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Fostering Eco-literacy and Naturalistic Intelligence through Environmentally Based Education in Coastal Preschool

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ABSTRACT: This research aims to analyze environmental-based education to increase environmental literacy and naturalistic intelligence. This research uses a qualitative descriptive method with interviews, observation, and document analysis as data collection techniques. Participants were selected using purposive sampling techniques. The criteria for selecting participants are teachers who have a minimum of five years of teaching experience and the ability to make environment-based learning plans. The sampling results were 15 teachers from five Preschools in the coastal area. The research results show that Environment-Based Education (EBE) can increase children's eco-literacy and naturalistic intelligence which focuses on four main dimensions, such as knowledge, understanding, skills, values, and attitudes. Increasing children's positive attitudes and behavior towards the environment can increase awareness of coastal environmental preservation. Results also show increased acquisition of practical knowledge, skills, and positive attitudes towards the preservation and sustainability of the coastal environment. The findings of the above studies allow recommendations for understanding the long-term impact of such teaching on environmental literacy in children that requires long-term studies. A more organized learning model that other educational institutions may employ, and includes the creation of unique curricula, including outdoor education programs, and efforts in environmental initiatives.

Keywords: eco-literacy, naturalistic intelligence, environmental-based education, coastal ECCE

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1 INTRODUCTION

Naturalistic intelligence, introduced by Flanagan and Symonds (2022), plays an important role in children's understanding and interaction with the natural environment. Naturalistic intelligence allows children to develop a deeper connection with nature. It not only provides an understanding of biodiversity, but also enhances a sense of care for the surrounding environment (Amalric & Cantlon, 2023). A common problem that needs to be addressed in this context is the lack of understanding and utilization of naturalistic intelligence in early childhood. Literacy problems in early childhood are often related to limited access to developmentally appropriate reading materials (Hutton et al., 2021). The lack of a stimulating and supportive environment for learning to read and write can also be a barrier. On the other hand, naturalistic intelligence problems in early childhood arise from a lack of opportunities to interact with nature and their physical environment. Limitations in observing, recognizing, and understanding natural phenomena can hinder the development of children's naturalistic intelligence.

In addressing these issues, a holistic approach that considers the diverse aspects of learning are essential. Educators and practitioners should design a well-rounded curriculum, provide rich and stimulating learning environments, and engage parents and communities in supporting the development of early childhood literacy and naturalistic intelligence (Kofi & Asemnor, 2024). A holistic approach in curriculum design and teaching facilitates the development of naturalistic intelligence along with other intelligences. Research (Suhirman & Yusuf, 2019) identified the problem of lack of stimulation and development of naturalistic intelligence in children, due to the lack of access to nature, exploration activities, and integration of the concept of sustainability in the curriculum. Low understanding of this potential can hinder optimal development (Sadiku et al., 2020).

Eco-literacy, the concept of integrating ecological and environmental understanding, plays a crucial role in children's development, especially in coastal Preschools. Support from child development and intelligence theory suggests that eco-literacy forms the basis of naturalistic intelligence (Gauvain, 2020). Eco-literacy helps children understand the relationship between humans and nature, develop environmental responsibility, and encourage sustainable behavior (Hilmi et al., 2020). Conversely, a lack of eco-literacy (Putri et al., 2019) could potentially lead to indifference to environmental issues, a lack of understanding of the consequences of behavior on nature, and difficulty facing environmental challenges. Therefore, it is necessary to improve environment-based education in coastal Preschools to ensure adequate eco-literacy and form a generation that cares about the environment (Kadarisman & Pursitasari, 2023). Based on the scope of coastal Preschools, some fundamental problems related to the development of eco-literacy intelligence and naturalist intelligence can be scientifically identified (Srinivasan & Borkar, 2021). Thus, an in-depth understanding of this issue is essential to designing effective strategies for raising awareness and developing eco-literacy in coastal Preschool settings.

Environment-Based Education (EBE) is an innovative approach that integrates everyday learning with the local environment to enhance students' understanding of the environment (Kim & Chung, 2023). Rooted in the concept of environmental education, EBE aims to develop students' sense of community, independence, and provide significant learning opportunities (Zhuang & Sun, 2023). Involving student participation in hands-on experiences such as ecosystem exploration and community projects, EBE brings the benefits of increased student engagement and a deeper understanding of the local environment (Nagar et al., 2023). This approach also stimulates students' critical, problem-solving, and decision-making skills, strengthening their relationship with the environment (Giorgi & Mariotti, 2019).

The research was conducted by Wang et al., (2023) only focuses on self-efficacy in coastal Preschool teachers who can effectively improve eco-literacy. This study in addition to discussing the impact of eco-literacy owned by teachers, it also discusses the impact of eco-literacy, Naturalistic Intelligence, and Environment-Based Education on Preschool teachers and students. The research conducted by Wirdianti et al., (2019) used a quantitative descriptive research design through a correlational approach, while this study used a descriptive qualitative method. Previous research conducted (Ningtyas, 2019) was limited to students in one school, while this study was conducted in five schools and conducted research on students and teachers. This research lies in its focuses on the utilization of loose component media and green ecological design in the Preschool environment. This approach has not been widely explored in previous research, thus making a valuable contribution to the field of early childhood education and environmental conservation.

The importance of this research is to address the need to improve eco-literacy and Naturalist Intelligence among coastal Preschool students. Through empirical analysis, this research aims to inform educational practice, emphasizing the potential of eco-literacy-focused pedagogy to nurture environmentally conscious citizens from an early age. This research contributes to the understanding of the relationship between environmental education and cognitive development, providing insights that can shape policies and strategies to promote sustainable attitudes in early childhood. The research aims to analyze the implementation of environment-based education in improving environmental literacy and naturalist intelligence among coastal Preschool students.

2 THEORITICAL STUDY

2.1 *Eco-Literacy*

Eco-literacy is the understanding and application of ecosystem principles to humans to create a sustainable society (López et al., 2021). Environmental literacy encompasses the development of practical skills, attitudes, and knowledge that contribute to the improvement of environmental conditions for present and future generations (Kumpulainen et al., 2020). The acquisition of eco-literacy requires not only the delivery of theory but also the direct integration of theory and practice. The objective is to enhance

the environmental literacy of students in their daily lives, encompassing their knowledge, attitudes, and abilities, with the ultimate aim of improving conditions for present and future generations (Wahyuni et al., 2022). Puspitasari & Khomarudin (2020), assert that teaching eco-literacy to all is necessary to reduce the number of individuals lacking adequate knowledge regarding environmental preservation. Schools can implement eco-literacy through a series of straightforward measures. These include communicating the theory of eco-literacy to students, encouraging them to engage in activities that protect and responsibly utilize the environment, and conducting an evaluation of the movement by offering policymakers in schools guidance and input regarding the implementation of eco-literacy (Alfianto et al., 2019). Pursitasari et al. (2022), have created eco-literacy-based interactive teaching materials (EITM) in the field of science education to enhance students' critical thinking skills. Nurwidodo et al. (2020), mention the dimensions related to Eco Literacy involving Knowledge, Understanding, Skills, and Values & Attitudes which include children's ability to explain the relationship between humans and the environment and children's ability to identify environmental problems.

Eco-literacy is defined as an understanding of the organizing principles of ecosystems and the application of these principles to create sustainable communities and societies (Juhriati et al., 2021). The lack of eco-literacy and naturalist intelligence among Preschool students in coastal environments can be attributed to the absence of environment-based education (Shaban et al., 2023). Research conducted by (Biber et al., 2023) used quantitative methods to compare the environmental attitudes and awareness of children attending a traditional preschool program with those attending a nature-based preschool program. The study used the Personal Information Questionnaire and the Environmental Attitudes and Awareness Scale for Preschoolers, which consists of two sub-dimensions, namely Attitude Towards the Environment (15 items) and eco-literacy (11 items). The data were collected through face-to-face meetings with each child. The results showed significant differences in environmental attitudes and awareness between nature-centered Preschools and general Preschools, suggesting that children in general schools have lower environmental exposure. Therefore, pre-school education preparation and implementing eco-literacy can effectively improve the environmental awareness of children in mainstream schools, indicating that environmental education alone is not enough. This confirms the need to include eco-literacy in the curriculum to increase students' environmental awareness (Bater et al., 2024).

2.2 *Naturalistic Intelligence*

Naturalistic Intelligence is a type of intelligence that involves the ability to recognize, categorize and utilize environmental features (Nattel & Akullian, 2021). It is the ability to understand and interact with the natural world, including plants, animals, and other living things (Park et al., 2022). This kind of intellect is frequently correlated with those who possess an extraordinary affinity for the natural world and are capable of discerning and valuing its splendor and intricacy.

Research has demonstrated that the provision of spare parts media, which can be utilized to augment the naturalist intelligence of Preschool children, has a significant impact. Furthermore, research has demonstrated the efficacy of the ecological citizenship-based character education paradigm in enhancing the environmental naturalist intelligence of students (Rakhmawati & Kawuryan, 2023). Therefore, naturalist intelligence in education is essential to foster a deeper understanding of the environment and promote environmental literacy. Various educational activities and approaches can be used to develop naturalist intelligence in students, which contributes to a more sustainable future and a greater appreciation of nature.

2.3 *Environment-Based Education*

EBE is a learning approach that emphasizes the integration of environmental concepts and issues across different subject areas (Hong & Lee, 2022). It aims to foster an understanding of ecological systems, sustainability, and environmental management. EBE often involves hands-on, experiential learning activities that take place in natural environments, such as coastal environments, to give students direct experience and observation of the natural world (Tamblyn et al., 2023). EBE can broaden students' understanding of environmental issues and develop their skills in solving problems related to the environment (Hermawan et al., 2022). EBE can be implemented through activities such as field trips to local beaches, outdoor exploration, and interactive teaching that engages students in exploration and deep learning of the surrounding environment.

The steps for implementing EBE can be outlined systematically. In addition to efforts to recognize natural diversity, children are invited to participate in various activities, such as talking about plants, animals, and insects around them, with the aim of helping to identify natural diversity in the surrounding environment. Furthermore, to develop naturalistic intelligence, field trips are organized to parks or outdoor areas where children can observe and record interesting things they find. In addition, children are invited to plant plants in their schoolyard or home as a means of learning the concept of environmental care and the life cycle of plants. In order to improve their understanding and observation skills, children are guided to make environmental reports, where children are directed to record observations, draw, and record notes about the surrounding nature (Istiana et al., 2021). To teach environmental responsibility and involvement in nature conservation, children are involved in simple conservation projects, such as cleaning the garden or recycling, so as to foster a sense of responsibility and awareness of environmental conservation from an early age (Melash & Varenychenko, 2020).

3 METHOD

This research adopts Descriptive Qualitative Approach to explore the implications of EBE on enhancing eco-literacy and naturalist intelligence in early childhood in a Coastal Preschool setting. A qualitative approach was chosen as it facilitates in-depth exploration of learners' perspectives and contextual factors that influence the effectiveness of EBE in

enhancing eco-literacy and naturalist intelligence. The research was conducted using open-ended interviews, observation, and document analysis with five teachers in different Preschool schools.

3.1 Participant

Using methods of purposive sampling, participants were chosen. Teachers with at least five years of classroom experience and the capacity to create environment-based lesson plans are the requirements for choosing participants. Fifteen Preschool teachers from five different coastal areas made up the sample. Research participants description can be seen on Table 1.

Table 1. Research Participants

No	School Name	Participant Code	Gender	Years of Teaching
1	TK I	ADI	Male	10 Years
		LIS	Female	14 Years
		DIA	Female	9 Years
2	TK II	FIS	Female	11 Years
		RIS	Male	7 Years
		SIT	Female	15 Years
3	TK III	ANG	Female	13 Years
		HER	Male	6 Years
		GER	Male	18 Years
4	TK IV	CAN	Male	20 Years
		ALI	Male	15 Years
		MEI	Female	28 Years
5	TK V	SAS	Female	16 Years
		YAS	Male	31 Years
		RIT	Female	25 Years

3.2 Data Collection

The data collection process for this research involved the observation of learning activities across five distinct Preschool schools. The observations included direct observation of interactions between teachers and children, as well as observation of the use of materials or activities that focus on understanding eco-literacy and developing naturalist intelligence. In addition, in-depth interviews were conducted with five teachers from each school to get their views and experiences in implementing this approach. The research sites, which include beaches and tidal areas, serve as living laboratories that support the development of environmental literacy. Overall, the coastal Preschool environment was considered a rich context to test the effectiveness of environment-based education on students' environmental literacy and naturalist intelligence.

3.3 Data Analysis

Data analysis in this study was processed by triangulating data through observers or cross-referencing with other qualitative methods, such as interviews or focus groups, to provide a comprehensive understanding of the impact of environment-based education on environmental literacy and naturalist intelligence in coastal Preschools. After data collection, data reduction involved categorizing, coding, and organizing to identify

themes. Data display involves visual representation through graphs or diagrams, while the final stage involves drawing conclusions that are verified through comparison and triangulation, relating them to theories of environmental literacy and naturalist intelligence.

4 RESULT AND DISCUSSION

In the context of research, coding and grouping participants from the results of interview data collection, observation, and documentation play a crucial role in the analysis process. Grouping participants allows researchers to compare information between different groups or individuals, supporting an understanding of the demographic context that influences participants' perspectives. By selecting participants from various groups, researchers can seek more in-depth information, improve sample selection, and increase the generalizability of research findings. The combination of coding and grouping of participants ensures that the analysis of interview data is carried out systematically and produces reliable findings, enriching understanding of the phenomenon under study.

4.1 Result

The results of this research show that there are three important points including, 1) The Impact of Eco-Literacy on Children's Abilities in Coastal Preschools, 2) The Influence of Naturalistic Intelligence on Children's Competencies in Coastal Preschools, 3) The Impact of Environment-Based Education (EBE) on Children's Competencies in Coastal Preschools. The results of the research data are described with flowchart in Figure 1.

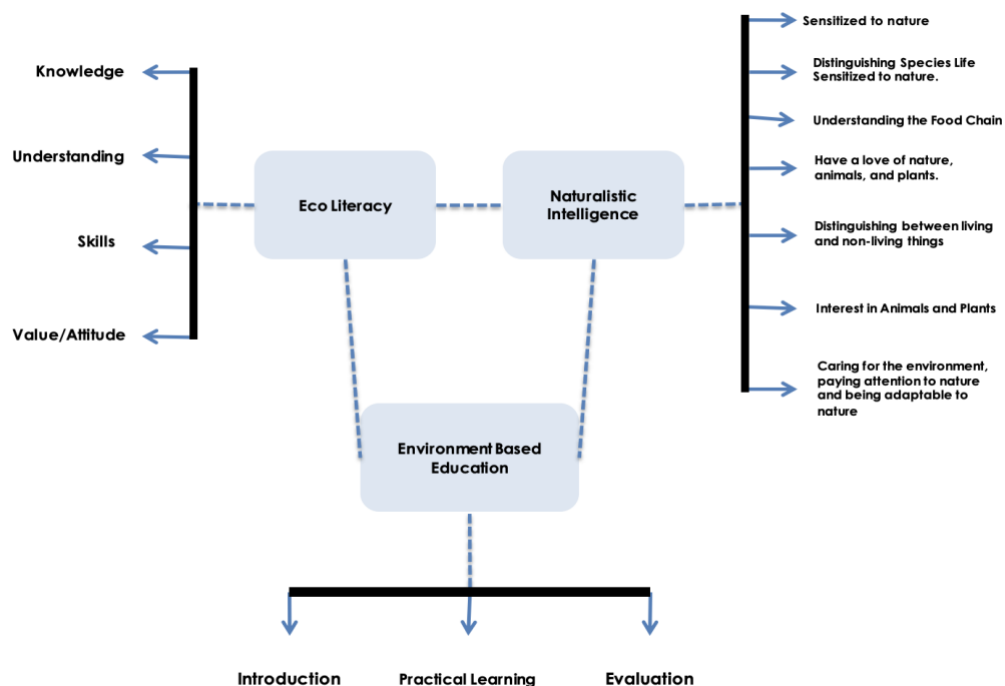


Figure 1. Flowchart of Research

4.1.1 The Impact of Eco-Literacy on Children's Abilities in Coastal Preschools

The results indicate that children have developed a profound comprehension of the interplay between humans and the environment, acquired practical skills in environmental management, and exhibited favorable shifts in their attitudes regarding nature conservation. The findings of this study demonstrate that environment-based education has a beneficial impact on the growth of eco-literacy during the early stages of education (see in Figure 2).

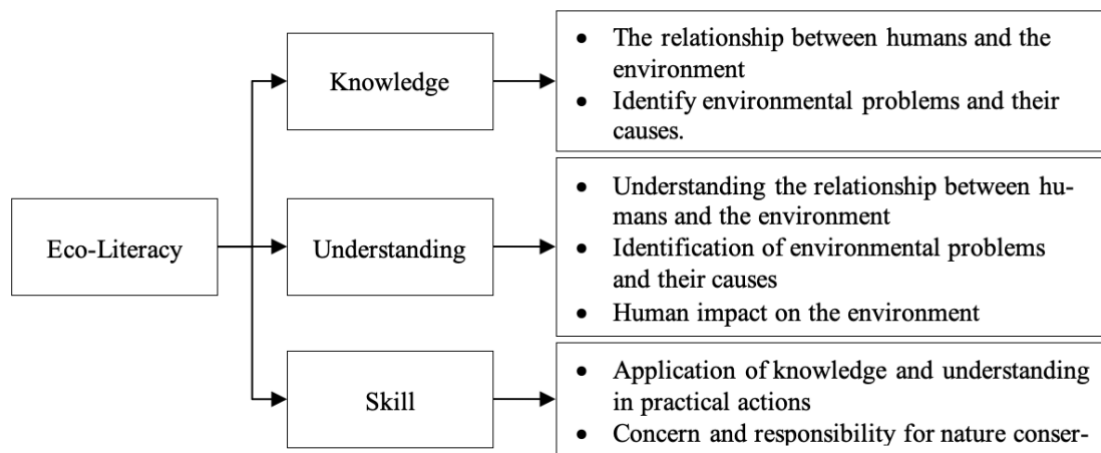


Figure 2. The Scheme of Eco-Literacy

The research findings presented in Table 2 provide a comprehensive account of the accomplishments of children in terms of knowledge, comprehension, abilities, values, and attitudes.

Table 2. Data from Eco-Literacy Impact Test Results on Children's Abilities in Coastal Preschools

Theme	Sub Theme	Research Findings	Participants
Knowledge	The relationship between humans and the environment.	Children can explain the relationship between humans and the environment with sufficient understanding.	TKI-DIA, TKII-RIS, TKII-SIT, TKV-SAS
	Identify environmental problems and their causes.	Children's level of awareness of environmental problems is very good, identifying problems and mentioning their causes in detail.	TKII-RIS, TKII-SIT, TKIV-CAN
	Human impact on the environment	Children have sufficiently in-depth knowledge of the impacts of human activities on coastal ecosystems.	TKIII-HER, TKII-FIS, TKV-YAS, TKV-SAS, TKIV-CAN, TKIV-MEI, TKV-YAS, TKV-SAS
Understanding	Understanding the relationship between humans and the environment.	Children's understanding is not only limited to knowledge but includes a deep understanding of the complexity of interactions between humans and the environment.	TKIII-GER, TKII-SIT
	Identification of environmental problems and their causes.	In-depth understanding is seen in children's ability to detail environmental problems and understand their causes well.	TKI-ADI, TKII-RIS, TKV-YAS, TKV-SAS, TKIII-HER, TKIII-GER
	Human impact on the environment.	Children were able to detail the concrete impacts of human activities on coastal ecosystems, reflecting their deep understanding.	TKI-DIA, TKII-RIS, TKIV-ALI, TKIV-MEI, TKV-RIT

Theme	Sub Theme	Research Findings	Participants
Skills	Application of knowledge and understanding in practical actions.	Children can apply their knowledge and understanding in practical actions, such as waste management, tree planting and biodiversity conservation.	TKII-SIT, TKIII-GER, TKV-SAS, TKIII-ANG, TKIV-CAN,
	Concern and responsibility for nature conservation.	Results show children's caring attitude, responsibility, and concern for nature conservation because of environment-based education.	TKI-LIS, TKI-ADI TKII-HER- TKII-GER, TKIII-ANG, TKIV-ALI, TKIV-CAN, TKV-SAS, TKV-YAS

The most common impacts of Eco-Literacy on children's abilities in coastal Preschools according to the interview results are: 1) knowledge: human impact on the environment presented by 8 participants; 2) understanding: identification of environmental problems and their causes presented by 6 participants; and 3) skills: concern and responsibility for nature conservation presented by 9 participants. Eco-literacy has an important role in developing children's abilities in coastal Preschools, especially in the aspect of knowledge about human impact on the environment. Through eco-literacy, children can understand the coastal ecosystem and the biodiversity in it. Direct involvement in conservation activities, such as planting trees or cleaning beaches, can strengthen their understanding of the impact of human actions and foster a responsible attitude towards the environment. Ecological literacy also enables children to understand the negative impacts of plastic use and the importance of reducing plastic waste in coastal areas. In addition, they can learn to appreciate and use natural resources wisely for future generations to enjoy. As for the aspect of identifying environmental problems and their causes, ecological literacy is expected to provide a lesson for children to recognize problems such as water pollution or plastic waste and understand their root causes, which are often related to human actions such as irregular waste disposal or the use of hazardous chemicals. They learn to appreciate biodiversity and natural resources, respond thoughtfully to the impacts of their actions, and participate in conservation efforts such as tree planting or beach cleaning. The influence of Naturalistic Intelligence on Children's Competence in Coastal Preschool (see in figure 3).

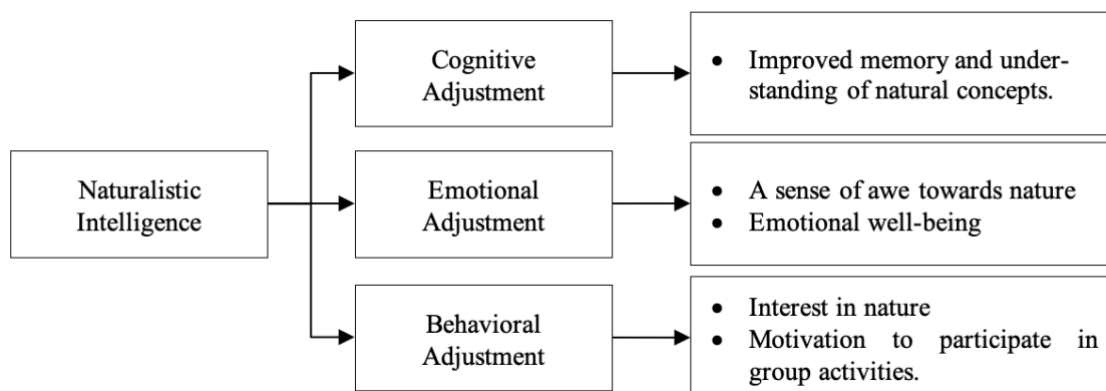


Figure 3. The Scheme of Naturalistic Intelligence

Based on the research results in Table 3, it provides a positive picture regarding the implementation of environment-based education with a focus on naturalistic intelligence on children's competence. Children involved in this approach show satisfactory

achievements in various dimensions, such as sensitivity to nature, understanding of the life of species, food chains, love of nature, and the ability to distinguish living objects from inanimate objects.

Table 3. Data from Test Results on the Effect of Naturalistic Intelligence on Children's Competence in Coastal Preschools

Theme	Sub Theme	Research Findings	Participants
Observation and Identification of the Natural Environment	1. Children's ability to observe the diversity of fauna and flora around the coastal Preschool.	Children showed significant improvement in their ability to observe and identify their natural surroundings after nature observation-focused learning program.	TKII-RIS, TKIII-HER, TKIII-GER
	2. Children's ability to identify the types of plants and animals in the coastal environment.		
Ability to Connect with the Water Environment	1. Children's level of understanding of the water cycle and aquatic ecosystems.	There was an increased awareness of the importance of keeping water clean, as well as a better understanding of the water cycle and its role in the ecosystem.	TKII-SIT, TKI-ADI, TKIII-ANG, TKIV-ALI, TKIV-MEL, TKV-SAS, TKV-RIT
	2. Children's ability to maintain the cleanliness and balance of aquatic ecosystems in Preschool		
Engagement in Nature Based Activities	1. Children's participation in tree or ornamental plant planting activities.	Children showed high levels of engagement in nature-based activities, creating creative projects and demonstrating a sense of responsibility towards the natural world.	TKIII-HER, TKV-SAS
	2. Children's creativity in making handicrafts from surrounding natural materials.		
Use of Natural Resources for Learning	1. Utilization of simple tools to observe the natural world.	Children successfully integrate natural resources into their learning, showing initiative in creating nature-based educational projects.	TKI-DIA, TKII-FIS, TKII-SIT, TKII-RIS, TKIII-ANG, TKV-SAS, TKV-RIT, TKIV-CAN, TKIV-ALI, TKI-ADI
	2. Children's ability to create nature-based ideas and projects.		
Positive Attitude and Behavior towards the Environment	1. Children's awareness of preserving the coastal environment.	Children's level of environmental awareness increases, with increased participation in cleaning and environmental conservation activities around the Preschool.	TKII-RIS, TKIV-ALI, TKIV-MEI, TKV-YAS
	2. Children's participation in cleaning and environmental preservation activities.		

The influence of naturalistic intelligence on children's competence in the scope of coastal Preschools that is most found from the results of interviews is 1) the ability to establish relationships with the aquatic environment described by seven participants, 2) the use of natural resources for learning described by ten participants, and 3) positive attitudes and behaviors towards the environment described by 4 participants. The use of natural resources for learning is presented by ten participants, as are positive attitudes and behaviors towards the environment, presented by four participants.

The influence of naturalistic intelligence, which focuses on sensitivity and skills to interact with nature, especially in the ability to establish relationships with the water environment. Children who have well-developed naturalistic intelligence tend to show a

deep interest in and better understanding of aquatic ecosystems such as rivers, beaches, or the sea. By integrating naturalistic intelligence into the education curriculum, teachers can create activities that strengthen children's ability to make meaningful connections with the aquatic environment, thus supporting the development of their competencies in appreciating, caring for, and positively interacting with biodiversity in coastal ecosystems.

4.1.2 *The influence of Naturalistic Intelligence on Children's Competence in Coastal Preschool*

The findings recorded in Table 4 reflect positive results in the implementation of Environment Based Education.

Table 4. Findings Data on the Impact of Environment-Based Education (EBE) on Children's Competencies in Coastal Preschools

Theme	Sub Theme	Research Findings	Participants
Introduction Stage	Introduction to the Coastal Environment	Children can be encouraged to explore the local beach or coastal area. They can observe the sand, seawater, corals, and perhaps discover different types of sea creatures.	TKI-DIA, TKII-FIS, TKII-SIT, TKII-RIS, TKIII-ANG, TKV-SAS, TKV-RIT, TKIV-CAN, TKIV-ALI, TKI-ADI
	Introduction to the Importance of Sustainability	Introduction to the concept of sustainability: Discuss the concept of sustainability at a level that is appropriate for Preschoolers' understanding. Talk about the importance of keeping the beach clean and preserving the marine ecosystem.	TKII-RIS, TKIII-ANG, TKV-SAS
	Biodiversity Introduction	Children can recognize some marine animals through pictures or models, or through stories involving marine animal characters.	TKI-DIA, TKII-FIS
Practical Learning Activities	Joint Project	Art Projects from Trash: Children can engage in simple art projects using trash they find around the beach, while being taught about the dangers of marine debris.	TKI-DIA, TKII-FIS, TKII-SIT, TKII-RIS, TKIII-ANG, TKV-SAS,
		Coastal Project Together: Engage children in simple projects that support the sustainability of the coastal environment, such as making beach cleanup posters or creative litter boxes.	TKV-RIT, TKIV-CAN, TKIV-ALI
	Community Collaboration	Local Folklore: Tell local folktales or legends related to the ocean. Discuss how local people are closely connected to the coastal environment.	TKII-RIS, TKII-SIT
		Guest Visit from the Fishing Community: Invite local fishermen or marine experts to provide additional knowledge and share their experiences with the children.	TKI-LIS, TKII-FIS, TKII-SIT, TKIV-CAN, TKIV-ALI, TKV-YAS
Environment Day with Parents: Organize a special day where parents can participate in environmental activities with the children, such as a school garden or beach clean-up.	TKIV-MEI		

Theme	Sub Theme	Research Findings	Participants
		Joint Projects with the Community: Involve children in joint projects with the local community, such as planting trees together or cleaning up beach areas.	TKV-RIT, TKIV-CAN, TKIV-ALI, TKI-ADI
	Children's Participation and Interaction	Group Activity Based Approach: Engage children in group activities, such as beach exploration together or group art projects that engage their creativity.	TKI-IDA, TKII-SIT, TKII-RIS, TKIII-ANG, TKV-SAS, TKV-RIT, TKIV-CAN, TKIV-ALI, TKI-ADI
		Small Group Discussions: Facilitate small group discussions where children can share their observations, questions, and ideas about the coastal environment.	TKV-SAS, TKIII-GER
		Collaborative Games: Organize games that encourage collaboration, such as creating a beach map together or group games with a coastal environment theme.	TKIII-HER
	Pro-Environmental Measures	Sustainability Projects: Encourage children to design simple sustainability projects in Preschool, such as waste management, plant planting, or water conservation activities.	TKIII-GER, TKI-IDA, TKII-SIT, TKII-RIS, TKIII-ANG, TKV-SAS
		Environmental Awareness Campaigns: Support children in designing small campaigns to raise environmental awareness among classmates, teachers and parents.	TKI-IDA, TKII-SIT, TKII-RIS, TKIII-ANG, TKIV-CAN, TKIV-ALI, TKI-ADI
		Environmental Performances: Let children create simple performances or short dramas that teach sustainability messages to their classmates.	TKIV-CAN
		Everyday Actions: Discuss everyday actions they can take to help the environment, such as using less plastic, saving water, or taking care of the plants around them.	TKII-SIT, TKIII-ANG, TKV-RIT
Evaluation Stage	Exhibition of Work and Awards	Environmental Works Exhibition: Organize an exhibition of children's work to showcase their projects and convey environmental messages to parents and community members.	TKII-RIS, TKIII-ANG, TKV-SAS, TKV-RIT, TKIV-CAN, TKIV-ALI, TKI-ADI
		Environmental Awards: Introduce a system of awards or recognition for children's pro-environmental actions, such as "Preschool Environmental Hero" or "Best Lifeguard."	TKIV-CAN, TKIV-ALI, TKI-ADI
	Evaluation Through Educational Games	Edutainment Games: Create simple games that teach children about the coastal environment, such as a marine animal picture pairing game or a fishing game with sustainability concepts.	TKIV-ALI, TKV-SAS

The most common impacts of Environment-Based Education (EBE) on children's competencies in coastal Preschools from the interviews are: 1) Introduction Stage: Introduction to the Coastal Environment, described by ten participants; 2) Practical Learning Activities: Children's Participation and Interaction related to the Group Activity-Based Approach, which was described by nine participants; and 3) Evaluation

Stage: Exhibition of Environmental Works, presented by seven participants. Through environment-based education, children are not only invited to learn from books but are also directly involved in observing and exploring their surroundings. This process allows children to recognize the uniqueness of coastal ecosystems, from the flora and fauna on the beach to marine life. By introducing them to the coastal environment through practical activities, children can build basic knowledge about biodiversity and the need to protect ecosystems. Environment-based education at this stage also shapes positive attitudes towards nature and hones their awareness of their important role in maintaining environmental sustainability. Related to practical learning activities, particularly through children's participation and interaction in group activity-based approaches. Group activity-based approaches allow them to learn collaboratively, share ideas, and solve problems together in the context of the coastal environment. These practical activities can involve nature exploration, tree planting, or activities related to environmental conservation.

In the evaluation stage, especially through the exhibition of environmental works, children not only explore knowledge about the environment around them but are also invited to apply this knowledge to real work. The exhibition of environmental works becomes a platform that allows children to express their ideas, creativity and understanding of environmental concepts in a concrete and visible way. This process involves children designing, making, and presenting their works to others, including teachers, classmates, and the school community. By experiencing the evaluation stage through the exhibition of environmental works, the children at Coastal Preschool not only gain an understanding of environmental concepts but are also active in contributing to environmental conservation and awareness in their school and community.

4.2 *Discussion*

4.2.1 *The impact of Eco-Literacy on Children's Abilities in Coastal Preschool*

This research produced significant findings related to the level of Eco-Literacy through Environmentally Based Education in Coastal Preschools, with a focus on four key dimensions: knowledge, understanding, skills, as well as values and attitudes. In the knowledge dimension, children show adequate abilities in explaining the relationship between humans and the environment. Their level of understanding of environmental problems and their causes also reaches a good level, indicating high awareness of environmental issues around them. Furthermore, in the understanding dimension, it was found that children not only have knowledge but also a deep understanding of the complexity of interactions between humans and the environment. The concrete impacts of human activities on coastal ecosystems can be described in detail, reflecting the high level of understanding gained through environmental-based education. This is confirmed by the research conducted (Mattirotto et al., 2021). Emphasizes the importance of understanding and preserving the local environment in the context of coastal ecosystems. Mattirotto's et al., (2021) study on the potential for local wisdom-based coastal ecotourism

in the Mandar tribe highlights the need for careful planning to ensure the sustainability of activities.

In the skills dimension, research findings show that children can apply their knowledge and understanding to real-life actions that support environmental sustainability. Their ability to carry out practical activities, such as waste management, tree planting, and biodiversity conservation, confirms the effectiveness of an environmentally based education approach in developing relevant practical skills. This is in line with the research conducted (Ernst & Burcak, 2019), which shows the positive influence of playing in nature on children's curiosity, creative thinking, and resilience, all of which are important for sustainability. Research conducted by Melis et al. (2020) further supports these findings, showing that Preschool children in Norway have a good understanding of environmental sustainability, with their knowledge being positively related to time spent in nature. Finally, the values and attitude dimension highlights changes in children's positive attitudes towards the environment. They are not only able to explain the relationship between humans and the environment but also show an attitude of care, responsibility, and concern for nature conservation. These findings comprehensively support that environmental-based education at Coastal Preschool is effective in forming positive values and pro-environmental attitudes in children, providing a strong foundation for a sustainable approach to producing a generation that cares more about the environment. This is in accordance with the opinion of Collado et al. (2020), that nature-based environmental education programs can also have a positive impact on children's environmental attitudes.

4.2.2 Influence Intelligence Naturalistic to Children's Competencies in Coastal Preschool

This research highlights the results of preliminary research that shows significant improvements in children's environmental observation and identification skills after participating in a learning program at a coastal Preschool. According to the opinion of Anjari & Purwanta, (2019), this learning approach significantly increases children's naturalistic intelligence about the environment. The results include increased sensitivity to the diversity of fauna and flora, as well as the ability to recognize types of plants and animals in the coastal environment. Furthermore, in the context of children's skills in interacting with the water environment, research reflects an increased understanding of the water cycle and aquatic ecosystems. Children also demonstrate the ability to maintain the cleanliness and balance of the water ecosystem in Preschool, with increased awareness of the importance of keeping water clean.

This reflects a sense of responsibility towards the natural environment through creative projects. In terms of using natural resources for learning, research shows that children can integrate natural resources into the learning process, including using simple tools to observe their natural surroundings. This is in line with the opinion of MacQuarrie et al., (2015), showing that nature can function as a setting, resource, and educator, which leads to improved attitudes towards the environment and better learning experiences.

Children's ability to create nature-based ideas and projects is also highlighted, showing positive initiative in nature learning. The research results noted an increase in children's positive attitudes and behaviors towards the environment, with increased awareness of coastal environmental preservation and active participation in environmental cleanliness and conservation activities. This reflects positive developments in children's attitudes towards environmental conservation efforts after participating in learning programs that focus on this aspect.

4.2.3 The Impact of Environment Based Education (EBE) on Children's Competencies in Coastal Preschools

The introductory stage resulting from this research succeeded in providing children with better insight into the coastal environment through beach exploration and an introduction to the concepts of sustainability and biodiversity. This is in line with research (Sakurai & Uehara, 2020), which highlights the effectiveness of marine conservation education programs in increasing children's awareness and behavior. Furthermore, at the practical learning stage, it was seen that joint project activities, collaboration with the community, and children's participation in group activities had provided in-depth and relevant direct experiences. This is further supported by research conducted (Pękala & Wichrowska, 2022) showing that the role of teachers is to facilitate children's participation in project activities, which allows children to express their creativity and opinions. Pro-environmental actions, such as sustainability projects, environmental awareness campaigns, and environmental shows, help children understand the importance of concrete actions in maintaining environmental sustainability. This is in line with research conducted (Kos et al., 2016) showing that children can understand the impact of pro-environmental actions, such as sustainability art projects and encouraging environmental awareness, if presented in an age-appropriate way.

There is concrete evidence that children are actively involved in trash art projects, guest visits from fishermen, and activities with parents, all of which contribute significantly to their understanding and appreciation of the coastal environment. Furthermore, the research results show that pro-environmental action approaches, such as sustainability projects and awareness campaigns, are successful in stimulating positive responses from children and encouraging active participation in concrete actions to support environmental sustainability. The evaluation of the EBE approach through work exhibitions and environmental awards demonstrates its capacity to produce outcomes that parents and the community can measure and value. Previous research has also shown that evaluation through work exhibitions and environmental awards can have a positive impact because it can lead to self-evaluation and program improvement (Mwambeo et al., 2022). Overall, this research strengthens the urgency and effectiveness of Environmentally Based Education in increasing the understanding and competence of children in Coastal Preschools, as well as stimulating positive action towards environmental sustainability.

5 CONCLUSION AND SUGGESTION

Based on the results of the analysis and discussion, the conclusions of this study are as follows: 1) Environmental Education in Coastal Preschool improves children's Eco-Literacy, including knowledge, understanding, practical skills, and positive attitudes towards the environment. This finding confirms the effectiveness of such education in shaping a generation that cares about environmental sustainability. 2) Nature learning programs in coastal Preschools improve children's observation skills, naturalist intelligence, and environmental understanding. They are active in nature activities, such as planting and creativity with natural materials, which also increase positive attitudes towards environmental conservation. 3) Through practical activities and pro-environment projects, children are actively involved and show positive responses. Teachers play an important role in supporting children's creativity. In conclusion, Environmental Education in Coastal Preschool successfully stimulates children's participation in positive actions for environmental sustainability. Based on the research conclusions above, the following suggestions can be made: 1) Long-term research is needed to understand the long-term impact of such education on children's Eco-Literacy. 2) It is necessary to develop a more structured learning model that can be adopted by other educational institutions, including the preparation of a special curriculum and the integration of nature activity programs and pro-environmental projects. (3) It is important to measure and understand the role of teachers in shaping children's participation, including the identification of specific teaching strategies and factors that can increase their involvement and support for children's creativity in environmental contexts. Thus, the development of this research can provide practical guidance for educational institutions to increase children's environmental awareness and involvement in environmental conservation.

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