

The Effectiveness of Nature-Based Learning on the Development of Environmental Stewardship in Early Childhood Education

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ABSTRAK

Pembelajaran berbasis alam dipandang sebagai pendekatan pedagogis yang relevan untuk menumbuhkan kepedulian terhadap lingkungan sejak usia dini melalui pengalaman belajar yang autentik dan bermakna. Penelitian ini bertujuan untuk menganalisis implementasi pembelajaran berbasis alam serta perannya dalam mengembangkan sikap peduli, tanggung jawab, empati ekologis, dan perilaku pro-lingkungan pada anak usia dini. Pendekatan kualitatif dengan desain studi kasus digunakan untuk memperoleh pemahaman mendalam mengenai proses dan makna pembelajaran dalam lingkungan alam. Subjek penelitian meliputi peserta didik pendidikan anak usia dini, pendidik, serta kepala satuan pendidikan pada lembaga PAUD yang secara konsisten menerapkan pembelajaran berbasis alam. Data dikumpulkan melalui observasi partisipatif, wawancara mendalam, dan dokumentasi, kemudian dianalisis menggunakan analisis tematik. Hasil penelitian menunjukkan bahwa pembelajaran berbasis alam memberikan pengalaman belajar holistik yang mendukung perkembangan kognitif, afektif, dan moral anak secara terintegrasi. Interaksi langsung dengan alam membangun ikatan emosional yang menjadi dasar bagi terbentuknya kepedulian terhadap lingkungan secara bertahap. Efektivitas pembelajaran dipengaruhi oleh kompetensi pendidik, dukungan kelembagaan, serta ketersediaan lingkungan fisik yang mendukung. Penelitian ini menegaskan pentingnya pembelajaran berbasis alam sebagai strategi pendidikan berkelanjutan dalam membentuk karakter sadar lingkungan sejak usia dini.

Kata kunci: Kepedulian lingkungan; Pendidikan anak usia dini; Pembelajaran berbasis alam.

ABSTRACT

Nature-based learning is seen as a relevant pedagogical approach to fostering environmental stewardship from an early age through authentic and meaningful learning experiences. This study aims to analyze the implementation of nature-based learning and its role in developing attitudes of care, responsibility, ecological empathy, and pro-environmental behavior in early childhood. A qualitative approach with a case study design was used to gain an in-depth understanding of the process and meaning of learning in a natural environment. The research subjects included early childhood education, educators, and heads of educational units at early childhood education institutions that consistently implement nature-based learning. Data were collected through participant observation, in-depth interviews, and documentation, then analyzed using thematic analysis. The results show that nature-based learning provides a holistic learning experience that supports children's integrated cognitive, affective, and moral development. Direct interaction with nature builds an emotional bond that serves as the foundation for the gradual formation of environmental stewardship. Learning effectiveness is influenced by educator competence, institutional support, and the availability of a supportive physical environment. This study emphasizes the importance of nature-based learning as a sustainable education strategy in developing environmentally conscious character from an early age.

Keywords: environmental stewardship, early childhood education, nature-based learning.



INTRODUCTION

The increasingly complex global environmental crisis demonstrates that ecological problems are not merely technical but also closely related to human mindsets and behavior. The various forms of environmental damage currently occurring reflect a weak collective awareness of the responsibility for maintaining environmental sustainability. Education is seen as a strategic instrument for shaping sustainability-oriented values and attitudes from the earliest stages of development. Early childhood is a critical period for the formation of character, attitudes, and moral values that will influence individual behavior in later life. Children's early experiences with the environment play a crucial role in building an emotional connection with nature. This emotional attachment forms the basis for the emergence of concern and responsibility for the environment. Environmental stewardship develops gradually through a process of repeated and meaningful internalization of values. Early Childhood Education plays a central role in building the initial foundation of a sustainable environmental attitude (Kamelia et al., 2024).

Environmental awareness formed from an early age is believed to be more enduring than values instilled at a later age. The learning process in early childhood requires an approach that aligns with their developmental characteristics, which are still concrete and exploratory. A learning environment rich in real-world experiences provides opportunities for children to understand nature through direct observation. Active interaction with the environment helps children develop understanding beyond abstraction. Direct experience also strengthens the link between knowledge, attitudes, and behavior. When children recognize nature as part of their lives, a tendency to care for and preserve it emerges (Irawati, 2023). This process is the beginning of the formation of authentic pro-environmental behavior. Environmental stewardship does not develop instantly, but rather through continuous and meaningful learning.

Learning practices in many early childhood education institutions still demonstrate a predominance of classroom-centered activities. The use of visual media and artificial teaching materials often replaces direct experience with the natural environment. This learning pattern has the potential to limit children's opportunities for sensory and emotional exploration. Minimal interaction with nature can lead to a shallow understanding of the environment, disconnected from everyday reality. Children tend to understand the environment only conceptually without supporting real-world experiences. This situation risks weakening the development of a responsible attitude towards the environment. Understanding without experience is often difficult to translate into concrete behavior. This challenge demands a more contextual learning approach oriented toward direct experience (Munawarah & Maemunah, 2022).

Nature-based learning offers an alternative approach that utilizes the environment as the primary learning resource. Nature provides a learning space rich in cognitive, social, emotional, and moral stimulation. Playing in nature allows children to learn naturally through direct interaction with environmental objects and phenomena. The exploratory learning process fosters children's curiosity and sensitivity to their surroundings (Handayani & Ichsan, 2025). Children's active involvement in nature-based activities strengthens meaningful learning experiences. These experiences help children gradually build an emotional connection with nature. A positive emotional connection is an important foundation for developing an environmentally conscious attitude. This approach aligns with the principles of early childhood development, which emphasize learning through concrete experiences.

Integrating nature-based learning into early childhood education (PAUD) has the potential to foster environmental responsibility and awareness from an early age.

Children who are accustomed to interacting with nature tend to demonstrate empathy for living things and their surroundings. Ecological empathy is a crucial component of the concept of environmental stewardship. Learning processes involving nature enable children to understand the consequences of their actions on the environment. This awareness fosters simple behaviors that reflect environmental awareness. Small habits, repeated over time, have the potential to develop into lasting attitudes. Learning focuses not only on cognitive aspects but also on character development. Education that balances knowledge and values is key to successfully developing environmental stewardship.

Although nature-based learning has a strong theoretical foundation, its implementation still faces various challenges. Limited facilities and educators' understanding often hinder the approach. Some educators still view nature as a supplement, rather than a primary learning resource. This perception results in less than optimal use of the surrounding environment in the learning process. Differences in geographic and institutional conditions also influence variations in the implementation of nature-based learning. These challenges highlight the importance of systematic, evidence-based studies. Empirical research is needed to assess the effectiveness of this approach in achieving environmental education goals. Research findings are expected to provide a strong foundation for developing learning practices.

Studies on environmental stewardship in early childhood are still relatively limited compared to other levels of education. Most studies focus more on environmental knowledge than on the formation of attitudes and behaviors. Yet, environmental stewardship encompasses affective, moral, and concrete action dimensions. This gap highlights the need for more comprehensive research. Nature-based learning needs to be studied not only from a methodological perspective but also from its impact on children's value development. Qualitative and contextual approaches can provide a more in-depth understanding. Analysis of children's learning experiences is crucial for understanding the process of stewardship formation. Such research can enrich the scientific literature on early childhood education.

The effectiveness of nature-based learning needs to be systematically tested to serve as a reference in developing educational policies. Strong empirical evidence will assist educators and policymakers in designing relevant and sustainable learning. Environmental education initiated at an early age has the potential to have a long-term impact on ecosystem sustainability. Nature-based learning offers an opportunity to integrate environmental values into children's learning experiences. The success of this approach depends on a sound understanding of children's characteristics and the learning environment. In-depth research can provide practical recommendations for implementation in the field. Research findings are expected to bridge the gap between environmental education theory and practice. This effort is a crucial part of education's contribution to sustainable development.

METHDOLOGY

This research uses a qualitative approach with a case study design to gain an in-depth understanding of the effectiveness of nature-based learning in developing environmental stewardship in Early Childhood Education. A qualitative approach was chosen because the research focuses on the process, meaning, and experiences of children's learning in a natural context, rather than solely on quantitative measurements. Case studies allow researchers to comprehensively explore the phenomenon of nature-based learning within a specific educational unit as a whole and meaningful context.

The research subjects included early childhood education (PAUD), early childhood education (PAUD) educators, and heads of educational institutions implementing nature-

based learning. Subjects were selected purposively, considering their direct involvement in the planning and implementation of nature-based learning. The research location was determined at an PAUD institution that consistently utilizes the natural environment as a primary learning resource in daily learning activities. The location characteristics were selected to ensure a match between learning practices and the research focus.

Data collection techniques included participant observation, in-depth interviews, and documentation. Observations were used to directly observe nature-based learning activities, children's interactions with the environment, and behaviors reflecting environmental stewardship. In-depth interviews were conducted with educators and heads of educational units to explore their understanding, strategies, and reflections on the implementation of nature-based learning. Documentation in the form of lesson plans, child development records, activity photos, and institutional archives served as supporting data to strengthen the research findings.

The primary research instrument was the researcher herself, acting as both observer and data collector. The observation and interview guides were developed based on environmental stewardship indicators, encompassing aspects of children's concern, responsibility, ecological empathy, and pro-environmental behavior. The instrument is flexible to accommodate field dynamics. This flexibility facilitates natural data exploration, tailored to the characteristics of the research subjects.

Data analysis was conducted using thematic analysis techniques through the stages of data reduction, data presentation, and conclusion drawing. Data obtained from various sources were coded to identify patterns, themes, and meanings related to environmental stewardship development. The analysis process was conducted iteratively and simultaneously with data collection to ensure depth of interpretation. The results of the analysis are presented in the form of narrative descriptions that reflect the experiences and practices of nature-based learning.

Data validity was maintained through source and method triangulation techniques. Source triangulation was conducted by comparing data obtained from children, educators, and heads of educational units. Method triangulation was conducted by combining the results of observations, interviews, and documentation. Member checking was also conducted by requesting confirmation from informants regarding preliminary findings to ensure the researcher's interpretations aligned with the reality on the ground.

Research ethics were maintained by adhering to the principles of confidentiality, informed consent, and protection of research subjects. Permission was obtained from the institution and the students' parents prior to data collection. Subject identities were disguised to ensure privacy and comfort. The entire research process was conducted with the best interests of the children as the primary subjects in mind.

DISCUSSIONS AND RESULT

Implementation of Nature-Based Learning in Early Childhood Education

The implementation of nature-based learning in Early Childhood Education reflects a constructivist paradigm that positions children as active subjects in constructing knowledge through real-life experiences. Constructivist theory states that understanding develops optimally when individuals interact directly with their environment. The natural environment serves as an authentic medium that provides simultaneous cognitive and affective stimuli. Learning experiences derived from nature enable children to construct meaning based on concrete interactions. This approach aligns with the view of cognitive development that emphasizes the importance of direct experience in the pre-

operational stage. Exploratory activities designed by educators enrich children's thinking patterns (Rahma et al., 2024). The learning process not only transmits knowledge but also shapes ways of thinking. The implementation of nature-based learning represents meaningful learning rooted in empirical experience.

Children's active involvement in nature-based learning is supported by developmental theory, which asserts that young children learn through play and exploration. Multisensory stimulation gained from interactions with nature strengthens the process of concept formation. Developmental research shows that sensory experiences contribute significantly to the formation of long-term understanding. Interactions with natural elements such as soil, water, and plants enrich children's cognitive representations. These activities also strengthen emotional regulation and attention. Holistic learning occurs when cognitive, affective, and motor aspects are integrated. Natural learning environments enhance children's engagement and intrinsic motivation. The implementation of nature-based learning supports the principles of developmentally appropriate learning.

The role of educators in nature-based learning can be explained through a reflective and facilitative pedagogical approach. Sociocultural theory emphasizes that educators function as mediators who help children construct meaning. Sensitive support for children's responses enables effective scaffolding. Adaptive learning strategies reflect educators' understanding of children's learning dynamics. Continuous observation helps educators tailor learning experiences to individual needs. Dialogic interactions foster language and social development. The resulting pedagogical relationships support children's sense of security and confidence. The role of educators is a key factor in the successful implementation of nature-based learning.

The institutional environment contributes to the success of nature-based learning through structural support and school culture. Ecological educational theory emphasizes that child development is influenced by interconnected environmental systems. School policies that support nature-based learning create a conducive learning climate. Integrating this approach into the curriculum strengthens the consistency of instructional practices. Educator collaboration reflects adaptive organizational learning. A school environment that values exploration fosters pedagogical innovation. Institutional support expands opportunities for sustainable implementation. Nature-based learning thrives in a supportive educational system (Prawesti et al., 2025).

The success of nature-based learning implementation can be observed through the quality of children's engagement and the meaningfulness of the learning experience. The theory of meaningful learning explains that knowledge is more easily internalized when connected to real-life experiences. Children's enthusiasm demonstrates an emotional connection to the learning process. Authentic experiences strengthen knowledge retention and attitude formation. Learning that is relevant to everyday life enhances value transfer. The integration of environmental values occurs naturally through routine activities. Consistent implementation strengthens learning across developmental domains. Nature-based learning demonstrates effectiveness as a comprehensive pedagogical approach.

Developing Environmental Stewardship in Early Childhood through Nature-Based Learning

The development of environmental stewardship in early childhood can be explained through the theory of human attachment to nature. This theory states that an emotional connection to the environment forms the basis for the emergence of environmentally conscious behavior. Direct interaction with nature fosters a sense of

ownership. Nature-based learning facilitates this connection through repeated experiences. Children learn to recognize nature as part of themselves. Affective experiences reinforce the internalization of environmental values. Stewardship develops as a long-term process. Nature-based learning provides optimal conditions for this process.

The dimension of environmental awareness in children is closely related to the development of empathy. Moral development theory explains that empathy emerges through meaningful emotional experiences. Children who interact with nature demonstrate affective responses to environmental conditions. Nature-based learning provides situations that trigger simple emotional reflection. Awareness of the impact of actions on the environment begins to develop. This process fosters the emergence of ecological awareness. Concern develops through concrete experiences, not verbal instruction (Suryadi, 2025). Environmental stewardship is rooted in authentic emotional experiences.

Aspects of environmental responsibility can be explained through behavioral conditioning theory. Pro-environmental behavior is formed through the repetition of simple, meaningful actions. Nature-based learning allows children to see the direct consequences of their behavior. Understanding cause and effect strengthens the formation of responsibility. Children begin to internalize values through daily practice. This process reflects experiential character learning. Responsibility develops with the consistency of experience. Environmental stewardship emerges as part of a child's character formation.

Ecological empathy is linked to the development of moral and affective awareness. Developmental morality theory emphasizes the importance of concrete experiences in shaping values. Caring for plants and observing living things strengthens children's sensitivity. Nature-based learning enables children to build an emotional connection with the environment. This connection strengthens awareness of the interdependence of humans and nature. This awareness forms the basis for ethical attitudes toward the environment. Value learning occurs implicitly through experience. Environmental stewardship develops as a result of the integration of values and emotions.

Continuous learning is a crucial factor in developing environmental stewardship. Social learning theory emphasizes the role of repetition and consistency in the internalization of values. Nature-based learning provides continuous and relevant experiences. Children learn through observation, imitation, and direct experience. This process reinforces the formation of long-term attitudes. Stewardship is not formed instantly, but gradually. Continuous learning reinforces the transfer of values into behavior. Environmental stewardship at an early age lays the foundation for future pro-environmental behavior.

Supporting and Inhibiting Factors of the Effectiveness of Nature-Based Learning in Cultivating Environmental Stewardship

The effectiveness of nature-based learning is greatly influenced by educator competence, which can be explained through the theory of teacher professionalism. Educators' pedagogical knowledge and environmental awareness determine the quality of the learning experience. Educators act as models of pro-environmental behavior for children. Social learning theory emphasizes the importance of role models in developing attitudes. Reflective mentoring strengthens children's learning processes. Educator competence includes the ability to design, observe, and reflect on learning. Professional development is a crucial need. Educator factors are the primary determinants of learning effectiveness.

The physical environment of a school can be explained through developmental ecology theory. Stimulus-rich learning spaces foster children's exploration and engagement. Access to nature enhances authentic learning experiences. A supportive physical environment enriches the variety of learning activities. Nature-based learning leverages the potential of the surrounding environment. The connection between space and the learning process enhances meaningfulness. The physical environment acts as a passive learning agent. These factors strengthen the effectiveness of nature-based learning.

Institutional support relates to educational management theory and organizational culture. Progressive school policies encourage pedagogical innovation. Integrating nature-based learning into the curriculum strengthens the legitimacy of practices. Managerial support facilitates resource availability. A collaborative culture strengthens implementation consistency. Learning organizations foster reflection and continuous improvement. Adaptive institutional environments strengthen learning effectiveness. Systemic factors determine the sustainability of practices.

Implementation barriers can be explained through the theory of resistance to change. Traditional perceptions of learning limit pedagogical innovation. Limited facilities reduce the variety of learning experiences. Safety concerns impact educators' confidence. Lack of training reinforces structural barriers. These barriers impact the quality of implementation. Adaptive strategies are needed to address these challenges. Identifying barriers is the first step towards improvement.

The effectiveness of nature-based learning is determined by the synergy between supporting factors and the ability to overcome obstacles. Educational systems theory emphasizes the interconnectedness of elements in the learning process. Strengthening educator competencies improves implementation quality. Optimizing the school environment broadens children's learning experiences. Policy support strengthens the sustainability of practices. Continuous evaluation enables continuous improvement. Nature-based learning has the potential to foster optimal environmental stewardship. Systemic synergy is key to the success of environmental education for early childhood.

CONCLUSION

Nature-based learning in Early Childhood Education has been proven to provide authentic and meaningful learning experiences through children's direct engagement with the environment. The implementation of this approach reflects a constructivist and developmental paradigm that positions children as active subjects constructing knowledge and values. The role of educators as reflective facilitators is a determining factor in the quality of learning experiences and the successful internalization of environmental values. Institutional environmental support and school policies strengthen the consistency and sustainability of nature-based learning practices. Repeated interactions with nature foster emotional attachments that form the foundation of children's ecological concern and empathy. Concrete experiences enable children to understand the consequences of actions, thus encouraging the emergence of responsibility and pro-environmental behavior. Environmental stewardship at an early age develops gradually through habituation, repetition, and meaningful affective experiences. Sustainable learning plays a crucial role in strengthening the internalization of values and their transfer to daily behavior. The effectiveness of nature-based learning is influenced by educator competence, the availability of the physical environment, and the school's organizational culture. Various implementation barriers require adaptive strategies, ongoing training, and proportionate risk management. Systemic synergy between educational actors improves the quality of implementation and the impact of

learning on environmental character formation. Overall, nature-based learning is a relevant and effective pedagogical approach to foster environmental stewardship from an early age as a foundation for future sustainability..

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