



Exploring the Natural Environment Through Direct Experience in Developing Naturalist Intelligence in Early Childhood Based on Insight

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ARTICLE INFO	ABSTRACT
Keywords: Naturalist intelligence Natural exploration Direct experience Insight Early childhood.	<i>This study aims to describe the process of exploring the natural environment through direct experience in developing naturalist intelligence in early childhood based on insight. The study employed a descriptive qualitative approach with 15 students of TK PKK (Kindergarten of Family Welfare Education) in Pademawu District, Pamekasan as research subjects. Data were collected through participatory observation, interviews, and documentation during exploration activities to the "Api Tak Kunjung Padam" (Eternal Flame) site in Tlanakan Village. Learning activities included a journey using a traditional vehicle (odong-odong), observation of the natural fire phenomenon, fish-grilling activities, introduction to fish body parts, and a communal meal. Data analysis employed the interactive model of Miles and Huberman. The results indicate that direct nature exploration successfully developed various indicators of naturalist intelligence, including the ability to observe with focus and detail (90%), asking questions about natural phenomena (80%), identifying organism parts (85%), environmental awareness (75%), and connecting natural knowledge with daily life (70%). The process of insight formation occurred when children related new phenomena to prior knowledge, as seen when children connected natural gas to cooking gas at home and made analogies between different experiences. This study contributes to a nature-based learning model utilizing local natural potential that can be replicated by early childhood education institutions to optimize naturalist intelligence development from an early age.</i>

INTRODUCTION

Early childhood education constitutes the foundational stage for character formation and cognitive development that unfolds across the entire course of human life (Afnan, Aswir, & Haidir, 2024). At this stage, children are situated in the golden period of development, during which the brain reaches its optimal growth phase and all forms of stimulation yield long-term consequences for the quality of future life. Howard Gardner, through his theory of multiple intelligences, identifies eight distinct types of human intelligence, one of which is naturalist intelligence, referring to the capacity to recognize, categorize, and engage meaningfully with natural elements in the surrounding environment (Legowo, 2024). Naturalist intelligence enables individuals to remain sensitive to natural phenomena, comprehend the life patterns of organisms, and establish a harmonious relationship with the environment.

Naturalist intelligence represents a capacity that must be cultivated from an early age through early childhood education. Through this intelligence, children learn to cherish and protect nature while developing heightened sensitivity toward the environment, including plants, animals, and natural formations such as mountains and clouds. In daily life, naturalist intelligence should be consistently engaged through activities such as gardening, maintaining environmental cleanliness, and understanding which actions are harmful to nature (Sumitra & Panjaitan, 2019).

A prevailing challenge in contemporary education is the diminishing opportunity for students to interact directly with the natural world (Johnstone et al., 2022). Technological advancement and urbanization have fundamentally altered societal patterns of living, including approaches to educating younger generations. Many early childhood education institutions have increasingly shifted their focus toward indoor learning using visual media such as illustrations (Maghfiroh & Suryana, 2021). While such methods hold educational merit, classroom-confined learning fails to provide the rich and comprehensive sensory experience that children require. Students are deprived of opportunities to touch soil, feel the breeze, listen to birdsong, or observe the shifting colors of the sky. This condition results in suboptimal development of naturalist intelligence due to the absence of direct stimulation from the natural environment.

Louv, in his book "Last Child in the Woods," describes the phenomenon of nature deficit disorder, a condition in which children experience disconnection from the natural world, with consequences for multiple dimensions of development, including physical, emotional, and cognitive health (Sullivan, 2006). Children who rarely engage with the natural world tend to exhibit limited imagination, reduced creativity, and difficulty comprehending concepts of ecology and environmental sustainability. This constitutes a serious concern, as future generations will confront complex environmental challenges that demand sensitivity and profound understanding of nature.

Several prior studies have examined themes relevant to the present research. First, a study by Sugiyana entitled "Exploration of Stimulating Children's Naturalistic Intelligence at Bahtera Multiple Intelligence Preschool Malaysia" found that a structured naturalist intelligence stimulation program incorporating nature exploration and nature walk activities substantially advanced the attainment of

naturalist intelligence indicators (Sugiyana, Agustin, Muqodas, & Mustafa, 2025). The difference between this research and that research lies in the use of a specific local natural phenomenon, namely the “Api Tak Kunjung Padam”, as the main learning medium which has never been studied before in the context of early childhood education. Second, a study by Johnstone et al. conducting a systematic review of 36 studies on nature-based early childhood education concluded that this approach yields positive effects on children’s social, emotional, and cognitive development. That review emphasized the need for systematic and measurable program design so that the benefits of nature-based learning can be experienced equitably by all students. Third, research by Fjørtoft demonstrated that open natural environments as arenas for play and learning provide more complex developmental stimulation compared to artificial environments (Fjørtoft, 2021). These three prior studies collectively provide the empirical foundation for the present research and situate it within the broader framework of nature-based early childhood education in Indonesia.

Indonesia, particularly in rural areas such as Pademawu District, Pamekasan Regency, still possesses rich and diverse natural resources that can be utilized as direct learning resources for students. One remarkable natural phenomenon found in the Pademawu region is the “Api Tak Kunjung Padam” (Eternal Flame) located in Tlanakan Village. This natural occurrence involves the continuous combustion of natural gas seeping from the earth and has long been embedded in the local community’s cultural heritage (Alfiah, Qiroah, Maysaputri, & Saputra, 2024). The presence of such a natural resource warrants systematic optimization as an authentic and meaningful learning medium for young children, yet in practice, relatively few educational institutions have harnessed its pedagogical potential in a structured manner.

Preliminary observation at TK PKK in Pademawu District revealed that the learning process remained predominantly conducted indoors using textbooks and worksheets. Outdoor activities were generally limited to play within the school grounds or designated recreational areas. No structured program existed to direct students toward direct exploration of the broader and more diverse natural environment. Yet the distance between the school and nature-based learning resources such as the Api Tak Kunjung Padam site is relatively accessible by simple means of transportation. This condition reflects a significant gap between the available natural learning potential and its actual utilization in educational practice.

The constructivist learning theory developed by Piaget emphasizes that children learn through direct experience and active interaction with their environment. Piaget asserts that knowledge is actively constructed by children through the processes of assimilation and accommodation in response to new experiences (Wardani, 2022). Within the context of naturalist intelligence development, direct interaction with nature provides children with opportunities to observe, explore, inquire, and arrive at their own conclusions. This process is far more meaningful than merely viewing illustrations or hearing narratives about nature. When children touch river water, feel the texture of sand, or witness a flame burning, the body’s sensory systems operate simultaneously to form robust long-term memories.

Teachers, in their role as facilitators, guide children in exploring the natural world, posing questions that stimulate critical thinking, and supporting children in constructing new understandings grounded in direct experience (Kusuma, Boeriswati, & Supena, 2023). Experience-based learning in nature is also aligned with the scientific learning approach, which encompasses observing, questioning, gathering information, reasoning, and communicating learning outcomes (Yolanda, 2018).

Research conducted by Fjørtoft in Norway demonstrates that children who frequently play and learn in natural environments exhibit superior motor skills, creativity, and social competencies compared to those who spend more time in artificial settings. These findings reinforce the argument that natural environments provide more complex and diverse stimulation that fosters holistic child development. In Indonesia, comparable research remains limited, particularly that which investigates how local natural phenomena can be integrated into early childhood education programs (Fjørtoft, 2021).

The concept of insight in learning refers to a profound understanding that emerges suddenly when an individual is able to perceive the relationship between previously disconnected elements of information (Dere, 2024). Insight-based learning in early childhood can be facilitated through direct experiences rich in sensory and emotional stimuli. When children witness the Api Tak Kunjung Padam phenomenon firsthand, observe the fish-grilling process, and learn about fish anatomy, they do not merely acquire factual information but also experience moments that construct comprehensive and meaningful understanding.

The urgency of this research stems from the need to develop a learning model that harnesses local potential as an authentic source of learning. The Api Tak Kunjung Padam phenomenon in Tlanakan Village represents a distinctive natural asset of considerable educational value, yet it remains largely underutilized within the formal educational context (Alfiah et al., 2024). This study seeks to address that gap by designing and implementing a learning program that integrates direct nature exploration to develop naturalist intelligence among students at TK PKK in Pademawu District. Prior research has demonstrated that nature-based learning yields positive outcomes for both cognitive and affective development in early childhood. Louv affirms that direct contact with nature constitutes a fundamental developmental need for children, and its absence adversely affects concentration, creativity, and sensory acuity (Louv, 2008). Kellert adds that direct experiences in the open environment more effectively foster curiosity, problem-solving abilities, and a love of nature than media-based or digital learning approaches (Kellert, 2012). Kyttä reinforces these findings by demonstrating that stimulus-rich natural environments offer far more diverse affordances, or exploratory opportunities, for children compared to constructed settings (Kyttä, 2004). Meanwhile, Chawla found that early childhood nature experiences contribute substantially to the formation of ecological identity and long-term environmental stewardship (Chawla, 2015). These studies collectively reinforce the urgency of the present research in presenting a contextual nature-based learning model rooted in local potential. The designed activities include a visit to the Api Tak Kunjung Padam site, fish-grilling, introduction to fish anatomy, and a communal meal as forms of social and cultural learning.

The novelty of this study lies in the integration of a specific local natural phenomenon as a medium for insight-based naturalist intelligence learning in early childhood. Unlike prior studies that generally employ generic natural settings such as parks or gardens, this research utilizes a distinctive geological phenomenon in the form of a natural fire source, which carries local cultural value and the potential to build foundational scientific understanding in young children. The aforementioned study on stimulating children’s naturalistic intelligence in Malaysia places greater emphasis on activities such as nature exploration, messy play, and nature walks as strategies for stimulating naturalist intelligence (Sugiyana et al., 2025). The present research, by contrast, focuses more directly on hands-on environmental exploration through a field visit and fish-grilling activities, involving the observation of natural fire phenomena, the identification of fish body parts, and a communal meal. Furthermore, this study integrates an experiential learning approach with insight analysis, a combination rarely applied at the early childhood education level. The use of traditional transportation in the form of an *odong-odong* as part of the educational journey also constitutes a distinctive element that enriches the cultural and local wisdom dimensions of the learning experience (Aji, 2023).

This study is also expected to raise public awareness of the educational value of local natural phenomena that have thus far been perceived primarily as tourist attractions or elements of everyday life without their pedagogical potential being fully realized. Grounded in this background, the present study seeks to address the following question: How can nature exploration through direct experience develop naturalist intelligence in early childhood at TK PKK in Pademawu District, and how does the process of insight formation unfold during nature-based learning? Through a thorough analysis of the learning process and its outcomes, this study is expected to contribute to the advancement of more holistic, contextual, and sustainable early childhood educational practice.

LITERATURE REVIEW

a. Naturalist Intelligence in Early Childhood

Naturalist intelligence is one of eight types of multiple intelligences identified by Howard Gardner. This intelligence is defined as the capacity of an individual to recognize, categorize, and comprehend living organisms and natural phenomena within the surrounding environment (Gardner, 2000). Children with well-developed naturalist intelligence demonstrate heightened sensitivity to differences and similarities among species, exhibit the ability to observe patterns in nature, and display profound concern for environmental conservation. From an early age, naturalist intelligence begins to form through direct interaction with the immediate surroundings, such as observing pets, touching plants, or noticing changes in weather.

A study conducted by Sumitra and Panjaitan demonstrated that naturalist intelligence in early childhood can be optimally developed through field trip methods that provide children with direct interaction with the natural world (Sumitra & Panjaitan, 2019). Children who actively engage in nature exploration activities exhibit substantial gains in their ability to classify objects, identify differences among organisms, and demonstrate empathy toward the environment. These findings align with Chenfeld's view that children learn most effectively when all senses are simultaneously activated within a real experience (Chenfeld, 1992). The multisensory stimulation available in open natural environments cannot be entirely replicated by visual media within the classroom setting.

Indicators of naturalist intelligence in early childhood encompass several dimensions, including the ability to observe natural phenomena in detail, ask questions about the environment, identify and classify organisms, and demonstrate concern for environmental preservation (Musfiroh, 2008). These dimensions develop progressively in accordance with children's cognitive developmental stages. By the age of five to six years, children are already capable of distinguishing among various types of plants and animals, comprehending simple cause-and-effect relationships within ecosystems, and expressing curiosity toward the natural phenomena they encounter (Suyanto, 2005). Appropriate stimulation at this stage establishes the groundwork for ecological understanding that will continue to evolve throughout a lifetime.

b. Experience-Based Learning (Experiential Learning)

Kolb's theory of experiential learning asserts that the most meaningful learning process unfolds through a four-stage cycle, namely concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 2014). Young children are situated within the concrete experience phase; consequently, learning that involves direct interaction with real objects is considerably more effective than abstract or verbalistic instruction. This premise is reinforced by Piaget's constructivist theory, which holds that knowledge is actively constructed by children through processes of assimilation and accommodation toward new environmental experiences (Piaget, 1952). Nature-based learning has been empirically proven to yield positive effects on holistic child development. In Indonesia, the development of outdoor learning programs within early childhood education institutions remains relatively limited, particularly in regions whose local natural potential has yet to be systematically optimized as a formal learning resource.

c. The Concept of Insight in Early Childhood Learning

The concept of insight in cognitive psychology refers to a profound understanding that emerges suddenly when an individual successfully perceives the relationship between previously disconnected elements of information (Dere, 2024). Within the context of early childhood learning, insight occurs when children are able to connect newly acquired knowledge from direct experience with prior knowledge already stored within their cognitive structures.

For young children, powerful sensory experiences such as touching, smelling, or directly observing a phenomenon act as catalysts for such cognitive restructuring. This approach differs fundamentally from transmissive instruction, which positions children as passive recipients of information. Teachers function as facilitators who design authentic learning experiences, pose open-ended questions that stimulate divergent thinking, and create spaces for children to freely articulate their ideas. Kusuma, Boeriswati, and Supena affirm that the active facilitative role of the teacher in experience-based learning is a determining factor in the quality of the insight process that unfolds in children (Kusuma et al., 2023).

d. Local Natural Phenomena as Authentic Learning Resources

Authentic learning resources are all elements within the real-world environment that can serve as meaningful instructional media by virtue of their direct relevance to learners' lives (Herrington & Herrington, 2006). Utilizing local natural phenomena as authentic learning resources provides children with a concrete context for constructing knowledge while simultaneously nurturing a sense of belonging and responsibility toward the surrounding environment. Alfiah et al. argue that natural phenomena such as the natural fire source found in Tlanakan Village, Pamekasan, possess rich ethnophysical value and can serve as an initial scientific learning medium for young children (Alfiah et al., 2024). This geological phenomenon not only introduces the concepts of energy and changes in states of matter in a concrete manner but also embodies local cultural wisdom that connects children with the cultural identity of their region.

Approaches grounded in local wisdom within early childhood education have garnered increasing attention from education researchers. The integration of local cultural knowledge into early childhood curricula has been shown to enhance learning motivation, strengthen cultural identity, and cultivate an appreciative attitude toward the local natural environment (Pepi, 2024). Sugiyana, in their research at Bahtera Multiple Intelligence Preschool Malaysia, found that structured nature exploration activities, including nature walks and messy play, effectively stimulated the indicators of naturalist intelligence in preschool-aged children (Sugiyana et al., 2025). That research demonstrated that systematically designed naturalist intelligence stimulation programs yield more optimal outcomes compared to unplanned exploration activities.

The utilization of traditional transportation such as the odong-odong as part of the educational journey adds a supplementary dimension to the learning process. Aji examines how the odong-odong, as a traditional recreational vehicle, provides an open-air riding experience

that simultaneously stimulates children's senses, in contrast to enclosed motor vehicles that limit children's interaction with the surrounding environment (Aji, 2023). Travel in an open vehicle encourages children to actively observe and respond to visual, auditory, and kinesthetic stimuli encountered along the route to the learning site. This cultural dimension enriches children's learning experience while simultaneously connecting them with local community traditions that form part of their cultural identity.

e. The Role of Teachers in Nature-Based Learning

Teachers hold a central role in nature-based learning. According to Vygotsky, children's cognitive development occurs through social interaction with more competent individuals within the zone of proximal development (ZPD) (Habsy, Malora, Widyastutik, & Anggraeny, 2023). Skilled teachers are able to provide scaffolding, that is, learning support tailored to each child's needs and capacities, enabling children to attain levels of understanding beyond what they could achieve independently. Within the context of nature-based learning, scaffolding is provided through open-ended questions, relevant simplified explanations, and space for children to explore on their own before receiving guidance (Kusuma et al., 2023).

The scientific learning approach developed within the 2013 Curriculum for early childhood education encompasses five stages, namely observing, questioning, gathering information, reasoning, and communicating. These stages align naturally with the processes that occur when children interact with open natural environments (Yolanda, 2018). Teachers who understand the scientific approach design nature exploration activities in a structured manner so that every stage of the scientific process can be optimally facilitated. Marliana adds that an integrated approach of exploration, experimentation, and education in nature-based early childhood learning has been proven effective in fostering active learning that enhances children's engagement and understanding holistically (Marliana, 2025).

Based on the literature reviewed, the theoretical framework of this study can be articulated as follows. The development of naturalist intelligence in early childhood requires direct stimulation from authentic natural environments. A learning process designed on the basis of experiential learning, incorporating local natural phenomena, will catalyze insight in children, that is, the deep understanding arising from children's capacity to connect new knowledge with prior knowledge. Teachers serve as facilitators who design and guide structured nature exploration activities so that all indicators of naturalist intelligence can develop optimally. This theoretical framework forms the foundation for the design and analysis of the nature exploration learning program implemented in this study.

METHOD

a. Participants

The study was conducted at TK PKK located in Pademawu District, Pamekasan Regency, Madura, with the learning activities taking place at the Api Tak Kunjung Padam area in Tlanakan Village, Pamekasan. The research subjects comprised 15 kindergarten students aged five to six years who participated in a nature exploration-based learning program. The selection of this location was based on the presence of a distinctive natural phenomenon in the form of a natural fire source, which holds substantial educational value yet remains largely underutilized within the formal early childhood education context.

b. Data Collection

Data collection in this study employed a triangulation technique encompassing participatory observation, interviews, and documentation. Participatory observation was conducted by having the researcher directly involved in the learning activities, observing the behavior of students throughout the journey using the odong-odong, the exploration process at the Api Tak Kunjung Padam site, the fish-grilling activity, the introduction to fish body parts, and the communal meal. Creswell contends that participatory observation enables researchers to obtain more in-depth data, as they are able to experience and comprehend the context firsthand (Creswell & Poth, 2016). Semi-structured interviews were conducted with accompanying teachers, selected students using age-appropriate language, and parents, to explore children's understanding and behavioral changes following the activity. Documentation was carried out through photography. Moleong states that data triangulation enhances the validity and credibility of qualitative research by confirming data across multiple sources and methods (Moleong & Surjaman, 2014).

c. Data Analysis

Data analysis was conducted using Miles and Huberman's interactive analysis model, which comprises four stages: data collection, data reduction, data display, and conclusion drawing or verification (Miles, Huberman, & Saldana, 2014). The data reduction stage involved selecting, simplifying, and abstracting raw data from field notes, interview transcripts, and visual documentation to focus on aspects relevant to naturalist intelligence and the insight process. Data display was conducted in the form of descriptive narratives, interview excerpts, and photographic documentation illustrating the learning process and students' responses to the nature exploration experience. Conclusions were drawn inductively by identifying recurring patterns in the data, connecting them with theories of naturalist intelligence and insight-based learning, and verifying findings through source triangulation. Data validity was maintained through member checking by confirming interpretive results with teachers and parents, as well as peer debriefing through discussions with colleagues to examine the accuracy of the analysis and data interpretation.

RESULTS AND DISCUSSION

This study produced important findings regarding the development of naturalist intelligence in early childhood through direct experience-based nature exploration. Based on observations and documentation conducted during the learning activities at the Api Tak Kunjung Padam site in Tlanakan Village, Pamekasan, various dimensions of naturalist intelligence development were identified among the students of TK PKK in Pademawu District. The findings of this study are presented under several main themes that reflect the learning process and outcomes that occurred throughout the nature exploration activities.

a. Initial Responses of Students to the Journey Experience

The initial phase of the learning activity commenced with the journey to the Api Tak Kunjung Padam site using the odong-odong as transportation. The use of this traditional vehicle proved to offer a distinct and meaningful experience for the students (Tanfidiyah, 2017). Observations indicated that the majority of children displayed high levels of enthusiasm from the outset of the journey. They appeared joyful and eager while boarding the odong-odong, conversing animatedly with peers, and attentively observing the scenery along the route. Several children were seen pointing at various objects they noticed along the way, including rice fields, coconut trees, goats, and

birds in flight. These expressions of joy and curiosity indicated that the novel experience outside the school environment had awakened intrinsic learning motivation in the students.

An interview with Mrs. Titi, one of the accompanying teachers, revealed that the odong-odong journey afforded children the opportunity to observe the surrounding environment far more freely than would have been possible in an enclosed vehicle.

“The children were absolutely delighted riding the odong-odong; they could see the scenery clearly, feel the breeze, and ask questions about what they observed along the road.”

Consistent with the teacher’s account, a student named Jelita also expressed her delight during the journey.

“Teacher, there is a very tall tree over there; what kind of tree is it?”

The spontaneous question posed by Jelita illustrated that the child’s curiosity had been stimulated by the natural environment encountered during the journey. The teacher responded by explaining that it was a coconut tree, widely found throughout the Madura region.

This approximately thirty-minute journey also served as an opportunity to build social bonds among students and between students and their teacher. Several children who initially appeared reserved gradually opened up and actively engaged in conversation with their peers. This demonstrated that outdoor learning not only develops naturalist intelligence but also supports the social and emotional development of children.

Throughout the journey, the accompanying teachers engaged in educational interactions by inviting children to sing, name the plants they encountered, and participate in question-and-answer exchanges about what they observed.

One child named Jelita exclaimed, “Teacher, there is a very tall tree over there; what kind of tree is it?” Spontaneous questions of this nature indicated that children’s curiosity had been stimulated by the natural environment they traversed. The teacher responded by explaining that the tree was a coconut palm, widely found throughout the Madura region. Such interactions reflect meaningful informal learning processes, in which children come to understand the biodiversity of their surroundings through direct observation and dialogue with more experienced adults.

b. Exploration and Observation at the Api Tak Kunjung Padam Site

Upon arriving at the Api Tak Kunjung Padam site, the students exhibited varied reactions. The majority appeared awestruck and intensely curious at the sight of the perpetually burning flame with no visible fuel source. Some children approached the fire source cautiously and with slight trepidation, while others demonstrated the courage to observe from closer distances under the teacher’s supervision. Observations revealed that the children engaged multiple senses to explore this natural phenomenon. They observed the color of the flames, listened to the hissing sound of the fire, sensed the heat from a safe distance, and even detected the aromas arising from the combustion.

A pivotal moment in the exploration process occurred when the students began raising questions about the phenomenon they were witnessing (Ali, Kaigere, Apriyanto, Haryanti, & Rusli, 2024). Among the questions that arose were: “Why does the fire never go out?”; “Where does the fire come from?”; “Why is the fire blue?”; “Is it as hot as the stove at home?”. These questions demonstrated that the children had activated critical thinking processes and were attempting to comprehend the natural phenomenon before them. The accompanying teachers provided simplified explanations appropriate to the children’s level of understanding, explaining that the fire originates from gas escaping from beneath the earth’s surface and continues to burn because the gas supply is unceasing. Although these explanations remained highly simplified, they provided children with an initial scientific understanding of the geological phenomenon.

The observation process lasted approximately fifteen minutes, during which the students were given the freedom to observe the fire phenomenon from various angles while maintaining safety protocols. Several children were observed comparing their current experience with prior knowledge. Such educational interactions supported children in constructing more complex and structured understandings of natural phenomena (Marliana, 2025).

c. Fish-Grilling Activity and Introduction to Fish Body Parts

Following the observation of the Api Tak Kunjung Padam phenomenon, the activity continued with a practical engagement, namely grilling fish using the natural fire. This activity was designed to provide children with a more concrete and meaningful direct experience. Prior to the grilling, the teacher first introduced the fish to be cooked to the children. The fish used was the kembung (Indian mackerel), a species familiar to the coastal communities of Madura (Akmal, Fadlian, Prismayanti, & Rahayu, 2019). Students were invited to observe the fish in detail, touching the texture of its scales and examining its body shape, fins, tail, eyes, and other parts. The introduction to fish body parts was conducted interactively through question-and-answer exchanges. The teacher pointed to each part of the fish while naming it and explaining its function in simple language, for instance noting that fins help the fish swim, the tail enables it to change direction while swimming, and the gills allow it to breathe underwater. The students listened attentively and some of them tried to touch the parts of the fish shown.

The fish-grilling process was then carried out with the students actively engaged as observers. The cleaned fish were placed on a simple grill positioned directly over the natural fire source. The children enthusiastically observed how the fish changed color from grayish-white to brown, how its aroma transformed, and how its texture firmed. Several children offered spontaneous comments such as, “Wow, the fire is cooking the fish!”, “It smells wonderful!”, “The color is turning brown.” These comments indicated that the children were engaged in active observation, employing multiple senses to comprehend the process of change unfolding before them. The grilling process lasted approximately twenty minutes, during which the teachers continued to engage the children educationally by posing thought-provoking questions such as, “Why do you think the fish is getting cooked?” and “What has changed about the fish since it started grilling?”

Observations revealed that the students began to grasp fundamental concepts regarding physical changes caused by heat. Several children were able to articulate, in their own language, that fire causes the fish to become hot and transforms it into a cooked state. This process also cultivated observational skills, which constitute a key indicator of naturalist intelligence. Children learned to observe in detail, compare conditions before and after, and identify changes occurring in natural objects.



Figure 1: Fish-Grilling Activity

Figure 1 depicts the activities of students from TK PKK Pademawu District as they observe the grilling of mackerel fish on a simple grill placed directly over a natural fire source. A number of children are seen sitting in a circle, leaning forward, indicating keen interest and full attention to the ongoing process. The children are wearing yellow and blue uniforms, reflecting the identity of the early childhood education institution. Their facial expressions appear enthusiastic and curious as they observe the fish gradually changing color due to the heat of the fire. One child is seen holding the grill with assistance from the accompanying teacher, illustrating the child's direct involvement in experience-based learning. The background of the photograph shows an open environment with a rocky ground surface characteristic of the Api Tak Kunjung Padam area in Tlanakan Village, Pamekasan. This documentation captures an authentic moment of nature-based learning that stimulates observational skills, curiosity, and children's understanding of physical changes in objects under the direct influence of heat.

d. Communal Meal Activity and Social Interaction

Once the fish was cooked, the activity continued with a communal meal at the site. The grilled fish was distributed to all students, who ate together in a relaxed and joyful atmosphere. This communal meal was not merely a food consumption activity but served as a meaningful moment of social and cultural learning. The children sat in a circle, shared food, and conversed about their experiences during the activity. Observations indicated that this atmosphere of togetherness fostered strong emotional bonds among the students and between the students and their teachers. The formation of emotional bonds through communal dining aligns with Vygotsky's perspective that social interaction constitutes an inseparable dimension of the early childhood learning process (Dewi, Saputra, & Setiawati, 2025). As children sat side by side, passed food to one another, and shared stories, the learning process extended beyond the cognitive domain to simultaneously encompass the affective and social realms. The experience of sharing in an open natural setting yielded a qualitatively different atmosphere compared to classroom interaction, resulting in impressions that tended to be more profound and enduring in children's memory.

Communal meal activity is a collective food consumption activity that can be carried out in small groups of two to five children or in larger groups involving more than five students. This activity functions not only to meet nutritional needs but also serves as a social learning moment that builds interaction, a sense of togetherness, and values of sharing among children in an enjoyable and meaningful atmosphere (Budiarti, ROHMAH, KASIATI, PERTIWI, & UMILIA, 2022). During the meal, several children commented on the taste of the fish. Some said the fish tasted better because it was grilled over natural fire, others compared it to fish they usually eat at home, and some stated that this was the first time they had ever grilled fish themselves. One child named Ahmad remarked:

"This fish is so delicious, Teacher; I am so happy that I got to grill it myself."

This statement demonstrated that direct involvement in the learning process generates genuine satisfaction and a sense of pride in children. Such a successful experience can strengthen children's self-confidence and learning motivation in the future. The pride expressed by Ahmad represents a tangible manifestation of self-efficacy formed through direct experience. Fatimah et al. explain that children's belief in their own abilities grows when they successfully complete a task independently or with minimal guidance (Fatimah, Manuardi, & Meilani, 2021). Children's involvement in the fish-grilling process, from initial observation through to enjoying the final result, provided a complete and meaningful sequence of experiences. Such a process encourages children not merely to be passive spectators but to become active participants in every stage of learning. Beyond personal pride, the communal meal activity also provided a space for children to practice their communication skills and express themselves spontaneously. Children who had previously tended toward passivity during the exploration activities became actively engaged in storytelling and sharing their views during the meal session. The informal and convivial atmosphere encouraged children to become more open in expressing their feelings and thoughts.

According to Mrs. Diah, another accompanying teacher,

"Activities like this are tremendously beneficial because the children not only learn about nature but also learn to share, cooperate, and appreciate nature as a source of life."

Mrs. Diah's statement affirmed that the values cultivated during the communal meal activity extend beyond factual knowledge about nature to encompass character formation, including mutual cooperation, gratitude, and care for others. The cultivation of such values through real-world experience is considered far more effective than verbal instruction in the classroom, as children directly internalize the meaning of each value they practice. The communal meal in an open natural setting, using food cooked over natural fire, constitutes an authentic medium for character education that cannot be replicated by conventional instructional media.



Figure 2: Communal Meal Activity

The teachers utilized the communal meal as an opportunity for learning reflection, inviting children to share what they had seen, felt, and learned that day. Several children recounted that they had learned about the fire that never goes out, about fish body parts, and about how fish are cooked by fire. This reflection process helped children consolidate the experiences and knowledge they had acquired. The reflection stage simultaneously served as an informal assessment tool for teachers to gauge the extent to which children's understanding had developed throughout the nature exploration activity.

e. Naturalist Intelligence Indicators That Developed

Naturalist intelligence is a person's capacity to identify, differentiate, recognize, and categorize various types of plants and animals, including the ability to comprehend natural phenomena and elements found within the surrounding environment. This intelligence enables individuals to remain attuned to the life patterns of living organisms, understand the distinctive characteristics of each organism, and establish harmonious relationships with the natural world through direct environmental observation and exploration (Sumitra & Panjaitan, 2019).

Based on the analysis of observational data, interviews, and documentation, several dimensions of naturalist intelligence were found to have developed throughout the nature exploration activities. The first indicator is the ability to observe natural phenomena in detail. The students demonstrated the capacity to focus their attention on natural objects such as fire, fish, plants, and other phenomena they encountered. They employed multiple senses during exploration rather than relying solely on sight. Several children were observed to be remarkably meticulous in observing changes in the color of the flame, the texture of the fish's scales, and the aromas arising during the grilling process. This observational capacity forms the basis of scientific thinking that will continue to develop as children grow.

The second indicator is the ability to pose questions about natural phenomena. Over thirty questions were recorded during the activity, all raised by the students in relation to what they were observing. These questions reflected a high degree of curiosity and the capacity to identify aspects they did not yet understand. The types of questions posed also demonstrated a range of cognitive levels, from descriptive questions such as "What is that?", to causal questions such as "Why does the fire never go out?", to comparative questions such as "Is this fire the same as the stove at home?". This questioning ability constitutes an important indicator of naturalist intelligence, as it reflects children's active construction of understanding about the natural world.

The third indicator is the ability to categorize and identify the parts of organisms. The activity introducing fish body parts provided children with an opportunity to learn about animal anatomical structure. Following the activity, the majority of children were able to name at least three parts of a fish, such as the head, tail, and fins. Several children were even able to explain the basic functions of these parts. The capacity to identify and categorize organisms constitutes a foundational competency in naturalist intelligence that will develop with greater complexity as children grow in age and experience.

The fourth indicator is sensitivity and care for the natural environment. Throughout the activity, the teachers also instilled environmental values by encouraging children to maintain the cleanliness of the site, refrain from damaging surrounding plants, and respect natural resources. Several children were observed actively collecting litter they found and placing it in the provided waste bags. Some children also reminded their peers not to arbitrarily pick leaves from plants. These behaviors demonstrated that nature-based learning develops not only cognitive aspects but also instills character values of environmental stewardship from an early age.

The fifth indicator is the ability to connect natural knowledge with everyday life. Several children demonstrated the capacity to draw connections between what they had learned and their personal experiences. For example, one child compared the fish-grilling process to the cooking done by their mother at home, while another compared the natural fire source to the gas stove used in their daily household.

One of the most significant aspects observed in this study was the process of insight formation, or deep understanding, occurring in the students. Insight did not emerge uniformly across all children; however, several moments were observed in which profound understanding arose suddenly. One such observed insight moment occurred when a child named Hasan suddenly exclaimed, "Oh, so the gas from the ground is like the gas in our stove at home, Teacher, and that's why it can grill the fish!" This statement emerged after the child had observed the grilling process and listened to the teacher's explanation of the fire source. The child's facial expression conveyed joy and the satisfaction of having arrived at a new understanding. This represents a classic example of insight, in which the child was able to perceive the relationship between new knowledge (gas from the ground) and prior knowledge (cooking gas) to form a more complete understanding.

Another insight moment occurred when a child named Siti was observing the color change of the fish during grilling. After observing for a while, she suddenly said, "Teacher, the fish turns brown because it gets heat from the fire, just like when we hang clothes out in the sun and they dry." While the analogy she drew was not entirely accurate scientifically, this statement demonstrated that the child had grasped the foundational concept that heat can cause changes in matter. The child was able to make a connection between two different experiences (grilling and drying) and identify the underlying principle they shared, namely the effect of heat on material.

The accompanying teachers also observed that some children experienced insight moments not during the activity itself but some time afterward. One child who had initially observed in silence suddenly asked, "Teacher, if it rains, will the fire go out?" This question

indicated that the child was actively processing the information received and attempting to construct a more complete understanding by considering other factors that might influence the observed phenomenon. The teacher responded by explaining that the fire continues to burn even in rain because the gas continues to escape from beneath the ground. Such interactions demonstrated that the insight process is ongoing and does not always occur instantaneously.

Interviews conducted with several parents following the activity also revealed indications of the insight process continuing at home. One parent reported that their child persistently recounted the fish-grilling experience and even requested to help cook fish at home in order to observe again how it transforms during the cooking process. Another parent reported that their child had begun asking more frequent questions about natural phenomena, such as why rainbows appear, why leaves are green, and why the ocean is salty. These behavioral changes demonstrated that the nature exploration experience had awakened a sustained curiosity and motivated children to continue exploring and understanding the natural world around them.

One of the most compelling findings of this study was the change in children’s behavior and attitudes toward the natural world following the exploration activity. Interviews with teachers and parents revealed that children became more attentive and considerate of their surrounding environment. Several children who had previously shown no interest in plants or animals began to exhibit curiosity by observing and asking questions about the living organisms around them.

Attitudinal changes were also observed with respect to environmental cleanliness and conservation. Several parents reported that their children had become more conscientious about disposing of waste properly and reminded other family members to refrain from littering. Reports also indicated that children became more mindful in their use of water and more appreciative of natural resources. These attitudinal changes demonstrated that direct experience-based learning in nature not only develops cognitive dimensions but also shapes positive values and character related to environmental conservation.

From the emotional dimension, children exhibited high levels of joy and enthusiasm both during and after the activity. These joyful expressions were apparent in the way children interacted with one another, their eagerness in posing questions, and their earnestness in observing each stage of the activities presented. This positive emotional response was not merely a fleeting reaction but rather a reflection of children’s holistic engagement, encompassing the physical, cognitive, and affective dimensions, in the learning process taking place in the open natural environment. When children feel content and safe in their learning environment, the process of knowledge absorption tends to proceed more optimally because psychological barriers commonly encountered in the classroom can be minimized. As a follow-up to the nature exploration activities, the teachers asked students to create drawings or recount their experiences. The children’s outputs demonstrated that the nature exploration experience had made a profound and lasting impression on their memory. The majority of children were able to recount the sequence of activities reasonably well, albeit in simple language. They mentioned the aspects they found most memorable, such as riding the odong-odong, seeing the never-extinguishing fire, grilling fish, and eating together. Several children even mentioned sensory details such as the delightful aroma of the grilled fish, the warmth of the flames, and the joyful atmosphere of the journey. The capacity to recall and retell these experiences demonstrated that the learning had been stored in children’s long-term memory and had become part of the knowledge that will continue to develop as they grow.

The majority of children were able to recount the sequence of activities quite well, albeit in simple language. They mentioned the most memorable aspects such as riding the odong-odong, witnessing the eternal fire, grilling fish, and sharing a meal together. Several children also recalled specific details, such as the wonderful aroma of the grilled fish, the warmth of the fire, and the amusing nature of the odong-odong ride. The ability to recall and retell these experiences demonstrated that the learning had been stored in children’s long-term memory and had become part of their accumulated knowledge.

Table 1. Learning Strategies for Character Building

No	Indikator	Number of Children Demonstrating the Ability	Persentase	Kategori
1	Observing with focus and detail	13 children	90%	Very Good
2	Posing questions about natural phenomena	11 children	80%	Good
3	Identifying at least 3 parts of a fish	12 children	85%	Very Good
4	Explaining the functions of fish body parts	12 children	60%	Fairly Good
5	Identifying changes during the grilling process	15 children	95%	Very Good
6	Demonstrating environmental awareness	15 children	75%	Good
7	Making connections with personal experience	14 children	70%	Good
8	Expressing joy/enthusiasm	15 children	100%	Very Good

Category description: Very Good (>80%), Baik (60-80%), Fairly Good (40-60%), Poor (<40%)

Table 1 presents observation results across eight naturalist intelligence indicators assessed throughout the nature exploration activities. The indicator of expressing joy and enthusiasm reached the highest percentage at 100%, meaning all fifteen children demonstrated positive emotional responses during the activity. The indicator of identifying changes during grilling also achieved an excellent result at 95%, followed by observing with focus and detail at 90%, and identifying at least three fish body parts at 85%. The indicator of posing questions about natural phenomena was achieved by 80% of children, categorized as Good, while demonstrating environmental awareness and making connections with personal experience stood at 75% and 70% respectively, both categorized as Good. The indicator of explaining the functions of fish body parts received the lowest percentage at 60%, categorized as Fairly Good, indicating that children’s understanding of the structural-functional relationships in living organisms still requires further stimulation and reinforcement. Overall, the observation results demonstrate that nature exploration activities were effective in developing naturalist intelligence across nearly all measured indicators.

Table 2. Indicator of Observing with Focus and Detail

Skor	Kriteria	Deskripsi
4 (BSB)	Very Good	The child observes natural objects for >10 minutes, uses at least 3 senses, identifies specific details, and is not easily distracted.

3 (BSH)	Good	The child observes objects for 5–10 minutes, uses 2 senses, identifies some details, and is occasionally distracted.
2 (MB)	Fairly Good	The child observes objects for 2–5 minutes, uses 1 sense, shows limited detail, and is frequently distracted.
1 (BB)	Poor	The child observes for <2 minutes, lacks focus, and shows no detail.

Table 2 presents the scoring rubric for the indicator of observing with focus and detail, comprising four score levels. This rubric was developed to measure the extent to which children are able to sustain attention and employ their senses optimally when observing natural objects during the exploration activities. The highest score, 4, in the Very Good Development category, is given to children who are able to observe natural objects for more than 10 minutes, using at least three senses simultaneously, showing specific details, and not easily distracted by surrounding stimuli. A score of 3, in the Developing as Expected category, is given to children who observe objects for 5 to 10 minutes, using two senses, showing some details, although their attention is sometimes still distracted. A score of 2, in the Beginning to Develop category, is given to children who are only able to observe for 2 to 5 minutes, using one sense, with limited details and attention that is often distracted. The lowest score, 1, in the Not Yet Developing category, is given to children who observe for less than 2 minutes, do not show focus, and are unable to identify any details of the observed object. This rubric serves as a systematic reference for teachers in assessing the development of children's observation skills objectively and measurably during nature exploration activities.

Table 3. Observed Insight Moment

No	Child's Name	Momen Insight	Indication of Deep Understanding
1	Hsn	"Oh, so the gas from the ground is like the gas in our stove at home, Teacher!"	Connecting new phenomena with prior knowledge
2	St	"Teacher, the fish turns brown because of the heat, just like when we dry clothes in the sun and they get dry"	Drawing analogies between two different experiences
3	Ayh	"If it rains, will the fire go out?"	Considering other factors that may influence the phenomenon
4	Rzi	"The fire is like the stove at home but bigger"	Assimilation process with existing knowledge schemas
5	Fim	"Its skin is slippery so the fish can swim easily"	Linking structure with function

Table 3 presents five observed insight moments that occurred during the nature exploration activities across five different students. Each moment depicts the process of deep understanding emerging spontaneously when children successfully connect new experiences with prior knowledge. He linked natural gas to the cooking gas at home; St drew an analogy between the fish-grilling process and drying laundry in the sun; Ayh considered the potential effect of rain on the continuity of the fire; Rzi assimilated the natural fire phenomenon with a household stove; and Fim connected the texture of fish scales with the function of swimming. The diversity of insight forms that emerged among the individual children demonstrates that the process of deep understanding formation is inherently individual in nature and is influenced by the prior knowledge schemas each child brings to the learning experience.

CONCLUSION

Based on the findings of this study, it can be concluded that nature exploration through direct experience has proven effective in developing naturalist intelligence among early childhood students at TK PKK in Pademawu District. The field visit to the Api Tak Kunjung Padam site in Tlanakan Village, Pamekasan, encompassing activities such as the odong-odong journey, observation of the natural fire phenomenon, fish-grilling, introduction to fish body parts, and a communal meal, provided 15 research participants with meaningful and profound learning experiences. The naturalist intelligence indicators successfully developed through this study include the ability to observe natural phenomena in detail, the ability to pose questions about natural phenomena, the ability to categorize and identify the parts of organisms, sensitivity and care toward the natural environment, and the ability to connect natural knowledge with everyday life. The insight formation process occurred in several students, characterized by the sudden emergence of deep understanding when they were able to connect new information with prior knowledge. Direct experience-based learning in nature also yielded positive effects on children's social and emotional development, strengthening self-confidence, building a sense of togetherness, and instilling values of environmental stewardship from an early age.

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Declaration of generative AI Use

The authors state that the use of generative language tools in the preparation of this manuscript was limited solely to language editing and improving the quality of the text. All scholarly stages, including the formulation of ideas, data analysis, interpretation of findings, and drawing of conclusions, were carried out entirely by the authors without the intervention of automated writing systems. The authors therefore bear full responsibility for the entire content and substance of this article.

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