and active engagement: the moderating role of pro-environmental behavior. *Leadership & Organization Development Journal*, *44*(2), 218-239.

Kinslow, A. T., Sadler, T. D., & Nguyen, H. T. (2019). Socio-scientific reasoning and environmental literacy in a field-based ecology class. *Environmental Education Research*, *25*(3), 388-410.

Masemene, K. J., & Msezane, S. B. (2021). Exploring environmental literacy components in promoting sustainable behaviour: a case study of rural primary schools. *Journal for the Education of Gifted Young Scientists*, *9*(3), 233-249.

Nurwidodo, N., Amin, M., Ibrohim, I., & Sueb, S. (2020). The role of eco-school program (Adiwiyata) towards environmental literacy of high school students. *European Journal of Educational Research*, *9*(3), 1089-1103.

Patel, S., Dey, A., Singh, S. K., Singh, R., & Singh, H. P. (2021). Socio-economic impacts of climate change. *Climate Impacts on Sustainable Natural Resource Management*, 237-267.

Sagita, S., Rahmat, A., Priyandoko, D., & Sriyati, S. (2023). Sustainability of project-based learning: Challenge and obstacles from students perception point of view. *Jurnal Penelitian Pendidikan IPA*, *9*(2), 810-816.

Shutaleva, A., Martyushev, N., Nikonova, Z., Savchenko, I., Abramova, S., Lubimova, V., & Novgorodtseva, A. (2021). Environmental behavior of youth and sustainable development. *Sustainability*, *14*(1), 250.

Sumirat, F., Saâ, U. S., Sopandi, W., & Supriatna, N. (2023). A Brave to Green: Are There Environmental Literacy Problems in Rural Areas Public Elementary Schools?. *Jurnal Penelitian Pendidikan IPA*, *9*(5), 3758-3764.

Van den Beemt, A., MacLeod, M., Van der Veen, J., Van de Ven, A., Van Baalen, S., Klaassen, R., & Boon, M. (2020). Interdisciplinary engineering education: A review of vision, teaching, and support. *Journal of engineering education*, *109*(3), 508-555.

Vargas, A. C., Magnussen, R., Mulder, I., & Larsen, B. (2023). Towards a framework for open data literacy in education: A systematic mapping review of open data skills and learning approaches. *Interaction Design and Architecture (s)*, (57), 133-151.

Wu, E., Cheng, J. Q., & Zhang, J. B. (2019). Study on the environmental education demand and environmental literacy assessment of citizens in sustainable urban construction in Beijing. *Sustainability*, *12*(1), 241.

Xie, C. (2023). Climate change in contemporary British and Irish poetry and poetic criticism: Literary representation and environmental activism. *Wiley Interdisciplinary Reviews: Climate Change*, *14*(1), e807.