

Exploration of stimulating children's naturalistic intelligence at Bahtera Multiple Intelligence Preschool Malaysia

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Abstract

Naturalist intelligence is a crucial aspect of early childhood development as it encourages children to recognize and directly interact with the natural environment. However, children's interaction with nature has declined due to the dominance of academic curricula and the increasing use of technology in learning, which limits environmental exploration and potentially hinders their cognitive and social development. Amid these challenges, it is essential to understand how learning strategies can be optimized to stimulate children's naturalist intelligence in a contextual manner that reflects the dynamics of field implementation, the challenges encountered, and the solutions adopted. This study employed a descriptive qualitative method using a case study approach. The research subjects were 12 students at Bahtera Multiple Intelligence Preschool, Malaysia. Data collection techniques included observation, interviews, and documentation of learning activities involving children aged 3–4 years. The results indicate that nature exploration, messy play, and nature walks are effective approaches in stimulating naturalist intelligence. These strategies are supported by the use of indoor exploration spaces and nature-based materials as solutions to external constraints such as weather conditions and high exposure to digital technology among children. These findings contribute to the development of adaptive learning strategies tailored to the characteristics of naturalist intelligence in early childhood.

Keywords: Naturalist Intelligence, Nature-Based Learning, Early Childhood, Learning Strategies

INTRODUCTION

Early childhood, particularly between the ages of 3 and 6, is considered a golden period of development during which the brain undergoes rapid growth and demonstrates an exceptional ability to absorb information and explore the environment through active learning and sensory experiences. (Muqodas et al., 2020) Providing appropriate stimulation during this stage is essential to support the optimal development of children's potential. This is why it's crucial to remember that

children learn best by doing. As the saying goes, "Experience is the best teacher." When children actively engage in activities, the knowledge they gain is more deeply ingrained in their minds, making it more likely to be remembered and applied in the future. (Altun et al., 2022)

One fundamental aspect of early childhood development is naturalist intelligence, which relates to a child's ability to understand, appreciate, and interact with the natural world. Naturalist intelligence (Gardner, 1983) refers to an individual's ability to recognize, understand, and interact with the natural environment. Children with high naturalist intelligence tend to show interest in animals, plants, weather phenomena, and other elements of nature. They possess a strong sense of curiosity and enjoy exploring and caring for their surroundings. More than merely a cognitive facet, naturalist intelligence serves as a foundational basis for the development of other intelligences. Therefore, it is essential for teachers to cultivate multiple intelligences in students, enabling them to grow through diverse learning pathways. When students are given opportunities to learn in ways that align with their individual strengths, they can experience significant cognitive, emotional, social, and even physical development (Muqodas et al., 2020). Children who routinely interact with nature tend to exhibit stronger critical-thinking skills, enhanced empathy, and well-developed interpersonal and intrapersonal intelligences (Gumitri and Suryana, 2022)

In recent years, the global education system including in Malaysia has faced significant challenges due to the decreasing interaction of children with the natural environment. This decline is largely attributed to the increased use of digital technologies and an excessive focus on academic achievement. In the context of early childhood education, this trend has resulted in reduced opportunities for sensory exploration and direct engagement with the surrounding environment. Reports from the Malaysian Ministry of Education indicate that most preschool programs still emphasize indoor and screen-based activities, often neglecting the ecological and affective aspects of children's development (Altun et al., 2022)

Stimulating naturalist intelligence in early childhood education is a crucial aspect of fostering environmental awareness from an early age. However, in practice, effective strategies to cultivate this intelligence are still lacking, as many institutions prioritize academic skills over environmental interaction (Wulandari et al., 2021) According to (Gardner, 1983) theory, naturalist intelligence supports critical thinking, problem solving, and environmental empathy. In line with this, environmental education aims to shape individuals, including young children, to be aware, care for nature, and behave in environmentally responsible ways (Priadi and Fatria, 2024)

Each individual uses naturalist intelligence when recognizing plants, animals, and objects in their surroundings. By interacting with the physical environment, children develop an understanding of causality, as they begin to notice the cause-and-effect relationships in nature. (Alhamuddin et al., 2023) This awareness extends to observing patterns in the behavior of animals and plants, as well as changes in weather conditions. As (Gardner, 1983) suggests, intelligence does not operate in isolation; rather, it works in conjunction with other forms of intelligence. In this way, naturalist intelligence complements and enhances other cognitive, emotional, and motor skills, facilitating a holistic approach to problem-solving and development. In line with this, the learning objective in this research is for students to be able to identify and explain various types of natural resources, as well as the efforts required to preserve them (Lutfauziah et al., 2024) In the context of early childhood education, fostering naturalist intelligence encourages children to connect their observations with real-world contexts, promoting a deeper understanding of their environment while nurturing other aspects of their intelligence. (Amri, Amalia, et al., 2021)

Research on strategies used to stimulate naturalistic intelligence is still very limited in the context of early childhood education, most previous studies have mainly focused on general cognitive development or the application of play-based methods without specifically linking them to the development of naturalistic intelligence. In addition, there is still a lack of in-depth research exploring how nature-based learning strategies are applied in preschool education practices in Malaysia, especially

through direct approaches such as nature walks, irregular play, and exploration of natural materials (Romli and Ixfina, 2023). In fact, direct experience with nature plays an important role in fostering children's curiosity and exploration skills (Agustin et al., 2020). Therefore, early childhood educators play a strategic role not only as transmitters of knowledge but also as facilitators, mediators, and communicators in introducing concepts related to nature to children in a meaningful way (Elyana, 2020)

METHOD

This study employs a descriptive qualitative approach with a single case study design to gain an in-depth understanding of how teachers implement strategies to develop naturalist intelligence in children at Bahtera Multiple Intelligence Preschool, Malaysia.

This approach was chosen in line with Creswell (Cresswell, 2012) who emphasizes in-depth exploration of children's naturalist intelligence stimulation. The study involved 3- and 4-year-old children and the teachers engaged in the children's learning process as part of member checking, specifically those implementing naturalist-intelligence stimulation activities at Bahtera Multiple Intelligence Preschool.

The participants in this study were selected using a purposive sampling technique based on recommendations from the preschool institution. The sample consisted of 12 children aged 3–4 years who were actively enrolled at Bahtera Multiple Intelligence Preschool Malaysia. The selection was guided by the school's consideration that children in this age group are still in the early stages of exploration-based learning and are not yet heavily engaged in formal academic instruction such as reading, writing, and arithmetic. As such, their daily activities are primarily centered on play, discovery, and direct interaction with the environment making them ideal participants for a study on naturalist intelligence development. According to (Sugiyono, 2018), purposive sampling is a sampling technique where the selection of participants is based on specific considerations, typically chosen because they are deemed most knowledgeable and capable of providing rich information related to the research focus.

The qualitative data in this research were analyzed using NVivo 12 Plus, which facilitated the systematic organization, coding, and visualization of the data. The analysis followed the interactive model of (Miles and Huberman, 1994) which includes data reduction, data display, and conclusion drawing/verification. Data reduction involved coding relevant segments from interviews and observations using open and axial coding processes in NVivo. Data display was conducted through Word Clouds and Mind Maps, which visually illustrated dominant themes such as "children," "learning," and "nature," confirming the centrality of child-environment interaction within learning practices. Conclusion drawing was iterative and continuously validated throughout the research process to ensure reliability.

The data collection instruments in these research interviews and observations were carefully designed to align with the research objectives, which focus on identifying learning strategies used to stimulate naturalist intelligence, examining how children respond to those strategies, and understanding the challenges faced by educators. The semi-structured interview protocol was developed to explore teachers' insights into the planning and implementation of nature-based learning. Sample questions included: "What types of activities do you use to introduce natural elements to children?", "How do children typically respond to nature-based activities?", and "What obstacles have you encountered when implementing these strategies?" These open-ended questions enabled the participants to elaborate on their experiences and reflect on classroom practices in depth.

In parallel, the observation checklist focused on documenting children's behavioral responses during specific learning activities such as nature walks, messy play, and Bahtera Plus sessions. Observations were conducted using a non-participant approach, allowing the researcher to record spontaneous interactions without interfering in the learning process. The observation indicators were categorized based on children's engagement with natural materials, expressions of curiosity,

environmental empathy, and peer collaboration. For example, during a messy play session, the researcher recorded whether children were able to identify and describe natural textures, initiate imaginative play, or engage in group interaction. This dual approach—interview and observation—provided triangulated data that not only captured the teachers’ intentions and strategies but also reflected the real-time learning experiences of the children, ensuring strong alignment with the study’s objectives.

RESULT AND DISCUSSION

This study observed 12 participants, seven boys and five girls who were between 3 and 4 years old. NVivo software was employed to facilitate the display of important keyword frequencies using the Word Frequency Query feature, which provides informative data visualizations.



Figure 1. Word Cloud (Frequently Occurring Words in the Data)

The word-cloud visualization reveals that “child,” “learning,” and “naturalist” are the most dominant terms in the interview data. This indicates that the primary focus of the learning strategies at Bahtera Multiple Intelligences Preschool is on student-centered learning that stimulates naturalist intelligence.

The dominance of the word “child” indicates that the learning process is centered on children as the primary subjects. This aligns with the student-centered learning approach employed at Bahtera Multiple Intelligences Preschool, where children are given the opportunity to explore independently with teachers serving as facilitators.

The prominence of the word “naturalist” demonstrates that naturalist intelligence is a crucial component of the learning process. Learning strategies such as nature exploration, messy play, and STEAM projects support children in understanding their environment. These activities concur with (Gardner, 1983) view that naturalist intelligence involves the ability to recognize, categorize, and comprehend elements of the natural world.

Additionally, the words “strategy” and “teacher” highlight the important role of teachers in designing learning experiences that support the stimulation of naturalist intelligence. Educators use a range of strategies like outdoor walks, utilizing natural materials, and exploring nature to create engaging and meaningful learning experiences that nurture children’s naturalist intelligence. From an early stage, children are encouraged to observe and understand elements of the natural world, including plants and animals (Zaman et al., 2023).

Furthermore, a mind-mapping visualization of the coded data illustrates the relationships among concepts identified through interview and observation coding. This diagram displays the interconnec-

tions between learning strategies, naturalist intelligence, challenges, and the solutions implemented at Bahtera Multiple Intelligences Preschool.

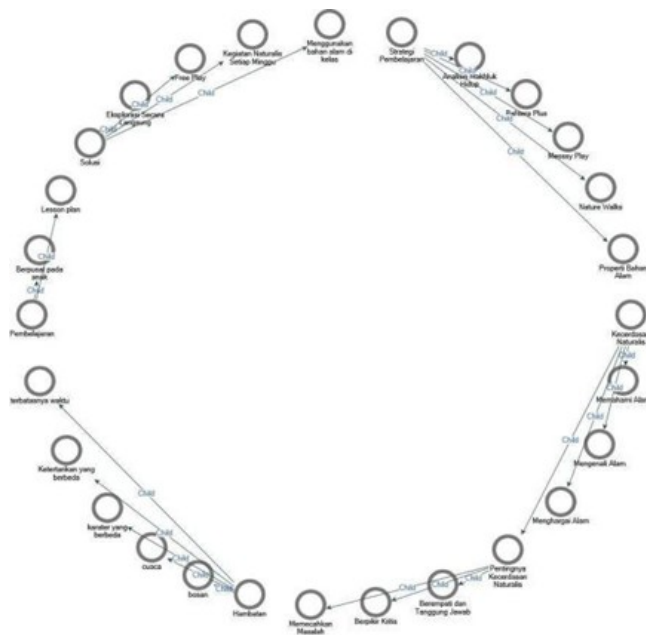


Figure 2. Mind Map of Nature-Based Learning Strategies (Research Findings)

The coding results indicate that the implementation of Gardner's Multiple Intelligences framework at Bahtera Multiple Intelligences Preschool focuses on stimulating various dimensions of children's intelligence, one of which is naturalist intelligence. Naturalist-based learning is delivered through a child-centered approach that provides ample opportunities for environmental exploration. Teachers design activities that engage children actively such as Nature Walks and Messy Play inviting them to interact directly with natural materials like soil, leaves, water, and animals. This approach aligns with the principle that authentic, hands-on experiences serve to reinforce the development of naturalist intelligence (Prayogi, Asy'ari, et al., 2021).

The learning strategies implemented by educators to foster children's naturalist intelligence typically involve a range of exploratory approaches that emphasize multisensory engagement, such as direct interaction with natural elements, observation-based activities, and hands-on experiences. In alignment with these pedagogical practices, the development of this stimulation material is informed by both theoretical perspectives and empirical evidence concerning the optimization of multiple intelligences in kindergarten-aged children. This ensures that the material not only supports the enhancement of naturalist intelligence but also contributes to the holistic development of the child's cognitive, emotional, and perceptual abilities (Agustin et al., 2021). The mind-mapping visualization shows that the dominant strategy is Nature Walks, during which children are invited to observe their surroundings, identify different plant species, and watch small creatures such as caterpillars and butterflies. Additionally, the Messy Play strategy gives children the opportunity to explore the textures of natural materials through free play with soil, water, and sand. This approach aligns with (Gardner, 1983). Multiple Intelligences theory, which classifies human intelligences into several categories one of which is naturalist intelligence, defined as an individual's ability to recognize and understand elements of the natural environment (Ikhlas et al., 2021)

In its implementation, educators face several obstacles in stimulating naturalist intelligence. The primary challenge identified is limited instructional time, especially since outdoor exploration

activities require extended durations. In addition, unpredictable weather often hinders the execution of outdoor activities. Another obstacle is the variation in children's interests and personalities. Not all children exhibit the same level of interest in nature-based activities, so more personalized approaches are necessary to keep each child actively engaged.

To address these challenges, educators have implemented several solutions identified through coding. One solution is to integrate natural materials into classroom activities, such as using leaves, seeds, and soil for indoor sensory exploration. Teachers also design child-centered lesson plans that allow children to choose exploration activities based on their interests (Abdelhak and Romaissa, 2022).

The Free Play approach has proven to be an effective strategy for giving children the freedom to explore their environment according to their individual interests. By providing a flexible exploration space, children become more actively engaged and motivated to understand natural concepts.

According to (Armstrong, 2009) the primary challenge in stimulating naturalist intelligence is children's reduced interaction with nature due to modernization and changing lifestyles. To address this, the following solutions can be implemented:

1. Provide indoor exploration areas that still incorporate natural elements, such as mini-gardens or sensory bins filled with natural materials.
2. Use nature-based learning media, including educational videos and interactive games, to maintain children's connection with the environment

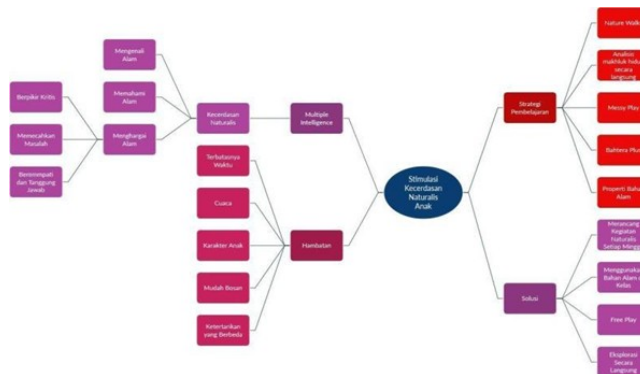


Figure 3. Thematic Diagram of Key Findings on Naturalistic Intelligence Stimulation

The study's findings indicate that naturalist intelligence stimulation at Bahtera Multiple Intelligence Preschool is carried out through various nature-exploration-based learning strategies. NVivo visualization of coding results shows that children's naturalist intelligence is influenced by several factors, including the learning strategies employed, the challenges encountered, and the solutions implemented by educators to support children's development.

Learning strategies used by educators are a primary factor in stimulating children's naturalist intelligence. This aligns with Experiential Learning theory, which states that learning through direct experience can deepen children's understanding of concepts. The following learning strategies were identified in this study:

The nature walk activity involved taking children around the school environment to observe plants, insects, rocks, and other natural elements. The children were provided with magnifying glasses or small containers to collect objects that caught their attention. Upon discovering a leaf with holes or unusual colors, one child asked, "Why is this leaf a different color?" or "Why does this leaf have bite marks?" indicating curiosity and causal thinking.



Figure 4. Nature Walks Activity

This activity aligns with naturalist intelligence as described by (Gardner, 1983), where children are trained to recognize, classify, and understand elements of nature. In the context of experiential learning children gain real experiences through direct observation and reflection facilitated by the teacher (Mufid et al., 2022). Such question reflect curiosity and casual thinking. During this activity, children also appear anthusiastic, which fosters their enjoyment in exploring and encourage them to ask numerous questions. This, in turn, leads them to engage in critical thinking about their discoveries in nature (Indri, Handayani, et al., 2022).

Nature walks successfully foster children's observational skills, cause-effect reasoning, and empathy for living things. Children not only identify objects in nature, but also understand their function and learn to respect living beings demonstrated by a child who remarked, "Don't step on the ant, it will get hurt."

Other preschools can adopt the nature walk approach, even in limited outdoor space, by designing mini "nature trails" in school yards or gardens. This activity enhances environmental awareness, curiosity, and exploration skills, while also encouraging close, detailed observation.



Figure 5. Direct Analysis of Living Organisms

Children were invited to directly observe living organisms such as insects, snails, and caterpillars. In one session, they observed a caterpillar crawling on a leaf. A child asked, "Will the caterpillar turn into a butterfly?", This demonstrates children's curiosity; through learning science, they can explore numerous concepts via nature-based exploration, while also developing social skills as they engage in discussions about their findings (Jelita et al., 2022)

This strategy supports naturalist intelligence, as children analyze the relationship between living creatures and their environment. According to (Gardner, 1983) this activity nurtures biological classification skills. Within Kolb's experiential learning cycle, children observe directly and reflect on their role as natural explorers.

The activity developed early scientific thinking, biological cognition, and a stronger understanding of life cycles. Children also learned to respect small living creatures and comprehend natural

processes in a concrete way (Armstrong, 2009). Through nature play, children are able to engage in learning activities while playing, which also supports the development of their creative thinking skills, as they learn to create, share, and assign value to objects derived from nature (Qiromah et al., 2023).

This can be implemented in school gardens with designated “living organism observation corners.” The benefits include strengthening basic biological concepts, fostering empathy, and increasing children’s social sensitivity toward living beings.



Figure 6. Messy Play

In this activity, children created “ice cream” using a mixture of flour, water, food coloring, and beads. They were free to choose colors, mix ingredients, and decorate their creations. One child said, “This is grape flavor! But just for playing, not for eating.” Another added, “I put toppings for my friend.” These responses reflect not only imaginative thinking, but also social awareness and empathy.

This activity stimulates naturalist intelligence by engaging children with natural-based materials in a way that encourages observation, classification, and creativity. It also activates bodily-kinesthetic and interpersonal intelligences, as children use fine motor skills to mix and shape the materials, while collaborating and expressing ideas with peers. Children engage in a hands-on process, conduct their own experiments, and construct personal meaning. Messy play enhances fine motor skills, imagination, and collaborative abilities. Children learn to create, share, and assign value to objects derived from nature (Armstrong, 2009).

This practice requires minimal cost only teacher creativity. It encourages innovation, early leadership, and healthy free exploration to support emotional and social development.



Figure 7. Bahtera Plus

Bahtera Plus is a weekly program involving natural experiments and creative projects using natural materials. During this activity, children often demonstrated sensitivity to their environment, such as identifying colors from natural items they used. For example, a child said, "Green is the color of vegetables," or identified color changes during mixing activities.

Children learn about physical changes, natural color properties, and how to form simple hypotheses. They also practice teamwork, take turns mixing materials, and report their findings (Armstrong, 2009)

Bahtera Plus can be adapted as a 'Natural Experiment Day' at school, serving as a platform for experiential learning where children engage directly with their environment. During this activity, students are encouraged to observe natural phenomena, ask questions, formulate hypotheses, and test their ideas through hands-on exploration. This process nurtures scientific reasoning as children begin to understand cause-and-effect relationships and draw conclusions based on their observations.



Figure 8. Use of Natural-Material Props

Teachers provide natural materials such as leaves, pebbles, twigs, and seeds to support various daily learning activities. These materials are used in creative and sensory-based tasks, such as making collages, forming letters of the alphabet, sorting by size or color, and exploring different textures. For example, during a texture exploration activity, a child might pick up different objects and compare their surfaces, saying, "This rock is rough, the leaf is smooth." In another instance, a child may use the materials to form shapes or letters, proudly stating, "I made the letter A." This approach reflects (Armstrong, 2009) interpretation of Multiple Intelligences in educational practice, emphasizing that each child has a unique blend of intelligences that can be nurtured through appropriate learning strategies.

This is an example of naturalist intelligence integration in thematic learning. Gardner emphasizes the importance of using diverse learning media tailored to children's intelligences. Experientially, children touch and experiment with real objects from nature. Children develop sensory awareness of textures, creativity in design, and begin to understand symbols and structure using natural materials. The use of nature-based materials is both effective and cost-efficient in classroom settings. This strategy enriches multiple intelligences, particularly for children who may not respond well to artificial or digital media.

Based on the coding results, children's naturalist intelligence developed through three main dimensions:

1. Recognizing Nature

In the initial phase, children learn to distinguish various natural elements through direct observation. They differentiate shapes, colors, and textures of items such as leaves, flowers, and stones. This process is the first step in cultivating curiosity about the environment.

2. Understanding Nature

Through exploration and discussion, children begin to grasp basic concepts such as life cycles, weather changes, and interrelationships among living things. This understanding is reinforced by activities like organism analysis and material exploration.

3. Valuing Nature

The final stage in naturalist-intelligence development is the emergence of empathy and responsibility toward the environment. Children start to exhibit caring behaviors such as not littering, watering plants, and releasing observed animals back into their habitats.

These findings confirm that nature-exploration-based strategies enhance children's observational skills, problem-solving abilities, and environmental awareness. According to (Yidana et al., 2022) naturalist intelligence contributes significantly to the development of critical thinking, environmental empathy, and interpersonal and intrapersonal intelligences.

Moreover, asserts that children who regularly interact with nature demonstrate stronger analytical abilities and enhanced social skills. Therefore, implementing Multiple Intelligences-based learning strategies can be an effective approach in early childhood education (Armstrong, 2009)

Although nature exploration based learning strategies offer many benefits, several obstacles arise in the process of stimulating children's naturalist intelligence. Coding results revealed the following common challenges:

1. Limited Time: A packed instructional schedule allows only a brief window for outdoor exploration.
2. Weather Conditions: Unpredictable weather such as rain or extreme heat often disrupts outdoor activities.
3. Varying Child Characteristics: Not all children show equal interest in nature-based activities; some lose interest quickly or feel less comfortable outdoors.
4. Diverse Interests: Children differ in their preferences some are drawn to animals, others to plants or specific natural materials.

Educators employ multiple solutions to ensure that naturalist-intelligence stimulation remains effective despite these challenges. The implemented strategies include:

1. Weekly Naturalist Activities: Scheduling regular, recurring nature-exploration sessions so that children benefit from consistent, hands-on experiences.
2. Bringing Nature Indoors: When outdoor exploration is not feasible, teachers introduce natural materials (leaves, seeds, soil) into classroom activities for sensory investigation.
3. Free Play with Natural Materials: Allowing children unstructured play time with natural items so they can self-direct their exploration according to personal interests.
4. Group Exploration: Organizing small-group investigations to motivate less-interested children through peer interaction and collaborative discovery.

The findings demonstrate that stimulating naturalist intelligence through nature exploration provides children with meaningful learning experiences. Beyond acquiring factual knowledge about the environment, children cultivate curiosity, develop critical-thinking skills, and foster empathy for nature. The dynamic interplay among learning strategies, encountered obstacles, and applied solutions forms a holistic educational process in which children are active participants rather than passive observers in their own exploration of the natural world.

CONCLUSION

The results of this study indicate that the stimulation of naturalist intelligence in early childhood at Bahtera Multiple Intelligences Preschool is implemented through a variety of nature-exploration-based learning strategies. Strategies such as Nature Walks, Messy Play, Direct Analysis of Living Organisms, the Bahtera Plus program, and the use of Natural-Material Props have proven

effective in fostering children's abilities to recognize, understand, and appreciate the natural environment. The exploratory learning process provides meaningful experiences in which children not only acquire factual knowledge about nature but also develop curiosity, critical-thinking skills, and empathy for the environment.

Although challenges such as limited time, unpredictable weather, and differences in children's interests and characteristics arise, educators successfully address these obstacles through creative solutions: integrating natural materials into indoor classroom activities, employing a Free Play approach, and allowing children the freedom to choose exploration activities that align with their individual interests.

Therefore, the nature-exploration-based learning strategies at Bahtera Multiple Intelligences Preschool not only stimulate naturalist intelligence but also reinforce a student-centered learning approach that positions children as active participants in their own learning. These findings suggest that consistent, structured nature exploration can help children understand, value, and care for the environment from an early age.

AUTHOR CONTRIBUTION STATEMENT

L.S. formulated the research problem, designed the study, and carried out data collection through interviews and observations. M.A. provided guidance during the preparation and academic writing process. I.M. contributed input in structuring the article and supported the overall writing process through to completion. L.M.M. assisted with obtaining research permissions and provided support during the data collection phase.

DECLARATION

The author declares that there is no conflict of interest regarding the publication of this article. The author has no affiliation or involvement with any organization or party that has a financial or non-financial interest in the material or subject discussed in this manuscript.

DATA AVAILABILITY

Due to the involvement of educational participants and ethical considerations, some data cannot be published openly.

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