Numeracy and Environmental Awareness Attitudes of Primary School-Age Children in the Malind Community

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Article Info

ABSTRACT

Purpose of the study: This study examines students' numeracy abilities and attitudes toward environmental awareness among primary school-age children. Through an in-depth understanding of these two aspects, this study aims to provide a strong foundation for formulating appropriate solutions and learning methods that align with the needs and conditions of primary school-age children.

Methodology: This research employed a descriptive method with a quantitative approach to explore numeracy literacy capabilities and attitudes toward environmental awareness. The descriptive research design was structured to provide detailed descriptions of the conditions or characteristics of the phenomena under study, focusing on "how" questions and presenting facts clearly, accurately, and comprehensively.

Main Findings: The results indicated that 57.5% of primary school-age children demonstrated moderate numeracy skills, while 32.5% fell into the poor category. This suggests the need for educational intervention to enhance numeracy capabilities. Additionally, children's environmental awareness attitudes largely fell into the good category at 65%. However, certain aspects of environmental awareness attitudes still require additional attention for optimal development. Systematic efforts remain necessary to improve both aspects.

Novelty/Originality of this study: This study provides novel insights into numeracy capabilities and environmental awareness attitudes among primary school-age children from the Malind community in EswambiVillage. The data offers contextual and specific information regarding educational conditions and environmental awareness in this region, which has yet to be extensively studied in previous research.

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1. INTRODUCTION

The increasingly dynamic and complex global development requires individuals to possess relevant capabilities for competitive advantage. Literacy, as one fundamental ability, encompasses not only reading and

writing skills but also critical thinking abilities, information comprehension, and effective communication. It serves as the primary foundation for addressing modern life challenges, particularly in the digital era characterized by extensive information flows. However, literacy proficiency levels among individuals, especially children, are diverse. Various studies have indicated that literacy abilities are influenced by multiple factors, including socioeconomic conditions, health status, community involvement, and educational environment [1], [2]. Children with limited access to learning resources or inadequate social support tend to demonstrate lower literacy abilities than those in supportive environments [3]. Considering literacy's importance as a determinant of future success, developing literacy skills from an early age becomes crucial. Literacy development must be initiated in preschool through various approaches involving family, school, and community participation. Establishing strong literacy foundations early enables children to understand their environment better, utilize opportunities, and confidently address future challenges [4]. Therefore, literacy development represents not merely an individual responsibility but a collective task in creating a literate generation prepared for global competition.

Literacy capabilities play an essential role in individual development, as mastering literacy facilitates the acquisition of more complex skills in the future [5]. Literacy serves as the foundation for knowledge comprehension and mastery and supports critical thinking abilities, enabling individuals to analyze information thoroughly and make appropriate decisions [6], [7]. Furthermore, literacy contributes to developing significant life values such as responsibility, empathy, and cooperation. Additionally, strong literacy capabilities can enhance sensitivity to environmental issues, helping individuals understand the importance of maintaining ecosystem balance and promoting environmentally responsible behavior [8]. Thus, literacy functions not only as a tool for knowledge acquisition but also as a means of developing superior character and making positive societal contributions. Numeracy literacy represents a crucial component of literacy capabilities. The development of numeracy literacy skills influences higher-order abilities [2], [9], [10] and impacts future policy development and targeted interventions [11], [12]. These findings indicate that literacy represents an essential capability for global competitiveness.

Environmental issues have emerged alongside numeracy literacy concerns, with numerous environmental degradation and coastal erosion, among other environmental challenges. One contributing factor is the low level of environmental awareness attitudes. This is evidenced by children and adults disposing of waste inappropriately, such as along beaches and drainage channels [13], [14]. Environmental awareness attitude serves as a key determinant of environmental preservation; consequently, various methods have been implemented to develop environmental awareness attitudes. Several implemented approaches include enhancing environmental awareness attitudes through environmentally-oriented school culture [15], integrating moral values into learning to shape students' environmentally conscious character [16], and applying learning models that impact environmental awareness attitudes [14], [17], [18]. These findings suggest that habituating students to environmental activities can develop environmental awareness attitudes that positively impact environmental preservation.

These explanations highlight that, despite the implementation of numerous methods, significant challenges persist in certain areas, particularly concerning numeracy skills and environmental awareness. The low level of students' numeracy skills is reflected in behaviors such as littering, which is still common among school-aged children. Research findings indicate that students' numeracy literacy skills are categorized as low, as evidenced by the individual scores obtained by the students. The study also revealed that among the six components of numeracy literacy measurement, the indicator requiring the most attention is the use of measurement tools, which includes topics such as measuring length, time, area, and others [19]. Additionally, the practice of burning grass during the dry season, still prevalent in some regions, not only degrades air quality but also negatively affects food chains and ecosystem balance. If these conditions are left unaddressed, they could lead to further deterioration in the quality of education and the environment. One contributing factor to the failure of certain methods is their lack of alignment with local environmental conditions. Therefore, an initial assessment is necessary to understand the current state of numeracy skills and environmental awareness, ensuring that solutions implemented are both effective and contextually appropriate..

Previous research has primarily focused on implementing learning models, developing educational media, and applying cultural frameworks to enhance literacy capabilities and environmental awareness attitudes. However, this study aims to analyze numeracy literacy capabilities and attitudes toward environmental awareness. This focus derives from the observation that each region demonstrates varying levels of numeracy literacy capabilities and attitudes toward environmental awareness. The results of this research are expected to provide appropriate solutions for developing these abilities effectively according to regional characteristics. Several studies have produced diverse findings regarding students' numeracy literacy capabilities and environmental awareness attitudes. Research at a private junior high school in Batam reported students' numeracy literacy capabilities in the good category, with an average score of 84.7 [20]. Other studies indicated that junior high school students' numeracy literacy capabilities during the independent learning era remained at a low level of 37% [21]. Additional research demonstrated that numeracy literacy capability among 22 participants

achieved a very good category with an average score of 84.7 [22]. Studies also indicated that first-grade students' numeracy literacy capabilities in mathematics demonstrated satisfactory performance aligned with existing numeracy literacy indicators, with students showing increased enthusiasm for mathematics learning [23]. Regarding environmental attitudes, research has indicated that students' environmental awareness attitudes meet good criteria [24], [25]. These varied findings regarding students' numeracy literacy capabilities and environmental awareness attitudes indicate that while some research demonstrates positive outcomes, with students achieving very good categories in both domains, other studies reveal persistent challenges, such as low numeracy literacy levels among some students. This variation suggests that more strategic and contextual approaches are needed to enhance students' numeracy literacy capabilities and environmental awareness attitudes tailored to specific regional or group requirements and conditions.

2. RESEARCH METHOD

This study employed a descriptive research methodology with a quantitative approach to explore numeracy literacy capabilities and attitudes toward environmental awareness. Descriptive research is designed to provide detailed descriptions of conditions or characteristics of a studied phenomenon or problem, focusing on "how" questions and presenting facts clearly, thoroughly, and comprehensively [26], [27]. In this approach, data were obtained without manipulation or additional treatment [28]. The research was conducted through three main phases: preparation, implementation, and conclusion. During the preparation phase, researchers identified research problems and relevant assumptions and then developed research instruments in the form of questionnaires. The implementation phase involved distributing questionnaires to measure the application of learning to students' multiliteracy capabilities. In the final phase, data were analyzed and processed to draw conclusions based on research findings, which were compiled into a report [29]. This systematic approach aimed to comprehensively overview students' numeracy literacy capabilities and attitudes towards environmental awareness.

Research sampling plays a crucial role in determining the validity and generalizability of research findings. Using representative samples enables researchers to formulate accurate conclusions about the broader population. Experts define samples as carefully selected portions of the population based on specific quantities and characteristics to represent the entire population. Therefore, appropriate sample selection becomes crucial for reducing bias and improving research efficiency. In this study, cluster sampling was employed as the sampling method. Cluster sampling is a probabilistic method involving the selection of specific subpopulations or groups, termed clusters, where all members within the selected groups become part of the sample. This method was chosen for its ability to handle large, dispersed populations, such as student populations across schools. In this research context, the studied population comprised elementary school students in Eswambi Village, totaling 40 children. Through cluster sampling, all students within this group were included as samples. This approach facilitated data collection and ensured that the collected data represented population characteristics. Additionally, cluster sampling helped address logistical constraints commonly encountered in geographically dispersed population research while maintaining research validity and reliability [30].

Data collection methods are defined as techniques used by researchers to gather necessary research data. These methods can be divided into two categories: test and non-test methods. The test method is defined as an objective measurement method regarding an individual's behavior, which can be assessed and described using numbers, scales, or category systems. The non-test method represents a technique used to measure learning progress or learning problems experienced by students and is used to evaluate learning outcomes in psychomotor, attitudinal, or value aspects [32], [33]. This research required data related to a quantitative approach to explore capabilities; therefore, both test and non-test methods were selected, utilizing questionnaire instruments and multiple-choice tests. The questionnaire, completed without direct interviews with respondents, aimed to discover complex and relevant information regarding the research problems [30]. The questionnaire measured environmental awareness attitudes through 20 statements developed from 8 indicators: cleanliness maintenance habits, empathy toward environmental issues, waste management, natural resource conservation, positive environmental attitudes, awareness and responsibility, environmental preservation, and proactive environmental actions. Children's numeracy skills were evaluated using 20 tests developed based on literacy capability indicators established by the Ministry of Education and Culture (Kemendikbud). These indicators include estimating and calculating with whole numbers, using fractions, decimals, and percentages, recognizing and applying patterns and relationships, using spatial reasoning, employing measurements, and interpreting statistical data [19].

Data analysis was conducted interactively, as explained by Sugiyono, where qualitative data analysis occurred continuously with active researcher involvement in explaining and concluding obtained data and summarizing it with utilized theories. This interactive data analysis model included three main components: data reduction, data presentation, and conclusion drawing (verification). Data reduction involved selecting, focusing, observing, abstracting, and transforming raw data from field notes. This process continued throughout data

collection, including creating summaries, coding, tracing themes, and developing clusters and analytical memos. Data presentation aimed to systematically organize information for drawing conclusions or making decisions, effectively utilizing matrices, graphs, networks, or charts. The final stage involved answering research questions by revealing the "what" and "how" of research findings. Additionally, descriptive data analysis processed data systematically using numbers or percentages relevant to the research object [31], [34]. Quantitative descriptive analysis determined percentages from research instrument dimensions and categorized them in percentage tables, as shown in Table 1.

Table 1. Percentage Value Categories

Score Interval	Category
Mi +1,5 Sdi s/d Mi + 3Sdi	Very Good
Mi + 0,5 Sdi s/d Mi +1,5 Sdi	Good
Mi – 0,5 Sdi s/d Mi + 0,5 Sdi	Moderate
Mi – 1,5 Sdi s/d Mi – 0,5 Sdi	Poor
Mi – 3 Sdi s/d Mi – 1,5 Sdi	Very Poor

3.   RESULTS AND DICUSSION

This research focused on analyzing numeracy capabilities and environmental awareness attitudes among grade 3-5 primary school-age children in Eswambi Village. Primary school-age children were selected as respondents because numeracy capability represents one of the essential fundamental skills, as does environmental awareness attitude. Understanding children's numeracy capabilities and environmental awareness conditions is expected to represent their situation, facilitating relevant policy formulation. The research sample involved 40 children from families of swamp and sea fishermen, as well as hunting families. Living conditions in this village remain far from prosperous, with family income generally sufficient only for daily food requirements. Additionally, during dry seasons, primary school-age children are frequently absent from school to assist their families in hunting activities. Observations also indicated that many children in this village possess minimal learning facilities, which affects their learning processes. The following sections provide a detailed analysis of numeracy capabilities and attitudes towards environmental awareness.

3.1 Literacy numeracy

Based on the data, 57.5% of children demonstrated moderate category performance, while 32.5% fell into the poor category. Although most children achieved moderate levels, this condition indicates that many still need adequate numeracy capabilities. These results are detailed in Table 2. Considering numeracy as a fundamental skill, this situation requires serious attention. Numeracy capability functions not only as a foundation for mathematics learning but also influences children's ability to understand and solve daily life problems. Low numeracy capabilities can impact children's academic achievement and limit their future development opportunities.

Table 2. Analysis Results of Student's Numeracy Capabilities

Score Range	Category	Frequency	Percentage (%)
75.05 – 100.0	Very Good	0	0
58.3 – 74.9	Good	4	10
41.7 – 58.2	Moderate	23	57.5
25.0 - 41.6	Poor	13	32.5
0.0 – 24.9	Very Poor	0	0

This suboptimal numeracy proficiency is influenced by various factors, both internal to the children and from their external environment. One significant internal factor is students' learning interests. Learning interest plays a vital role in determining the success of the learning process [35]-[38]. When there is low learning interest, children's ability to absorb learning material, including numeracy, tends to decline [39], [40]. Low learning interest among primary school-age children can be attributed to several factors. One such factor is the limited available learning resources [41], [42]. Children in certain areas, such as Eswambi Village, often have limited access to quality learning materials, such as books, teaching aids, or supporting technology. Additionally, learning models that lack variety and innovation contribute to children's low enthusiasm for learning [43], [44]. Monotonous methods or those less relevant to children's daily lives make learning seem tedious and unengaging. Another crucial factor is the presence and role of teachers in the learning process. Teachers who demonstrate limited physical or emotional presence in supporting children can affect their learning enthusiasm and interest.

Teacher presence extends beyond physical classroom attendance to include attention, encouragement, and the ability to create interactive and engaging learning environments [45]. When teachers inadequately fulfill these needs, children tend to lose motivation for optimal learning. Therefore, comprehensive efforts are required to address these factors, such as improving access to learning resources, enhancing teaching methods, and ensuring teachers possess both competence and commitment in creating meaningful learning experiences for children. These measures are expected to increase learning interest and improve primary school-age children's numeracy capabilities.

Parents' socioeconomic factors significantly influence children's learning processes, particularly in Eswambi Village, where many parents work as fishermen and hunters. Their economic constraints often become barriers to providing adequate learning facilities and supporting children during the learning process. Consequently, children experience various difficulties, such as limited learning resources, including a lack of access to writing materials, books, digital devices, or other learning materials that support both school and home learning processes. Furthermore, parents who must work extensively to meet basic needs often need more time to accompany their children, making it difficult for children to receive direct guidance in understanding lessons. This condition may also cause psychological stress in children, as family economic pressure affects their learning motivation and enthusiasm. Moreover, children from economically disadvantaged families face limited access to quality education or supplementary activities that could support their academic and non-academic development. These findings align with several research outcomes, including studies indicating that parents' economic levels influence interest in continuing education [46], there exists an insignificant direct influence between parents' economic levels and mathematics learning outcomes [47], parents' socioeconomic status significantly influences students' economic literacy levels [48], and there exists a significant relationship between parents' economic conditions and learning loss [49]. These research findings illustrate that parents' socioeconomic conditions influence learning success. In this case, school children are often taken to the forest by their parents to meet food requirements, inevitably impacting children's numeracy capabilities through lost learning opportunities.

Parents' understanding of education's importance is another factor influencing children's numeracy capabilities. Parents often prioritize meeting daily needs in villages with low economic conditions over their children's education. Parents tend to assume that earning income for family survival is more urgent than ensuring their children's optimal school attendance. This perspective impacts support for children's education, including numeracy capability development, which requires special attention and guidance at school and home. Consequently, children tend not to receive sufficient stimulation to develop their numeracy capabilities optimally. Factors influencing numeracy capabilities are not limited to three factors, as many other factors can contribute. However, in this village's conditions, these three factors limited learning facilities, lack of guidance time, and low parental understanding of education's importance represent the primary reasons affecting children's low numeracy capabilities. This indicates the need for special attention to increase awareness, support, and access to education in this region.

3.2. Environmental awareness Attitudes

Children's environmental awareness attitudes were measured using 20 statements designed based on social attitude indicators. These statements encompassed various aspects reflecting environmental concern, including awareness of cleanliness importance, waste management, prudent resource utilization, and involvement in environmental conservation activities. Based on data collection results, children's overall environmental awareness attitudes fell into the good category at 65%. This data indicates that most children have already developed adequate awareness of maintaining and caring for their surrounding environment. However, a more detailed analysis of each statement reveals that several aspects of environmental awareness attitudes require further attention for enhancement or development. This is essential to ensure that primary school-age children's attitudes toward environmental awareness persist and continue to develop into more substantial and consistent habits. To provide a clearer illustration, the distribution results of children's environmental awareness attitudes by category are presented in Table 2.

Table 2. Analysis Results of Environmental Awareness Attitudes

Score Range	Category	Frequency	Percentage (%)
75.05-100	Very Good	0	0
58,3-74,9	Good	26	65
41,7-58,2	Moderate	14	35
25-41,6	Poor	0	0
0-24,9	Very Poor	0	0

Although the research findings indicate that children's environmental awareness attitudes generally fall into a moderately good category, several aspects still require enhanced attention for improvement. A primary concern is children's need for more awareness in maintaining environmental cleanliness, particularly regarding waste disposal behavior. Observational findings demonstrate that children frequently dispose of waste inappropriately, even when such waste does not fall into hazardous categories such as plastics or cans. For instance, plastic snack food packaging is often discarded indiscriminately within schools and other public spaces. This behavior indicates the necessity for increased awareness regarding disciplined waste disposal in designated locations, regardless of waste type or size. If left unaddressed, this condition could lead to adverse consequences. In addition to enhancing awareness about proper waste disposal, another crucial habit requiring modification is clearing grass or land through burning. This practice not only adversely impacts environmental quality but potentially generates various negative consequences for public health and ecosystem sustainability. While grass or land burning is often considered a quick and practical method for area clearing, particularly in rural or plantation regions, the impacts of this action significantly outweigh its apparent benefits. The burning process produces air pollution through smoke and hazardous gases such as carbon monoxide (CO) and carbon dioxide (CO_2), which deteriorate air quality and contribute to global warming. Furthermore, the generated smoke can cause respiratory disturbances, particularly affecting children, elderly individuals, and those with specific health conditions.

From an environmental perspective, land burning significantly degrades soil structure and diminishes its fertility. Soil microorganisms, essential for maintaining ecosystem equilibrium, perish due to the generated heat. Additionally, burning activities may trigger uncontrolled fires that threaten the safety of surrounding communities and devastate regional biodiversity. To address this prevailing practice, educational initiatives and the introduction of more environmentally sustainable alternatives are imperative. For instance, grass clippings or plant residues intended for clearing could be processed into organic compost for fertilizer applications. This methodology presents a safer alternative and generates economic benefits for the community. Furthermore, collaboration among governmental bodies, educational institutions, and community stakeholders can promote awareness regarding the hazards of land burning while establishing local regulations that support sustainable land-clearing practices. While behavioral modification requires substantial time and effort, these incremental steps will yield significant impacts for future generations. Through collective efforts to eliminate land-burning practices, preserve a healthy and sustainable environment, and transmit environmental stewardship values to children as future custodians of the Earth.

As elaborated, education presents a viable solution for enhancing attitudes toward environmental awareness. Multiple research findings support this assertion. Studies have demonstrated the influence of episodic future thinking on attitudes toward environmental awareness [50]. Research has also established the impact of social media content on environmental awareness [51], and investigations have confirmed the effectiveness of environment-based learning in fostering environmental awareness attitudes [52]. Studies have documented the positive influence of P5 sustainable lifestyle approaches in enhancing students' environmental awareness [53]. Furthermore, research has demonstrated the efficacy of various pedagogical approaches. Implementing Problem-Based Learning (PBL) has significantly affected attitudes towards environmental awareness [14]. Studies utilizing the Meaningful Instructional Design (MID) model have identified it as an effective solution for improving student comprehension and environmental awareness [54]. Additional research has established that problem-based learning significantly enhances problem-solving capabilities and attitudes towards environmental awareness among participants[55]. Investigation into PBL implementation through bottle craft activities has demonstrated positive effects on students' environmental consciousness (Yusuf et al., 2023). Studies have also confirmed the influence of animation media on developing environmental awareness characteristics [57], and research has validated the effectiveness of smartphone-based learning materials in ecosystem education for developing environmental awareness [58].

These findings illustrate that implementing learning processes utilizing appropriate models and educational media can positively impact the development of environmental awareness attitudes among students. This effectiveness stems from students' consistent engagement in learning activities that instill environmental awareness values. Students progressively develop understanding, awareness, and behavioral patterns aligned with environmental conservation principles through integrated habituation in the learning process. For example, the implementation of Project-Based Learning, which engages students in practical activities such as waste management or reforestation initiatives, enables them to directly observe the positive environmental impact of their actions. Additionally, educational media, including instructional videos, digital simulations, and interactive games focused on environmental issues, play crucial roles in reinforcing their awareness. Through this approach, students move beyond theoretical understanding of environmental awareness concepts to practical application in their daily lives. This habituation process serves as a fundamental mechanism in fostering enduring environmental awareness attitudes, potentially becoming an integral component of their long-term character development.

Based on these considerations, addressing ongoing environmental awareness challenges among primary school-age children requires more strategic and sustainable approaches despite their generally adequate current attitudes. One effective intervention to enhance children's environmental awareness attitudes involves habituation through school-based learning processes and the integration of environmental values into their daily lives. An effective approach in this context involves implementing local culture-based learning methodologies. This method not only maintains relevance to children's lives but also excels in naturally instilling environmental values through community-inherited local wisdom. Local cultures frequently encompass traditions and practices related to environmental preservation, such as forest conservation, water resource management, and traditional waste management techniques. For instance, learning activities can be designed to engage students in local culture-based activities, such as communal tree planting, identification of regional endemic plant species, or exploration of traditional songs, folklore, and games that convey environmental conservation messages. Through this approach, students not only acquire environmental awareness concepts but also develop emotional connections with their culture, ultimately strengthening their sense of environmental responsibility. Furthermore, local culture-based learning can be integrated with contextual learning models, such as Project-Based Learning (PjBL) or Problem-Based Learning (PBL). These methodologies enable students to engage directly in addressing real environmental challenges within their communities, facilitating their understanding of how their actions directly impact environmental sustainability. Through the integration of local culture-based learning into daily life, primary school-age children are expected to develop not only an enhanced understanding of the importance of environmental preservation but also consistent environmental awareness attitudes as inherent character traits. This approach represents a long-term investment in developing a more environmentally conscious and responsible generation.

4. CONCLUSION

The research findings reveal significant variations in primary school-age children's numeracy capabilities. Results indicate that 57.5% of children demonstrate moderate performance, while 32.5% remain in the poor category. Although the majority of children exhibit adequate numeracy capabilities, this data indicates that a substantial proportion still needs to achieve sufficient numeracy proficiency levels. This condition suggests the necessity for more intensive educational interventions to enhance their numeracy capabilities. Regarding environmental awareness attitudes, children's overall performance falls into the "good" category, reaching 65%. This data indicates that most children possess adequate awareness levels in maintaining and caring for their surrounding environment. However, a deeper analysis of each measured statement reveals several aspects of environmental awareness attitudes requiring additional attention. Some aspects need strengthening or further development to optimize children's environmental awareness and behavior. This indicates that while overall results appear relatively positive, systematic efforts remain necessary to enhance specific aspects that have yet to reach their maximum potential.

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