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Literature Review of Environment-Based Science Learning as an Effort to Foster Environmental Awareness in Students

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Abstract

Environmental problems remain among the most critical global issues. Various forms of environmental damage, such as pollution, ecosystem degradation, and the exploitation of natural resources, demonstrate the need for systematic efforts to foster an attitude of environmental care from an early age. Education plays a strategic role in shaping students' awareness of and attitudes toward the environment, particularly through the field of science, which is closely related to natural phenomena and the surrounding environment. Environment-based science learning is a relevant approach because it integrates scientific concepts with real environmental problems that are close to students' daily lives. This study aims to comprehensively examine research findings related to environment-based science learning as an effort to foster students' environmental care attitudes. The research method used is a literature review, conducted by analyzing reliable and relevant national and international journals published within the last 5–10 years that align with the topic. The results of this literature study indicate that environment-based science learning, implemented through various methods such as contextual learning, project-based learning, and environmental observation activities, can increase students' attitudes of environmental care at various educational levels and across different subjects. This improvement is reflected in aspects of environmental awareness, responsibility, and pro-environmental behavior. These findings indicate that environment-based science learning is an effective approach and can be applied sustainably in science education to support the development of students' environmental care character.

INTRODUCTION

The population and the rate of human growth continue to increase with the times. Climate change can be affected by various forms of human action (Arisma et al., 2024). In the current era of globalization, environmental problems are one of the challenges faced by examples such as pollution, ecosystem degradation, and declining quality of natural resources. This is due to the increased concentration of gases that block the reflection of solar energy to the earth which causes an increase in the greenhouse effect so that the earth we live in is hotter, in addition to the damage and environmental pollution is increasing due to the number of industrial factories that are standing, waste that is still a problem and other problems (Purba et al., 2024). This condition reinforces the urgency of the need for systematic efforts in managing the environment in a sustainable manner through various sectors, including the education sector. These conditions highlight the urgency of developing systematic efforts to promote environmental sustainability through various sectors, including education.

Education plays a strategic role in shaping environmental awareness and responsible behavior among students. Through education, individuals can develop knowledge, attitudes, and skills that support sustainable environmental practices. Science Education has an important position in efforts to build an attitude of caring for the student's environment. Science is seen as relevant in shaping the character of students to care about their environment so that in teaching science we can lead students to better understand the importance of having an attitude of caring for the environment around (Cahyani et al., 2024). The character of caring for the environment can be instilled in the learning process that utilizes learning media, so that learning is made to be full of awareness (Mindful), means (Meaningful), and fun (Joyful). In this context, science literacy is an important competency that students must possess to be able to understand natural phenomena, analyze environmental problems, and determine the right attitudes and actions. Students who have good science literacy are expected to be able to relate science concepts to real environmental issues around them, so that learning is not abstract (R. Putri & Rahmat, 2025).

Several previous studies have emphasized the importance of integrating environmental values into science learning. For example, Murdianingsih and Siswanto (2022) found that environmental care attitudes can be developed effectively through learning activities that involve students directly with their surrounding environment. Similarly, Fauzi (2024) showed through a meta-analysis that science learning significantly contributes to the development of students' environmental awareness and responsible environmental behavior. Research conducted by Suhartinah et al. (2019) also revealed a positive correlation between science literacy and students' environmental care attitudes, indicating that learning approaches emphasizing environmental understanding can foster pro-environmental behavior.

Other studies have explored specific learning models that support environmental awareness. Problem-Based Learning (PBL) and Project-Based Learning (PjBL) have been widely used to integrate environmental issues into science learning and have shown positive results in improving students' environmental attitudes (Prastyo & Hartono, 2020; Timutiasari et al., 2016). In addition, the Science, Technology, and Society (STS) approach has also proven effective in helping students understand the relationship between science and environmental sustainability (Adnyana & Warpala, 2019). Studies by Kartini and Aljamaliah (2024) further indicate that science literacy-based learning can significantly strengthen students' environmental care character, especially when learning activities involve real environmental problems.

Despite the growing number of studies discussing environment-based science learning, most research tends to focus on the implementation of specific learning models or experimental studies conducted in certain educational contexts. Meanwhile, comprehensive studies that synthesize various research findings related to environment-based science learning across different educational levels remain relatively limited. In addition, previous studies often examine environmental awareness from a single perspective, such as environmental literacy or specific learning strategies, without providing an integrated overview of how various environment-based science learning approaches contribute to the development of students' environmental care attitudes.

Based on this gap, this study aims to conduct a literature review to comprehensively analyze previous research related to environment-based science learning as an effort to foster

environmental care attitudes among students. By reviewing various studies conducted at different educational levels, this research seeks to identify the types of learning methods, media, and environmental topics that are most effective in developing students' environmental awareness and responsible environmental behavior. The results of this study are expected to provide a broader understanding of the role of environment-based science learning in environmental education and to serve as a reference for educators in designing more contextual and meaningful science learning that supports the development of students' environmental care attitudes.

METHOD

The method used was a Narrative Literature Review. A literature review is the process of searching for and examining literature by reading various books, journals, and other publications related to the research topic (Amri Marzali, 2017). The data source in this study was secondary data, consisting of articles from national and international scientific journals published within the last 5–10 years; therefore, primary research was not required. The articles were obtained from sources such as Google Scholar, Publish or Perish, and other reputable journals. The selected articles focused on research discussing environmental care attitudes in science learning.

The data analysis technique used in this study was qualitative descriptive analysis combined with content analysis. Content analysis was conducted by identifying key themes, patterns, and findings from the selected articles related to environment-based science learning and environmental care attitudes.

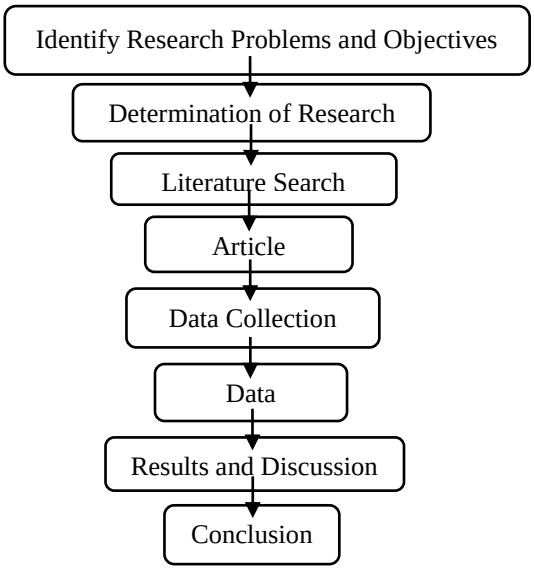

Figure 1. Research Procedure in Literature Review
Source: Adapted from Marzali (2017) and modified by the author.

RESULTS AND DISCUSSION

According to (Fauzi, 2024) That fostering awareness and understanding of the importance of maintaining the environment can be realized through education. Caring for the

environment must be taught from an early age through the application of learning in schools (Murdianingsih & Siswanto, 2022). Meaningful learning will help students in improving the material learned. Students can see various objects around their environment to be used as learning media. With environment-based science learning, students can improve their mastery of the material and also their attitude of concern for the surrounding environment.

The methods or media used are very diverse. Its application to the subject certainly has various methods and media. Especially in science-based learning to increase environmental care attitudes towards students.

Table 1. Environment-Based Science Learning Methods and Media

High School					
Subjects	**Learning Methods**	**Learning Media**	**Material**	**Results**	**Related Research**
Biology	*4-D Models; Problem Based Learning;* CIPPP; Laboratory Experiments	RPP, LKPD, THB; Laboratory; questionnaire; LKS; CD; WEB; *Social Media*	Environmental Change; environmental pollution; biodiversity; Environmental Conservation;	Students can improve their attitude of caring for the environment	(Amalini, 2022); (Priadi et al., 2012); (Aini et al., 2014); (Kurnia & Suryadharma, 2016); (Qodriyanti et al., 2022); (Iseu Laelasari & Rahmawati, 2020); (Cholvistaria, 2012); (Mariza Fitriati, Rachmat Sahputra, 2018).
Chemistry	Experiments; *Quasi-experimental;* Quantitative Approach; Experiments	Test Questions and Questionnaires; Questionnaire	Petroleum; alkane derivative compounds; Green Chemistry and the Environment		(Prastyo & Hartono, 2020); (Annisa & Rohaeti, 2017); (Santosa et al., 2024)
Physics	*Blended Learning; Quasi-experimental;*Descriptive qualitative	Samrthphone and laptop; questionnaire; *E-Module;* Pre-test and Post-Test;	*Global Warning;* Climate Change; Global Warming		(Najaah & Amrulloh, 2022); (Gustria & Fauzi, 2020); (Mardiyanti Hartati, 2020); (Gunawan, 2019)
Junior High School					

Subjects	Learning Methods	Learning Media	Material	Results	Related Research
IPA	Habituation method; *Project Based Learning* ; *Quasi Experimenatl Design;* *Single-case design;* Experiments; *ex post facto;* *Problem Based Learning;* *Contextual Teaching and Learning;* *Outdoor Learning;* *Inquiri Learning;* Science and Technology Society (STM)	School environment; LKPD; Questionnaire	Recycling; Biotechnology; environmental pollution; Issues related to the environment; Transport of water and nutrients in plants; Ecosystems; Environmental Education	It can improve the attitude of caring for the environment, science literacy skills.	(Eufrasia et al., 2018); (O. Y. Putri et al., 2025); (Hosnia & Laila Khusnah, 2024); (Adnyana & Warpala, 2019); (Khairin Nisaq, 2020); (Dian Perayanti Sinaga, Fenny Mustika Piliang, 2024); (Suhartinah et al., 2019); (Mariza Fitriati, Rachmat Sahputra, 2021); (Gusti Ngurah Santika et al., 2023); (Apriani et al., 2025); (Indah Pujiastuti, 2023)
SD					
Subjects	**Learning Methods**	**Learning Media**	**Material**	**Results**	**Related Research**
IPAS	*Problem Based Learning;* *Project Based Learning*; Survey; Descriptive; *Problem Based Learning;* *Make a match;* Science literacy;	Natural laboratories; Modules; Learning documents; LKPD; Teaching Materials; Socialization of Material Delivery	Plant parts and their functions; composting; organic farming; organic fisheries; the use of alternative renewable energy; Water Cycle The important	Students can solve problems and relate them to environmental problems	(Sri Fatria Sukmawati, Zaeni Mastur, 2021); (Timutiasari et al., 2016); (Hasibuan & Sapri, 2023); (Imansari et al., 2024); (Debby Rahmawati, 2024); (Kamila &

Contextual Teaching and Learning; Science Environment Technology Society	value of caring for the environment; Environmental Literacy; Environment; Natural Events	Annisa, 2024); (Najih et al., 2025); (Rizal & Meidawaty, 2020); (Mina Zuyyina Ramadhani, Ni'matul Aufa, Nida Adzkia, Zerdy Firnanda Ramadhan, Ahmad Suriansyah, 2021); (Mursalin & Setiaji, 2021); (Lustianti et al., 2024); (Kartini & Aljamaliah, 2024)

Source: Author's compilation based on literature review of previous studies (2025)

Based on the results of the literature review summarized in table 1, it was found that environment-based science learning has been applied to various levels of education, ranging from elementary to secondary school with a variety of learning methods, media and materials. Overall, it shows that environmental issues in science learning are an effective approach because they can have a positive impact on improving students' environmental care attitudes. This makes learning more meaningful and contextual, so that environmental care can develop naturally through the learning process.

Various methods that invite students to get to know the environment by solving problems by integrating several aspects other than the environment such as technology, social, and ethnoscience that utilize various local resources. Methods such as *Problem-Based Learning*, *Project-Based Learning*, Experiments, and *Inquiry Learning* Placing students as active subjects who are directly involved in the process of observing and solving environmental problems (Katherine 2022). Students not only receive existing information, but are also actively involved in forming an attitude of caring for the environment and reflecting on environmental problems directly. In its application, students are invited to get to know and interact with the environment, the methods and media used can also use school laboratories to objects in the surrounding environment (Arisma et al., 2024). The use of appropriate learning media can strengthen the effectiveness of environment-based science learning. Media can help connect science concepts to real environmental conditions. This is in line with the goal of science learning, not only to increase the mastery of knowledge, but also to form attitudes and values that support environmental sustainability (R. Putri & Rahmat, 2025).

Environment-based science learning can be designed according to levels. Each level has learning outcomes related to the environment in the field of science, meaning that environment-based science learning is suitable for all subjects in the field of science from elementary school to secondary school. The difference in focus on the level of education is adjusted to the cognitive development of students. At the elementary level, the method used emphasizes more on habituation and the introduction of the value of caring for the environment. At the junior high school level, the method is more focused on cause-and-effect relationships in environmental problems. Meanwhile, at the high school level, the method used requires a more in-depth analysis of global and local environmental issues (Adinata & Setiawan, 2024).

These results confirm that environment-based science learning is a strategic effort in fostering students' environmental care attitudes. In this science learning, it not only increases the understanding of scientific concepts for students, but also forms attitudes and environmental awareness. Students can learn more about the science material they are learning in depth and meaningfully by taking part in activities that involve the environment. Other outcomes of this learning include improving learning outcomes, process skills, creativity, critical thinking skills, and science and environmental literacy (Arisma et al., 2024).

CONCLUSION

Based on the results of the literature review, environment-based science learning can be concluded to be an effective approach for fostering students' environmental care attitudes across various educational levels, including elementary, junior high, and high school, as well as across science-related subjects such as physics, biology, and chemistry. By integrating environmental issues into science learning, the learning process becomes more contextual, meaningful, and relevant to students' daily lives, which not only enhances students' understanding of scientific concepts but also helps develop environmental awareness and responsible attitudes toward the environment. Therefore, educators are encouraged to consistently integrate environment-based approaches in science learning and design activities that involve real environmental issues while promoting students' active participation in addressing environmental problems. Future research should explore a wider range of learning models and conduct empirical studies in diverse educational contexts to further examine the effectiveness of environment-based science learning in promoting students' environmental awareness and sustainable behavior.

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