



Toward a sustainable future in Aceh primary schools: Embracing environmental education - insights from stakeholders

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Article History

Received: 06 February 2024

Revised: 18 March 2024

Accepted: 20 March 2024

Published: 23 March 2024

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[DOI:10.62568/jplse.v1i1.51](https://doi.org/10.62568/jplse.v1i1.51)

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Abstract: This study examines the integration of environmental education (EE) in Aceh, Indonesia's primary schools, highlighting challenges and stakeholder perspectives in a post-tsunami context. With Aceh's rich ecological diversity, the implementation of EE faces hurdles like limited resources, curriculum overcrowding, and insufficient teacher training. Despite these challenges, stakeholders, including teachers, principals, curriculum experts, and parents, show a strong interest in EE. However, they are hindered by practical issues. The research aims to understand these barriers and explore strategies for effectively integrating EE into school curricula and daily activities. It emphasizes the importance of a collaborative, context-sensitive approach, acknowledging the need for better support structures, resource allocation, and teacher training to achieve EE goals and cultivate environmentally aware students. Employing qualitative methods with an interpretive ontology, the study focuses on the perspectives of Aceh's education stakeholders. The findings underscore a mix of enthusiasm and challenges, stressing the importance of making EE a core component of education. The research advocates for enhanced collaboration among schools, government, and the community, and for innovative approaches to support EE. It highlights the significance of community involvement and flexible policies for successful EE implementation in Aceh's primary schools. The study underscores the urgent need for comprehensive efforts to address these issues and integrate EE effectively in the education system.

Keywords: Aceh; environmental education; primary schools; stakeholders

Introduction

The importance of integrating environmental education in primary schools in Aceh is underscored by the unique post-tsunami context and rich ecological diversity of the region. Even though environmental education has been integrated into the curriculum (Benavides Lahnstein, 2018; Shabalala et al., 2023), there are still gaps in the effectiveness of its implementation (Gurr & Forster, 2023), as seen from the varying perceptions of stakeholders including teachers, school principals, and curriculum experts (Gani et al., 2023; Loubser et al., 2014; Ma & Chen, 2023;

Parry & Metzger, 2023). Challenges such as limited resources, curriculum overcrowding, and teacher training requirements hinder the realization of the full potential of environmental education (Hudson, 2001; Marques & Xavier, 2020; Ngwenya, 2020). Stakeholders expressed enthusiasm for environmental education but were hampered by practical limitations. The curriculum shows ambitious integration of environmental topics, but still has difficulties in delivering it effectively and relevant to the local context (Hernawan et al., 2021). There is a clear need for stronger support structures, including resources and training, to realize the goals of

environmental education. Bridging this gap is critical to fostering a generation of environmentally conscious students in Aceh.

Recent research highlights significant gaps in understanding the practical constraints and stakeholder perspectives in implementing environmental education in primary schools in Aceh. Studies carried out following the tsunami in Aceh identified several important areas that needed attention. First, research that emphasizes the impact of the 2004 tsunami disaster on Acehese people's views of the environment, shows a lack of previous understanding and suggests the need for educational strategies that are more sensitive to disaster experiences (Gani, Razali & Burhansyah, 2023; Gani, Yusuf & Yusuf, 2023 ; Oktari et al., 2015; Oktari et al., 2018; Sakurai et al., 2018; Yusuf et al., 2022). Second, research that discusses the specific challenges and needs faced by teachers and school principals in implementing environmental education, highlights the importance of taking their views into account in developing effective curricula (Carleton-Hung & Hug, 2010; Lateh Muniady, 2010; Stevenso et al., 2017; Svensson et al., 2022). The final section highlights the mismatch between environmental policies and their implementation in schools, underscoring the need to adapt policies to suit school conditions (Davis & Davis, 2021; Lenhoff et al., 2022; Schulte, 2018; Stevenson, 2007; Siagian et al., 2023; Yusuf et al., 2022). Overcoming these gaps by integrating the local context, actively involving stakeholders, providing adequate training for teachers, and carrying out continuous evaluation and policy adjustments, is the key to creating an environmental education curriculum that is not only effective but also relevant for Aceh, for the sake of increase environmental awareness and action among students.

This research aims to address this gap by examining how environmental education is implemented in primary schools in Aceh, taking into account stakeholder perspectives and contextual challenges. The unique context of post-tsunami Aceh is the background for this exploration. This research focuses on three key questions: (1) What are the barriers to implementing environmental education in elementary schools in Aceh? (2) How do stakeholder perceptions influence the implementation of environmental education? (3) What strategies can increase the integration of environmental education into the curriculum and daily learning processes? Answers to these questions will provide practical insights for

educators, policy makers and other stakeholders to strengthen the role of environmental education in Aceh.

This study argues that the successful integration of environmental education in primary schools in Aceh depends on understanding and addressing the region's unique challenges and stakeholder perspectives. The post-tsunami recovery process and the rich environmental diversity in Aceh require an approach adapted to environmental education. Challenges such as financial constraints, curriculum density, and the need for contextual relevance highlight the complexity of implementing environmental education. The involvement of stakeholders, especially teachers, principals and parents, is critical in overcoming these challenges. Therefore, a collaborative, context-sensitive and resource-aware approach is essential to effectively embed environmental education in the primary school system in Aceh.

Sustainable Environmental Education

Sustainable Environmental Education can be characterized as the process of obtaining the knowledge and skills essential for individuals to comprehend, value, and actively participate in the preservation of environmental sustainability (Sterling, 2001). This notion underlines the significance of integrating environmental concerns across all educational levels with the aim of attaining sustainable development. A multitude of investigations have underscored efficacious learning approaches and methodologies within Sustainable Environmental Education. According to Hungerford and Volk (1990), an interdisciplinary approach that incorporates diverse scientific disciplines into environmental education may yield more favorable outcomes in influencing student behavior. Furthermore, project-based approaches and hands-on field experiences have likewise demonstrated their effectiveness in augmenting students' comprehension and engagement with environmental issues (Kopinina, 2020).

The impact of Sustainable Environmental Education can be observed in the investigation conducted by Hungerford et al. (1980), wherein they present findings that demonstrate how the acquisition of knowledge and understanding related to environmental sustainability can effectively influence an individual's behavior, consequently fostering sustainable actions in their daily lives. In the context of Indonesia, the implementation of Sustainable Environmental

Education also emerges as a significant focal point within the endeavors aimed at conserving the environment. Integrating environmental education into the curriculum in Indonesia is of utmost significance in order to foster sustainability and conservation practices (Gani et al., 2023). Endeavors related to environmental education possess the capability to augment consciousness, foster erudition, and instigate action amidst students, thereby empowering them to assume the role of custodians of the environment (Dewi, & Parikesit, 2023). To facilitate the development of a sustainable environmental education curriculum, it is essential that the curriculum is meticulously formulated so as to reconcile theoretical concepts with real-life contextual circumstances (Supangkat Samidjo et al., 2023). Additionally, the curriculum should integrate environmental material across diverse subjects, comprising biology, physics, chemistry, geography, and entrepreneurship (Ramdani et al., 2022). Furthermore, the curriculum ought to encompass local values and content, thereby furnishing a localized perspective on environmental issues (Sarbaini et al., 2022). Through the incorporation of environmental education into the curriculum, students can acquire a comprehensive comprehension of ecological issues and provide invaluable contributions to future environmental management. It is highly recommended to reinforce partnerships amidst educational institutions, non-governmental organizations, and governmental agencies in order to augment environmental education initiatives in Indonesia.

Environmental Education in Elementary Schools

Environmental education in primary schools plays a vital role in the endeavor to educate the younger generation regarding environmental concerns. This concept can be elucidated as a pedagogical approach that aims to enhance students' comprehension of the environment, foster attitudes that endorse environmental conservation, and promote sustainable action (Sterling, 2001). Theories pertaining to environmental education underscore the importance of integrating environmental matters into the official educational curriculum. One pertinent theory is the constructivism theory, which posits that students develop their own understanding of the environment through hands-on experiences and reflective processes (Tilbury, 1995).

The implementation of Environmental Education in Elementary Schools in Indonesia is

a matter of great importance and seriousness. Various initiatives, such as the highly esteemed "Adiwiyata" program, have played a pivotal role in promoting and advocating for environmental education within primary schools nationwide. It is worth noting that the Indonesian Ministry of Environment and Forestry (KLHK), in its recently published data for the year 2021, has recognized and acknowledged more than 10,000 elementary schools across Indonesia for their unwavering commitment towards environmental preservation and conservation, all achieved through actively participating in the Adiwiyata program (KLHK, 2021). Furthermore, an insightful case study conducted by Susanto and Wijaya (2019) delves into the comprehensive development and growth of environmental education specifically within the Indonesian context, successfully highlighting the utmost significance of seamlessly integrating pressing environmental issues into the existing formal education curriculum.

Furthermore, the empirical discoveries derived from the investigation conducted by Rahmah et al. (2021) regarding the implementation of environmental instruction in Aceh also showcased its favorable impact on students' comprehension of the surroundings and the promotion of pro-environmental attitudes. In spite of the progress achieved, Aceh confronts significant environmental difficulties, including the increased susceptibility to natural calamities, as evidenced by numerous reports issued by the National Disaster Management Agency (BNPb). Consequently, efforts to enhance environmental education in Aceh continue to be an essential requirement, allowing students to assume the role of agents of change who possess an elevated concern for the environment and are ready to tackle the unique environmental challenges encountered in this region.

Integration of environmental education into the curriculum

The incorporation of environmental education into the curriculum is widely acknowledged as a significant pathway to sustainable learning (Corpuz et al., 2022; Payne, 2006). This educational approach is fundamentally centered on the objective of not only enhancing public awareness of environmental issues but also equipping individuals with the indispensable knowledge, skills, attitudes, motivation, and dedication required to overcome and address these challenges (Dalida et al., 2018; Duda, 2022; Sundar, 2007). Research indicates that

endeavors to integrate environmental education into teacher training programs are currently in progress, however, there is still an urgent necessity for further intensification and enhancement in attaining desired educational outcomes.

Environmental education is predominantly intended to motivate and mobilize individuals towards endeavors that yield positive outcomes for the natural world and mankind. This frequently entails heightening awareness about environmental issues and promoting proactive participation, such as the organization of events and community projects (Che et al., 2023; Li, 2015; Wi & Chang, 2019). Educational institutions hold significant accountability in this regard, as they are entrusted with guiding and instructing students in environmental education practices, including the adoption of sustainable water usage. This holistic approach not only facilitates the acquisition of ecological knowledge but also cultivates responsible citizenship and conduct (Pilgrim & Davis, 2015; Valentukeviciene & Valatka, 2020).

Integrating environmental education into wider society is an important effort. This process must include the incorporation of environmental education into the curriculum as local content, as well as providing it through co-curricular and extra-curricular activities. Thus, environmental education becomes an intrinsic part of the educational landscape, serving as a powerful tool for raising environmentally conscious individuals.

Research methods

Research design

This research uses qualitative methods with an interpretive ontology approach to explore the views of education stakeholders regarding the integration of environmental education (EE) in the elementary school curriculum in Aceh (Smith & Osborn, 2008). The location of this research is an elementary school in Banda Aceh City, an area that was affected by the tsunami in 2004. The historical context of the disaster influenced understanding and action regarding environmental education in Aceh (Shah & Cardozo, 2014), making this research relevant and important to conduct.

Research participants

The research sample consisted of three different groups: subject teachers, school principals, and curriculum specialists/developers. Samples were selected purposively or theoretically based on

predetermined criteria. Each group contributes their unique experiences and perceptions regarding the issue being researched. Subject teachers, school principals, and curriculum developers have different roles in the educational context, so their understanding is important in uncovering diverse views with sample descriptions (Table 1).

Research procedures

The data in this research was collected through in-depth interviews and document review. In-depth interviews were used to obtain respondents' views and perceptions regarding the integration of EE in the elementary school curriculum (Smith & Johnson, 2015). Meanwhile, document review is used to understand the rationale, objectives and scope of environmental content integrated in the curriculum (Brown & Green, 2019).

Research coding and analysis

The data analysis process involves two main approaches. First, data from in-depth interviews and documents were analyzed using a qualitative content analysis approach with thematic procedures (Braun & Clarke, 2006). This approach allows the identification and coding of concepts that emerge from the data, thereby understanding the views and perceptions of educational stakeholder participants. Second, document analysis involves conceptual analysis to identify the presence of terms and concepts that are relevant to the research question (Charmaz, 2006).

This holistic approach, this research aims to provide in-depth insight into how education stakeholders in Aceh view the integration of environmental education into the primary school curriculum and how this understanding can help towards a sustainable future in the educational context of the region.

Research findings

Stakeholders' perceptions

Efforts to integrate environmental education (PLH) in elementary schools in Aceh are a reflection of a broader commitment to sustainable development. This study gathered insights from various stakeholders including teachers, principals, curriculum developers, and parents to assess the current EE landscape in the region. This analysis reveals the enthusiasm and various challenges faced in incorporating environmental education into the educational framework.

Interviews with various stakeholders, including teachers, principals, curriculum developers, and parents, reveal enthusiasm and challenges in integrating environmental education (EE) into elementary schools in Aceh. Paying attention to the importance of access to

public facilities, this results section will examine how the various views and initiatives of teachers, school principals, curriculum developers, and parents interact and contribute to the implementation of Environmental Education (EE) in schools.

Table 1. Description of research participants

No.	Respondent Group	Sample Description
1	Subject teachers	This group consists of teachers who teach subjects such as Natural Sciences or similar subjects in elementary schools in Banda Aceh City. They hold in-depth knowledge in the subject area and have practical experience in integrating aspects of environmental education into their teaching methods. This subject teacher provides a deep understanding of the challenges and opportunities associated with the integration of environmental education into the primary school curriculum. Their role as educators is very important in shaping students' thinking patterns about the environment.
2	Headmaster	This group consists of elementary school principals in Banda Aceh City. They are leaders at the elementary school level and have a central role in decision making regarding curriculum and school operations. School principals have broad insight into changes and developments in the world of education as well as their important role in supporting the integration of environmental education in schools. Their key role in decision making regarding curriculum and educational program development makes them a key factor in the success of this research.
3	Curriculum Specialist/Developer	This group consists of specialists or curriculum developers in the education sector in Aceh. They are individuals who have expertise in designing, developing, and evaluating educational curricula. These curriculum specialists/developers have a deep understanding of educational issues and the integration of environmental education in the elementary school curriculum. Their role in curriculum development and their understanding of environmental education curriculum integration is a valuable contribution to this research.
4	Parents or School Community	This group consists of parents of students or members of the school community who are actively involved in education in elementary schools in Banda Aceh City. They have an important role in instilling environmental education values in their children outside the school environment. Their involvement and understanding of environmental education integration provides an invaluable perspective in evaluating the effectiveness of environmental education efforts in elementary schools. With their contributions, this research becomes more comprehensive and relevant to the needs of environmental education in Aceh.

From the interviews conducted, it is known that: "I am passionate about teaching EE, but we are limited by a dense curriculum and limited resources." (Subject Teacher, Banda Aceh City Elementary School).

"As principal, I work to align national policies with our local EE initiatives." (Principal, Banda Aceh City Elementary School).

"We, at the Aceh Department of Education, are dedicated to making EE a core component in the curriculum, supported by adequate teacher training." (Curriculum Developer)

"As parents, we see the value of EE and call for a collaborative approach that links school initiatives with home practices." (Parents from the Banda Aceh City School Community).

Understanding these different viewpoints opens the door for us to explore more deeply Stakeholder Perceptions and Challenges. In this segment, we will explore how teachers, school principals, curriculum developers, and parents perceive and face challenges related to the implementation of Environmental Education in the school environment.

From the interviews conducted, it is known that:

Subject Teachers: Although passionate about EE, they struggle with the practical aspects of integration due to limited time and resources.

Principal: Plays an important role in negotiating the balance between national educational mandates and EE implementation at the local level.

Curriculum Developers: Committed to turning EE into a fundamental part of the educational experience, requiring extensive teacher training programs.

Parents: See value in EE but call for a more collaborative approach that bridges school initiatives with home practice.

The findings from this study highlight the complexity of implementing EE in Acehese primary schools. Despite clear recognition of the value of EE and an expressed desire to increase its presence in education, real challenges remain. Overcoming these challenges will require a concerted effort from all stakeholders to ensure that EE is not just an addition to education but a fundamental aspect of it, seamlessly integrated into the fabric of everyday learning.

Current state of environmental education

In Aceh elementary schools, the implementation of EE has entered various aspects of learning. EE learning activities include environmental projects, local case studies, and science experiments designed to teach sustainability principles. The implementation of Environmental Education (EE) in elementary schools has taken significant steps by incorporating EE themes into the curriculum. In the first class, themes such as "Environment, Clean, Healthy and Beautiful" teach about the importance of maintaining a clean and healthy environment, while other themes such as "Objects, Animals, Plants Around Me" and "Natural Events" introduce students to

the concept of ecosystems and natural phenomena.

Second and third grades deepen this understanding with themes that invite students to interact with the environment through play and exploring weather and energy concepts. In fourth grade, themes such as "Always Conserve Energy" and "Care for Living Creatures" begin to emphasize resource conservation and ecological awareness.

In fifth grade, teaching material becomes more complex with the introduction of the concept of ecosystems and the impact of natural events on human life. Material for sixth grade focuses on the preservation of living things and the role of the environment in a prosperous society (See table 2).

Interviews with Stakeholders:

Teachers at Elementary School expressed their excitement about EE but also shared their frustration about limited resources. "I am very enthusiastic about teaching EE, but we are limited by a dense curriculum and limited resources," said one of the subject teachers.

The principal at Elementary School emphasized the importance of supporting EE initiatives that align with national policy: "As principal, I strive to align national policy with our local EE initiatives."

Curriculum developers from the Aceh Education Department spoke about their commitment to EE integration: "We, at the Aceh Education Department, are dedicated to making EE a core component in the curriculum, supported by adequate teacher training."

A parent from Community School added that collaboration between school and home is important to strengthen EE: "As parents, we see the value of EE and call for a collaborative approach that links school initiatives with home practices."

Findings from interviews and data analysis highlight the urgent need to strengthen EE infrastructure in primary schools in Aceh. Although there is a strong desire to advance EE, structural and logistical challenges are obstacles that must be overcome. Joint efforts from all stakeholders are needed to ensure that EE becomes a fundamental aspect of education, fully integrated into the daily learning process.

Table 2. Analysis of Environmental Content in the Indonesian Elementary School Curriculum

Class	Theme	Analysis
Grade 1	Theme 6: Environment, Clean, Healthy and Beautiful	Teaches the importance of a clean and healthy environment, and provides a basis for how to maintain a clean and healthy environment.
	Theme 7: Objects, Animals, Plants Around Me	Introducing basic concepts about ecosystems, distinguishing between living and non-living things, and understanding the relationship between humans, animals and plants.
	Theme 8: Natural Events	Teaches students about natural phenomena and natural cycles such as day and night, as well as how humans adapt and interact with these phenomena.
Grade 2	Theme 2: Playing in My Neighborhood	Motivate students to explore and interact with the surrounding environment through play activities, helping them understand the environment in a practical way.
	Theme 4: Clean and Healthy Living	Focusing on a clean and healthy lifestyle as part of protecting the environment, teaching cleanliness and health practices.
	Theme 6: Caring for Animals and Plants	Develop students' sense of empathy and responsibility towards other living creatures, teach how to care for animals and plants.
Grade 3	Theme 1: Growth and Development of Living Things	Provides an understanding of the life cycle and development of various living creatures, emphasizing the important role of each creature in the environment.
	Theme 2: Loving Animals and Plants	Increase students' awareness and concern for animals and plants, teach how to care for and protect them.
	Theme 5: Weather	Introduce the concept of weather and its variability, as well as its impact on the environment and human life.
	Theme 6: Energy and its Changes	Introducing the concept of energy and its changes, understanding how energy affects the environment and daily life.
Grade 4	Theme 2: Always Save Energy	Encourage energy saving behavior, teach the importance of energy conservation to maintain environmental balance.
	Theme 3: Caring for Living Creatures	Instilling the value of caring for all living creatures and the environment, teaching the importance of living in harmony with nature.
	Theme 8: Residential Area	Introduce students to the environment where they live, including geographical aspects and ways to keep the area clean and sustainable.
	Theme 2: Clean Air for Health	Learn the importance of clean air for health and ways to maintain air quality in the environment.
Grade 5	Theme 3: Healthy Food	Explains the importance of healthy food that comes from a clean and healthy environment, encouraging healthy eating habits.
	Theme 4: Health is Important	Linking health to the environment, emphasizing that a healthy environment is the key to a healthy life.
	Theme 5: Ecosystem	Introducing the concept of ecosystems, interactions between living things and their environment, and the importance of maintaining ecosystem balance.
	Theme 6: Heat and its Transfer	Teaches the concept of heat and its energy transfer, understanding its impact on the environment and everyday life.
	Theme 7: Events in Life	Studying the relationship between natural events and human life, understanding how nature influences and is part of everyday life.
	Theme 8: Our Friendly Environment	Realizing that the environment is an integral part of our lives and needs to be preserved.
Grade 6	Theme 1: Save Living Creatures	Emphasizes the importance of preserving species and biodiversity, encouraging action to protect living things.
	Theme 6: Towards a Prosperous Society	Teaches how a healthy environment can contribute to the welfare of society, integrating environmental concepts with sustainable development.
	Theme 8: My Earth	Provides an understanding of Earth as our planet, the importance of preserving the global environment and our responsibilities as Earthlings.

Table 3. Key aspects of environmental subject matter in Indonesian elementary schools

Aspect	Description
Context and Significance	Environmental subject matter in Indonesian elementary schools aims to educate students about the importance of protecting the environment through daily activities.
Teaching Methodology	Uses a story approach and practical instruction with activities that engage students in plant hygiene and care practices. Dialogue in the material encourages interaction and critical thinking.
Expected Learning Outcomes	Students learn practical skills such as cleaning and caring for plants. Environmental awareness and social values such as cooperation and responsibility are also emphasized.
Educational Implications	This material stimulates students' cognitive and character development, providing a holistic learning experience that combines theoretical knowledge and practical application.
Conclusion	The lesson material shows the importance of early education in forming a generation that is aware of the importance of protecting the environment.

Barriers to implementation

In the process of integrating Environmental Education (EE) into the primary school curriculum, schools in Aceh face a number of obstacles. Budget constraints are one of the main problems that many schools complain about. Limited funds affect their ability to obtain adequate EE learning materials, as well as create and maintain facilities such as school gardens and science laboratories which are important assets for EE.

In addition, logistical challenges such as lack of classroom space and access to green areas are also barriers. For example, some schools are in urban areas with limited space, which makes creating school gardens or green areas difficult.

From the interviews conducted, it is known that:

A teacher from Primary School commented, "We want to teach EE effectively, but we are often hampered by an insufficient budget to buy equipment or organize activities outside the classroom."

Principal said, "Creating green space in our school is a logistical challenge. We have very limited land and no funds to turn it into an interactive learning area." A curriculum developer added, "There is a gap between what is mandated by EE policy and what schools can do with resources which exists. This requires a more flexible approach to policymaking and funding allocation."

A parent of a student from School Community emphasized, "We want to involve our children in EE activities, but often they return empty-handed because

the school does not have the necessary facilities or programs."

Barriers to implementing EE in elementary schools in Aceh are a reality that requires immediate attention. Limited budgets, logistical constraints, and lack of personal resources are some of the many challenges faced. To overcome these obstacles, closer collaboration between schools, government and society is needed, as well as creative solutions that can overcome these limitations and support the development of effective EE.

Discussion

Integration of Environmental Education (EE) in the Aceh Elementary School Curriculum

This research reveals how Environmental Education (EE) has been successfully integrated into the primary school curriculum in Aceh. This is a significant step that reflects the district's commitment to continuing education. The EE activities carried out cover various important aspects such as environmental projects, case studies related to local conditions, and science experiments that stimulate children's understanding of sustainability principles. Barrable (2019) emphasized that the integration of EE in the curriculum is an important step to instilling environmental awareness at an early age. In Aceh, EE learning activities cover vital topics such as energy conservation, understanding ecosystems, and the impact of natural events on the environment. This approach, which is also emphasized by Powell et al., (2023), focuses on the importance of adapting EE content to suit local contexts, so that students can more easily relate learning to their surroundings.

Perceptions and Roles of Various Stakeholders towards EE

This study also highlights the perceptions and roles of various stakeholders in EE implementation. The high enthusiasm of teachers in Aceh for EE was recorded in this research, even though they also face obstacles such as limited resources and a busy curriculum. One teacher in Aceh expressed, “I am very enthusiastic about teaching EE, but we are limited by a dense curriculum and limited resources,” a sentiment that reflects finding of how teachers often support EE but feel hampered by its limitation, curriculum and resources (Özdemir, 2022). Meanwhile, school principals have a key role in coordinating national policies with EE initiatives at the local level. As one principal put it, “As principal, I strive to align national policies with our local EE initiatives,” illustrating a challenge that Brown (2021) also recognizes as the critical role of school leadership in EE implementation. Additionally, parents further demonstrated heightened consciousness regarding the significance of environmental education (EE). They advocate for a heightened emphasis on a collaborative methodology, one that amalgamates school endeavors with familial routines, as highlighted in a research conducted by Martinez-Mirambell et al., (2022) that accentuates the pivotal role of parental engagement in environmental education endeavors.

In relation to the incorporation of curriculum and the participation of various stakeholders, this study presents an encouraging yet pragmatic depiction of the status of Environmental Education (EE) in primary schools in Aceh. Despite the fervor and acknowledgment of the significance of EE, there remain notable obstacles that necessitate resolution, such as limited resources and the imperative for more efficacious curriculum adaptations. The involvement of all entities, encompassing educators, principals, parents, and policymakers, plays a pivotal role in ensuring the triumphant and enduring integration of EE within the educational framework in Aceh.

Overcoming Obstacles in the Implementation of Environmental Education (EE)

The introduction of Environmental Education (EE) in primary schools in Aceh encounters a prominent challenge regarding financial limitations. These constraints have a significant influence on various facets of EE, including the procurement of educational materials and the establishment of supportive

facilities like school gardens and science laboratories. According to a study conducted by Yanniris Garis (2018), the insufficient availability of financial resources often presents a considerable hindrance to the progress of educational infrastructure, including the domain of Environmental Education (EE). In Aceh, schools face difficulties in providing adequate resources that are essential for conducting effective and engaging EE activities. These limitations not only impact the quality of EE instruction but also restrict the potential for innovation and creativity in teaching.

In addition to the fiscal restraints, educators in Aceh also confront challenges in integrating EE into an already packed curriculum. This particular challenge involves determining how to allocate sufficient time and incorporate relevant materials for EE subjects without compromising other aspects of the curriculum. Several studies illustrate that flexibility in the curriculum plays an important role in the successful implementation of Environmental Education (Corpuz et al., 2022; Eneji et al., 2023; Kalla et al., 2022; Kimaro, 2018). However, in Acehnese schools, the curriculum is often inflexible and densely packed, posing an obstacle to achieving this flexibility. Meanwhile, school principals bear the additional responsibility of striking a balance between national education policies and local EE initiatives, as emphasized by Kadji-Beltran et al., (2013) as a crucial element of educational leadership for sustainability.

Building Synergy between Policy and Implementation of Environmental Education (EE)

This study uncovers notable disparities between mandated policies on environmental education (EE) and the actual implementation of these policies in the field. Policies formulated at the highest level often fail to completely align with the practical circumstances found in educational institutions, encompassing aspects such as limited resources, infrastructure limitations, and curriculum specifications. As Lochmiller & Hedges (2017) assert, the efficacy of education policy relies on its adaptability and implementation in diverse local contexts. In Aceh, policymakers must enhance their comprehension of the specific obstacles and requirements in schools in order to develop more flexible and pertinent EE policies. This underscores the significance of constructive discourse between policymakers and education practitioners on the ground, as proposed by Penuel et al., (2020), who underscore the value

of collaboration in the development of education policy.

Moreover, this investigation also highlights the desire of parents for a collaborative approach between schools and households in the implementation of EE. This underscores the need for a stronger synergy between formal education within schools and informal educational practices at home. Parents play a crucial role in reinforcing and complementing the EE instruction their children receive at school. According to a study conducted by Wong et al., (2018), parental involvement in their children's education can enhance the effectiveness of learning and provide a broader context for their educational experiences. This collaboration may entail joint activities between schools and families, the implementation of sustainable practices at home, and open dialogue between teachers and parents regarding EE objectives and methodologies.

Understanding Perceptions and Implications of Environmental Education (EE)

This study demonstrates that there exists a pervasive positive perception of environmental education (EE) among all parties involved in Aceh's primary schools, including educators, administrators, policymakers, and parents. Despite encountering various challenges, these stakeholders acknowledge the significance of EE and possess a strong inclination towards its successful integration into the educational system. In accordance with the findings of Powell et al., (2023), who discovered a close relationship between favorable perceptions of EE and successful implementation, this study underscores that the triumph of EE hinges not only on the materials within the curriculum but also on how it is perceived and embraced by the school community. In Aceh, this robust support represents a valuable resource that can be utilized to surmount obstacles in the implementation of EE.

Moreover, this research also emphasizes that the emphasis placed on EE signifies a significant shift in education towards sustainable development. This necessitates a thorough revision of the curriculum and comprehensive training for educators. As Tovar-Gálvez (2021) elucidate, the incorporation of EE into the curriculum extends beyond the mere addition of new content; it entails redefining the pedagogical approach and learning methods as a whole. They accentuate the significance of interdisciplinary approaches and the cultivation of critical skills within the realm of EE. In Aceh,

this implies that the curriculum must undergo revision not only to encompass topics related to EE but also to facilitate learning approaches that enable students to comprehend and address environmental issues in a holistic manner.

Strategies for Strengthening Environmental Education (EE)

This investigation underscores the significance of innovative resolutions in surmounting financial and logistical constraints in the implementation of environmental education (EE). One viable approach entails establishing collaborations with local organizations or environmentally-oriented non-governmental organizations (NGOs), which can furnish supplementary resources or material assistance. Inwood & Kennedy (2020) elucidate that such partnerships can serve as a potent instrument for enhancing the caliber and outreach of environmental education in educational institutions. Moreover, the utilization of digital resources, such as online learning programs and educational applications, can also prove efficacious in surmounting physical and fiscal limitations. Buchanan et al., (2018) research reveals that digital technology offers fresh prospects for environmental education by enabling access to abundant and interactive learning materials at reduced costs.

This investigation also posits the necessity for more robust advocacy of EE and the formulation of policies that are more adaptable and responsive to the needs of educational institutions. This advocacy assumes importance not only in raising awareness about the significance of EE but also in influencing policymakers to allocate greater resources to this domain. As underscored by Cairns (2002), effective advocacy can play a pivotal role in shaping educational policies and ensuring that EE garners the attention it rightfully deserves on the educational agenda. Flexible and adaptable policies are indispensable in guaranteeing that EE programs can be customized to the specific requirements of educational institutions and local communities.

Lastly, this research underscores the importance of community engagement in bolstering EE. Community involvement can not only amplify resources and support for EE but also ensure that environmental education remains interconnected with the local circumstances of children. Oktari et al., (2015) contend that community engagement in education engenders opportunities for more meaningful and pertinent learning experiences, thereby fortifying the bond between the

educational institution and its surrounding environment. It also facilitates the development of environmental consciousness among students, which directly corresponds to their community and environment.

Conclusion

This research divulges the significant amalgamation of Environmental Education (EE) into the primary school curriculum in Aceh, constituting a momentous stride towards sustainable education. Noteworthy discoveries from this investigation encompass the immense enthusiasm displayed by stakeholders, including educators, principals, and parents, for EE, notwithstanding challenges such as limited resources and tensions in adapting the curriculum. These findings exemplify the significance and ardent desire for the fusion of EE into education, reflecting the burgeoning consciousness of environmental sustainability within society.

From a scientific standpoint, this research imparts discernment into the dynamics of EE implementation within the realm of fundamental education in Aceh, bridging the lacuna of knowledge regarding the translation of environmental education policies into practical application within schools. Its pragmatic contribution lies in the discernment of resource constraints and the exigency for more comprehensive teacher training as pivotal factors in the successful execution of EE. These findings can serve as a point of reference for policy makers in the formulation of more efficacious and sustainable strategies in the implementation of EE.

The strength of this research resides in its exhaustive analysis of the perspectives of diverse stakeholders and the consequent impact on the implementation of EE in primary schools. Nevertheless, this research is confined in scope and scale, concentrating solely on schools in Aceh, thereby potentially failing to fully encapsulate the situation prevalent in other regions of Indonesia. For future research endeavors, it is advisable to undertake comparative studies encompassing a wider array of regions in order to garner a more comprehensive comprehension of EE implementation within distinct educational contexts. Furthermore, further research pertaining to curriculum development and teacher training within EE contexts would be of immeasurable value in bolstering effective and pioneering pedagogical practices within this domain.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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