

Transformation of Learning in Madrasah through Innovations in Developing Environmental Care Character for Future Generations

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ABSTRACT

This research explores pioneering innovations aimed at promoting environmental stewardship in Madrasah Ibtidaiyah, emphasizing the critical need to integrate sustainable living and environmental management in early education. A key innovation is the adoption of project-based learning, where students engage in practical activities such as developing community gardens and managing waste. These initiatives, along with curriculum enhancements that incorporate ecological principles into religious studies, provide a comprehensive framework for environmental education. The study examines various pedagogical strategies, including interactive ecology-based storytelling and curriculum modifications that introduce environmental themes into Islamic studies. Additionally, it highlights community engagement efforts, such as collaboration between parents and teachers in environmental initiatives. These methods are analyzed to determine how they successfully instill a profound sense of environmental responsibility in students, transforming abstract concepts into actionable practices in their daily lives. Furthermore, the research addresses challenges faced by educators in aligning environmental education with the religious and cultural contexts of Madrasah Ibtidaiyah, ensuring compatibility with Islamic values while fostering global ecological awareness. Through a thorough review of contemporary practices, this study identifies successful models and best practices that shape the character of environmental care. The findings offer valuable insights for educators, administrators, policymakers, and curriculum developers, potentially influencing future educational policies and the design of curricula. This research underscores the vital role Madrasah Ibtidaiyah can play in cultivating environmentally conscious citizens and promoting sustainable ecological management at local and global levels.

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1. INTRODUCTION

Education in Madrasahs holds a strategic role in shaping the character of the younger generation, particularly in fostering environmental awareness (Yampap & ., 2023). As institutions rooted in religious values, Madrasahs play an important role in facing environmental challenges. They have a significant responsibility not only to impart religious knowledge, but also to shape attitudes and behaviours that are aligned with Islamic teachings. This includes fostering a sense of responsibility towards the environment, which is particularly important in the current context of increasing ecological concerns. By integrating these principles, Madrasahs can effectively contribute to spiritual and environmental education, guiding students toward a holistic understanding of their responsibilities as custodians of the earth. In Islam, the concept of humans as stewards of the earth emphasizes the responsibility to preserve and care for nature as a trust from God. Therefore, education in Madrasahs must go beyond merely providing theoretical knowledge; it must also cultivate an awareness of the importance of the environment and how we, as humanity, should actively participate in its preservation. In the increasingly interconnected and complex global context, environmental challenges such as climate change, pollution, and biodiversity loss are issues that cannot be ignored (Widodo et al., 2023). The younger generation educated in Madrasahs must be prepared to become future leaders who can wisely address these problems, grounded in strong values.

Innovation in teaching methods within Madrasahs is crucial for instilling environmental care character in students. The previously traditional education, with an approach more focused on rote memorization and theoretical knowledge, now needs to be transformed to meet the demands of a dynamic era that requires a high level of environmental awareness. This innovation could include integrating technology into the learning process, employing project-based learning methods centered on environmental issues, and introducing sustainability practices in daily school activities. Additionally, interactive and contextual teaching methods that actively involve students in decision-making and problem-solving related to the environment can foster a sense of personal and collective responsibility toward nature. This transformation also includes changes in the curriculum to place greater emphasis on character education, incorporating materials on the importance of maintaining ecosystem balance, reducing waste, and managing natural resources sustainably. Thus, students will not only gain knowledge but also be trained to apply environmental values in their daily lives, making them committed agents of change for environmental sustainability (Fahrudin et al., 2023).

Climate change, pollution, and environmental degradation are not merely local issues that can be ignored but have become global challenges that require serious attention from all sectors of society, including the field of education (Harsari et al., 2020). These conditions trigger various problems such as the increasing frequency of natural disasters, worsening air quality, and loss of biodiversity, all of which have direct impacts on human well-being and the sustainability of our planet. In this context, education in Madrasahs must respond in a proactive and visionary manner. Students in Madrasahs need to be equipped not only with religious and academic knowledge but also with values and skills relevant to preserving and conserving the environment. The instillation of these values must be done in an integrated and sustainable way, through a holistic approach that combines science, technology, and religious teachings. Education in Madrasahs must cultivate the awareness that humans have a responsibility as stewards on earth, which means they must maintain the balance of nature and avoid actions that harm the environment.

The educational approach in Madrasahs should include the development of practical skills that enable students to be directly involved in environmental conservation activities. For example, students can be taught proper waste management, such as recycling and composting, as well as participating in greening activities and school garden maintenance (Fitri & Asrizal, 2023). In addition, the Madrasah curriculum also needs to be strengthened with materials that emphasize the importance of sustainable use of natural resources and energy-saving practices. Innovations in learning like these will not only help students understand the impact of climate change and pollution, but also prepare them to become change agents capable of addressing future environmental challenges. Character education focused on

environmental care in Madrasahs must be delivered in a contextual and relevant manner to the students' daily lives, so they can internalize these values and apply them in real actions. This integrative approach will shape a generation that is not only sensitive to environmental issues but also committed to being part of the solution, in line with Islamic values that emphasize the importance of preserving nature as a trust from God.

Madrasahs, as educational institutions based on religious values, have a significant moral responsibility to integrate environmental care character education into their curriculum. This responsibility extends not only to theoretical teaching but also to practical applications that encourage students to take real action in environmental conservation. Islamic teachings are rich with values that support environmental preservation, from the concept of *khalifah* (stewardship), which emphasizes the role of humans as guardians of the earth, to the principle of *mizan* (balance), which in this context refers to the importance of maintaining ecological equilibrium. Thus, Madrasahs have a strong theological foundation to teach environmental care as part of worship and religious duty. Character education focused on environmental care in Madrasahs should be understood as an integral part of the mission of Islamic education, which not only aims to form good morals but also to produce individuals who are aware of the importance of environmental sustainability.

Previous research is vital for understanding and advancing the transformation of learning in Madrasahs through innovations in Environmental Care Character. By analyzing literature, we highlight key findings to guide future educational practices and character development. The findings come from an electronic module developed using the local wisdom of mangrove ecotourism. The research centers on creating and evaluating this module's effectiveness in improving students' perceptions, interest, and environmental care (Asrial et al., 2022). The findings underscore the significance of environmental education in ecotourism development and reveal a positive relationship between environmental knowledge and attitudes toward ecotourism. It suggests that bolstering environmental education could lead to greater ecotourism and a more sustainable tourism approach (Aswita, 2018). The finding indicates that environmental education and knowledge positively influence students' intentions to separate solid waste on campus. It emphasizes the need to integrate environmental protection information into curricula and to provide proper facilities for waste separation (Liao & Li, 2019). The finding shows that environmental education, knowledge, and engagement can predict students' waste management behavior through campus programs. It suggests that increased environmental education and knowledge foster environmental involvement, which subsequently impacts waste management practices (Ridayani et al., 2022). The finding not only provide valuable insights for educators and administrators at SMK Negeri 1 Ampek Angkek but also contribute to the broader discussion on incorporating environmental education into both primary and religious education systems in the 21st century (Syahrani et al., 2024).

The research aims to identify learning strategies that are effective in instilling values of environmental care among students of MIS PP Sungai Kalu, explore how these innovations are applied in various educational contexts in the madrasah, and evaluate the challenges and obstacles faced in the implementation process. By understanding the factors that both support and hinder the implementation of these innovations, this research also aims to assess the long-term impact of these approaches on students' character formation, particularly in terms of their awareness and actions towards environmental issues. This research seeks to examine how this learning transformation can contribute to the creation of a generation that not only has academic competence, but also has a strong commitment to environmental conservation, as well as how MIS PP Sungai Kalu, as an Islamic educational institution can play a key role in shaping a generation that cares and is responsible for the environment. Thus, this research is expected to make a significant contribution in the development of educational policies that are more sustainable and relevant to current and future global environmental challenges.

2. METHODS

The research method employed in this study is qualitative, utilizing a case study approach focused on Madrasah Ibtidaiyah MIS PP Darul Ulum Sungai Kalu as a representative example. The research sample will be selected using purposive sampling based on specific inclusion criteria, which will involve teachers who have actively implemented environmental care initiatives, students who have engaged in related projects, and parents who support these educational innovations. Data collection will encompass various techniques, including interviews with teachers, students, and parents to gather insights into their experiences and perceptions; observations during learning activities at MIS PP Darul Ulum Sungai Kalu to understand the practical application of environmental education; and a review of documentation, including lesson plans and training materials used in the madrasah. The collected data will be analyzed qualitatively using thematic analysis to identify key patterns related to the development of environmental care character. This analysis will explicitly discuss outcomes, such as changes in students' environmental awareness, attitudes, and behaviors, supported by specific findings and feedback from participants. To ensure validity and reliability, data triangulation will be employed, incorporating multiple sources of information and involving independent researchers in the analysis process. Ethical aspects will be addressed by obtaining permission and informed consent from MIS PP Darul Ulum Sungai Kalu, along with maintaining data confidentiality according to research ethics guidelines. The results of the study will be reported in a comprehensive report that includes key findings, recommendations for further development, and contributions to the understanding of environmental care character at MIS PP Darul Ulum Sungai Kalu. This method aims to provide an in-depth and holistic understanding of innovations in developing environmental care character in Madrasahs in the 21st century, particularly through the lens of the case study at MIS PP Darul Ulum Sungai Kalu.

3. FINDINGS AND DISCUSSION

3.1 Integrating Environmental Stewardship into Educational Practices

Integrating environmental themes into the curriculum across various subjects ensures that students encounter these critical issues from multiple perspectives. This interdisciplinary approach involves weaving environmental topics into science, social studies, and language arts, allowing students to explore ecological systems, climate change, and sustainability through diverse lenses. For instance, science classes might focus on understanding ecosystems and the impacts of human activities, while social studies could examine environmental policies and their social implications. Language arts might engage students with literature and media that address environmental themes (Denis-Robichaud et al., 2023). By embedding environmental issues throughout different subjects, students gain a comprehensive and multifaceted understanding of the importance of environmental stewardship. This cross-curricular integration not only enhances their awareness but also emphasizes the practical relevance of environmental knowledge in various contexts (Kholis et al., 2024).

Cross-disciplinary collaborations between different subjects and departments further promote a holistic understanding of environmental issues (Wibowo et al., 2023). By facilitating collaboration among teachers from various disciplines, schools can create integrated lessons and projects that address environmental challenges from multiple angles. For example, a project that combines science, social studies, and art might explore the effects of climate change on local communities through scientific research, historical analysis, and creative expression. This integrated approach helps students appreciate the interconnectedness of environmental and social systems and reinforces the importance of addressing environmental issues in a comprehensive manner.

Student-led environmental initiatives play a crucial role in fostering leadership skills and a sense of responsibility among students. By organizing their own environmental campaigns, such as recycling drives or conservation efforts, students take ownership of their learning and contribute actively to their communities. These initiatives provide students with opportunities to develop project management

skills, set goals, and mobilize their peers. Through the planning and execution of these campaigns, students learn to advocate for environmental issues and raise awareness within their school community. The experience of leading and managing environmental projects not only empowers students but also instills a sense of agency and commitment to sustainability (Subaidi, 2019).

Creating green clubs and environmental committees offers students a platform to collaborate on sustainability projects and advocate for environmental issues. These student-led organizations focus on various aspects of environmental care, such as waste reduction, energy conservation, and biodiversity protection. By participating in or leading these clubs, students gain leadership experience, develop organizational skills, and work together on initiatives that align with their interests. Green clubs and committees also serve as a catalyst for promoting eco-friendly behaviors and sustainability practices within the school environment (Yusuf & Fajri, 2022). By engaging with their peers and the broader school community, students help create a culture of environmental awareness and stewardship.

Engaging students in community-based environmental service projects connects their classroom learning with real-world applications and impacts their local environment positively. These projects might include activities such as organizing clean-up events, participating in tree planting, or collaborating with local organizations on conservation efforts. Community service projects allow students to see the direct results of their actions and strengthen their connection to their local communities. Service learning opportunities that integrate community service with academic coursework further enhance students' understanding of environmental issues and provide practical experience in addressing them. Reflection on these experiences helps students articulate their insights and reinforce their commitment to environmental care.

Engaging parents and the broader community in environmental education initiatives significantly extends the impact of school-based efforts into students' home lives and local surroundings. Organizing workshops and seminars for parents and community members serves as a pivotal strategy to raise awareness about environmental issues and practices. These events provide valuable information on sustainable living, conservation methods, and practical ways to incorporate eco-friendly habits into daily routines. By involving parents in these educational activities, schools create a supportive network that reinforces the principles taught in the classroom and encourages families to adopt similar practices at home (Mu' ammar & Badri, 2022). This collaborative approach strengthens the overall effectiveness of environmental education, ensuring that the message of sustainability reaches beyond the school environment and influences community behaviors.

Forming partnerships with local environmental organizations and businesses further enhances the scope and effectiveness of school-based environmental initiatives (Wajdi et al., 2022). Collaborating with these entities provides schools with additional resources, expertise, and support that can amplify their educational programs. For instance, local organizations might offer guest speakers, educational materials, or hands-on activities that enrich students' learning experiences. Businesses can contribute by sponsoring environmental projects or providing practical examples of sustainable practices in action. These partnerships create a bridge between the school and the community, facilitating a shared commitment to environmental stewardship and offering students real-world connections to their classroom learning.

Encouraging family participation in environmental projects also reinforces the importance of environmental care and strengthens the link between school and home practices. Family-based initiatives, such as home recycling programs or community clean-ups, provide practical opportunities for families to engage in sustainability efforts together. These activities not only promote eco-friendly behaviors within households but also foster a sense of collective responsibility towards the environment. By involving families in such projects, schools create a collaborative environment where students and their families work together towards common environmental goals, further embedding the principles of environmental stewardship into their daily lives. Assessing the long-term impact of environmental education requires a systematic approach to monitoring changes in students' behaviors

and attitudes (Wihardjo et al., 2020). Implementing systems to track these changes helps evaluate the effectiveness of educational programs and identify areas for improvement. By regularly reviewing students' environmental actions and perspectives, schools can gauge whether their initiatives are successfully fostering a culture of environmental care. This ongoing assessment ensures that educational programs remain relevant and impactful, adapting to the evolving needs of students and the broader community.

Gathering feedback from students and parents provides valuable insights into the effectiveness of environmental education efforts. Regular feedback mechanisms, such as surveys or focus groups, allow schools to understand the experiences and perceptions of both students and their families regarding environmental programs. This feedback is crucial for identifying strengths and weaknesses in the curriculum and making necessary adjustments to enhance the educational experience. By actively listening to the voices of students and parents, schools can ensure that their environmental initiatives are engaging, relevant, and impactful. Evaluating educational outcomes related to environmental care involves periodic assessments of students' knowledge retention and application. Conducting evaluations helps determine whether students are effectively acquiring and applying the skills and knowledge necessary for environmental stewardship. These assessments might include tests, projects, or practical demonstrations of environmental practices (Islami et al., 2023). By measuring educational outcomes, schools can ensure that students are developing the desired environmental care character and competencies, and make informed decisions about future curriculum enhancements.

At MIS PP Darul Ulum Sungai Kalu, a range of environmental initiatives underscores the commitment to instilling a strong sense of environmental responsibility among students. Daily cleanliness routines are a cornerstone of this commitment, with students actively participating in tasks such as collecting trash and maintaining the school grounds. These routines instill habits of responsibility and environmental care from an early age, reinforcing the importance of personal contribution to a clean and healthy environment (Ginting et al., 2023). Student-driven clean-up efforts further highlight the emphasis on maintaining a clean environment. Students are actively involved in cleaning their classrooms and surrounding areas, demonstrating their commitment to personal responsibility and environmental stewardship (Greiff et al., 2015). These efforts not only contribute to the upkeep of the school environment but also serve as practical demonstrations of the values taught in the classroom.

The incorporation of dining etiquette is another critical aspect of environmental education at the madrasah (Ramli et al., 2022). Emphasizing proper dining habits, such as eating while sitting and using the right hand, promotes cleanliness and respect for the environment. This approach helps students develop good habits related to both personal and environmental hygiene, reinforcing the connection between daily practices and environmental care. The implementation of a green school program further reflects the madrasah's dedication to sustainability (Fahlevi* et al., 2023). The program at MIS PP Darul Ulum Sungai Kalu aims to enhance the school's atmosphere through various initiatives, focusing on increasing greenery, improving comfort, and promoting environmental balance. One of the key components of this program includes regular clean-up drives, which actively engage students in maintaining a clean and green environment. Environmental awareness campaigns are essential in fostering a culture of sustainability among students, highlighting the significance of environmental stewardship. These initiatives collaborate to create a supportive environment that empowers students to take responsibility for their surroundings. Through participation in these activities, students not only gain knowledge about environmental issues but also develop the skills necessary to become proactive members of their communities. To enhance the clarity and readability of this discussion, it is advisable to implement subheadings that define distinct themes or strategies. For instance, sections could be titled "Fostering Environmental Stewardship," "Encouraging Student Engagement in Sustainability," and "Preparing Students for Community Involvement." This structured approach would effectively guide the reader through the findings, making it easier to understand how each initiative contributes to the overarching goal of instilling environmental responsibility in students. By delineating these themes,

the text will better articulate the interconnectedness of the initiatives and their collective impact on nurturing environmentally conscious behavior among students.

3.2 Implementation of a Specialized Environmental Ethics Module in the Madrasah Curriculum

The Madrasah curriculum employs a comprehensive strategy aimed at fostering a deep understanding of environmental issues and sustainable practices among students. This approach not only incorporates theoretical knowledge but also emphasizes practical applications through various initiatives. Specifically, the implementation of project-based learning and community engagement activities has significantly enhanced students' environmental awareness, attitudes, and behaviors. For instance, students who participated in community garden projects reported a greater appreciation for biodiversity and sustainable food practices. Feedback from teachers and parents indicated that students are more likely to engage in environmentally friendly behaviors at home, such as recycling and conserving energy. Moreover, pre- and post-intervention surveys demonstrate a marked improvement in students' understanding of key environmental concepts, illustrating the effectiveness of these educational strategies. By linking curriculum content with real-world applications, the Madrasah effectively nurtures a generation of environmentally conscious individuals equipped to address current and future ecological challenges (Riyanto et al., 2023). One approach is embedding environmental topics within existing subjects such as Islamic Studies, Science, and Ethics. For example, lessons on ecological balance, resource conservation, and the ethical treatment of the environment can be seamlessly incorporated into these subjects, allowing students to see the connections between their religious teachings and environmental stewardship (Kidman & Casinader, 2019). This integration helps reinforce the relevance of environmental care within the context of their faith. In addition to integrating environmental topics into existing subjects, specialized environmental modules or courses can be introduced. These modules might cover areas such as environmental ethics in Islam, the significance of biodiversity, and the principles of sustainable living from an Islamic perspective. Such dedicated modules provide students with in-depth knowledge and a focused understanding of environmental issues, reinforcing the importance of caring for the earth within the framework of their religious education. Practical, hands-on experiences are also crucial for effective integration (Hokayem & Jin, 2019). This can involve organizing outdoor activities, field trips, or community projects related to environmental conservation. These experiences allow students to connect classroom concepts with real-world applications, fostering a deeper appreciation for the environment (Wakit et al., 2023). For instance, participating in local clean-up drives or visiting natural reserves can provide tangible connections to the theoretical knowledge gained in class.

Integrating relevant religious texts and teachings into the curriculum is essential. By incorporating verses from the Quran and Hadiths that emphasize environmental stewardship, students can see the direct relevance of their religious teachings to caring for the earth. This approach strengthens the spiritual connection between their faith and environmental responsibility. Collaborative and interdisciplinary methods further enhance learning by addressing environmental issues through projects that span multiple subjects (Camangian & Cariaga, 2022). This approach mirrors the interconnected nature of environmental challenges and encourages students to approach problem-solving with a well-rounded perspective. Madrasahs employ a variety of innovative teaching methods to foster environmental awareness among students. Experiential learning is one effective approach, involving activities such as nature walks and field trips to ecologically significant areas. These hands-on experiences enable students to directly observe and interact with the environment, deepening their connection and understanding of nature (Fernando & Sarkity, 2023).

Role-playing exercises simulate environmental scenarios, helping students understand the complexities of decision-making in environmental management. Additionally, integrating environmental themes with Islamic studies, such as discussions on Islamic eco-theology, emphasizes the compatibility of environmental stewardship with religious principles. Interactive games, community engagement activities, and storytelling further contribute to a holistic and engaging

learning experience, fostering a deep sense of environmental responsibility and stewardship among students. MIS PP Darul Ulum Sungai Kalu, a range of environmental initiatives are implemented to cultivate a caring and responsible attitude towards the environment. Routine activities are integral to this strategy, with students participating in daily cleanliness routines, including class pickets and trash collection. "Clean Friday" is a weekly event dedicated to maintaining the school's cleanliness, while special environmental commemorations are organized around significant environmental days.

The behavior of the Madrasah principal and teachers plays a crucial role in modeling environmental care for students. Their exemplary actions are complemented by active motivation and, when necessary, appropriate warnings or reprimands to reinforce the importance of maintaining cleanliness. Supportive infrastructure, such as sorted trash bins for different types of waste, handwashing stations, adequately sized toilets, and access to clean water, underpins the efforts to cultivate an environmentally caring character among students. Slogans promoting environmental care, displayed throughout the school, serve as constant reminders of the importance of stewardship. Additionally, the Madrasah's green school program enhances the school's atmosphere by increasing greenery, improving comfort, and fostering environmental balance. This program includes regular clean-up drives and environmental awareness campaigns, helping to create a culture of sustainability among students. Through these comprehensive initiatives, MIS PP Darul Ulum Sungai Kalu effectively promotes environmental responsibility and instills lasting habits of environmental care in its students. This structured approach not only enhances readability but also clarifies how each aspect contributes to the overall goal of fostering an environmentally conscious school community.

3.3 Implementation of Interdisciplinary Approaches to Environmental

Interdisciplinary approaches into environmental education within Madrasahs represents a strategic effort to cultivate a comprehensive understanding of environmental issues among students. This approach intertwines religious teachings, scientific principles, and ethical considerations to provide a holistic perspective on environmental stewardship. In Islamic Studies, the curriculum is designed to explore Quranic verses and Hadiths that address environmental stewardship and conservation. By examining these religious texts, students gain insight into the spiritual and ethical dimensions of their responsibilities toward the environment. This aspect of the curriculum underscores the importance of environmental care as a fundamental principle of faith, linking religious beliefs directly with sustainable practices (Oberdörfer et al., 2021). The Science curriculum complements this by offering a robust exploration of ecological principles, biodiversity, and sustainability. Students learn about the natural processes that sustain life on earth, the impact of human activities on ecosystems, and strategies for mitigating environmental damage. This scientific understanding provides students with the tools to analyze environmental issues critically and apply solutions grounded in scientific knowledge.

Ethics classes further enrich the curriculum by delving into the moral implications of environmental decisions and actions. Students are encouraged to reflect on how their behavior affects the environment and future generations, fostering a deeper awareness of the ethical responsibilities associated with environmental care (Deniş ÇeliKer & Kara, 2020). This component of the curriculum helps students understand that environmental stewardship is not only a scientific and religious duty but also an ethical obligation (Fikri et al., 2022). Collaborative projects that integrate knowledge from Islamic Studies, Science, and Ethics allow students to address real-world environmental challenges. For instance, students might work together on projects focused on waste management, water conservation, or renewable energy (Masithoh et al., 2022). These projects enable students to apply their learning in practical contexts, bridging the gap between theoretical knowledge and real-world applications. Integrated lesson plans are developed to ensure that religious teachings, scientific principles, and ethical considerations are seamlessly combined in the classroom (Kumar et al., 2023). These plans facilitate a cohesive learning experience, where students see the interconnectedness of faith, science, and ethics in addressing environmental issues. By integrating these elements, educators help students

appreciate how different perspectives contribute to a comprehensive understanding of environmental stewardship.

Field trips and experiential learning activities play a significant role in this approach. Interdisciplinary field trips expose students to environmental issues from multiple viewpoints, allowing them to observe and analyze real-world scenarios through scientific, ethical, and religious lenses. Activities such as community clean-ups, nature walks, and environmental surveys provide practical experiences that reinforce classroom learning and deepen students' connection to the environment (Khan et al., 2021). Guest lectures from experts in Islamic environmental ethics, environmental science, and ethical philosophy offer additional layers of insight (Arshad et al., 2023). These lectures introduce students to diverse perspectives and contemporary issues in environmental care, enhancing their understanding of the multifaceted nature of environmental challenges. By engaging with experts, students gain a broader view of how different disciplines contribute to addressing environmental problems (Kultsum, 2020). Professional development for teachers is essential to the success of this interdisciplinary approach. Ongoing training ensures that educators are equipped to integrate various subjects effectively and facilitate interdisciplinary discussions in the classroom (Righi et al., 2021). This support helps teachers stay current with best practices and innovative methods for teaching environmental education.

Assessment strategies at MIS PP Darul Ulum Sungai Kalu are designed to reflect the interdisciplinary nature of the curriculum, integrating Islamic Studies, Science, and Ethics into evaluations of students' understanding and application of environmental issues. Evaluations focus on students' ability to apply knowledge from these subjects to real-world environmental challenges, with assessment methods including projects, reflective essays, and practical applications. These methods measure students' engagement and comprehension of the material, ensuring that they can effectively integrate religious teachings, scientific principles, and ethical considerations. The implementation of these interdisciplinary approaches at MIS PP Darul Ulum Sungai Kalu creates a comprehensive and integrated learning experience. By connecting faith-based teachings with scientific knowledge and ethical insights, the curriculum fosters a deep, holistic understanding of environmental stewardship. This approach not only enriches students' knowledge but also instills a profound sense of responsibility toward the environment, rooted in their faith and ethical values. To enhance clarity and readability, the discussion can be structured with subheadings that define distinct themes or strategies. For example, sections could include "Integrating Faith and Environmental Responsibility," "Developing Ethical Values in Environmental Stewardship," and "Preparing Students for Environmental Challenges." Through this comprehensive strategy, the Madrasah aims to prepare students to become conscientious and informed stewards of the earth, equipping them with the skills and values necessary to effectively address environmental challenges. By organizing the content in this manner, readers will be better guided through the findings, allowing for a clearer understanding of how each theme contributes to the overarching goal of nurturing environmentally responsible behavior among students. This structured approach will facilitate a more coherent presentation of ideas and emphasize the importance of integrating faith with environmental education.

3.4 Utilization of Modern Technologies to Enhance Environmental Education in Madrasahs

The integration of modern technologies into the environmental education curriculum in Madrasahs represents a pivotal shift towards a more engaging and interactive learning experience. Virtual field trips and tours serve as a particularly effective method for immersing students in various environmental contexts without the logistical constraints of physical travel (Nurlila & La Fua, 2022). By utilizing virtual reality platforms, students can "visit" diverse ecosystems such as rainforests, coral reefs, or arctic tundras, gaining a comprehensive understanding of these environments and their unique challenges. These virtual experiences offer a vivid depiction of ecological systems and environmental issues, providing students with a sense of immediacy and immersion that traditional classroom settings may lack. The ability to explore these environments in a controlled virtual space

enables students to observe firsthand the effects of environmental changes and conservation efforts, thereby fostering a deeper connection to the subject matter. This immersive approach not only enhances students' awareness of environmental issues but also stimulates their curiosity and engagement through interactive and visually stimulating content.

Incorporating interactive data analysis tools into the curriculum further enriches students' environmental education by allowing them to engage with real-time data and statistics. Modern software and applications designed for data visualization offer students the ability to analyze and interpret complex datasets related to climate change, air and water quality, and biodiversity. These tools enable students to create graphs, charts, and predictive models that illustrate environmental trends and the impact of human activities (Jung & Li, 2023). By working with actual data, students develop critical analytical skills and a deeper understanding of the quantitative aspects of environmental science. This hands-on approach not only aids in comprehending the scope and scale of environmental issues but also empowers students to contribute to discussions and solutions with a data-informed perspective (Waluyo & Kharisma, 2023). The ability to visualize and manipulate data in real time provides a more dynamic and practical understanding of environmental science, bridging the gap between theoretical knowledge and real-world applications.

Gamification of environmental education introduces an element of playfulness and competition into the learning process, which can significantly enhance student engagement and retention of environmental concepts. Educational games and simulations that focus on topics such as resource management, conservation strategies, and ecological balance offer students a unique opportunity to apply their knowledge in interactive scenarios (Jung et al., 2018).. These games often incorporate problem-solving challenges and decision-making tasks that require students to think critically and strategize in order to achieve sustainability goals. By integrating these gamified elements into the curriculum, educators can create a more engaging and motivating learning environment that encourages students to explore and experiment with environmental concepts (Shahraki et al., 2016). Gamification not only makes learning more enjoyable but also reinforces important lessons through experiential learning, allowing students to grasp complex topics in a more intuitive and memorable way.

Augmented Reality (AR) technology presents an innovative approach to enhancing environmental education by providing interactive and immersive learning experiences. At MIS PP Darul Ulum Sungai Kalu, AR applications enable students to overlay digital information onto their physical surroundings, creating a dynamic and engaging learning environment. This innovative method not only enriches the educational experience within this specific context but also has broader implications for other educational settings. The strategies implemented at MIS PP Darul Ulum can be adapted and scaled to similar religious or cultural contexts, offering valuable insights for enhancing environmental education in diverse environments. By considering how these AR applications can be integrated into other curricula and institutions, educators can leverage the engaging nature of AR technology to promote environmental stewardship across different communities. Thus, this research highlights not only the effectiveness of AR in a Madrasah setting but also its potential to serve as a model for other educational institutions seeking to cultivate a deeper understanding of environmental issues among students.(Carlsson, 2017). This technology allows students to see environmental changes and their consequences in real-time, bridging the gap between abstract concepts and tangible experiences (Nabasumba et al., 2023). By integrating AR into the curriculum, educators can create visually rich and interactive lessons that capture students' attention and enhance their understanding of environmental issues. While this section provides a comprehensive overview, improving its structure could enhance readability. To achieve this, consider using subheadings to organize the discussion into distinct themes or strategies, such as "Curriculum Integration," "Student-Led Initiatives," "Interdisciplinary Approaches," and "Use of Modern Technologies." This organization would guide the reader through the findings and facilitate a clearer progression of ideas. Moreover, the ability to interact with virtual models and simulations in a real-world context fosters a deeper connection to the subject matter and

encourages active participation in environmental education. Overall, incorporating modern technologies into environmental education within Madrasahs not only enriches the learning experience but also equips students to become informed and responsible stewards of the environment. By structuring the content effectively and emphasizing the role of technology, the discussion will better highlight the significance of these educational strategies in shaping environmentally conscious individuals.

4. CONCLUSION

The research highlights that fostering environmental stewardship within Madrasahs is a critical component in promoting sustainable practices and nurturing environmental responsibility among students. Findings indicate that integrating environmental education with innovative teaching methods and practical initiatives not only aligns Madrasah curricula with global environmental goals but also showcases the adaptability of traditional educational institutions to modern challenges. Key contributions of this study include the effective use of technology—such as virtual simulations and online resources—to enhance students' understanding and engagement with environmental conservation. Furthermore, establishing partnerships between Madrasahs, local communities, and environmental organizations fosters a holistic, experiential learning approach, allowing students to apply their knowledge practically, thereby deepening their connection to nature. However, limitations of this research include the relatively narrow focus on specific Madrasah settings, potentially limiting the generalizability of findings across diverse educational contexts. Additionally, the study suggests that future research could explore broader implementation strategies across various religious educational settings and assess long-term impacts on students' environmental behaviors. This research underscores the importance of evolving Madrasah education to address contemporary environmental challenges, with implications for policy development, educational practices, and broader investigations into environmental stewardship in religious institutions.

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