

ENVIRONMENTAL EDUCATION TO ENHANCE STUDENTS' AWARENESS OF PROTECTING THE ENVIRONMENT AT SMAN KERJO, KARANGANYAR

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Abstrak: Lingkungan hidup merupakan aset penting bagi keberlangsungan hidup manusia, mencakup tanaman, hewan, cuaca, dan segala sesuatu yang saling terhubung untuk menciptakan keseimbangan hidup. Oleh karena itu, diperlukan upaya untuk meningkatkan pemahaman, pengetahuan, motivasi, dan praktik hidup berkelanjutan bagi generasi muda melalui program Edukasi Lingkungan. Program pengabdian kepada masyarakat berupa edukasi lingkungan ini penting dilakukan untuk membekali siswa Sekolah Menengah Atas (SMA) dengan kemampuan dan kesadaran yang dibutuhkan dalam menjaga serta mengawal kelestarian lingkungan hidup di masa depan. Metode pelaksanaan pada kegiatan ini adalah penyuluhan dan evaluasi yang meliputi persiapan, seminar edukasi lingkungan, dan evaluasi. Kegiatan PkM ini bertujuan untuk meningkatkan pembentukan karakter siswa SMAN Kerjo, Karanganyar terhadap lingkungan. Hal tersebut juga mendukung visi serta misi SMAN Kerjo dalam membangun lembaga yang unggul, berakhhlakul karimah, berkarakter, dan berwawasan lingkungan. Pengumpulan data menggunakan service learning dimana penilaian perkembangan berdasarkan pre-test dan post-test, serta kuisioner. Hasil diperoleh bahwa pemahaman siswa tentang lingkungan meningkat signifikan, dengan pengetahuan naik dari 18,2% menjadi 40,9%. Motivasi siswa untuk menjadi seorang pecinta lingkungan belum mengalami peningkatan signifikan, akan tetapi mereka sudah menunjukkan minat untuk berpartisipasi dalam menjaga kelestarian lingkungan, seperti membuang sampah pada tempatnya dan menanam serta merawat tanaman. Implikasi dari kegiatan PkM ini adalah meningkatnya perilaku positif siswa sebagai agen perubahan di lingkungan sekolah dan komunitas sekitar. Dengan pendampingan yang konsisten, siswa dapat lebih mengembangkan perilaku hidup berkelanjutan dan meningkatkan kesadaran mereka akan pentingnya kelestarian lingkungan dalam jangka panjang.

Kata Kunci: edukasi lingkungan, lingkungan hidup, pengabdian kepada masyarakat, SMAN Kerjo

Abstract: The environment is a vital asset for the sustainability of human life, encompassing plants, animals, weather, and all interconnected elements that create a balance in life. Therefore, efforts are needed to enhance understanding, knowledge, motivation, and sustainable living practices among the younger generation through environmental education programs. This community service program, in the form of environmental education, is essential to equip high school students with the necessary skills and awareness to protect and preserve the environment for the future. The implementation method for this program included outreach and evaluation, consisting of preparation, environmental education seminars, and evaluation activities. This Community Service Program (PkM) aims to enhance the environmental character development of students at SMAN Kerjo, Karanganyar. It also supports the vision and mission of SMAN Kerjo in building an institution that is excellent, virtuous, character-driven, and environmentally aware. Data collection was conducted using service learning, with assessments based on pre-test and post-test results and questionnaires. The results showed a significant increase in students' environmental understanding, with knowledge rising from 18.2% to 40.9%. Although students' motivation to become environmental advocates did not show significant growth, they demonstrated interest in participating in environmental conservation efforts, such as proper waste disposal and planting and maintaining vegetation. The implications of this PkM program include the improvement of positive behavior among students as agents of change in their school and surrounding communities. With consistent guidance, students can further develop sustainable living practices and enhance their awareness of the importance of environmental conservation in the long term.

Keywords: environment education, environment, community-based service, SMAN Kerjo

Introduction

In the contemporary era of globalization and the rapidly advancing Industrial Revolution 4.0, particularly in technology, environmental issues have increasingly emerged as a significant concern in Indonesia. The annual population growth has led to heightened human needs, resulting in excessive exploitation of natural resources and land, exacerbating the country's environmental challenges (Harjianto, 2021). These environmental dilemmas represent critical challenges faced by both developed and developing nations, including Indonesia.

The Indonesian government holds jurisdiction and responsibility for regulating and managing environmental affairs. As Law No. 32 of 2009 outlined, environmental management and preservation are systematic and holistic efforts to maintain environmental functionality and prevent pollution or damage. These efforts encompass planning, utilization, monitoring, maintenance, supervision, and enforcement. Environmental issues often stem from recurring natural processes that typically have minimal impact on environmental management and can recover naturally. However, contemporary environmental issues cannot be dismissed as insignificant, given that human intervention acts as a primary catalyst for environmental degradation, with profound implications for the governance of nature and the environment (Herlina, 2015).

The enactment of Law No. 32 of 2009 on Environmental Protection and Management demonstrates the progressive implementation of environmental laws within Indonesia's governance framework. The environment, in essence, is a cohesive spatial system encompassing all supporting elements represented by biotic and abiotic constituents, including humans and their behavior (Rusdiyanto, 2015). These constituents collectively contribute to determinants affecting the survival and well-being of organisms.

SMAN Kerjo, a renowned high school in Karanganyar, is situated in a hilly region surrounded by green open spaces. The school holds great potential to serve as a primary center for environmental education. However, gaps remain in understanding and awareness of the importance of environmental stewardship. While the green open spaces around the school provide opportunities for practical environmental learning, there is still a lack of comprehensive programs to foster environmental consciousness. Activities such as tree planting and recycling programs are beneficial but may not resonate with all students, as some are more inclined toward non-environmental extracurricular activities (Greer & Wetherington, 2015). To address these issues, more intensive and collaborative educational programs are needed to raise environmental awareness among students at SMAN Kerjo and encourage them to apply this knowledge to preserve the environment around their school (Putri, 2022; Tjio, 2023).

Schools should not only function as places of learning but also as platforms to prepare students to become environmentally conscious change agents. Educating society and raising awareness about environmental preservation and climate change mitigation is critical to promoting sustainable practices. Environmental education in high schools plays a vital role in instilling a sense of environmental responsibility in students. It fosters awareness, knowledge, skills, attitudes, and commitment to addressing environmental challenges and promoting

sustainable environmental care (Reid & Ardo, 2024). Such education aims to engage students in responsible environmental management on both local and global scales (Reid & Ardo, 2024).

Previous studies have explored the role of environmental education in schools in shaping students' environmental character. Teachers play a key role in fostering students' environmental awareness (Pujilestari et al., 2024; Pangestu & Suhari, 2024), with the integration of environmental education into the curriculum being a critical aspect of this process (Ismail et al., 2023). However, a notable gap lies in the need for actionable initiatives involving practitioners or external parties (Sabardila et al., 2019). Collaboration with practitioners can reinforce environmental values in students, emphasizing the importance of environmental protection from an early age (Gule et al., 2023; Zulkarnain & Warmana, 2023).

Environmental education extends beyond promoting environmental sustainability; it enhances knowledge, fosters innovation, and supports policy changes (Tripathy et al., 2024; Uniyal, 2024). Engaging individuals from all societal levels in environmental campaigns and education programs can lead to greater environmental awareness and a shift toward sustainable lifestyle choices (Sudirman et al., 2024; Rusli et al., 2023).

By exploring environmental literacy among children and adolescents, individuals can develop pro-environmental attitudes, behaviors, and values, contributing to a more environmentally conscious society and fostering a culture of sustainability (Santhyami et al., 2021; Mukasyaf, 2024; Sudirman et al., 2024). Encouraging active participation in conservation efforts, such as reducing plastic use, planting trees, and conserving energy, can yield significant positive impacts. These steps aim to preserve the Earth as our shared home and ensure environmental sustainability for future generations.

This community service program seeks to enhance the environmental character of students at SMAN Kerjo, Karanganyar. The program aims to instill environmental values in students and encourage their active participation in conservation efforts through innovative, collaborative, and action-oriented environmental education initiatives. This approach aspires to cultivate environmentally aware individuals and change agents capable of contributing to environmental sustainability on both local and global scales.

Method

This community service program employed a counseling and evaluation method divided into three main stages (Figure 1): preparation, implementation, and evaluation (Sugiyarti et al., 2021). Counseling was chosen because it aims to provide understanding and raise students' awareness of environmental issues through direct material delivery (Bhakti et al., 2018). This approach typically involves sharing knowledge or skills from the program organizers with the students. Meanwhile, evaluation is conducted to measure the effectiveness of the activity using a service-learning-based data collection method, including pre-tests, post-tests, and questionnaires. Service learning integrates hands-on learning experiences with actionable initiatives to enhance educational outcomes (Andika et al., 2024).

The program partners with SMAN Kerjo, a senior high school in Karanganyar Regency and

24 Grade XII F1 students participated in the program. The criteria for participants are: 1) Aged 16–17 years, 2) From diverse social and economic backgrounds, 3) Possess basic knowledge of environmental issues from the school curriculum and 4) Show moderate to high motivation to participate in action-oriented environmental programs. The programme stages include preparation, implementation, and evaluation (see [Figure 1](#)).

Preparation Stage

This stage includes: 1) Site Survey: Conducted to understand the school environment and nearby green open spaces, 2) Interviews: Held with school representatives to identify key issues related to environmental education and gather information about the Grade XII curriculum, 3) Literature Review: Conducted to develop relevant and curriculum-aligned materials, and 4) Material Development: Topics prepared include "Environmental Education to Enhance Student Actions in Protecting the Environment."

Implementation Stage

The implementation involves delivering counseling sessions through a seminar format, consisting of: 1) Direct Material Presentation: Facilitated by speakers (faculty members and the team) using visual aids and interactive discussions and 2) Content Integration: Material designed to incorporate environmental values aligned with the curriculum of SMAN Kerjo.

Evaluation Stage

Evaluation adopts a service-learning approach to assess the effectiveness of the counseling. Data collection methods include:

Pre-Test: Conducted before the seminar to gauge students' initial understanding of environmental issues. The pre-test includes five questions assessing: 1) Basic environmental knowledge, 2) Awareness of environmental problems, 3) Understanding of sustainable practices, and 4) Relevance of environmental issues to daily life

Post-Test: Administered after the seminar to measure students' improvement. The post-test includes five questions assessing: 1) Basic environmental knowledge, 2) Awareness of environmental problems, 3) Understanding of sustainable practices and green open spaces, and 4) Relevance of environmental issues to daily life.

Questionnaire: Used to evaluate students' motivation, perceptions, and feedback on the material delivered. It includes five items that assess: 1) Understanding and knowledge of environmental issues before and after the counselling, 2) Motivation to protect the environment, and 3) Participation efforts in environmental stewardship within their surroundings.

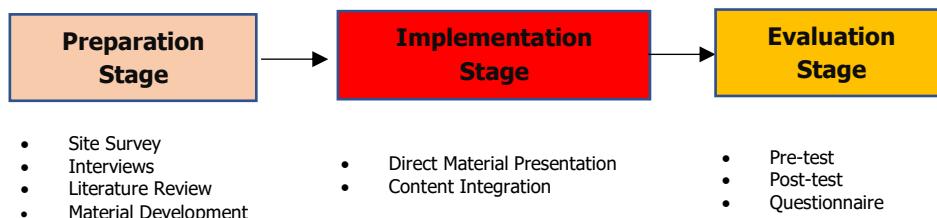


Figure 1. Flowchart of Environmental Education Community Service Activities

Results and Discussion

SMAN Kerjo, located in Sumberejo, Kerjo District, is a high school in a rural area with relatively well-preserved natural surroundings. Given the students' closer interaction with the natural environment (Figure 2), the community service program (PkM) titled "Environmental Education to Enhance Student Actions in Protecting the Environment" is highly relevant to be conducted at this school. This PkM activity serves as a platform to strengthen the students' character education, making them more socially responsible while aligning with contextual learning that supports the school curriculum. Additionally, the program has the potential to raise environmental awareness among students, helping them manage and preserve the environment.

The long-term impact expected from this PkM activity is to develop SMAN Kerjo students as future change agents who are concerned and actively involved in environmental conservation. Furthermore, this community service program aligns with SMAN Kerjo's vision and mission, which aims to make the institution excel in academic achievements and foster students with good morals, strong character, and environmental awareness.



Figure 2. SMAN Kerjo Environment

This community service activity involved 24 students from Class XII F.1 of SMAN Kerjo, Karanganyar. Before the educational session began, participants first filled out an attendance list and received a pre-test sheet to assess their initial understanding of environmental issues. Following this, the Community Service (PkM) team delivered the educational material to the students (Figure 3a). The content provided by the PkM team covered various important environmental topics, including the role of the environment in human life, the impacts of environmental degradation on humans, motivations for and practices of sustainable living, and career opportunities related to environmental fields. The material was presented interactively, enabling students to understand better and connect the information with real-life situations they encounter in their general environment, school, and home.

After the educational material session, the students were invited to participate in a post-test, which took the form of a quiz with prizes (Figure 3c). In addition, students completed a questionnaire (Figure 3b) via Google Forms, which could be accessed using a QR code (Figure 3d) from their smartphones. The questionnaire assessed the student's understanding, knowledge, and motivation concerning the community service activity (PkM). The questionnaire

aimed to evaluate how much their understanding, knowledge, and motivation had increased after receiving the "environmental education" content. The pre-test and post-test results were compared to measure the effectiveness of the PkM activities.



Figure 3. a) Environmental Education Material Presentation Session, b) Filling out the Questionnaire, c) Award Distribution After the Post-Test, and d) QR Code for Questionnaire.

Furthermore, the PkM team also distributed fruit tree seedlings to the students and teachers of SMAN Kerjo as a concrete step they could take to help preserve and improve the quality of the school and home environments (Figure 4). In this way, the PkM activity is expected to enhance the student's understanding and knowledge and motivate them to take tangible actions in protecting the environment, both at school and within their communities.



Figure 4. Distribution of Fruit Tree Seedlings to SMAN Kerjo Students and Teachers

Based on the results of the pre-test and post-test (Figure 5) conducted before and after the educational session, there was a 22.7% improvement in the participants' understanding. This improvement was reflected by five additional students who were able to answer the post-test questions correctly in the "good" category. Before the "environmental education" material was delivered, 36.4% of the students had limited knowledge. However, this percentage decreased to 22.7% after the material was presented. Meanwhile, the percentage of students with "sufficient" knowledge decreased from 45.5% to 36.4%. On the other hand, the number of students with "good" knowledge increased significantly, from 18.2% to 40.9%. These results indicate a positive impact of the environmental education session, as students demonstrated improved understanding and knowledge of environmental issues.

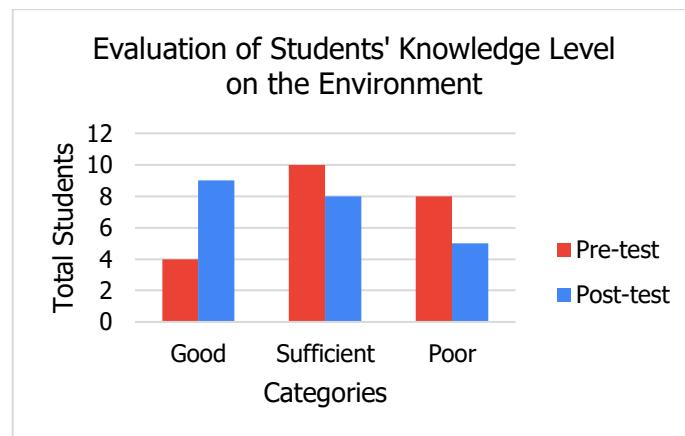


Figure 5. Evaluation of Knowledge Level on the Environment of SMAN Kerjo Students

Moreover, the evaluation results from the pre-test and post-test indicate that the community service activity in the form of 'environmental education' has positively impacted the improvement of students' knowledge and understanding. There is an increase in the number of students who could answer the post-test questions correctly, rising from 18.2% before the educational session to 40.9% afterward. The content covered various important aspects of the environment, such as the role of the environment in life, the impact of environmental damage on humans, sustainable living practices, and various professions related to the environment. Through this approach, it is hoped that students not only gain knowledge and insights but also internalize their belief in preserving the environment. They are encouraged to understand the importance of the environment and apply sustainable living practices in their daily lives to make a tangible contribution to preserving and sustaining their environment.

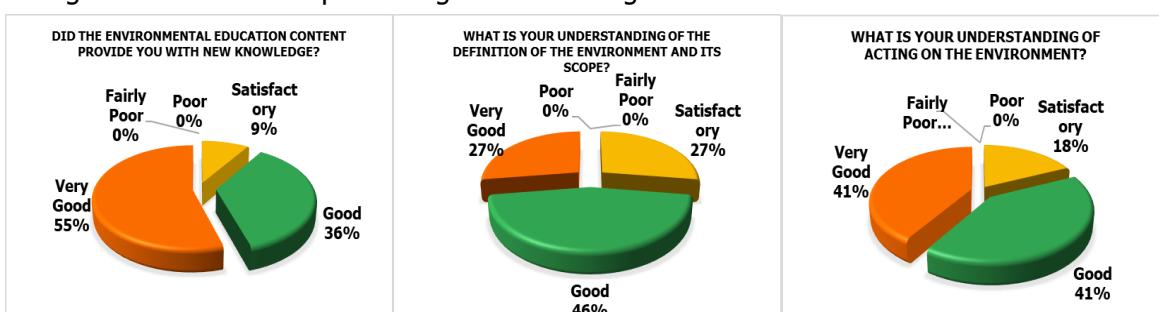


Figure 6. Results of the Questionnaire on SMAN Kerjo Students' Understanding

Based on the evaluation of the pre-test and post-test results, further analysis was conducted using the questionnaire responses filled out by the 12th-grade students of class F.1 at SMAN Kerjo regarding their understanding and knowledge (Figure 6), motivation (Figure 7), and efforts to participate (Figure 8) in environmental issues after receiving the "Environmental Education" material. Figure 6 illustrates that the material delivery was successful, with 55% of students rating the content as "excellent" and mentioning that it introduced new information for them. There was also an improvement in students' understanding of the environment and its scope, with 46% rating it as "good." Finally, students' understanding of the actions that should be taken to preserve the environment increased, with 41% indicating improvement in their knowledge.

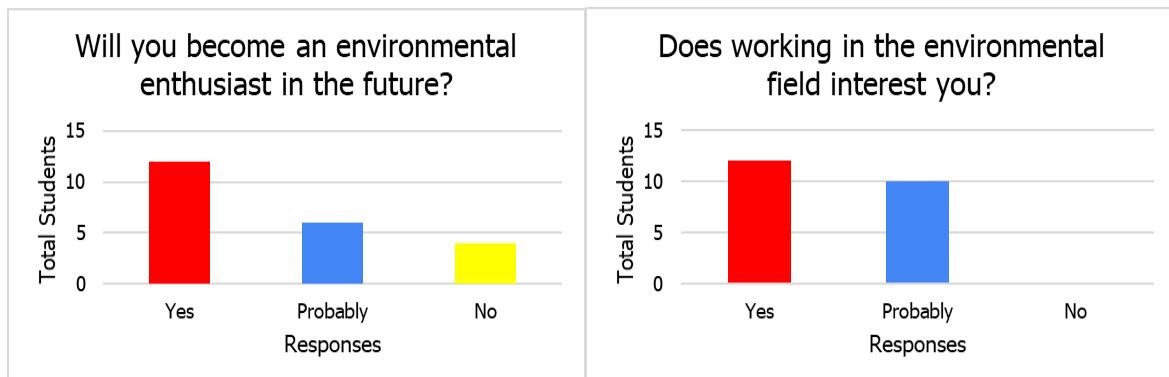


Figure 7. Results of the Questionnaire on SMAN Kerjo Students' Motivation

The motivation of the 12th-grade students in class F.1 (Figure 7) after receiving the "Environmental Education" material did not significantly increase. According to the results, 12 students (54.5%) answered "yes" to the possibility of becoming environmental advocates and pursuing a career in the field. Meanwhile, four students (18.2%) answered "no" to the likelihood of becoming environmental enthusiasts but still expressed interest or motivation to work in the environmental sector in the future.

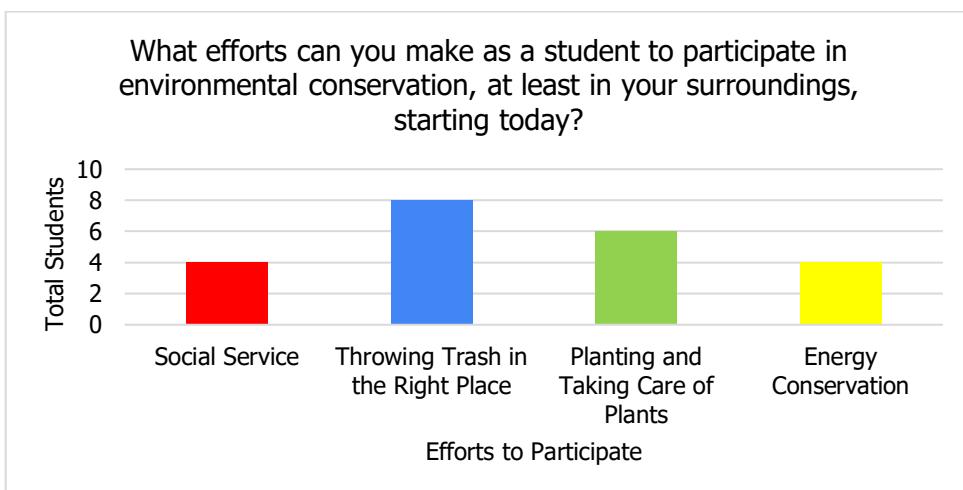


Figure 8. Questionnaire Results on Participation Efforts by SMAN Kerjo Students

During the "environmental education" session, students were introduced to various sustainable living practices in a simple, accessible, and engaging way to maintain their interest and motivation in environmental conservation. Figure 8 illustrates the diversity of participation types and levels among class XII F.1 students at SMAN Kerjo, reflecting their abilities and interests. However, further encouragement is essential, particularly from teachers at school, to ensure: 1) Students consistently engage in these activities, not just immediately after the material is presented, and 2) Increased environmental awareness that fosters more responsible behaviors toward the environment. Based on Figure 8, the activity of "proper waste disposal" emerged as the most common participation effort among students, with eight students (36.4%) committing to this practice. It indicates that the message regarding the importance of disposing of waste correctly resonated with students, as it is a simple and manageable effort. Following this, six students (27.3%) expressed interest in "planting and caring for plants." This type of activity also received significant interest and has room for further enhancement. With continued guidance and motivation, these activities have the potential to instill long-term habits that contribute to environmental sustainability.

The outcomes of this Community Service Program (PkM) demonstrate the effectiveness of the service learning-based counseling and evaluation method in enhancing students' environmental awareness. This approach aligns with the theory proposed by Sandoval & Cantero (2021), highlighting how service learning integrates academic learning with real-world community action, resulting in deeper and more relevant understanding. Interactive strategies used in this program, such as prize-based quizzes and the distribution of plant saplings, successfully increased students' understanding by 22.7% and motivated them to take concrete actions in environmental conservation. These findings support the research by Nelles & Ressler (2023), which concluded that experiential learning approaches effectively boost environmental awareness and pro-environmental actions among youth.

Additionally, the role of teachers and schools is critical in ensuring the sustainability of the program's impact. As facilitators, teachers must continuously motivate students to practice sustainable habits, such as planting trees or disposing of waste responsibly. In the context of SMAN Kerjo's vision and mission, the outcomes of this program are highly relevant. The school aspires to become an institution that excels in character-building and environmental awareness, making this program a concrete step toward achieving an eco-school framework. Research by Pujilestari et al. (2024) corroborates that school-based environmental education has the potential to instill proactive behaviors among students to address environmental challenges sustainably.

The results, such as the improvement in students' understanding of the importance of environmental conservation from 18.2% to 40.9%, reflect a shift in their perspectives and behaviors. It indicates that students are not only aware of the importance of protecting the environment but are also beginning to take small but impactful actions, such as planting and caring for trees or ensuring proper waste disposal. It aligns with the findings of Gule et al. (2023), which emphasized that contextual environmental education at Rivers School Surabaya successfully built ecological awareness and enhanced students' problem-solving skills for

environmental issues. Through this program, the impacts extend beyond individual students to the entire school community. The environmental education initiative serves as a practical solution for increasing environmental awareness at SMAN Kerjo, situated in a rural area with preserved natural resources. It indirectly addresses the school's challenge of shaping students as change agents dedicated to environmental sustainability.

For long-term sustainability, the school must devise strategies that actively involve teachers in mentoring and motivating students. Establishing sustainability programs that engage students in managing school or community environments—such as forming teams to maintain green spaces or manage waste—can provide students with continuous involvement and opportunities to witness the tangible outcomes of their actions. Such efforts are expected to deepen students' understanding of environmental conservation and foster intrinsic motivation to participate in sustainable change.

Conclusion

Using the environmental education counseling method, the community service program at SMAN Kerjo, Karanganyar, has successfully enhanced students' understanding of the importance of environmental conservation. Additionally, it has positively impacted their character development and motivated them to take tangible actions. While there was a significant improvement in students' understanding of environmental issues, the evaluation results revealed that their motivation to become environmental advocates or work in the environmental sector needs further encouragement. To sustain students' motivation for environmental stewardship, the school should design long-term strategies that involve active teacher participation in mentoring and inspiring students. Implementing sustainability programs, such as forming teams to manage school green spaces or waste management systems, can provide students with continuous engagement and opportunities to observe the direct impact of their actions. These efforts aim not only to deepen their understanding of environmental conservation but also to foster intrinsic motivation for active participation in sustainable changes.

The outcomes of this program suggest that similar approaches could be applied in other schools with aligned visions and missions, especially those in rural areas with significant natural resources. Adopting a service learning-based approach and environmental education programs in other schools can strengthen student character and build a sustainable culture of environmental awareness. This program highlights the effectiveness of service-learning strategies that directly involve students in practical activities, such as incentivized pre-tests, post-tests, and interactive questionnaires, to deepen their engagement. These methods not only make learning more interactive but also encourage students to participate and actively reflect on their actions toward environmental conservation. By fostering both understanding and motivation, this approach can nurture a generation knowledgeable about and committed to protecting the environment. Such initiatives are critical for creating a sustainable future and can serve as models for other educational institutions.

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