

The Use of Natural Material Media as a Learning Resource in Early Childhood Education

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ABSTRACT : This study addresses the underutilization of abundant coastal natural resources in island-based early childhood education settings. Although prior studies have examined natural materials in early childhood education, specific investigations in remote island contexts remain scarce. This study aims to describe the use of natural material media as learning resources in early childhood education at a Kindergarten in an island area. A qualitative descriptive approach was employed. Research subjects comprised 3 classroom teachers and 20 students, selected through purposive sampling; the school principal served as a supporting informant. Data were collected through participatory observation, in-depth interviews, and documentation, and analyzed using the Miles and Huberman interactive model comprising data reduction, data presentation, and conclusion drawing. Results show that teachers utilized natural materials—leaves, stones, sand, twigs, seeds, and shells—as effective and contextual learning resources through three stages: material collection, exploration, and creation. Natural material media increased learning motivation, creativity, and exploration skills; Observations conducted over eight weeks revealed that the majority of children actively engaged in each learning session. This study concludes that coastal island natural materials serve as authentic, multisensory, and culturally meaningful learning resources, and recommends that schools integrate their use in a more structured manner within an early childhood education curriculum grounded in local wisdom.

Keywords: Natural Materials, Learning Resources, Early Childhood Education, Creativity, Environment-Based Learning.

INTRODUCTION

Early childhood education (ECE) is an essential foundation for children's holistic development, covering cognitive, affective, physical-motor, language, social-emotional, and religious-moral aspects. Between the ages of 0–6, children are in the “golden age,” a period of especially rapid brain development that requires appropriate, directed, and meaningful stimulation (Sujiono, 2009). This critical period shapes the overall quality of a child's development throughout life, making the provision of appropriate stimulation through suitable media and learning resources extremely important.

Learning media is one of the essential components of the teaching and learning process in early childhood education. Arsyad (2020) defines learning media as tools that convey or deliver instructional messages so as to stimulate children's thoughts, feelings, attention, and interest. The use of appropriate and engaging media can help

children turn abstract concepts into something more concrete, improve retention, and foster interest and motivation to learn in early childhood (Sadiman et al., 2010). Selecting media that suit children's characteristics and environment is therefore a major challenge for early childhood educators.

Natural materials refer to any materials originating from the natural environment—such as leaves, twigs, stones, sand, soil, seeds, and water—that can be used in children's play and learning activities. Montessori (in Lillard, 2005) emphasized that learning through the real environment, including the surrounding nature, provides direct and meaningful experiences for children. This principle is reinforced by contemporary studies that adapt the idea of experiential learning to the modern early-childhood-education context; Hasanah and Pratiwi (2022), for example, showed that nature-based approaches in early childhood education consistently increase children's creativity and engagement through direct experience with real materials. Furthermore, Piaget's constructivist theory (in Berk, 2013) asserts that young children build their knowledge through active interaction with physical objects around them, including natural materials, which allow children to see, touch, smell, and manipulate objects directly. This approach aligns with the findings of Wulandari et al. (2021), who demonstrated that nature-based media can optimize young children's cognitive development and creativity more effectively than manufactured media.

Nature-based learning resources also support the scientific and exploratory approach that lies at the core of the 2013 Early Childhood Education Curriculum. The Ministry of Education and Culture (2014) affirms that early childhood education must be designed to develop all aspects of a child's development in a holistic and integrated manner through direct experience in the real environment. As learning media, natural materials have the advantage of stimulating multisensory development, fostering creativity, and bringing children closer to their local cultural environment. Hasanah and Pratiwi (2022), in their study of nature-based early childhood education, affirm that natural materials have diverse textures, colors, shapes, and weights, so that they can provide rich sensory experiences that manufactured media cannot replicate. Similarly, Permata and Hasyim (2023) found that multisensory stimulation through natural materials significantly enhances young children's naturalist intelligence and exploration skills. The use of natural materials is also ecologically and economically relevant, particularly for schools in island regions with limited access to conventional, industrially produced learning media.

The problem found in the field is the limited variety of learning media caused by the geographical conditions of island regions, which make access to factory-made media difficult; meanwhile, the environment surrounding the schools—rich in coastal natural resources such as beach sand, shells, coral rock, mangrove leaves, and various

seeds—represents a great opportunity that has not yet been optimally and systematically harnessed within the curriculum. This condition demands teacher creativity in developing alternative learning media that are contextual, economical, and meaningful for children.

A review of previous research reveals a consistent pattern that nonetheless contains gaps that need to be addressed. Sari (2020) demonstrated that natural material media significantly increases young children's creativity; Putri and Rahman (2021) extended this finding by showing its positive impact on fine and gross motor development. Oktaviani and Suryana (2022) and Wulandari et al. (2021) further reinforced the argument that natural materials, particularly in loose-parts format, effectively enhance children's cognitive abilities and divergent thinking. Permata and Hasyim (2023) added the dimension of naturalist intelligence as an outcome that can be stimulated through natural materials. Collectively, these studies form a strong consensus on the effectiveness of natural materials as early-childhood-education media, yet nearly all were conducted in urban or mainland rural contexts. None specifically examined how coastal island natural materials—with their distinctive ecological characteristics such as shells, beach sand, and coral rock—are used in early childhood learning. This gap is the basis for the urgency of the present study.

The novelty of this study lies in its distinctive geographical context, namely a remote island region rich in unique coastal natural materials that have received limited attention in the context of early childhood education. Most previous studies have been conducted in urban or mainland rural settings, leaving the use of island-specific natural materials, such as seashells, beach sand, and coral rocks, as learning media for young children relatively underexplored. Addressing this gap, the present study aims to provide an in-depth description of how teachers utilize coastal natural materials as learning resources in early childhood education, focusing on the types of materials used, the ways in which they are integrated into learning activities, children's engagement and responses, and the challenges encountered by teachers. By examining these practices within the context of island communities, this study is expected to contribute to the existing body of knowledge and provide a practical reference for the development of early childhood learning media rooted in island-based local wisdom.

METHODS

This study employed a qualitative approach using a descriptive research design. A qualitative approach was chosen because the researcher wished to describe and deeply understand the phenomenon of natural material media use in early childhood education naturally, in accordance with the context found in the field (Creswell, 2014).

Descriptive qualitative research aims to depict, describe, and interpret a phenomenon in depth without manipulating variables (Moleong, 2017). This paradigm was chosen because the researcher sought to understand the meaning, process, and context of natural material use from the perspectives of teachers and students.

Time and Place of the Study

The study was conducted from January to March 2024 at a kindergarten located in an island region with abundant natural material potential but limited access to conventional learning media. The school is situated in an island area surrounded by a coastal ecosystem rich in a diversity of natural materials relevant for use as learning resources.

Research Subjects

The subjects of this study were 3 classroom teachers and 20 Group B students (aged 5–6 years). The school principal was also involved as a supporting informant. Subjects were determined using a ‘purposive sampling’ technique, that is, selecting informants considered to have the most knowledge of and direct involvement in learning activities using natural material media (Sugiyono, 2019). The subject-selection criteria included: (1) teachers who actively use natural materials in learning, (2) students belonging to learning groups that use natural material media, and (3) a principal with knowledge of the school's media-use policies. This sample size was considered adequate for descriptive qualitative research because data saturation was achieved during data collection; by week 6 of the 8-week observation period, no new information was found that substantially altered the themes previously identified from either interviews or observations. This is consistent with the principle of saturation in qualitative research, which holds that data adequacy is determined by the completeness of themes rather than merely the number of subjects (Creswell, 2014; Moleong, 2017).

Data Collection Techniques and Instrument Development

The data collection techniques used included: (1) participatory observation, in which the researcher was directly involved in observing the learning process using natural material media for 8 weeks (January–March 2024), following a structured observation schedule of 3–4 sessions per week on Mondays, Wednesdays, and Fridays; each observation session was documented using a structured observation sheet covering indicators of children's engagement, the types of materials used, teachers' approaches, and children's qualitative responses; (2) in-depth interviews with the three teachers and the principal regarding the selection, preparation, and use of natural material media, conducted twice per informant (at the beginning and end of the study period) using a semi-structured interview guide; and (3) documentation in the form of photographs and videos of learning activities, Daily Lesson Plans (RPPH),

portfolios of children's work, and the researcher's reflective field notes. The research instruments the observation sheet, semi-structured interview guide, and documentation sheet were validated through expert judgment by two early-childhood-education experts. The validation process involved a content review by the experts of the relevance, clarity, and completeness of the instrument indicators, resulting in a number of wording refinements and the addition of observation indicators related to the safety of using natural materials. Consistency of the interview guide was maintained through a readability check prior to use, while the observation sheet was tested for interrater reliability across two simulation sessions to ensure shared understanding among observers.

Data Analysis Technique

Data were analyzed using the interactive model of Miles and Huberman (1994), which consists of three activities occurring simultaneously: (1) data reduction, the process of selecting, focusing attention on, simplifying, and transforming raw data from field notes into meaningful data; (2) data display, the organization of a set of information into descriptive narrative form that allows conclusions to be drawn; and (3) conclusion drawing and verification, carried out continuously throughout the research process. Data validity was tested through source triangulation (teachers, students, principal) and technique triangulation (observation, interviews, documentation) as recommended by Creswell (2014) and Moleong (2017).

RESULT AND DISCUSSION

RESULT

A. Types of Natural Materials Used in Learning

Based on 8 weeks of observation and in-depth interviews with the three teachers, it was found that the school had used a variety of natural materials as learning media. These materials were selected based on three main criteria applied by teachers in their daily practice: (1) ease of access, meaning the materials are easily found in the environment around the school at no additional cost; (2) safety for children, meaning the materials had undergone a selection and cleaning process to ensure no sharp or hazardous parts remained; and (3) abundant availability, particularly of coastal-specific materials such as shells, small coral rocks, and beach sand. In practice, Teacher G1 explained that the material-selection process also directly involved the children: the children were invited to collect materials along the beach near the school, while the teacher supervised and set aside unsafe materials. Children's involvement in this collection stage itself became part of the learning process, as Teacher G1 described in an interview:

"Here, we're never short of natural materials. Beach sand, shells, small stones, leaves it's all around the school. The children actually get more excited when they use materials they've found themselves on the beach." (Interview, G1, January 15, 2024)

The research findings are organized around three main aspects that were the focus of observation: (1) the types of natural materials used and their applications in learning activities; (2) the methods and approaches teachers used to utilize natural materials; and (3) the level of children's engagement with and responses to the use of natural materials. These three aspects align with the study's aim of comprehensively describing the use of natural material media from the perspectives of teachers and students. The types of natural materials and their uses are presented in Table 1 below.

Table 1. Types of Natural Materials and Their Use in Learning

No.	Type of Natural Material	Use in Learning
1	Leaves	Face/landscape collages (children arrange various leaf shapes on paper); learning about colors and shapes through leaf classification; counting leaves; leaf-printing technique (applying paint to a leaf and printing it on paper); and mosaics made from dried leaf fragments. In these activities children interact directly: they choose their own leaves, compare colors and textures, and create works that are unique to each of them.
2	Beach Sand	Learning about texture, writing in the sand, craft activities, constructive play
3	Stones and Pebbles	Counting, learning big and small, stone painting, pattern arranging
4	Twigs/Sticks	Pattern arranging, simple construction, counting, learning about size
5	Seeds	Learning the concept of many and few, mosaics, handicrafts, counting games
6	Shells	Learning geometric shapes, decorating, collages, role play

B. Methods of Utilizing Natural Materials in Learning Activities

Teachers integrated natural materials into various learning activities through two main approaches: guided learning and free exploration. In guided learning, teachers provided direction and a specific theme, such as making a face collage from leaves and seeds. In free exploration, children were given the freedom to experiment with natural materials according to their own imagination. Teacher G2 explained:

"I usually take the children to the beach by the school to gather materials themselves. They pick out the shells or stones that interest them. The searching process itself has already become a very valuable form of learning." (Interview, G2, January 22, 2024)

The learning process unfolded in three stages: (1) the material-collection stage, in which children and teachers gathered natural materials from the surrounding environment; (2) the exploration stage, in which children observed, compared, and classified the materials; and (3) the creation stage, in which children used the materials to make a work or complete a learning task. The principal affirmed that this approach aligns with the school's vision of developing learning grounded in local potential.

C. Children's Engagement and Responses to the Use of Natural Materials

The 8-week observation results showed a very high level of active participation. Of the 20 students observed, 17 children (85%) were actively engaged in every activity that used natural materials. The children displayed high enthusiasm, marked by spontaneous curiosity, initiative to explore, and a longer attention span than when using manufactured media. This was confirmed by Teacher G3:

"When we use materials from the beach or the nearby forest, the children can stay focused for 30–40 minutes without getting bored. But with ordinary plastic toys, after 10–15 minutes they're already restless. They're also more creative—no two children make exactly the same thing." (Interview, G3, February 5, 2024)

The observation findings also noted that children who were initially passive during activities using conventional media showed a marked increase in participation when using natural materials. This indicates that natural materials hold a stronger intrinsic appeal in motivating young children's engagement.

D. Challenges in Utilizing Natural Materials

Despite the positive results, the use of natural materials also faced a number of challenges identified through interviews and observation. The main challenges included: (1) preparation requiring more time, as teachers had to collect, clean, and sort natural materials before use; (2) the need for strict material selection to ensure children's safety, especially with sharp-edged stones or shells; and (3) the high level of teacher creativity required to design structured activities using natural materials.

Teacher G1 stated that preparing natural materials required extra time, but the results were worth it given the far greater enthusiasm and engagement of the children.

DISCUSSION

The findings of this study confirm that the use of natural material media proceeded systematically and had a real, positive impact on children's engagement and development. In the context of this qualitative study, the finding that 17 of 20 students (85%) were actively engaged in every session represents an observational frequency count not a formal quantitative measurement obtained through a structured observation sheet. This figure reflects a consistent, recurring pattern of engagement across the 8 weeks of observation and serves as a descriptive marker that reinforces the qualitative finding of children's high motivation and enthusiasm. This finding aligns with Sari (2020), who likewise confirmed increased children's creativity through natural material media; however, this study offers a more specific nuance: active engagement occurred not only in the dimension of creativity, but also encompassed sensory exploration, concentration, and spontaneous initiative that were consistently observed. Compared with the findings of Wulandari et al. (2021), which focused on improving divergent thinking through loose parts, this study found that coastal island natural materials carry a distinctive intrinsic appeal not found in mainland studies—namely, children's emotional attachment to materials they discovered themselves in their everyday environment.

The use of natural material media shows strong alignment with Vygotsky's constructivist learning theory (in Berk, 2013), which emphasizes that children learn through active interaction with their environment within the Zone of Proximal Development. Qualitative data from this study provide a concrete picture of this process: when a child selected shells by size for a counting activity and asked the teacher, “Is this one bigger than that one, Ma'am?”, she was independently constructing the concept of size comparison with minimal but precise scaffolding from the teacher. An observation in week 4 also recorded a child spontaneously arranging stones from smallest to largest without instruction, then inviting a friend to do the same a form of peer-assisted learning that is a concrete manifestation of the ZPD concept. The scaffolding teachers carried out through open-ended questions (“Where do you think this stone would fit best?”) is a concrete embodiment of Vygotsky's theory. This finding also aligns with Piaget's view (in Berk, 2013) that children at the preoperational stage learn best through the manipulation of concrete physical object and in this context, coastal natural materials offer both concreteness and a sensory diversity that far exceeds manufactured media.

The advantages of natural material media identified in this study are their authenticity, multisensory nature, and the freedom with which children can

manipulate them. Children can touch, smell, see, and even hear the sounds of these natural materials, making the learning experience richer and more meaningful than when using manufactured media. This finding aligns with the research of Putri and Rahman (2021), who showed that exploring natural materials provides multisensory stimulation that positively affects children's fine and gross motor development. Hasanah and Pratiwi (2022) likewise affirm that natural materials have diverse textures, colors, shapes, and weights, providing rich sensory experiences that manufactured media cannot replicate a finding highly relevant to the island-school context, where the diversity of coastal natural materials far exceeds the availability of commercial media.

The island geographical context gives this study its own distinctive character. The abundant availability of coastal natural materials sand, shells, coral rock, and various dried marine organisms is a key factor distinguishing this learning context from mainland schools. Specifically, the research data show that using shells in activities to learn geometric shapes produced very high levels of child engagement—children actively compared shell shapes with one another, grouped them, and created patterns without teacher direction. Beach sand used as a medium for writing numbers and letters was found to reduce children's anxiety about writing activities, since mistakes could easily be erased and left no permanent mark. This finding reinforces Bronfenbrenner's (1979) view of the ecology of development: a child's immediate physical environment is not merely a backdrop but an active agent of learning. Thus, the use of island-specific natural materials is not only economically efficient but also culturally meaningful, as it brings children closer to the identity and local wisdom of their environment while building a sense of belonging to the coastal ecosystem in which they grow up.

Research by Oktaviani and Suryana (2022) revealed that contextual nature-based learning that is, learning that uses natural materials from a child's own surrounding environment is more effective at improving cognitive ability and understanding of scientific concepts than learning with generic media. This finding reinforces the argument that harnessing local environmental wisdom in early childhood education is a valid and recommended pedagogical practice, particularly for island regions rich in coastal natural resources.

This study also identified a number of real challenges from the field data. Based on interviews with the three teachers, the greatest challenge was preparation time being far longer than when using conventional media: Teacher G1 reported needing 1–2 extra hours before class to collect, clean, and sort natural materials. In addition, safety selection of materials particularly separating out sharp-edged shells or stones required a high degree of care. The researcher's field notes also recorded that, in

several sessions, teachers struggled to design structured activities that appropriately integrated natural materials with curriculum indicators. These challenges align with the findings of Putri and Rahman (2021), who emphasized that teacher competence is a determining factor in the effectiveness of nature-based media. Permata and Hasyim (2023) add that teachers with strong nature literacy are more effective at using the environment as a learning resource. Ongoing training for early-childhood-education teachers on the creative and structured use of natural materials is therefore an urgent need, particularly for schools in island and remote regions.

CONCLUSION

Based on the findings, it can be concluded that teachers at the island-region kindergarten made systematic and varied use of natural material media as a learning resource for young children. Six types of coastal island natural materials leaves, beach sand, stones and pebbles, twigs, seeds, and shells were integrated into learning activities through three structured stages: material collection, exploration, and creation. This use was carried out through two main approaches, guided learning and free exploration, both of which contributed to stimulating children's cognitive, motor, language, social-emotional, and creative development.

The findings show that coastal island natural materials hold strong intrinsic appeal for young children evidenced by high active engagement (17 of 20 children, or 85%, consistently active in every observation session) and a far longer attention span than when using conventional media. Natural materials are authentic, multisensory, and culturally meaningful, making them a learning resource that is not only pedagogically effective but also contextually meaningful for island children. The recommendations of this study are drawn directly from the field findings: (1) schools need to integrate the use of natural materials in a programmed manner within an early-childhood-education curriculum grounded in local wisdom; (2) improving teacher competence through ongoing training on the creative and safe use of natural materials is an urgent priority; and (3) cooperation among schools, parents, and the community is needed to support the sustainable provision and management of natural materials. This study has methodological limitations that should be transparently acknowledged: its qualitative design with a small sample (3 teachers and 20 students) at a single island school limits the generalizability of the findings to other contexts. Future research is therefore recommended to use experimental or multi-site approaches with a broader subject scope to strengthen external validity and generalizability of the findings.

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