

Environmental Education in Aceh: Building Awareness of Sustainability in Urban Development

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ABSTRACT

This study focused on the role of environmental education in Aceh, particularly in schools and pesantren, in fostering sustainability awareness in urban development. As Aceh experienced rapid urbanization, integrating environmental education into the curriculum became crucial for cultivating a sustainable mindset among students and contributing to environmentally conscious cities. The study employed a mixed-method approach, combining qualitative and quantitative methods. It involved a literature review, interviews, and surveys to gather data on environmental education in schools and pesantren. The findings revealed variations in curriculum implementation and the depth of environmental knowledge among students in Aceh. Challenges such as limited resources, inadequate training for educators, and insufficient integration of sustainability principles into the educational framework could have helped the effectiveness of environmental education in fostering sustainable practices among students. To promote sustainability in urban development, it is essential to strengthen environmental education in schools and pesantren. This can be achieved by enhancing curriculum content, providing adequate educator training, and fostering collaborations between educational institutions and relevant stakeholders. By addressing these challenges and improving the quality and accessibility of environmental education, Aceh can foster a generation of environmentally conscious individuals who actively contribute to sustainable urban development.

Keywords: Aceh, environmental education, sustainability, urban development, collaboration

INTRODUCTION

Sustainable urban development has become an important and urgent issue in Aceh, along with rapid urbanization growth and significant environmental changes (Amri & Giyarsih, 2022). With its abundant natural wealth, Aceh faces challenges in maintaining environmental sustainability when developing modern cities that meet people's needs. The rapid urbanization of Aceh has led to increased energy consumption, air and water pollution, increased waste, and reduced environmental quality.

In this context, environmental education is essential in making people aware of how important it is to be sustainable and keep the environment healthy (Achmad et al., 2018). Through environmental education, young people can learn a lot about environmental issues and be better prepared for the challenges of sustainable urban development.

Through a coordinated educational program, ecological schooling in Aceh can show supportability ideas and standards, foster the abilities and mentalities expected to oversee assets dependably, and diminish adverse consequences on the climate (Nurdin, 2019). Aceh can move toward building environmentally

friendly cities where residents have the knowledge and skills to face environmental challenges with sustainable actions by raising awareness of sustainability through education.

According to Oktari et al. (2018) research on the role of environmental education in sustainable urban development in Aceh is crucial for advising the government and stakeholders on how to advance sustainable development in this region.

It is essential to comprehend the specific difficulties and opportunities within the local context and the significant role that environmental education plays in sustainable urban development in Aceh (Jannah et al., 2013). Shutaleva et al. (2020) said that cultural norms, economic conditions, and political dynamics could significantly influence the success and success of environmental education initiatives. To tailor educational strategies and approaches that resonate with the local community, a comprehensive research study focusing on Aceh's specific socio-cultural and environmental dynamics is necessary (Yusuf et al., 2022). By distinguishing the novel requirements and goals of individuals of Aceh, policymakers and teachers can foster designated and effective ecological instruction programs that advance reasonable practices and add to the general prosperity of both the local area and the climate.

Additionally, the purpose of this study is to assess how well existing environmental education programs in Aceh support the objective of sustainable urban development. By concentrating on the genuine effect of natural training, this study means to distinguish the elements that impact the achievement or disappointment of these projects (Herdiansyah et al., 2016). The application of digital technology, a collaboration between the public and private sectors, and community involvement in sustainable urban development efforts are just a few of the new possibilities and opportunities that will be investigated in this study to improve environmental education in Aceh. In addition, this study aims to offer concrete suggestions for improving the role of environmental education in sustainable urban development to the government and other Aceh stakeholders. These suggestions could incorporate fostering an educational program that is coordinated with ecological issues, expanding educator preparation in realistic training, expanding the openness of natural schooling for the local area, as well as advancing mindfulness and dynamic cooperation in endeavors to keep up with ecological maintainability in Aceh (Kamil et al., 2020).

Subsequently, a definitive objective of this exploration is to add to how we interpret the significance of ecological training in creating reasonable urban communities in Aceh fundamentally. This study's findings and recommendations will serve as the foundation for more effective public policies and concrete steps to build cities in Aceh that are environmentally friendly and sustainable. The Significance of Ecological Training in Practical City Advancement: Individual awareness and comprehension of environmental issues are shaped by environmental education, which also inspires concrete actions to maintain sustainability. Through realistic training, individuals in Aceh can get the information and abilities expected to partake in metropolitan economic turn of events, for example, overseeing waste, saving energy, and keeping up with biodiversity. Past exploration by Boca & Saraçlı? (2019) has demonstrated how ecological schooling can decidedly influence changing individual ways of behaving and coordinating manageability standards into day-to-day existence. As a result, this study aims to improve our understanding of Aceh and the role that environmental education plays in meeting the challenges of sustainable urban development.

Problem

The problems faced in urban development in Aceh related to environmental sustainability are very complex. One of the main challenges is the rapid and uncontrolled growth of cities, which results in increased demand for natural resources, dense settlements, and infrastructure that could be more environmentally friendly. This leads to environmental degradation, including forest destruction, reduced air and water quality, and an increased risk of natural disasters. The public's need for environmental awareness and knowledge is another issue that must be addressed in conjunction with these difficulties. Negative behaviors like littering, water

pollution, and activities that harm natural ecosystems are caused by a lack of awareness of the significance of environmental protection and care. This lack of awareness can result in apathy toward environmental problems and prevent active community participation in sustainability initiatives.

When it comes to addressing the challenges it faces in terms of sustainability, environmental education plays a crucial role. Environmental education can educate students about the significance of preserving and protecting the environment. Ecological schooling shows individuals harmless to the ecosystem rehearses, for example, excellent waste administration, energy saving, and nature preservation. A sense of responsibility for nature, concern for biodiversity, and awareness of the relationship between humans and the environment are all positive attitudes and values that can be shaped by environmental education. Positive changes in Aceh's urban development will result from overcoming obstacles to environmental sustainability, expanding environmental awareness and knowledge, and strengthening the role of environmental education. As a result, biodiversity can be preserved, people's quality of life can be improved, and valuable natural heritage can be preserved for future generations through sustainable and environmentally friendly development.

Research Questions

Promoting sustainability and raising awareness of environmental issues require environmental education. In order to create a culture of sustainability and address environmental issues in Aceh, it is essential to implement environmental education in schools and pesantren. The inquiry is:

1. How is environmental education implemented in schools and Islamic boarding schools (pesantren) in Aceh?
2. What are the curriculum and environmental knowledge variations within the context of environmental education in Aceh?
3. What are the challenges faced in ensuring the effectiveness of environmental education in Aceh?

Understanding the implementation, curriculum variations, and challenges of environmental education in Aceh is vital for enhancing its effectiveness. The findings from this research can inform policy and practice, enabling improvements in environmental education programs to effectively engage students and empower them to become active agents of change in building sustainable cities in Aceh.

LITERATURE REVIEW

Environmental education is crucial in promoting sustainable practices and fostering awareness of environmental issues (Krasny, 2020). In the context of urban development in Aceh, examining the existing literature on environmental education and its impact on building sustainability awareness becomes essential. This literature review explores the key findings, trends, and gaps in previous studies related to environmental education in Aceh, specifically focusing on its role in urban development and creating environmentally conscious cities.

Aceh is experiencing significant environmental difficulties due to its rapid urbanization and development. These difficulties incorporate air and water contamination, squandering the executive's issues, and the consumption of average assets (Gopalakrishnan et al., 2019). For the environment's and Aceh's residents' long-term well-being, the city's urban areas need practical solutions to these problems and sustainable practices.

Natural schooling is a fantastic asset for making mindfulness, information, and uplifting outlooks toward the climate (Kolawole & Iyiola, 2023). It gives people the skills to comprehend, appreciate, and contribute to sustainable development. In various contexts, the significance of environmental education in addressing

environmental challenges and promoting sustainable practices has been highlighted by several studies.

Previous studies have identified various initiatives and efforts in Aceh to integrate environmental education into schools and pesantren. These initiatives include curriculum development, teacher training programs, environmental awareness campaigns, and community involvement (Mandra et al., 2020). Some schools and pesantren have shown proactive engagement in incorporating environmental education, but there are variations in the implementation and depth of environmental knowledge among students. Despite the efforts, challenges and gaps exist in implementing environmental education in Aceh. Limited resources, inadequate training for educators, and the need to integrate sustainability principles into the educational framework are common challenges identified in the literature (Lahmar, 2020). Furthermore, studies have pointed out the need for comprehensive evaluation and assessment of environmental education programs to measure their effectiveness and identify areas for improvement (Pannell et al., 2013).

Several recommendations emerge from the literature to enhance environmental education in Aceh and effectively address environmental challenges. These include strengthening the curriculum content to encompass a broader range of environmental topics, providing adequate training and professional development opportunities for educators, fostering collaborations between educational institutions and relevant stakeholders, and integrating sustainability principles across various disciplines (Weiss et al., 2021). Aceh’s literature on environmental education emphasizes its pivotal role in building sustainability awareness and promoting environmentally conscious practices in urban development. While there have been initiatives to incorporate environmental education in schools and pesantren, challenges regarding implementation and depth of knowledge persist. By tending to these difficulties and executing the proposals from past examinations, Aceh can advance towards a metropolitan economic turn of events, where people are outfitted with the vital information and abilities to save the climate for people in the future. The environmental education programs in Aceh must continue to be improved and improved in order to be effective.

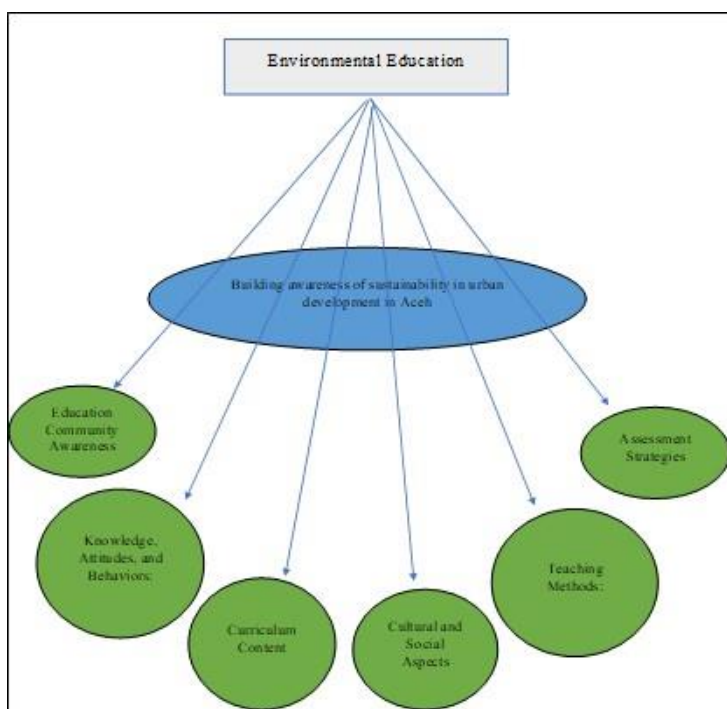


Figure 1. The framework of environmental education in schools and Islamic boarding (pesantren) schools

In the context of rapid urbanization and its detrimental impact on the environment, there is a pressing need to address sustainability in Aceh’s urban development. The following study framework explores the role of environmental education in schools and pesantren as a means to foster awareness and promote sustainable

practices. By investigating curriculum content, teaching methods, and the level of environmental knowledge among students and educators, this research aims to identify challenges and opportunities for integrating environmental education effectively.

The framework is needed to conduct the study in strengthening environmental education through curriculum enhancement, educator training, and stakeholder collaborations is crucial for fostering sustainable practices and awareness among students in Aceh's urban development.

METHODOLOGY

In order to get a complete understanding of environmental education's role in sustainable urban development in Aceh, this study used qualitative and quantitative research methods. First, a literature review in which relevant literature was investigated and analyzed was used to employ a qualitative research strategy. The literature review provided a comprehensive understanding of environmental education policies and practices at the national and international levels, as well as related research and theoretical concepts (Baraz et al., 2015). In addition, interviews were conducted with relevant stakeholders, such as educators, environmental professionals, community members, and local government representatives. According to Gill & Baillie (2018), the interviews revealed their perspectives, experiences, and ideas regarding the significance of environmental education for sustainable urban development in Aceh.

In addition to conducting interviews, a survey was administered to gather information from Aceh residents, teachers, students, and the general public. According to Frels & Onwuegbuzie (2013), the survey aimed to gauge respondents' awareness, knowledge, and participation in environmental education, as well as their perceptions of the program's efficacy. Upon information assortment, information examination was performed utilizing both subjective and quantitative methodologies. Coding, thematic analysis, and interpretation of interview data are all part of qualitative data analysis, which seeks to identify patterns, themes, and crucial issues. According to Alshenqeeti (2014), quantitative data analysis, on the other hand, entails statistically processing survey data in order to identify trends, relationships, and significant differences.

The information examination gave a far-reaching comprehension of the commitment of ecological training to feasible metropolitan improvement in Aceh, as well as recognized difficulties and valuable open doors. Arguments and suggestions to improve environmental education in Aceh were based on the analysis's findings (Patten, 2017). The study's objectives were to provide the government and stakeholders with concrete, evidence-based recommendations for developing and enhancing environmental education programs in Aceh and a comprehensive understanding of environmental education's role in sustainable urban development.

RESULT

Implementation of Environmental Education in Schools and Islamic Boarding Schools in Aceh

Diverse pedagogical approaches are used to implement environmental education in schools and Islamic boarding schools (pesantren) in Aceh to instill a profound sense of environmental awareness and responsibility in students (Bascopé et al., 2019). In schools, environmental education is seamlessly integrated into the curriculum, where loyal subjects or modules are meticulously crafted to disseminate essential environmental concepts, principles, and practices. This integration enables students to delve into various environmental topics, such as biodiversity conservation, climate change mitigation, waste management strategies, and sustainable resource utilization (Lecciones et al., 2022). Within the classroom, environmental education activities encompass engaging discussions, thought-provoking debates, stimulating field trips to ecologically significant areas or environmental organizations, hands-on experiments, and

project-based initiatives centered around environmental preservation and restoration (Krasny, 2020).

Islamic boarding schools in Aceh, deeply cognizant of the significance of environmental education within the Islamic faith, actively incorporate environmental teachings into their religious instruction. They ardently emphasize the Islamic perspective on environmental stewardship, highlighting the sacred responsibility of Muslims to safeguard and nurture the natural world (Abdelzaher et al., 2019). Environmental education is seamlessly woven into religious lessons, thought-provoking sermons, and extracurricular activities that fervently promote environmental conservation and the implementation of sustainable practices that align with the profound principles of Islam (Helfaya et al., 2018).

Both schools and pesantren in Aceh ardently foster collaborative relationships with local government agencies, non-governmental organizations, and community groups to fortify the implementation of environmental education. These strategic partnerships catalyze student engagement in impactful environmental initiatives and facilitate active involvement in transformative endeavors such as tree-planting campaigns, innovative waste management projects, and community-based awareness programs (McCormick et al., 2013). Educators’ pivotal role in environmental education delivery cannot be overstated. Teachers and religious instructors undergo comprehensive training and participate in ongoing professional development programs that empower them with the latest knowledge and effective pedagogical strategies in environmental education (Ferguson et al., 2021). This continuous investment in their professional growth ensures that they remain abreast of current environmental issues and are equipped with the pedagogical acumen to engage students effectively in transformative environmental learning experiences (Marouli & Duroy, 2019)

The determined determination to implement environmental education in Aceh’s schools and pesantren exemplifies a collective effort to cultivate an unwavering sense of responsibility among the younger generation, promote sustainable practices, and cultivate a profound environmental consciousness. It cultivates sustainable communities and harmonious coexistence with the natural world in Aceh by providing students with the essential knowledge, necessary skills, and enduring values required to become active participants in environmental conservation (Gross et al., 2021).

The implementation of environmental education in schools and public schools in Aceh is a critical aspect of fostering sustainability awareness and promoting environmentally conscious practices. This section presents an overview of the current state of environmental education in these educational institutions, examining curriculum content, teaching approaches, and the level of environmental awareness among students and educators. By understanding the existing landscape, it becomes possible to identify areas for improvement and develop strategies to enhance environmental education efforts.

Table 1. Environmental education in schools and public schools in Aceh

Aspect	Findings	Evidence
Integration in Curriculum	<ul style="list-style-type: none"> · The curriculum includes environmental education. · Dedicated subjects/modules cover environmental concepts. · Topics include biodiversity, climate change, and waste management. 	<p>Yiannakaris (2016)</p> <p>McCowan et al. (2022)</p>

Teaching Methods	<ul style="list-style-type: none"> · Engaging in discussions, debates, and hands-on experiments. · Field trips to ecologically significant areas. 	<p>Janakiraman et al. (2021)</p> <p>Raab & Bogner (2021)</p>
Collaboration	<ul style="list-style-type: none"> · Collaboration with local government and NGOs for initiatives. · Involvement in tree planting and waste management projects 	<p>Escher & Brzustewicz (2020)</p> <p>Dale et al. (2020)</p>
Role of Educators	<ul style="list-style-type: none"> · Educators receive training and professional development. · Continuous updates on environmental issues and pedagogy 	<p>Henry & Namhla (2020)</p> <p>Glavi? (2020)</p>
Islamic Perspective	<ul style="list-style-type: none"> · Islamic schools emphasize environmental stewardship. · Integration of environmental teachings in religious lessons 	<p>Wakhidah & Erman (2022)</p> <p>Ilyasin (2019)</p>
Student Engagement	<ul style="list-style-type: none"> · Students actively participate in environmental initiatives. · Involvement in community-based awareness programs. 	<p>Quinn et al. (2019)</p> <p>Rickenbacker et al. (2019)</p>
Outcomes	<ul style="list-style-type: none"> · Foster environmental consciousness and sustainable practices. · Nurturing responsibility among the younger generation. 	<p>Oe et al. (2022)</p> <p>Pizzutilo & Venezia (2021)</p>

Table 1 provides a comprehensive overview of the key findings related to environmental education in schools and public schools in Aceh. It highlights variations in curriculum implementation, teaching methods, and the depth of environmental knowledge among students. The data presented in this table shed light on the challenges and opportunities that exist in promoting sustainable practices through environmental education. By analyzing these findings, recommendations can be formulated to strengthen environmental education initiatives and create a more impactful learning experience for students in Aceh's educational institutions.

Variance in Curriculum and Environmental Knowledge

Within the context of environmental education in Aceh, there are notable variations in the curriculum and environmental knowledge across different educational institutions. These differences reflect diverse approaches and priorities in addressing environmental issues and fostering environmental literacy among students (Darmawan & Dagamac, 2021). Firstly, the variations in the curriculum can be observed in the range and depth of environmental topics covered. Some schools and pesantren in Aceh have comprehensive

environmental education curricula encompassing various subjects, including natural resource management, climate change, pollution, and sustainable development. These curricula often emphasize theoretical knowledge and practical skills, providing students a holistic understanding of environmental issues and their potential solutions. In contrast, other institutions may have more limited environmental education content integrated into existing subjects, focusing primarily on local environmental challenges specific to the Aceh region (Nurdin et al., 2017)

Additionally, variations in environmental knowledge can arise due to differences in the availability of resources and expertise. Schools and pesantren with better access to environmental education resources, such as textbooks, teaching materials, and qualified educators, may have a more comprehensive and up-to-date understanding of environmental issues. Conversely, institutions facing resource constraints may need help to provide in-depth environmental knowledge and may rely on more basic or outdated materials (Severo et al., 2021). Furthermore, variations in the curriculum and environmental knowledge may also stem from differences in institutional priorities and values. Some educational institutions in Aceh may prioritize religious teachings and Islamic perspectives on environmental stewardship, integrating environmental education within the broader framework of Islamic education. This approach may emphasize environmental responsibility's moral and ethical dimensions and resonate with students' religious beliefs. Other institutions may adopt a more secular approach, focusing on scientific concepts and empirical evidence in environmental education (Shaturaev, 2014).

These variations in curriculum and environmental knowledge highlight the importance of considering the unique contexts and characteristics of educational institutions in Aceh when designing and implementing environmental education programs. By recognizing and understanding these variations, stakeholders can develop tailored strategies to address specific needs and challenges, ensuring that environmental education effectively promotes sustainable attitudes, knowledge, and actions among students in Aceh. Within the context of environmental education in Aceh, there are notable variations in the curriculum and environmental knowledge across different educational institutions. These differences reflect diverse approaches and priorities in addressing environmental issues and fostering environmental literacy among students. The following table presents the participants' views and potential research evidence regarding these variations.

To gain a comprehensive understanding of the various aspects related to environmental education in Aceh's urban development, this study collected participants' views and research evidence. The following table (Table 2) presents a summary of the key aspects examined, including the perspectives of the participants and the supporting research findings

Table 2. Aspects, participants' views, and research evidence

Aspects	Participants' Views	Research Evidence
Curriculum Variations	<ul style="list-style-type: none"> · Teachers: Varying coverage of environmental topics and integration within existing subjects · Santri: Differences in environmental education content between pesantren and regular schools · Students: Varied exposure to environmental concepts and practices 	Lubis et al. (2009)

Environmental Knowledge	<ul style="list-style-type: none"> · Teachers: Access to diverse resources and expertise affects the depth and currency of knowledge · Santri: Influence of religious teachings on environmental knowledge · Students: Variances in understanding environmental issues and solutions 	La Fua et al. (2018)
Institutional Priorities	<ul style="list-style-type: none"> · Teachers: Different emphasis on religious perspectives or scientific approaches in environmental education · Santri: Integration of environmental education within Islamic teachings · Students: Perception of the moral and ethical dimensions of environmental responsibility 	Rahman et al. (2020)

By analyzing the participants' views and the research evidence, this study aimed to shed light on the effectiveness and challenges associated with environmental education in Aceh. The findings from Table 2 provide valuable insights into curriculum content, teaching methods, and the level of environmental awareness among students and educators. These findings contribute to a better understanding of the current state of environmental education in Aceh and inform potential strategies for improving sustainability awareness in urban development.

Within the context of environmental education in Aceh, the curriculum and environmental knowledge variations are depicted in the table above. The members' perspectives, including educators, santri, and understudies, are introduced from every angle. However, more specific research evidence is required to back up these points of view. Additional research is required to provide extensive evidence regarding the curriculum and environmental knowledge variations in Aceh's environmental education programs.

Effectiveness of Environmental Education in the Face of Obstacles

Several obstacles in the way of environmental education's effectiveness in Aceh could hinder its ability to produce the desired results. These challenges must be addressed to ensure that environmental education initiatives effectively promote sustainable attitudes and behaviors among students. One significant challenge is the limited availability of resources and funding for environmental education programs. Research indicates that adequate financial support and access to educational materials and infrastructure can help implement comprehensive and impactful environmental education (Lotz-Sisitka, 2011). More resources can allow the development of engaging learning materials, hinder the organization of field trips and practical experiences, and limit educators' training and professional development opportunities.

Another challenge lies in the need for effective curriculum integration and alignment. Environmental education should be integrated across different subject areas to foster a holistic understanding of environmental issues. However, achieving this integration can be challenging due to the compartmentalized nature of traditional subject-based curricula (Mawdsley & Willis, 2018). Lack of coordination and collaboration among subject teachers may lead to fragmented and isolated environmental education efforts, limiting students' ability to understand environmental concepts and their interconnectedness comprehensively. Additionally, the challenge of assessment and evaluation in environmental education

should be noticed. Evaluating the effectiveness of environmental education programs requires developing appropriate assessment tools and strategies that go beyond traditional testing methods (Jacobson et al., 2015). The abstract idea of natural issues and the intricacy of estimating social changes and mentalities towards supportability present difficulties in precisely evaluating the effect of ecological schooling drives.

Furthermore, the challenge of engaging diverse stakeholders in environmental education implementation should be addressed. Environmental education should involve educators, local communities, government agencies, and non-governmental organizations (Guerra et al., 2018).

Engaging these stakeholders requires effective communication, collaboration, and consensus-building to ensure that environmental education efforts align with local priorities, cultural values, and environmental challenges. To overcome these challenges and enhance the effectiveness of environmental education, it is crucial to establish strong partnerships among educational institutions, government agencies, and community organizations (Didham & Ofei-Manu, 2018).

Collaboration can facilitate the mobilization of resources, sharing best practices, and the development of a supportive ecosystem for environmental education.

Assessing the state of environmental education in Aceh, this study examines the variations in curriculum implementation and environmental knowledge among students. By analyzing these factors, the research seeks to gain insights into the effectiveness of environmental education initiatives in fostering sustainability awareness in the region’s urban development.

The findings presented in Table 3 shed light on the current state of curriculum content and the level of environmental knowledge among students, providing a comprehensive overview of the challenges and opportunities in environmental education practices in Aceh.

Table 3. Variations in curriculum and environmental knowledge in environmental education in Aceh

Participant Perspectives	Challenges in Environmental Education Effectiveness	Research Evidence
Teachers	<ul style="list-style-type: none"> · Limited availability of resources and funding · Curriculum integration and alignment · Assessment and evaluation methods · Engagement of diverse stakeholders 	<p>Kricsfalusy et al. (2018)</p> <p>Ardoin et al. (2020)</p>
Students	<ul style="list-style-type: none"> · Lack of resources affects learning experiences · Compartmentalized nature of environmental education within subject areas · Need for more engaging and practical assessments · Value of engaging with local communities and organizations 	<p>Rogayan Jr & Nebrida (2019)</p> <p>Romero-Gutierrez et al. (2016)</p> <p>Gani et al. (2023)</p>

Santri	<ul style="list-style-type: none"> · Limited availability of materials and infrastructure in pesantren · Better integration of environmental education in religious studies · Challenges of assessing behavior changes and Attitudes towards sustainability · Appreciation of the involvement of relevant stakeholders in environmental education 	<p>Lahmi et al. (2020)</p> <p>Gani, Muthalib et al. (2023)</p>
Community	<ul style="list-style-type: none"> · Insufficient financial support for environmental education initiatives · Lack of coordination among subject teachers in integrating environmental education · Development of innovative assessment strategies · Role of Collaboration between educational institutions and local stakeholders 	<p>Achmad, Irwansyah et al. (2018)</p> <p>Risiro (2014)</p> <p>Ayres et al. (2022)</p>

The variations observed in curriculum implementation and environmental knowledge emphasize the need for targeted interventions and improvements in environmental education. These findings highlight the importance of refining curriculum content to ensure comprehensive coverage of environmental topics and enhancing pedagogical approaches to facilitate effective learning outcomes. Additionally, addressing the identified gaps through educator training programs and collaboration with relevant stakeholders can contribute to strengthening environmental education initiatives and fostering sustainability awareness in Aceh’s urban development.

DISCUSSION

The findings regarding implementing environmental education in schools and pesantren in Aceh highlight the comprehensive and diverse approaches to cultivating environmental awareness and responsibility among students. Both schools and pesantren integrate environmental education into their curricula, covering topics such as biodiversity conservation, climate change, waste management, and sustainable resource utilization. This integration enables students to engage in various activities, including discussions, debates, field trips, experiments, and projects centered around environmental preservation and restoration. Islamic boarding schools in Aceh also emphasize the Islamic perspective on environmental stewardship, incorporating environmental teachings into spiritual lessons and extracurricular activities (Zainal et al., 2021).

To fortify the implementation of environmental education, schools, and pesantren in Aceh collaborate with local government agencies, NGOs, and community groups. These partnerships facilitate student engagement in impactful environmental initiatives such as tree-planting campaigns, waste management projects, and community-based awareness programs. Educators play a crucial role in environmental education, undergoing comprehensive training and professional development to stay updated on environmental issues and effective pedagogical strategies (Prasetyo et al., 2021). However, curriculum and environmental knowledge variations exist across educational institutions in Aceh. Some institutions have comprehensive curricula that cover a wide range of environmental topics, while others have more limited content focused

on local environmental challenges. Variations also arise from differences in resource availability, expertise, and institutional priorities. Some institutions prioritize religious teachings and Islamic perspectives on environmental stewardship, while others adopt a more secular approach. According to Liu-Lastres et al. (2020) these variations highlight the significance of tailoring environmental education programs to the particular contexts and characteristics of Aceh's educational institutions.

Aceh's environmental education program must overcome several obstacles to be adequate. Comprehensive programs may be challenging to implement due to insufficient funding and resources, and curriculum integration and alignment must be improved to understand environmental issues comprehensively (Swainson & Mahanty, 2018). Green. Assessment and evaluation methods require refinement to measure environmental education initiatives' impact accurately. Engaging diverse stakeholders is crucial for effective implementation, requiring effective communication, collaboration, and consensus-building. Strong partnerships among educational institutions, government agencies, and community organizations are essential to enhance environmental education's effectiveness. Collaboration can facilitate resource mobilization, knowledge sharing, and the development of a supportive ecosystem for environmental education.

Previous studies conducted in different contexts have also highlighted the importance of environmental education and its implementation in schools and educational institutions. These studies have shown similarities and differences when compared to the findings in Aceh. For example, studies conducted in other regions have also emphasized integrating environmental education into the curriculum as a crucial aspect. Including loyal subjects or modules to teach environmental concepts and practices aligns with the findings in Aceh. Similarly, the emphasis on engaging teaching methods, such as discussions, debates, field trips, and hands-on experiments, aligns with effective pedagogical strategies identified in previous research (Yusuf et al., 2020).

However, similar to the findings in Aceh, various contexts have observed variations in curriculum content and environmental knowledge. Differences in institutional priorities, expertise, and the availability of resources can all contribute to these variations. Numerous studies have shown that environmental education programs face a challenge due to limited funding and resources, highlighting the need for adequate support to ensure their complete implementation. A more profound comprehension of environmental education's challenges, best practices, and potential areas for improvement can be gained by comparing Aceh's findings to those of previous studies. It emphasizes the need for context-specific approaches and identifies commonalities to help develop and improve environmental education programs worldwide (Nada et al., 2021).

CONCLUSION

Aceh's environmental education can produce a generation that cares about the environment and actively contributes to sustainable urban development. As a result, to improve the efficacy of environmental education in Aceh, educational institutions and related parties must work closely together. In this cooperation, nearby states, non-legislative associations, and networks can trade assets, foster comprehensive projects, and engage in significant natural drives.

A focus must also be placed on creating a comprehensive and integrated curriculum for environmental education. Students with a good curriculum can fully comprehend environmental issues and how they relate to other subjects. To raise awareness of the environment, it is necessary to incorporate environmental education into various subjects.

Furthermore, it is essential to strengthen training and professional development for educators. By providing ongoing training on current environmental issues and effective pedagogical strategies, educators will be better equipped to deliver impactful environmental education to students. This will help improve the quality

of learning and increase student participation in environmental issues.

Innovative and participatory teaching approaches also need to be applied in environmental education. Through engaging discussions, field activities, practical experiments, and environment-based projects, students can become more involved and understand environmental concepts better. This will encourage students to think critically, develop practical skills, and proactively approach the environment. Finally, it is also necessary to strengthen assessment and evaluation in environmental education using a comprehensive approach. The assessment focuses on theoretical knowledge and evaluates skills, behavior change, and sustainable environmental attitudes. Thus, environmental education can significantly impact forming a generation that cares and is responsible for the environment. Increasing environmental education in Aceh is not only to maintain environmental sustainability but also to form a generation with a deep understanding and awareness of the importance of protecting and protecting the environment. Aceh can become an inspiring development example by involving various parties and implementing these recommendations.

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