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ORGANIZING SCIENCE EXPLORATION ACTIVITIES FOR 5- TO 6-YEAR-OLD CHILDREN THROUGH A NATURE-BASED EDUCATION APPROACH IN PRESCHOOLS IN DIEN BIEN PHU WARD, DIEN BIEN PROVINCE

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ABSTRACT

Organizing science exploration activities for 5-6-year-old children through a nature-based education approach plays an important role in preparing children for formal learning in Grade 1. Nature-based education is an early childhood pedagogical orientation that positions nature as a central learning environment and transforms the environment into a significant condition, medium, and third teacher for the holistic development of children. This study examines the organization of science exploration activities for 5-6-year-old children in preschools in Dien Bien Phu Ward, Dien Bien Province. The findings show that although teachers have initially implemented these activities and achieved certain positive outcomes, limitations remain in the activity content, implementation process, teacher pedagogical capacity, and supporting conditions. These limitations need to be addressed in order to improve the quality and effectiveness of nature-based science exploration activities in preschool education.

KEYWORDS: Science exploration activities; nature-based education; preschool children; 5E instructional model; early childhood education

1. INTRODUCTION

Organizing science exploration activities through a nature-based education approach for 5-6-year-old children plays a core role in preparing children for Grade 1. At this age, children have a strong need to understand the world around them, and their visual-representational thinking develops rapidly. Therefore, learning activities connected with nature help children develop observation, logical thinking, life skills, and love for the natural world (Kuo et al., 2019; Louv, 2005; Nguyen & Le, 2023; Roslund et al., 2020).

However, due to limitations in physical facilities and educational spaces in preschool institutions, as well as constraints in teacher capacity to organize educational activities, nature-based science exploration has not yet been implemented effectively. In addition, parental psychological concerns about child safety outside the classroom also create barriers to implementation. This article discusses

the role, implementation process, and current limitations in the organization by teachers of science exploration activities for 5-6-year-old children through a nature-based education approach in preschools in Dien Bien Phu Ward, Dien Bien Province.

2. RESEARCH METHODS

The study employed theoretical analysis and synthesis to review relevant scientific studies on the organization of science exploration activities for 5-6-year-old children through a nature-based education approach in preschools. This method was used to generalize the theoretical issues addressed in the study (Christidou, 2008; Dillon et al., 2006; Kuo et al., 2019; Louv, 2005; Nguyen & Le, 2023; Roslund et al., 2020).

The study also used observation and survey methods. Direct observations were conducted in several science exploration activities for 5-6-year-old children in preschools in Dien Bien Phu Ward, Dien Bien Province. A survey on the current status of nature-based science exploration activities was administered to teachers in five preschools: 7/5 Preschool, 20/10 Preschool, Hoa Hong Preschool, Hoa Mai Preschool, and Him Lam Preschool. Educational plans of teachers were also analyzed to clarify the current situation. In-depth interviews with teachers were conducted to obtain additional qualitative evidence. The survey results were processed using a five-point Likert scale and analyzed qualitatively.

3. RESEARCH RESULTS AND DISCUSSION

3.1. Theoretical Basis for Organizing Science Exploration Activities for 5-6-Year-Old Children through a Nature-Based Education Approach

i. The Importance of Organizing Science Exploration Activities for 5-6-Year-Old Children in Preschools

In preschool education, organizing science exploration activities for 5-6-year-old children through a nature-based approach refers to the process of enabling children to observe, experience, and solve problems related to nature through play, experiments, exploration, and practical experiences. These activities stimulate the curiosity of children, develop logical thinking and foundational cognitive skills, and nurture love for nature and life among children. Through such activities, children practice observation, questioning, and knowledge accumulation about the natural and social world, thereby developing cognitive competence and becoming better prepared for learning in Grade 1. Nature-based education is an early childhood pedagogical form that positions nature as the central learning environment rather than as a supplementary activity. In this approach, the environment functions as a condition, a medium, and the third teacher supporting the optimal development of children (Louv, 2005; Roslund et al., 2020; Walker & Shore, 2015).

Science exploration activities in preschools support children cognitive and thinking development by stimulating curiosity and the desire to learn. They create an environment in which children use multiple senses to classify, compare, predict objects and phenomena, and solve simple problems. Louv (2005) analyzed the cost of the alienation of children from nature, including reduced sensory use, difficulty

concentrating, and increased physical and emotional problems. Roslund et al. (2020) showed that children contact with biodiversity in daycare settings can support immune regulation and health-related microbiota. Kuo et al. (2019) argued that converging evidence supports a causal relationship between experiences with nature and learning through pathways such as attention restoration, stress reduction, self-discipline, physical activity, motivation, calm and safe learning contexts, social connection, autonomy, and creative play.

Nguyen and Le (2023), in their synthesis of nature-experience-oriented educational activities for preschool children, identified three main content strands: observing nature, making objects from natural materials, and playing in nature. They also provided guidance for designing preschool environments such as sand and water areas, fairy gardens, school gardens, nature corners, and small animal-care areas. Their work highlights the importance of natural environments and nature-based education for preschool the development of children.

Nature-based science exploration activities provide children with elementary knowledge by helping them develop practical and accurate understandings of life, natural phenomena, the characteristics of familiar objects and events, changes in weather and seasons, and the value of close contact with nature. These activities also cultivate age-appropriate life skills, including independence, confidence, communication, and teamwork through practical activities and experiments using familiar natural materials.

ii. The Process of Organizing Science Exploration Activities for 5-6-Year-Old Children through a Nature-Based Education Approach

Nature-based science exploration activities can be organized through a five-step process: Engage, Explore, Explain, Elaborate, and Evaluate. This child-centered process transforms natural phenomena into practical learning experiences. It helps children develop critical thinking, problem-solving skills, and long-term learning motivation through hands-on participation.

The 5E instructional model includes Engage, Explore, Explain, Elaborate, and Evaluate. It is learner-centered, emphasizes experiential learning, and supports children in constructing knowledge through direct interaction with phenomena and materials.

Engage: The teacher activates and elicits the prior knowledge and experiences of children and helps them participate in a new activity. New objects or phenomena are connected with the previous experiences of children and observations, including objects, phenomena, natural environments, materials, and tools. This stage also builds relationships among children, between children and the teacher, between children and the surrounding environment, and between children and learning materials.

Explore: The teacher provides a general orientation for exploration activities, organizes the experiences of children, and guides and supports them in directly exploring objects or phenomena. Children may observe objects, phenomena, and environments; design objects; conduct experiments; and collect data from exploration activities. The aim is for children to participate directly in experience and practice in order to seek answers. Teachers should provide open-ended tools and materials so that children can experiment, observe, manipulate, and collect data independently rather than simply watching the teacher demonstrate. Children may work individually or in groups, use their senses to explore, and record results in their own ways.

Explain: The teacher organizes opportunities for children to share what they have discovered, express their feelings, and exchange observations with peers. At this stage, the teacher may introduce new terms and scientific concepts to help children perform learning tasks more effectively. The aim is to share exploration results and standardize knowledge. The teacher encourages children to present their findings and ideas after the experience, acts as a facilitator, synthesizes children responses, and introduces accurate scientific terminology and concepts. Children are guided to use language to express ideas and listen to explanations from the teacher or peers in order to understand the essence of the phenomenon.

Elaborate: The teacher creates an exploratory environment, including space, opportunities, and materials, so that children can apply what they have discovered and constructed to solve practical tasks. Teachers need to create appropriate challenges through questions and tasks in order to extend the understanding and skills of children. The aim is to help children broaden and apply new knowledge in real-life situations or new contexts. Teachers may ask extension questions such as What would happen if? or assign design and problem-solving tasks related to the lesson. Children are guided to apply newly learned knowledge to create products or solve practical problems.

Evaluate: The teacher assesses children on the basis of their attitudes, behaviors, and outcomes during exploration activities. Assessment focuses on the ability of children to collect information, participate actively in discussion, present exploration results, follow the process of creating products, and demonstrate learning through records or products. These forms of assessment help teachers adjust the organization of activities and provide support so that children can achieve the intended objectives. Teachers may use short tasks, quick questions, observation, final products, self-assessment, and peer assessment. The aim is to evaluate the extent to which children have developed understanding, skills, and personal progress.

iii. Conditions for Organizing Science Exploration Activities for 5-6-Year-Old Children through a Nature-Based Education Approach in Preschools

To organize nature-based science exploration activities effectively, preschools need to satisfy several basic conditions.

First, the the natural environment of the school should be rich and accessible. Schools need green campuses, spacious gardens, convenient activity spaces, flower beds, areas for experiences with soil, sand, gravel, and water, and sufficient natural materials in classrooms such as leaves, dry branches, and seeds so that children can interact with nature safely and effectively.

Second, physical facilities, learning materials, and equipment should be adequate. Activity spaces should be sufficiently large for movement and physical participation. Schools need observation, measurement, and experiment tools suitable for young children, such as magnifying glasses, binoculars, thermometers, balance scales, measuring containers, specimen trays, mini-gardening tools, and spaces for displaying products created by children.

Third, teachers need professional competence in organizing exploration activities. They should have basic biological and environmental knowledge, skills in using natural materials in educational activities, questioning techniques, and the ability to design inquiry processes for children, including the 5E process of Engage, Explore, Explain, Elaborate, and Evaluate.

Fourth, the educational plan should be flexible. The curriculum should maximize outdoor activities, allow children to get messy, observe the life cycles of plants and animals, and explore weather patterns. In this way, nature becomes a powerful teacher in the learning of children.

3.2. Current Status of Organizing Science Exploration Activities for 5-6-Year-Old Children through a Nature-Based Education Approach in Preschools in Dien Bien Phu Ward, Dien Bien Province

A survey was conducted with 98 teachers from five preschools in Dien Bien Phu Ward, Dien Bien Province, to examine the process of organizing nature-based science exploration activities for 5-6-year-old children. The results are presented in Table 1

Table 1. Evaluation by Teachers of the Process of Organizing Nature-Based Science Exploration Activities for 5-6-Year-Old Children in Preschools in Dien Bien Phu Ward, Dien Bien Province (n = 98)

Steps in the Process	Very poor	Poor	Average	Good	Excellent	Mean	Rank
Stimulating and eliciting the prior knowledge and experiences of children	0	0	48	33	17	3.68	1
Organizing the experience of children and exploration	0	0	49	32	17	3.67	2
Guiding children to explain what they have discovered and supporting them in	0	10	36	35	17	3.60	3

Steps in the Process	Very poor	Poor	Average	Good	Excellent	Mean	Rank
clarifying concepts and task requirements							
Creating an environment for children to apply what they have discovered	0	13	36	33	16	3.53	5
Assessing children on the basis of attitudes, behaviors, and activity outcomes	0	10	38	32	18	3.59	4
Overall mean						3.61	

The statistical results show that the process of organizing nature-based science exploration activities for 5-6-year-old children in preschools in Dien Bien Phu Ward, Dien Bien Province, was rated by teachers as relatively good but still at a low level, with an overall mean score of 3.61. The results also indicate that the implementation of the steps was not yet consistent and the level of performance was not high.

The highest-rated step was stimulating and eliciting the prior knowledge and experiences of children, with a mean score of 3.68, corresponding to a relatively good level of implementation. The lowest-rated step was creating an environment for children to apply what they had discovered, with a mean score of 3.53. Although this score still falls within the relatively good range, it is close to the average level; notably, 13 out of 98 teachers, accounting for 13.26%, rated this step as poor.

The fifth step, assessing children on the basis of attitudes, behaviors, and activity outcomes, also received a modest result, with a mean score of 3.59. This step needs improvement, especially because 10 out of 98 respondents, or 10.2%, rated its implementation as poor.

Analysis of lesson plans of teachers showed that most activities were conducted mainly inside classrooms and were only weakly connected to the natural environments of children such as school gardens, experiential corners, and outdoor landscapes. Teachers mainly guided children to examine and explore the characteristics of objects and phenomena, observe, discuss, conduct experiments, collect information in different ways, classify objects by various signs, recognize simple relationships among objects and phenomena, solve simple problems, and express understanding through play, music, and art activities.

Interviews with teachers (T1, T2, T3, and T4) indicated that the greatest difficulty in organizing nature-based science exploration activities was the learning environment. Physical facilities were limited, and school gardens and experiential corners were not sufficiently diverse, rich, spacious, or open for the experiences of children. Taking children outside the school campus also created difficulties related to

finance, parental consent, and the management of child safety. In addition, teacher competence in designing and organizing nature-based science exploration activities remained limited, especially in relation to integrated pedagogical knowledge and skills.

In general, the process of organizing nature-based science exploration activities for 5-6-year-old children in preschools in Dien Bien Phu Ward has been initially implemented and has achieved relatively good results. However, several steps require further improvement, especially creating environments for children to apply what they have discovered, assessing children through attitudes, behaviors, and activity outcomes, and guiding children to explain what they have discovered while clarifying concepts and task requirements.

To examine the issue more deeply, the study investigated the conditions for organizing nature-based science exploration activities for 5-6-year-old children in preschools in Dien Bien Phu Ward, Dien Bien Province. The results are presented in Table 2.

Table 2. Conditions for Organizing Nature-Based Science Exploration Activities for 5-6-Year-Old Children in Preschools in Dien Bien Phu Ward, Dien Bien Province (n = 98)

Conditions	Not met	Minimally met	Partially met	Relatively met	Met	Mean	Rank
A rich natural environment in the school	0	0	52	31	15	3.62	1
Physical facilities, learning materials, and equipment	0	13	36	32	17	3.54	2
Teacher competence in organizing exploration activities	0	13	38	31	16	3.51	4
Flexible educational planning	0	13	38	30	17	3.52	3
Overall mean						3.54	

The survey results show that the conditions for organizing nature-based science exploration activities for 5-6-year-old children in preschools in Dien Bien Phu Ward were relatively met, with an overall mean score of 3.54, approaching the partially met level. Among the surveyed conditions, a rich natural environment in the school received the highest mean score of 3.62 and was rated as relatively met.

Teacher competence in organizing exploration activities received the lowest mean score of 3.51. In this condition, 49 out of 98 responses, accounting for 50%, rated teacher competence as minimally met or partially met. This finding can be explained by the influence of traditional teacher education and

professional habits, in which teachers are accustomed to educating children within the four walls of the classroom or, at most, the schoolyard. Spaces beyond the classroom have not yet been regularly and effectively used by teachers as learning environments.

In addition, flexible educational planning has not been used effectively. Teachers still lack flexibility in developing school educational plans and tend to be cautious because of concerns about mistakes and responsibility; therefore, their creativity remains limited.

Observation of school gardens and creative corners for children in the five surveyed preschools showed that the campuses were not sufficiently spacious. The systems of trees and flower beds were not diverse or rich, and there were few wide spaces for children to explore areas such as sand and water zones, fairy gardens, school gardens, nature corners, and small animal-care areas.

4. RESEARCH RESULTS AND DISCUSSION

This study examined the organization of science exploration activities for 5-6-year-old children through a nature-based education approach in preschools in Dien Bien Phu Ward, Dien Bien Province. The study clarified the educational value of connecting early science learning with natural settings and proposed a five-step process comprising engagement with children's prior knowledge and experience, direct exploration, explanation and conceptual clarification, application, and assessment. This process provides a practical framework for integrating scientific inquiry, play, observation, experimentation, and discussion in developmentally appropriate learning experiences.

The empirical findings indicate that nature-based science exploration activities have received initial attention in the surveyed preschools, but their implementation has not yet been consistent or sufficiently effective. Teachers rated the overall implementation process at a relatively good level ($M = 3.61$), while the conditions supporting such activities received a lower overall rating ($M = 3.54$). The strongest aspect was the stimulation and elicitation of children's prior knowledge and experience ($M = 3.68$). In contrast, creating opportunities for children to apply what they had discovered ($M = 3.53$), assessing learning through attitudes, behaviors, and activity outcomes ($M = 3.59$), and guiding children to explain their findings remained comparatively weak. Teacher competence was the least adequately met supporting condition ($M = 3.51$). Observations and interviews further showed that activities were still concentrated mainly inside classrooms, whereas school gardens, nature corners, outdoor spaces, and community environments were not used regularly or effectively.

These findings suggest that improving the quality of nature-based science education requires coordinated action at several levels. Preschool teachers need professional development in designing inquiry-oriented activities, managing experiential learning outdoors, facilitating children's explanations, and using observation-based assessment. Schools should enrich accessible natural learning environments with diverse plants, sand and water areas, small gardens, and flexible exploration corners, while adapting educational plans to local seasonal and ecological conditions. Administrators should also provide appropriate time, materials, safety procedures, and professional

support. Cooperation with families is essential to address safety concerns and extend children's opportunities to explore nature beyond school. Under these conditions, nature-based science exploration can strengthen scientific knowledge, inquiry skills, curiosity, autonomy, collaboration, and environmental responsibility.

The study is limited by its descriptive design and by its focus on 98 teachers from five preschools in one ward; therefore, the findings should not be generalized to all preschool contexts without caution. In addition, the study primarily reflects teacher evaluations, document analysis, interviews, and observations rather than direct measurement of changes in children's learning and development. Future research should include larger and more diverse samples, examine differences across urban and rural settings, and employ experimental or longitudinal designs to evaluate the effects of nature-based science activities on children's scientific thinking, language, social-emotional development, and environmental attitudes. Further studies should also validate appropriate assessment instruments and professional-development models for sustainable implementation in preschool practice.

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