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Empowering Communities through Ecobrick-Based Environmental Literacy for Sustainable Plastic Waste Management

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Abstract:
This community service program aimed to empower communities through ecobrick-based environmental literacy as an innovative approach to plastic waste management. The program was implemented using a participatory approach, with several stages: observation, problem identification, socialization, training, and continuous mentoring to encourage active community participation. The activities focused on increasing public awareness of environmental issues and on promoting practical solutions to reduce plastic waste through ecobrick production. The results showed that community members, especially women's groups and youth organizations, were able to transform plastic waste into ecobricks that were further utilized as functional products, such as plant pots and simple waste bins. In addition, the program successfully improved community understanding of environmental cleanliness, waste reduction, and the importance of sustainable environmental practices. The implications of this program suggest that ecobrick-based environmental literacy can be an effective strategy for strengthening community participation, encouraging environmentally responsible behavior, and supporting sustainable plastic waste management at the local level. Furthermore, the program fostered long-term environmental awareness and collective responsibility within the community.

INTRODUCTION

Plastic waste has become one of the most urgent environmental challenges in contemporary society, particularly in developing countries experiencing rapid population growth and changing consumption patterns (Azam et al., 2025; Bentley et al., 2025). The increasing use of single-use plastics in daily activities has significantly contributed to the accumulation of non-biodegradable waste, threatening environmental sustainability. Indonesia is among the countries with high levels of plastic waste, producing approximately 7.8 million tons annually, much of which remains inadequately managed and can pollute terrestrial and marine ecosystems (Bank, 2021). Furthermore, the Ministry of Environment and Forestry reported that more than 500 thousand tons of plastic waste polluted Indonesian seas in 2020, with most of the waste originating from land-based activities (KLHK, 2021). These conditions indicate that plastic waste

management is not merely a technical issue but also a social and educational concern requiring collective awareness and participation. Therefore, innovative, community-based approaches are urgently needed to reduce plastic waste generation and strengthen sustainable environmental practices across society.

The growing accumulation of plastic waste reflects the limited effectiveness of existing waste management systems and the low level of public participation in environmental conservation efforts (Altaf & Shabir, 2024). Although government policies regarding waste reduction and recycling have been implemented, many communities still rely on conventional disposal methods such as open dumping and burning, which can cause environmental degradation and health problems. Plastic waste contributes approximately 16–17% of the national waste composition, while the recycling rate remains relatively low (KLHK, 2022). This situation demonstrates that the problem is not only about waste volume but also about communities' limited capacity to manage and reuse waste productively. In many rural areas, inadequate waste infrastructure and limited environmental education further worsen the problem. As a result, communities often lack awareness of the environmental impacts of plastic waste and of sustainable alternatives to waste management. Consequently, there is a strong need for participatory educational programs that increase environmental awareness while simultaneously encouraging practical community involvement in reducing plastic waste through sustainable, locally applicable approaches.

The phenomenon of ineffective plastic waste management can also be observed at the local level, particularly in rural communities where waste disposal systems are still underdeveloped. In many villages, plastic waste is commonly burned, dumped into rivers, or disposed of in unmanaged open spaces due to the absence of proper waste-processing facilities and limited public understanding of environmental sustainability. Such practices contribute to soil, air, and water pollution while simultaneously increasing environmental risks for surrounding communities. These conditions reveal that environmental problems are closely related to behavioral patterns and limited ecological awareness among community members (Barron, 2006; Munawaroh & Syaikhon, 2024). In addition, the lack of community-based environmental initiatives often leads to low participation in waste-reduction activities. The situation illustrates that technical solutions alone are insufficient to address plastic waste issues effectively. Instead, environmental education and participatory empowerment are required to foster behavioral change and collective responsibility for environmental preservation. Therefore, strengthening environmental literacy through practical, community-oriented activities is an important strategy for fostering sustainable waste management practices in rural areas.

Environmental literacy, often referred to as ecoliteracy, has emerged as an important concept in developing environmentally responsible behavior and promoting sustainable lifestyles within communities. Ecoliteracy is understood as an individual's intelligence and awareness regarding environmental conditions and sustainability issues (Amalia, 2024; Hasibuan et al., 2025; Kazazoglu, 2025). According to Capra (2007), ecoliteracy does not merely involve knowledge about environmental systems but also emphasizes the ability to make responsible decisions and take actions that support ecological sustainability. Previous studies have shown that environmental education programs can significantly improve public awareness and participation in waste management activities, including plastic waste reduction and recycling (Czerwińska-Lubszczyk et al., 2022). In the context of plastic waste management, ecoliteracy

encourages communities to shift from merely disposing of waste to actively managing and reusing it productively. Several researchers have highlighted the importance of experiential learning approaches in environmental education because they enable communities to internalize ecological values more effectively. However, many existing studies still focus primarily on theoretical awareness without integrating practical community-based applications capable of producing direct environmental and social impacts. Therefore, integrating ecoliteracy with practical waste management initiatives remains an important area for further development.

One practical implementation of ecoliteracy in waste management is the use of ecobrick technology, which involves compacting non-organic plastic waste into plastic bottles to create reusable construction materials (Antico et al., 2017b). Previous studies have demonstrated that ecobrick activities can reduce plastic waste while also serving as educational tools to promote environmental awareness and social responsibility. In addition, participatory learning models involving training, mentoring, and collaborative activities have been shown to increase community engagement in environmental programs (Ardoin et al., 2020). Community empowerment approaches also play an important role in strengthening local capacity to identify and solve environmental problems independently (Sukoco et al., 2024; Masjhoer, 2024). Nevertheless, previous studies generally discuss ecoliteracy, ecobrick implementation, and community empowerment separately, resulting in limited integration between environmental education and practical waste management activities. Moreover, many studies emphasize urban contexts, while community-based environmental empowerment in rural areas remains underexplored (Dushkova & Ivlieva, 2024). This research gap underscores the need to develop integrated approaches that combine environmental literacy, ecobrick practices, and participatory empowerment within village communities.

The novelty of this study lies in integrating ecoliteracy, ecobrick practices, and participatory community empowerment as a comprehensive strategy for sustainable plastic waste management in rural communities. Unlike previous studies that mainly focus on waste reduction or environmental education separately, this study combines educational, practical, and social empowerment dimensions simultaneously. The program emphasizes direct community participation through observation, socialization, training, and continuous mentoring, encouraging behavioral transformation and collective environmental responsibility. In addition, ecobrick activities are not only positioned as waste management techniques but also as contextual learning media that can strengthen the cognitive, affective, and psychomotor aspects of environmental education. This integrated approach is important because sustainable waste management requires not only technical interventions but also long-term changes in community awareness and behavior. Furthermore, the study contributes to the development of community-based environmental management models that are adaptable to rural contexts with limited infrastructure and resources. Therefore, the research offers a relevant and innovative framework for promoting sustainable environmental practices at the local level.

Based on these conditions, this study examines how ecobrick-based environmental literacy can empower communities and improve sustainable plastic waste management practices in rural areas. The study argues that integrating ecoliteracy with participatory ecobrick activities can enhance community awareness, strengthen environmental responsibility, and encourage active participation in waste management

initiatives. Through educational and practical engagement, communities are expected to develop the capacity to transform plastic waste into functional and valuable products while simultaneously reducing environmental pollution. This study contributes to the theoretical discourse by expanding on the integration of environmental literacy and community empowerment in sustainable waste management. Practically, the study provides a community-based model that can be implemented in other rural areas facing similar plastic waste challenges. Therefore, the research not only offers short-term solutions for reducing plastic waste accumulation but also supports the development of long-term environmental awareness and sustainable community participation in environmental conservation efforts.

RESEARCH METHODS

This study employed a descriptive qualitative approach using a participatory research design that emphasized active community involvement throughout all stages of the program. The participatory approach was selected because it has been shown to effectively encourage behavioral change and improve community capacity through direct engagement in identifying problems and implementing solutions (Cornish et al., 2022). Community participation at each stage of the program fostered a sense of ownership and strengthened the sustainability of the activities. This approach was considered highly relevant to community empowerment because it positioned community members not merely as research subjects but as active partners in environmental problem-solving. The study also adopted experiential learning principles, which emphasize direct involvement in practical activities as an effective way to enhance understanding and encourage long-term behavioral transformation (Seaman et al., 2021).

The research was conducted in Lerepkebumen Village, Poncowarno District, Kebumen Regency, an area that still faces serious challenges in plastic waste management, such as open burning and unmanaged waste disposal practices. The location was selected because these environmental conditions reflected the urgent need for educational and participatory interventions related to sustainable waste management and provided a realistic context for implementing ecobrick-based environmental literacy programs. The primary participants involved in this study were women's community groups (PKK), youth organizations, and village officials, who were chosen due to their strategic roles in community social dynamics and their potential to serve as agents of change in environmental management practices (Ardoin et al., 2020). Their involvement was expected to accelerate the dissemination of environmental knowledge and encourage broader community participation in sustainable waste management initiatives. The implementation stages included observation and problem identification, socialization about the importance of plastic waste management and ecobrick concepts, hands-on ecobrick training, and continuous mentoring to ensure program sustainability and strengthen community independence in managing plastic waste.

Data collection techniques consisted of observation, interviews, and documentation. Observation was conducted to identify community behavior related to waste management practices and to understand the actual environmental conditions within the research setting, thereby providing a contextual basis for designing relevant intervention activities (Flick, 2020). Interviews were conducted to explore participants' understanding, experiences, and responses to the environmental literacy and ecobrick activities implemented during the program, enabling researchers to capture in-depth

qualitative insights. Documentation techniques were used to collect supporting evidence in the form of photographs, field notes, and records of community activities, thereby enriching and substantiating the findings. In addition, ecobrick training activities involved participants directly in collecting, sorting, and compacting plastic waste into used plastic bottles in accordance with ecobrick standards. The ecobricks produced during the activities were later used as simple construction materials, such as waste bins and plant pots, thereby providing practical, visible benefits to the local community and reinforcing the program's educational messages.

The collected data were analyzed using thematic qualitative analysis involving systematic processes of coding, categorization, interpretation, and conclusion drawing (Braun & Clarke, 2021). The analysis focused on identifying patterns related to environmental awareness, community participation, behavioral changes, and the implementation of ecobrick practices in daily community activities. To ensure the validity and trustworthiness of the data, the study used triangulation by comparing findings from observations, interviews, and documentation. Member checking was also conducted by reconfirming several findings with participants to ensure the accuracy of interpretations and conclusions. Continuous engagement and mentoring activities further strengthened the credibility of the research findings by enabling researchers to gain a deeper understanding of community dynamics and behavioral changes throughout the program implementation. Through these procedures, the study ensured that the findings accurately represented community experiences and provided reliable insights regarding the effectiveness of participatory ecobrick-based environmental literacy programs in supporting sustainable plastic waste management and community empowerment.

RESULTS AND DISCUSSION

Results

The implementation of community empowerment activities through ecobrick-based environmental literacy increased public awareness and participation in plastic waste management. The program was carried out in several stages: observation, socialization, practical training, and continuous mentoring activities involving women's groups, youth organizations, and village representatives. The results of the activities demonstrated that participatory environmental education can encourage behavioral change and strengthen community responsibility toward environmental sustainability. Based on the pretest conducted before the activities, most participants still had limited understanding regarding the environmental impacts of plastic waste and the concept of ecobricks as an alternative waste management solution. Many residents were still accustomed to disposing of waste carelessly or burning plastic waste without considering its environmental consequences. However, posttest results conducted after the program's implementation indicated significant improvements in participants' environmental knowledge, practical waste-management skills, and awareness of the importance of reducing plastic pollution.

In the initial stage, the community service team conducted direct observations to identify environmental conditions and community behavior related to waste management practices. The observations revealed that plastic waste remained scattered across residential areas and public spaces due to the absence of effective waste management systems and limited environmental awareness among residents. These

findings confirmed the urgency of implementing educational and participatory interventions to improve sustainable waste management practices within the community. The results of the preliminary observation became the basis for designing socialization and practical training activities tailored to local community needs and environmental conditions.

Figure 1. Scattered Waste without Proper Management

Figure 1 illustrates the environmental conditions identified during the observation stage. The image shows plastic waste scattered across the village environment, with no proper management or disposal facilities. This condition reflects the low level of environmental awareness and the limited implementation of sustainable waste management practices within the community. Improper waste disposal methods, such as open dumping and burning, were also commonly practiced by residents, potentially contributing to environmental pollution and health risks. Therefore, this condition highlighted the importance of environmental literacy education to encourage behavioral change and strengthen community participation in environmental conservation activities.

After identifying the existing environmental problems, the next stage focused on conducting socialization and educational activities regarding the dangers of plastic waste and the importance of environmentally friendly waste management practices. The socialization sessions were designed to be interactive to encourage participant engagement and improve understanding of ecobrick concepts. Educational materials emphasized the negative impacts of unmanaged plastic waste on ecosystems, public health, and environmental sustainability. Participants were also introduced to practical alternatives for reducing plastic waste accumulation through ecobrick production activities. The socialization process created active discussions among participants and increased community enthusiasm toward participating in the environmental program.

Figure 2. Ecobrick Socialization Activity

Figure 2 presents the socialization activities conducted by the community service team involving residents, especially women's groups and youth organizations. During this activity, participants received explanations regarding the environmental impacts of plastic waste and the procedures for making ecobricks as alternative waste management solutions. Interactive presentation methods and direct discussions were used to facilitate participant understanding and encourage active participation throughout the session. Based on the posttest results, participants showed improved understanding regarding sustainable waste management, environmental conservation, and the practical benefits of ecobrick implementation in everyday life.

Following the socialization stage, participants engaged in hands-on training activities to practice ecobrick production. The training activities aimed to improve participants' skills in sorting, collecting, and compacting plastic waste into used plastic bottles in accordance with ecobrick standards. This experiential learning process enabled participants to understand the practical aspects of plastic waste recycling while simultaneously strengthening their environmental awareness. The training also encouraged participants to collaborate and take collective responsibility for managing environmental problems within their community.

Figure 3. Inserting Plastic Waste into Used Plastic Bottles

Figure 3 shows participants practicing the process of making ecobricks by inserting plastic waste into used plastic bottles until the bottles become solid and compact. Participants were guided regarding proper techniques for selecting and compressing plastic waste to ensure the quality of the ecobricks produced. This practical activity enabled participants to apply the knowledge gained during the socialization stage immediately and increased their confidence in independently implementing ecobrick production. The comparison between pretest and posttest findings showed that participants experienced significant improvement in practical waste management skills following the training activities.

To ensure the program's sustainability, continuous mentoring was provided after the training sessions. Mentoring activities aimed to assist participants in applying ecobrick practices independently and consistently within their daily lives. Through direct assistance and regular discussions, participants were able to overcome challenges encountered during ecobrick production and develop stronger motivation to continue environmentally friendly waste management activities. Continuous mentoring also strengthened communication and collaboration between the community service team and residents, thereby supporting long-term environmental awareness and participation.

Figure 4. Continuous Mentoring Activities

Figure 4 illustrates the mentoring process carried out after the training activities. The mentoring sessions focused on strengthening participants' understanding and ensuring the sustainability of ecobrick practices within the community. Participants received additional guidance on waste-sorting techniques, ecobrick production standards, and the use of ecobricks as useful products. The mentoring process contributed significantly to maintaining participant motivation and strengthening collective responsibility toward environmental preservation.

The ecobricks produced during the program were subsequently used to create simple, functional products that provided practical value to the community. Participants transformed ecobricks into plant pots and simple waste bins for use in residential areas. These products demonstrated that plastic waste could be converted into useful items with environmental and social value rather than becoming pollutants. The use of ecobricks also increased participants' creativity and strengthened community understanding of sustainable waste recycling practices.

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Figure 5. Ecobrick Plant Pots

Figure 5 presents plant pots created from ecobricks produced during the training activities. These products demonstrate the practical application of ecobrick technology as an environmentally friendly means of reusing plastic waste. The production of ecobrick plant pots also encouraged participants to become more creative in transforming waste into functional products with aesthetic and practical value. Participants responded positively to the activity because the products could be used directly in their homes and surrounding environments.

In addition to improving environmental awareness and practical waste management skills, the implementation of this program also strengthened social collaboration among community members. The active involvement of women's groups, youth organizations, and village representatives created a collective learning environment in which participants could exchange experiences, ideas, and responsibilities related to environmental conservation. This collaborative process strengthened community solidarity and increased collective responsibility for maintaining environmental cleanliness. The program also demonstrated that community-based environmental literacy activities can serve as an effective means of integrating educational values, social participation, and practical environmental actions.

Furthermore, the sustainability of the ecobrick activities indicates that participatory empowerment approaches have the potential to create long-term environmental impacts within rural communities. The continued production and use of ecobricks after the program's completion reflect the emergence of independent environmental initiatives among community members. Participants no longer viewed plastic waste merely as useless material but as a resource that could be transformed into functional and economically valuable products. This shift in perspective is important because sustainable environmental management requires not only technical solutions but also changes in community mindset and daily behavior.

The results of this study also imply that ecobrick-based environmental literacy programs can serve as alternative models for community empowerment in addressing plastic waste problems in other rural areas with similar environmental conditions. The integration of socialization, practical training, and continuous mentoring proved effective in strengthening community participation and encouraging sustainable behavioral changes. Therefore, the program not only contributed to reducing plastic waste accumulation at the local level but also supported the development of environmentally responsible communities capable of independently managing environmental challenges sustainably.

Discussion

The findings of this study demonstrate that the participatory approach used in the ecobrick-based environmental literacy program successfully encouraged active community involvement in plastic waste management. Community participation became a crucial factor in the program's success because direct involvement enabled participants to develop environmental responsibility and collective awareness of sustainable waste management practices. These results are consistent with the view that meaningful participation strengthens both implementation quality and long-term program continuity by building a sense of ownership among stakeholders (Reed, 2018). At the same time, this study adds nuance by showing how participation operates not only in planning and decision-making but also in hands-on technical activities such as ecobrick production within a rural community context. The active participation of women's groups, youth organizations, and village representatives during the socialization, training, and mentoring stages reflected the emergence of a stronger sense of ownership toward the environmental program. This condition was evident from the enthusiasm shown by participants during the training and from the continuation of ecobrick production activities after the program's completion, indicating that participatory environmental programs can effectively strengthen social engagement while simultaneously fostering sustainable environmental behavior within local communities (Reed, 2018).

Furthermore, the increase in community understanding and awareness of plastic waste management demonstrates that practice-based environmental education has a significant impact on behavioral transformation. The combination of socialization activities and practical experiences enabled participants to understand environmental issues more comprehensively and apply their knowledge in their daily lives. This finding aligns with previous studies, which state that participatory and contextual environmental education can encourage communities to move beyond conceptual understanding toward concrete environmental action (Ardoin et al., 2019). However, the present study extends this literature by demonstrating how ecobricks function as a concrete, tangible medium that links abstract environmental concepts with visible behavioral changes in a village setting. The experiential learning process implemented through ecobrick training activities proved effective in developing sustainable, pro-environmental behavior, as participants were directly involved in solving environmental problems in their own surroundings. In this context, ecobrick activities served not only as technical solutions to reduce plastic waste but also as educational media that instilled environmental values, responsibility, and environmentally friendly habits within the community.

From the perspective of community empowerment, the program demonstrated a positive contribution to improving community capacity in independently managing plastic waste. Participants not only gained theoretical understanding of waste

management concepts but also developed practical skills in transforming plastic waste into useful, functional products. The ecobrick products created during the activities, such as plant pots and simple waste bins, became tangible evidence of community creativity and innovation in utilizing local resources. These findings align with the argument that community empowerment in sustainability contexts is reflected in communities' ability to develop local innovations that respond to their environmental and social needs (Avelino & Wittmayer, 2019). At the same time, this study contributes by illustrating that empowerment can grow from relatively simple technologies when they are embedded in a participatory and educational process. The program shows that environmental empowerment initiatives should not only focus on raising awareness but also emphasize skill development, self-reliance, and the capacity to create locally appropriate solutions. As a result, the program strengthened local community resilience and encouraged sustainable environmental initiatives grounded in local participation and creativity (Avelino & Wittmayer, 2019).

In addition to increasing environmental awareness and community capacity, implementing ecobrick practices also helped reduce the volume of plastic waste in the village environment. Although the program's quantitative scale of waste reduction remained relatively limited, the activities demonstrated strong potential for replication and wider implementation in other communities facing similar environmental problems. This finding is consistent with the literature that emphasizes the effectiveness of community-based approaches because the solutions developed are contextual and adapted to local social and environmental conditions (Ostrom, 2015). However, the present study adds empirical evidence from a rural Indonesian context, which remains relatively underrepresented in research dominated by urban case studies. The involvement of residents in identifying problems and implementing solutions led to stronger commitment and sustainability than top-down environmental interventions. Moreover, the use of ecobricks as functional products increased public appreciation for waste recycling and encouraged communities to view plastic waste as a resource rather than merely environmental pollution. Therefore, the program's success should be measured not only by the physical products produced but also by the transformation of community mindsets and behavioral patterns regarding sustainable waste management practices (Ostrom, 2015).

Theoretically, this study contributes by reinforcing and extending the discourse on integrating environmental literacy, participatory engagement, and experiential learning in community-based environmental management. The results support the idea that environmental education is most effective when it connects knowledge, attitudes, and practical skills within a real-life context (Ardoin et al., 2019). By integrating ecobrick activities into an environmental literacy program, this study shows how educational interventions can shift from information delivery toward transformative learning that changes behavior and social norms. The findings also highlight that participatory structures are not merely procedural elements but play a substantive role in shaping learning processes, empowerment, and the durability of environmental initiatives (Reed, 2018; Avelino & Wittmayer, 2019). Thus, this research offers a conceptual contribution in the form of an integrated framework that connects participatory methods, ecobrick-based experiential learning, and community empowerment as mutually reinforcing components in sustainable plastic waste management.

Practically, the study offers a community-based empowerment model that can be adapted and implemented in other rural communities facing similar waste management challenges. The stepwise process, starting with observation and problem identification, followed by socialization, hands-on ecobrick training, and continuous mentoring, provides a clear blueprint for practitioners and local governments who wish to replicate the program in different settings. The findings underscore the importance of ongoing support from local stakeholders, including village governments and community organizations, to sustain the program and ensure that ecobrick practices become part of community routines rather than one-time activities (Ardoin, Nicole M.; Bowers, Alison W.; Gaillard, 2020). The study also suggests that future programs should systematically monitor the volume of plastic waste processed and the long-term sustainability of ecobrick activities to understand their cumulative environmental impacts better. Consequently, the ecobrick-based environmental literacy program should be viewed as part of a broader strategy to build environmentally responsible communities capable of independently addressing local environmental challenges, rather than as a stand-alone short-term intervention.

CONCLUSION

The implementation of ecobrick-based environmental literacy activities in this study showed that participatory approaches are effective in increasing community awareness, environmental responsibility, and practical capacity in managing plastic waste, as reflected in changes from burning and indiscriminate disposal toward more sustainable practices and in the ability to convert plastic waste into functional products such as plant pots and simple waste bins. These findings suggest that similar programs can be applied more widely in other rural communities to promote a culture of viewing plastic waste as a resource and to strengthen local independence in environmental management. It is recommended that village governments, community organizations, and schools collaborate to institutionalize ecobrick-based environmental literacy through routine training, mentoring, and integration into village programs or local regulations so that the initiatives become continuous rather than one-off. Future research and community service are advised to involve broader community groups, use longer-term designs to observe behavioral and environmental impacts more comprehensively, and explore integrating this model into formal education curricula and regional environmental policies.

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REFERENCES

Altaf, H., & Shabir, Q. A. A. (2024). Systematic Evaluation of Existing Policies and Practices in Technical and Vocational Education and Training (TVET) and Their Implications for Employment and Industrial Growth in Pakistan. *International Research Journal of Management and Social Sciences, 5*(2), 140–165.

Amalia, D. (2024). The Integration of Eco-Literacy in Teaching-Learning Activities as an Effort to Reduce Environmental Crisis. *Madinah: Jurnal Studi Islam, 11*(2), 257–274. https://doi.org/10.58518/madinah.v11i2.2962

Antico, F. C., Wiener, M. J., Araya-Letelier, G., & González, G. (2017). Ecobricks: A Sustainable Substitute for Construction Materials. *IOP Conference Series: Materials Science and Engineering, 245*(3). https://doi.org/10.1088/1757-899X/245/3/032001

Ardoin, N. M., Bowers, A. W., & Gaillard, E. (2020). Environmental Education and K–12 Student Outcomes: A Review and Analysis of Research. *The Journal of Environmental Education*.

Avelino, F., Wittmayer, J. M., et al. (2019). Transformative Social Innovation and (Dis)Empowerment. *Technological Forecasting and Social Change, 145*, 195–206. https://doi.org/10.1016/j.techfore.2017.05.002

Azam, M., Mashdurohatun, A., Firmansyah, A. N., Saktiawan, M. D., & Jaya, K. O. P. (2025). Harmonizing Contemporary International Commercial Law with Sharia-Based National Legal Systems: A Comparative Study of Pakistan, Turkey, Indonesia, Malaysia, and Saudi Arabia. *MILRev: Metro Islamic Law Review, 4*(2), 1074–1096. https://doi.org/10.32332/milrev.v4i2.11334

Bank, W. (2021). *Plastic Waste Discharges From Rivers and Coastlines in Indonesia*. http://hdl.handle.net/10986/35607

Barron, B. (2006). Interest and Self-Sustained Learning as Catalysts of Development: A Learning Ecology Perspective. *Human Development, 49*(4), 193–224. https://doi.org/10.1159/000094368

Bentley, R., Mason, K., Jacobs, D., Blakely, T., Howden-Chapman, P., Li, A., Adamkiewicz, G., & Reeves, A. (2025). Housing as a Social Determinant of Health: A Contemporary Framework. *The Lancet Public Health, 10*(10), e855–e864. https://doi.org/10.1016/S2468-2667(25)00142-2

Braun, V., & Clarke, V. (2021). *Thematic Analysis: A Practical Guide*. SAGE Publications.

Cantor, J. A., et al. (2021). *Experiential Learning in Higher Education: A Guide for Educators and Institutions*.

Capra, F. (2007). *The Hidden Connections: A Science for Sustainable Living*. Anchor Books.

Cornish, F., Priego-Hernández, J., Campbell, C., Mburu, G., & McLean, C. (2021). Participatory Approaches to Research and Practice in Global Health: Theoretical Foundations and Practical Implications. *BMJ Global Health, 6*(1). https://doi.org/10.1136/bmjgh-2020-005500

Czerwińska-Lubszczyk, A., Grebski, M., & Jagoda-Sobalak, D. (2022). Competencies of Graduates – An Industry Expectation. *Management Systems in Production Engineering, 30*(2), 172–178. https://doi.org/10.2478/mspe-2022-0021

Dushkova, D., & Ivlieva, O. (2024). Empowering Communities to Act for a Change: A Review of the Community Empowerment Programs Towards Sustainability and Resilience. *Sustainability, 16*(19), 8700. https://doi.org/10.3390/su16198700

Flick, U. (2020). Qualitative Research Methods in an Age of Digitalization and Globalization. *Forum: Qualitative Social Research, 21*(1). https://doi.org/10.17169/fqs-21.1.3450

Hasibuan, S., Yustina, Y., & Wahyuni, R. (2025). Bridging Cognitive Skills and Environmental Awareness: Critical and Creative Thinking as Predictors of Digital Ecoliteracy. *Frontiers in Education, 10*, 1705676. https://doi.org/10.3389/feduc.2025.1705676

Kazazoglu, S. (2025). Environmental Education Through Eco-Literacy: Integrating Sustainability Into English Language Teaching. *Sustainability, 17*(5), 2156. https://doi.org/10.3390/su17052156

KLHK. (2021). KLHK Catat Setengah Juta Ton Sampah Plastik di Lautan Indonesia. *Tirto.id*.

KLHK. (2022). *Indeks Literasi Lingkungan Hidup Masyarakat Indonesia*. Kementerian Lingkungan Hidup dan Kehutanan.

Leal Filho, W., et al. (2022). The Role of Education for Sustainable Development in Community Empowerment: A Systematic Review. *Sustainability, 14*(9). https://doi.org/10.3390/su14095321

Masjhoer, J. M., et al. (2024). Community Engagement in Waste Reduction: A Critical Component for Sustainable Waste Management. *Environmental & Socio-Economic Studies, 12*(2), 1–12. https://doi.org/10.2478/environ-2024-0008

Monroe, M. C., Plate, R. R., Oxarart, A., Bowers, A., & Chaves, W. A. (2019). Engaging Youth in Environmental Learning: The Role of Experiential Education. *Applied Environmental Education & Communication, 18*(1), 1–12. https://doi.org/10.1080/1533015X.2018.1431187

Munawaroh, M., & Syaikhon, A. (2024). Bridging Ethics and Ecology: Fiqh as a Framework for Sustainable Environmental Management. *Al-Afkar: Journal for Islamic Studies, 7*(4), 603–611.

Ostrom, E. (2015). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press. https://doi.org/10.1017/CBO9781316423936

Reed, M. S., et al. (2018). A Theory of Participation: What Makes Stakeholder and Public Engagement Work? *Environmental Science & Policy, 90*, 1–8. https://doi.org/10.1016/j.envsci.2018.09.002

Seaman, J., Brown, M., & Quay, J. (2020). A Systematic Review of the Effects of Experiential Learning on Student Outcomes. *Journal Article, 43*(1), 3–20. https://doi.org/10.1177/1053825918824171

Sukoco, J. B., Wijaya, A. F., Mindarti, L. I., & Nuh, M. (2024). Community Empowerment, Waste, and Their Challenge (A Study on Empowerment, Participation, and Economic Value of Waste Management in Manunggal Karso Waste Bank). *International Journal of Science and Research Archive, 12*(2), 206–212. https://doi.org/10.30574/ijsra.2024.12.2.1218