

FOSTERING ELEMENTARY SCHOOL STUDENTS' ECOLITERACY THROUGH PROJECT-BASED LEARNING MODEL

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Abstract

Environmental degradation is a global challenge that requires educational efforts to foster environmental awareness and responsibility in students. This study aims to examine the implementation of Project-Based Learning (PjBL) in cultivating the ecoliteracy of elementary school students. This study uses a qualitative approach with a case study design. Data were collected through observation, interviews, and documentation. The results indicate that PjBL effectively improves students' ecological knowledge, awareness, attitude, and eco-friendly behavior through waste management activities, eco-brick making, composting, and planting within the school environment. The successful implementation of PjBL is supported by the teacher's role as a facilitator, students' active participation, and school support, while time constraints and facilities serve as hindering factors. Thus, Project-Based Learning is an effective learning approach to foster ecoliteracy and support sustainable environmental education in elementary schools.

Keywords: Ecoliteracy, Project-Based Learning, environmental education, elementary school students.

Introduction

Environmental damage has become one of the biggest challenges of the 21st century. Climate change, environmental pollution, deforestation, loss of biodiversity, and increasing waste volumes threaten ecosystem sustainability and human well-being. These issues do not only require solutions through policies and technology, but also necessitate educational efforts capable of shaping a society that is responsible toward the environment. Therefore, education for sustainable development has become a priority across various education systems to foster environmental awareness and encourage sustainable behavior in the younger generation. Primary education plays a vital role in shaping students' values, attitudes, and behaviors toward the environment. At this developmental stage, children are in a highly potential phase to receive learning experiences that

can influence their perspectives and future actions. Hence, schools need to provide meaningful learning experiences so that students can understand environmental issues and actively participate in environmental conservation efforts. Natalina et al. (2023) stated that developing ecological literacy in primary school students contributes significantly to increasing environmental awareness and caring behavior. One of the concepts widely developed in environmental education is ecoliteracy or ecological literacy. Ecoliteracy is an individual's ability to understand the principles of ecology and apply them in daily life through responsible actions toward the environment. Narulita et al. (2024) explained that ecoliteracy encompasses environmental knowledge, ecological awareness, environmental care attitudes, and behaviors that support environmental sustainability. Students with ecoliteracy can understand the relationship between humans and nature and make decisions that support environmental preservation. Despite its importance, environmental education in elementary schools is still frequently carried out theoretically and remains teacher-centered. Students mostly receive information about the environment without getting sufficient opportunities to be directly involved in solving real-world environmental problems. This condition causes students' understanding of the environment to develop superficially and fails to optimally drive the formation of pro-environmental behavior. Therefore, an innovative learning model is required to provide authentic and meaningful learning experiences to students. One learning model considered capable of addressing this need is Project-Based Learning (PjBL). PjBL is a student-centered learning model that organizes the learning process through project activities related to real-world problems. Through project activities, students engage in investigation, collaboration, problem-solving, critical thinking, and reflection. Research by Chaesar and Andayani (2024) shows that PjBL integrated with ecoliteracy can improve creative thinking skills and environmental care among elementary school students. Therefore, this study was conducted to explore how Project-Based Learning can foster the ecoliteracy of elementary school students.

Literature Review

1. Ecoliteracy

Ecoliteracy or ecological literacy is a concept introduced by Orr (1992) and further developed by Capra (1996) as the ability to understand the basic principles of ecology and apply them in daily life. Ecoliteracy does not solely focus on mastering environmental knowledge, but also includes awareness, attitudes, values, and behaviors that support environmental sustainability. According to Capra (1996), individuals who possess ecoliteracy understand the interconnectedness between humans and the environment, recognizing that the survival of human life heavily depends on ecosystem balance. In an educational context, ecoliteracy serves as an important foundation for shaping a generation with a sense of responsibility toward environmental preservation. Natalina et al. (2023) explained that ecoliteracy in elementary school students can be developed through four main dimensions: (1) Ecological Knowledge: Students' understanding of the environment, ecosystems, pollution, waste management, and natural resource conservation; (2) Ecological Awareness: Students' ability to recognize various environmental problems around them and understand their impact on life; (3) Ecological Attitude: Attitudes of care, responsibility, and appreciation for the environment as a vital part of life; (4) Ecological Behavior: Real actions taken by students to maintain and preserve the environment. Developing ecoliteracy in elementary school students is crucial because it serves as a foundation for building sustainable environmental-care characters.

2. Project-Based Learning (PjBL)

Project-Based Learning (PjBL) is a student-centered learning model driven by project activities designed to solve real-world problems. This model gives students opportunities to develop knowledge, skills, creativity, communication, collaboration, and problem-solving abilities. According to Thomas (2000), PjBL is learning oriented toward deep investigation of an issue, allowing students to gain meaningful learning experiences. Meanwhile, Krajcik and Blumenfeld (2006) explained that PjBL encourages students to construct knowledge through exploration, discussion, reflection, and project outcome presentations. The core characteristics of Project-Based Learning include: (1) Student-centered learning; (2) Oriented toward real-world problems; (3) Developing critical thinking skills; (4) Involving collaboration and communication; (5) Producing a concrete product or artwork; (6) Utilizing authentic assessment. The steps of Project-Based Learning according to Hosnan (2014, p. 325) are: (1) Project determination; (2) Planning the steps for project completion; (3) Compiling the project implementation schedule; (4) Project completion under the teacher's facilitation and monitoring; (5) Report preparation and presentation/publication of project results; (6) Evaluation of the project process and outcomes. Project-Based Learning (PjBL) has both strengths and weaknesses.

Research Methods

This study uses a qualitative approach with a case study research design. The qualitative approach was chosen because the study aims to deeply understand the implementation process of Project-Based Learning in fostering the ecoliteracy of elementary school students. A case study design was used to obtain a comprehensive overview of the investigated phenomenon within a real-world context. The research was conducted at an elementary school that implements project-based learning in environmental learning activities. Data were collected through several techniques: observation, interviews, and documentation.

Results and Discussion

1. Implementation of Project-Based Learning in Environmental Education

Based on observation and interview results, the implementation of Project-Based Learning (PjBL) was carried out through a series of activities focusing on solving environmental problems around the school. The teacher started the lesson by inviting students to identify environmental issues often encountered, such as scattered plastic waste, lack of awareness regarding throwing garbage in its place, and minimal utilization of vacant land in the school environment. At the initial stage, the teacher posed an essential question: *"How do we keep the school environment clean and healthy?"* This question served as the foundation for students to design their projects. Next, students were divided into groups and asked to arrange action plans covering project objectives, required tools and materials, and the implementation schedule. The projects executed by students included waste management, eco-brick making, processing organic waste into compost, and planting ornamental and medicinal plants around the school. During the project execution process, the teacher acted as a facilitator who provided guidance and assistance without dominating the students' learning activities. Students were given opportunities to discuss, gather information, conduct field observations, and find solutions to the discovered problems. Observations showed that applying PjBL created a more active, collaborative, and meaningful learning atmosphere. Students did not merely receive information passively but were directly involved in environmental

activities. This finding aligns with Thomas (2000), who states that PjBL gives students the chance to build knowledge through real experiences and authentic problem-solving.

2. Developing Ecological Knowledge

The research results show that project activities positively contributed to increasing students' ecological knowledge. Before the project, most students only understood the environment as a place to live and play. After participating in the project, students began to understand the concepts of environmental pollution, waste management, recycling, composting, and the importance of maintaining ecosystem balance. Based on interview results, one student stated: *"Now I know that plastic waste does not decompose easily and can pollute the environment."* This statement indicates that students gained new understanding through firsthand experience during project execution. The knowledge acquired was not merely theoretical but also contextual and applicable, making it easier for students to comprehend. This finding supports research by Chaesar and Andayani (2024), which indicates that project-based learning integrated with ecoliteracy can enhance students' understanding of various environmental issues more deeply compared to conventional learning.

3. Developing Ecological Awareness

In addition to increasing knowledge, the application of PjBL also contributed to the development of students' ecological awareness. Ecological awareness was evident in students' ability to recognize various environmental problems around them and understand the impacts caused. During the observation process, students demonstrated care for the condition of the school environment. They began paying attention to garbage in the school yard, the use of single-use plastics, and poorly maintained plants. Some students even proposed routine activities to maintain the cleanliness of the school environment. The ecological awareness developing in students shows that learning experiences through projects can encourage students to see the connection between human actions and environmental conditions. This finding is in line with Capra (1996), who asserts that ecoliteracy develops when individuals can understand the interconnectedness between humans and ecological systems.

4. Developing Ecological Attitude

The implementation of Project-Based Learning also brought positive impacts on the formation of students' ecological attitudes. During project execution, students demonstrated responsibility, cooperation, care, and commitment to the success of the activities. Students voluntarily cleaned the school area before planting. They also showed helpful attitudes in collecting materials needed for making compost. These attitudes reflect the development of environmental care values. Interview results with teachers showed that after participating in the environmental project, students became more mindful of classroom and school cleanliness. Teachers revealed that students began reminding their peers to throw trash in its place and maintain a clean learning environment. This finding indicates that learning experiences involving real activities can foster positive attitudes toward the environment. Such attitudes become an important indicator in shaping students' ecoliteracy.

5. Developing Ecological Behavior

The most tangible change from the implementation of PjBL was seen in students' ecological behavior. Based on observation results, students began applying habits that support environmental preservation, such as sorting waste by type, reducing the use of single-use plastics, caring for school plants, and keeping the classroom clean. This behavioral change demonstrates that learning does not only yield increased knowledge but is also capable of driving students to apply that knowledge in everyday life. Several students even admitted that they started applying the habits of sorting waste and planting at home with their parents. The results of this study reinforce the

findings of Natalina et al. (2023), which state that effective ecoliteracy development must be able to produce real and sustainable behavioral changes.

Discussion

The research results show that Project-Based Learning is an effective learning model for fostering the ecoliteracy of elementary school students. Through project activities directly related to the environment, students acquire authentic learning experiences, allowing them to develop ecological knowledge, awareness, attitudes, and behaviors in an integrated manner. In the perspective of constructivism theory, meaningful learning occurs when students actively construct knowledge through interaction with the environment and real experiences. The application of PjBL provides opportunities for exploration, observation, reflection, and problem-solving, making learning more contextual and relevant to daily life. The findings of this study also reinforce previous research by Chaesar and Andayani (2024), Al-Bahij et al. (2024), and Natalina et al. (2023), which assert that project-based learning can enhance learners' ecoliteracy through active and collaborative learning experiences. Thus, Project-Based Learning can serve as an alternative, effective learning strategy to support sustainable education and environmental character development in elementary school students.

Conclusion

Based on the research results, it can be concluded that the implementation of Project-Based Learning (PjBL) can cultivate the ecoliteracy of elementary school students through active engagement in various environmental projects that provide authentic and meaningful learning experiences. Project-based learning gives students opportunities to identify environmental issues, design solutions, execute project activities, and reflect on the learning outcomes achieved.

The application of PjBL contributes to the development of the four dimensions of ecoliteracy: ecological knowledge, ecological awareness, ecological attitude, and ecological behavior. Students showed an increase in understanding environmental issues, awareness of the importance of preserving nature, environmental-care attitudes, and real behaviors that support environmental sustainability both at school and at home. Furthermore, the successful implementation of PjBL is supported by the teacher's role as a facilitator, students' active participation, school support, and the utilization of the surrounding environment as a learning source. Although there are several constraints such as time limitations and supporting facilities, overall, Project-Based Learning has proven to be an effective learning approach to support ecoliteracy development in primary school students.

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