



Evaluation of the “Green Tent” School Program in Strengthening Students’ Environmental Literacy and Behavior

Muhammad Hidayatullah^{1*}, Nico Ferianzo², Moh. Imron Rosidi³, Abd Halid Lemba⁴

¹⁻² PT Pertamina Patra Niaga Integrated Terminal Gorontalo, Indonesia

³⁻⁴ Universitas Negeri Gorontalo, Indonesia

email: dayat@gmail.com¹

Article Info :

Received:

28-06-2026

Revised:

20-078-2026

Accepted:

02-09-2026

Abstract

The SEHAT Program (Sekolah Hijau Tenda/Green Tent School) is an environmental education initiative designed to strengthen students’ environmental literacy and pro-environmental practices through integrated school-based activities. This study evaluated the 2024 SEHAT Program by examining its implementation structure, learning contributions, alignment with green school principles, evidence strength, and potential for generating sustainable outcomes. A descriptive evaluative approach using a document-based single-case design was employed, with the 2024 SEHAT Program Report serving as the primary data source. The analysis reconstructed the program through an input-process-output-initial outcome framework, mapped activities across cognitive, affective, psychomotor, and creative learning domains, and examined their alignment with the four Green School Quality domains. The findings indicate that environmental orientation, waste literacy and reuse workshops, recycled-art competition, environmental study tours, school gardening, climate-change education, and three-color waste bins were implemented as complementary learning components. The program demonstrated strong implementation evidence and diverse learning opportunities, particularly in teaching and learning. However, baseline and post-test assessments, repeated behavioral observations, waste audits, garden sustainability records, and institutional indicators were unavailable, preventing causal verification of changes in environmental literacy or behavior. Future development should strengthen curriculum integration, environmental governance, behavioral monitoring, operational management, and sustained community engagement.

Keywords: Climate-Change Education, Environmental Education, Experiential Learning, Green School, Waste Literacy.



©2026 Authors.. This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.
(<https://creativecommons.org/licenses/by-nc/4.0/>)

INTRODUCTION

Environmental education has acquired increasing strategic importance within contemporary sustainability agendas because schools are expected not only to provide knowledge about ecological degradation but also to develop students’ capacity to translate environmental understanding into responsible everyday action. The field has progressively moved beyond information-oriented instruction toward approaches that connect knowledge, experience, participation, and behavioral practice within the learning environment. This development is reflected in the recent green school framework, which conceptualizes a sustainable school through an integrated approach encompassing governance, facilities and operations, teaching and learning, and community engagement (UNESCO, 2024a). Such an approach positions the school itself as an important environmental learning context because students continuously encounter sustainability values through classroom instruction, institutional routines, physical facilities, and social interactions. Climate and sustainability education likewise increasingly emphasizes scientifically grounded, age-appropriate, contextual, and action-oriented learning that enables students to connect environmental problems with individual choices and collective responses (UNESCO, 2024b). The importance of this shift is reinforced by global evidence showing that environmental education can improve students’ environmental knowledge, attitudes, intentions, and behavior, although the magnitude of these effects varies considerably across interventions and outcomes (van de Wetering et al., 2022). The central issue for applied research is therefore no longer whether schools have a role in environmental education, but how particular program

designs can transform environmental learning into sustained opportunities for pro-environmental behavior.

Previous studies indicate that environmental education can generate meaningful outcomes, but they also reveal that knowledge acquisition alone provides an insufficient explanation for behavioral change. The global meta-analysis by van de Wetering et al. (2022) demonstrates positive effects across knowledge, attitudes, intentions, and behavior while identifying substantial heterogeneity that could not be adequately explained by participant age, educational approach, or study design. This finding suggests that the effectiveness of environmental programs cannot be reduced to the presence of environmental content because the mechanisms connecting learning to action remain insufficiently specified. Research on Education for Sustainable Development similarly indicates that integrating sustainability into curricula can strengthen students' understanding when environmental concepts are embedded within meaningful learning processes rather than treated as isolated instructional content (Ferguson et al., 2022). Project-based and action-oriented learning has consequently received attention because students require opportunities to investigate environmental problems, make decisions, collaborate, and experience the consequences of their actions rather than merely reproduce environmental information (Kalla et al., 2022). Evidence from environmental education interventions also suggests that behavioral strategies such as nudges can complement conventional instruction when students face relatively low barriers to environmentally responsible action (Kurokawa et al., 2023). These findings collectively indicate that effective environmental literacy programs should integrate cognitive, affective, experiential, and behavioral dimensions rather than assume a linear progression from knowledge to action. The challenge is particularly significant for schools because students' behavior is shaped simultaneously by individual motivation, peer norms, institutional expectations, available facilities, and opportunities to practice environmentally responsible choices.

The Indonesian context makes this issue particularly relevant because environmental education has increasingly been institutionalized through school-based sustainability policies and programs. The national framework established through Regulation No. 52 of 2019 emphasizes the development of environmentally caring and cultured school communities through systematic environmental management and responsible behavior (Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia, 2019). This policy direction has subsequently been strengthened through Regulation No. 5 of 2025, which places greater emphasis on planning, implementation, monitoring, evaluation, and financing within the Adiwiyata program (Kementerian Lingkungan Hidup/Badan Pengendalian Lingkungan Hidup Republik Indonesia, 2025). Empirical evidence from Indonesian Adiwiyata schools indicates that pro-environmental behavior is more likely to develop when environmental practices involve school management, teachers, students, and the broader school community rather than being treated as individual student responsibilities (Nurwidodo et al., 2019). Research on Indonesian schools also demonstrates that environmental learning can be strengthened through activities involving physical participation, social interaction, enjoyment, and direct experience, which create more meaningful opportunities for students to engage with environmental issues (Tanu & Parker, 2018). School-based environmental literacy has consequently become relevant not only as an educational outcome but also as an indicator of whether environmental policies are being translated into students' practical understanding and behavior (Rokhmah & Fauziah, 2021). However, the expansion of institutional environmental programs does not automatically resolve the gap between policy implementation and measurable student outcomes. A critical evaluation is still required to determine whether program activities merely generate participation and awareness or actually establish learning processes and behavioral conditions capable of supporting longer-term environmental responsibility.

The gap between environmental concern and environmental behavior represents one of the most persistent conceptual and empirical problems in school-based environmental education. Adolescents may recognize environmental problems as important while remaining constrained by social norms, emotional responses, limited opportunities for action, weak institutional support, and competing influences from home and school environments (Huoponen, 2024). This means that environmental literacy should not be understood exclusively as the possession of factual knowledge, because its educational significance depends partly on whether students can interpret environmental problems and mobilize that understanding through appropriate action. Waste management provides a particularly useful context for examining this relationship because waste generation, sorting, reuse, and disposal are directly observable within students' daily school routines. Evidence shows that environmental

education and school-based waste programs can improve environmental knowledge, engagement, attitudes, and practices, although the magnitude and persistence of behavioral changes remain dependent on program and contextual conditions (Yusuf & Fajri, 2022). Evidence from a green school certification program in Chile similarly demonstrates that school environmental education can influence children's knowledge, attitudes, and practices concerning plastic waste, while also indicating that educational interventions should not assume that school-based changes automatically extend into family behavior (Salazar et al., 2024). Experiential activities such as field visits and interaction with external environmental communities can further strengthen students' engagement by exposing them to concrete sustainability practices beyond the classroom (Robina-Ramírez & Medina-Merodio, 2019). School gardens offer another experiential mechanism because they create continuing opportunities for students to observe, maintain, and interact with living systems, with previous research reporting potential improvements in environmental knowledge, attitudes, and experience as well as associations between garden-project interest and environmental motivation (Amiri et al., 2021; Christodoulou & Korfiatis, 2019).

The "Green Tent" School Program, or SEHAT, implemented in 2024 represents a relevant case for addressing these gaps because it adopts a multi-component rather than single-method approach to environmental education. According to the program report, its activities included environmental orientation, two sessions introducing waste classification and creative reuse, an inter-class recycled-art competition, two study tours, two introductions to school gardening, climate change education, and the provision of three-color waste bins (Program SEHAT, 2024). The program therefore combines cognitive learning, creative production, experiential learning, place-based exposure, school greening, and environmental facilities within a single intervention structure. School greening itself has been associated with students' appreciation of their environment and aspects of physical, cognitive, and social-emotional well-being, while students have also been reported to prefer school grounds enriched with vegetation over predominantly paved environments (van Dijk-Wesselius et al., 2018; Lindemann-Matthies & Köhler, 2019). More recent research further positions schoolyard revegetation as a mechanism that can simultaneously support environmental education and address environmental conditions such as excessive heat, illustrating the potential of physical school environments to function as active components of sustainability learning (Serrano-Jiménez et al., 2025). Yet the available SEHAT documentation primarily records activities and program implementation rather than providing empirical evidence of changes in environmental literacy or behavior. It does not establish baseline and post-program measurements, systematic observations of waste-sorting behavior, measurable changes in waste practices, sustained school-garden participation, or longer-term follow-up, leaving an important gap between documented program outputs and evidence of educational outcomes. Evaluating this program therefore requires distinguishing what was implemented from what was learned, what behavior may have changed, and what evidence remains necessary to establish sustained program effectiveness.

This study aims to evaluate the 2024 SEHAT program by reconstructing its intervention architecture, examining the extent to which its activities support students' environmental literacy and pro-environmental behavior, and assessing its alignment with the broader principles of green school education. The analysis focuses on how cognitive, creative, experiential, place-based, and practice-oriented activities are combined to create pathways from environmental understanding toward action within the school context. It also identifies the strengths and limitations of the program design by distinguishing implementation outputs from evidence of learning, behavioral outcomes, and sustainability. Theoretically, the study contributes to the environmental education literature by positioning environmental literacy development as an integrated process in which knowledge, experience, social support, physical facilities, and opportunities for action interact rather than operate as independent program components. Methodologically, the study contributes an evaluation approach that combines intervention reconstruction, pedagogical assessment, institutional alignment, and systematic identification of evidence gaps, providing a framework that can be adapted for evaluating similar multi-component school sustainability programs. The study does not treat the completion of activities as proof of causal behavioral effectiveness, but instead establishes a rigorous basis for determining the educational potential, implementation quality, and evaluative readiness of the SEHAT program. Its findings are expected to provide both scholarly and practical guidance for transforming short-term environmental activities into more coherent, measurable, and sustainable school-based environmental education systems.

RESEARCH METHODS

This study employed a descriptive evaluative approach using a single-case study design based on systematic document analysis to evaluate the 2024 SEHAT (Sekolah Hijau Tenda/Green Tent) School Program. As a non-empirical study, the methodological framework was constructed around the assumption that environmental literacy and pro-environmental behavior should be examined as outcomes of interconnected cognitive, experiential, institutional, and behavioral learning processes rather than as direct consequences of isolated environmental activities. The conceptual model therefore organized the program into an input–process–output–initial outcome chain, in which program resources and learning environments were connected to educational activities, immediate implementation outputs, and cautiously defined indications of students' environmental engagement and readiness for action. This framework was complemented by the four dimensions of the Green School Quality Standard, namely school governance, facilities and operations, teaching and learning, and community engagement, which provided the principal analytical lens for assessing the institutional completeness of the intervention (UNESCO, 2024a). The framework also recognized that environmental education does not necessarily produce behavioral change merely through knowledge acquisition, making the distinction between documented implementation and demonstrated outcomes essential to methodological rigor (van de Wetering et al., 2022). The analytical unit comprised each program component, its implementation mechanism, learning method, facilities or media, stakeholder involvement, and the type and strength of evidence available to support claims about environmental literacy and behavior.

Data were derived primarily from the 2024 SEHAT Program Report, including its activity records, descriptions, photographs, and supporting documentation, while relevant scholarly literature was used to interpret the educational significance of documented program elements rather than to substitute for unavailable empirical evidence. The analysis proceeded through four systematic stages: factual extraction, outcome-chain mapping, comparison with the green school framework, and evidence-gap analysis, with explicit separation between information directly stated in the report and interpretations generated by the researchers. Factual extraction recorded implementation frequency, environmental themes, instructional methods, study-tour locations, workshop products, school-garden activities, climate-change learning media, stakeholder involvement, and the provision of three-color waste bins, while outcome claims were not inferred when corresponding measurements were absent. The program components were then evaluated against evidence categories covering participation, environmental knowledge, attitudes, behavior, physical environmental change, and institutional sustainability, reflecting the need to distinguish awareness and engagement from actual pro-environmental practices (Huoponen, 2024). Internal validation was conducted through triangulation across activity matrices, narrative descriptions, and photographic documentation, while cross-checking the interpretation of waste-related activities against prior evidence concerning school environmental programs and students' environmental knowledge, engagement, and behavior (Yusuf & Fajri, 2022). Methodological robustness was further maintained through a conservative evidence rule under which the study reported implementation and potential educational mechanisms as documented findings, but did not claim improvement in environmental literacy, behavioral change, or causal effectiveness without baseline, post-intervention, observational, or longitudinal evidence.

RESULTS AND DISCUSSION

Intervention Architecture and Learning Sequence of the Green Tent Program

The 2024 SEHAT (Sekolah Hijau Tenda/Green Tent) Program was structured as a multi-component environmental education intervention rather than as a single awareness-raising activity. The program consisted of six substantive intervention components covering environmental orientation, waste education and reuse practices, recycled-art competition, environmental study tours, school gardening, and climate change education, supported by the provision of three-color waste bins. This configuration indicates an attempt to connect environmental knowledge with practical experiences, social participation, and physical learning environments. UNESCO (2024a) emphasizes that a green school requires environmental education to be integrated across teaching and learning, school facilities and operations, community engagement, and school governance. Within this framework, the SEHAT program can be interpreted as an educational architecture that combines classroom-oriented information

with experiential and place-based activities. However, because the available documentation does not contain baseline or post-intervention measurements, the analysis is limited to the program structure and its potential contribution to environmental literacy and behavior.

The internal structure of the program becomes clearer when each activity is examined according to its documented implementation and potential educational function. The environmental orientation provided an initial conceptual entry point, while waste classification and used-goods workshops introduced students to concrete environmental practices. The recycled-art competition extended these practices into a participatory and creative activity in which environmental messages could be expressed through student products. The environmental study tours added direct exposure to environmental facilities and green spaces, while the school garden created opportunities for interaction with living environmental elements. Climate change education broadened the thematic scope from local environmental practices toward larger environmental processes and impacts. Table 1 summarizes this reconstructed structure and distinguishes documented implementation from the learning functions analytically inferred from the program design.

Table 1. Reconstruction of the 2024 SEHAT Program Components

No.	Component	Frequency	Evidence of Implementation	Potential Learning Function
1	Orientation on the importance of the environment	1 time	Socialization; attended by the Gorontalo City Education Office	Building initial environmental awareness and problem framing
2	Introduction to waste types & used-goods workshop	2 times	Organic, inorganic, and hazardous waste; ecobrick and pencil-case practices	Connecting waste literacy with reuse skills
3	Inter-class recycled-art competition	1 time	Two categories: Grades 1–3 and Grades 4–6	Strengthening creativity, participation, and positive social norms
4	Environmental study tour	2 times	Talumelito Waste Disposal Site; Moodu Green Open Space	Place-based learning and observation of environmental processes
5	Introduction to the school garden	2 times	TOGA planting materials and practice: ginger, galangal, turmeric, and lemongrass	Developing care experiences, connection with plants, and routines
6	Introduction to climate change and its impacts	1 time	Presentations, film, and simple miniature	Building climate literacy through multimodal media
7	Supporting facilities	1 package	Three-color waste bins	Providing environmental cues and facilities for waste-sorting practice

Source: Processed from the 2024 SEHAT Program Report; learning functions represent the authors' analytical interpretation

The sequence presented in Table 1 suggests a potential progression from environmental awareness toward knowledge application and direct environmental experience. The orientation activity can function as an initial stage of problem recognition, followed by waste classification and reuse activities that translate environmental concepts into practical knowledge. The recycled-art competition introduces a social and creative dimension, allowing environmental practices to become visible within peer interactions. Study tours subsequently provide opportunities to encounter environmental conditions outside the immediate classroom, while gardening introduces repeated interaction with plants and the school environment. Climate change education then connects local environmental practices with broader environmental processes, although the documentation does not establish whether students integrated these concepts into their subsequent behavior.

This architecture is consistent with environmental education approaches that conceptualize learning as involving knowledge, attitudes, experiences, and opportunities for action rather than factual understanding alone. A meta-analysis by van de Wetering et al. (2022) indicates that environmental education can contribute to environmental outcomes among children and adolescents, although effects depend on the characteristics and implementation of educational interventions. The SEHAT program contains several elements that theoretically support such multidimensional learning, particularly practical waste activities, outdoor experiences, gardening, and multimodal climate education. These components provide different entry points for cognitive understanding, affective engagement, practical skills, and environmental experiences. The diversity of methods also reduces reliance on a single pedagogical mechanism and potentially accommodates differences in how students engage with environmental topics. Nevertheless, the reconstructed sequence should be regarded as an analytical interpretation of the documented activities rather than evidence that the program was formally designed according to this exact pedagogical progression.

One notable strength of the program architecture is the movement from abstract environmental concepts toward tangible environmental objects and situations. Waste classification becomes more concrete through ecobrick and pencil-case production, while environmental study tours expose students to actual waste-management and green-space contexts. The school garden similarly transforms environmental education into direct interaction with plants, which can strengthen students' experiential connection with nature. Amiri et al. (2021) found that school-garden activities can support students' environmental knowledge, attitudes, and experiences, providing a relevant conceptual basis for interpreting gardening as more than a decorative school activity. The SEHAT design therefore contains several mechanisms through which environmental learning could become experiential rather than exclusively informational. The limitation is that the program report does not document systematic reflection, assessment, or repeated measurement following these activities, so the educational potential cannot be equated with demonstrated learning outcomes.

Another important characteristic is the coexistence of episodic activities and facilities that could support continuous practice. Orientation sessions, competitions, study tours, and climate-change presentations are largely event-based interventions, whereas waste bins and school gardens have the potential to remain part of students' everyday school environment. Environmental cues and repeated opportunities for practice are particularly important because environmental behavior is not necessarily produced by knowledge alone. Yusuf and Fajri (2022) demonstrate the relevance of environmental learning and engagement in shaping waste-management behavior, while the SEHAT documentation provides no direct measurement of whether the installed facilities were consistently used after the activities. The facilities can therefore be interpreted as enabling conditions for behavioral practice rather than evidence of behavioral change. The program architecture would become stronger if these facilities were integrated with routine monitoring, classroom reinforcement, student responsibilities, and school-level environmental policies. Such integration would shift the program from a collection of environmental events toward a more sustained learning environment consistent with the whole-school orientation of green-school education.

Integration of Cognitive, Affective, Psychomotor, and Creative Learning

The SEHAT program integrates environmental learning through cognitive, affective, psychomotor, and creative activities rather than relying on environmental information alone. The cognitive dimension is primarily developed through the introduction of environmental importance, waste classification, and climate change and its impacts. These activities provide students with basic concepts for recognizing environmental problems and understanding their consequences. Environmental literacy, however, involves not only knowledge but also the capacity to develop appropriate attitudes and environmentally responsible practices (Rokhmah & Fauziah, 2021). The inclusion of workshops, competitions, study tours, gardening, and climate-related media indicates an effort to connect conceptual knowledge with practical and experiential learning. This structure provides a broader educational pathway through which environmental topics can potentially become meaningful in students' everyday contexts.

The waste-literacy component provides one of the clearest examples of the connection between cognitive and psychomotor learning in the program. Students were introduced to organic, inorganic, and hazardous waste before participating in activities involving the production of ecobricks and pencil

cases from used materials. The classification activity establishes conceptual understanding, while the workshop provides an opportunity to apply that understanding through direct manipulation of materials. Such action-oriented learning is relevant to the development of sustainability action competence because students are encouraged to engage with environmental issues through practical activities (Kalla et al., 2022). The recycled-art competition extends this process by adding creativity and peer interaction to waste-related learning. The combination of knowledge, practice, and creative production can make waste management more concrete than instruction based exclusively on verbal explanation. Nevertheless, the available documentation does not show whether students' knowledge of waste classification or practical competencies were assessed before and after the activities.

The affective and social dimensions become particularly visible through the recycled-art competition and environmental study tours. The competition created an opportunity for students to participate collectively and present environmental ideas through creative products. Social interaction and enjoyment can provide meaningful contexts for developing pro-environmental orientations among students, particularly when environmental practices become visible within peer relationships (Tanu & Parker, 2018). The study tours similarly moved learning beyond the classroom by exposing students to the Talumelito Waste Disposal Site and Moodu Green Open Space. These activities can increase the contextual relevance of environmental issues by allowing students to encounter environmental conditions directly rather than learning about them only through instructional materials. However, the LPJ documents participation and implementation rather than students' emotional responses, environmental attitudes, or subsequent intentions to act.

Table 2. Integration of Learning Domains Across SEHAT Activities

No.	SEHAT Activity	Dominant Learning Domain	Analytical Function
1	Orientation on the importance of the environment	Cognitive and affective	Introducing environmental concepts and developing initial awareness
2	Introduction to waste types and used-goods workshop	Cognitive and psychomotor	Developing waste knowledge and practical reuse skills
3	Inter-class recycled-art competition	Affective, social, and creative	Encouraging participation, peer interaction, and creative environmental expression
4	Environmental study tour	Cognitive and experiential	Connecting environmental concepts with direct observation of environmental settings
5	Introduction to the school garden	Affective, psychomotor, and experiential	Developing interaction with plants, care experiences, and practical environmental engagement
6	Introduction to climate change and its impacts	Cognitive and creative	Building understanding of climate issues through presentations, films, and miniature models

Source: Authors' analysis based on the 2024 SEHAT Program Report and relevant environmental education literature

The school garden represents another important mechanism for integrating affective, psychomotor, and experiential learning. Students were introduced to TOGA plants, including ginger, galangal, turmeric, and lemongrass, and participated in planting activities that required direct interaction with the school environment. School-garden activities can provide opportunities for students to develop environmental knowledge while also building experiences and attitudes through contact with living elements of nature (Amiri et al., 2021). Research also indicates that students' interest in school gardens can be associated with environmental motivation and intention to act, although such relationships cannot be assumed automatically from participation in gardening activities (Christodoulou & Korfiatis, 2019). Within the SEHAT program, gardening therefore functions as a potential bridge between

environmental understanding and affective connection with nature. However, the LPJ does not document the frequency of subsequent maintenance, student responsibilities, plant survival, or students' attitudes toward the garden after the intervention.

The climate-change component expands the learning structure from immediate environmental practices toward broader systems-level understanding. Presentations, films, and simple miniatures provide multiple representations of climate change and its impacts, allowing complex concepts to be communicated through different forms of media. Multimodal and contextually relevant approaches are important in climate-change education because students need opportunities to connect scientific information with social and behavioral dimensions of environmental problems (UNESCO, 2024b). Climate education can also involve behavioral mechanisms and social norms, meaning that understanding climate change does not necessarily translate directly into climate-related action (Galeotti et al., 2024). In SEHAT, the use of film and miniature models creates potential opportunities for cognitive and creative engagement, but there is no documented evidence of students' comprehension, concern, or behavioral responses following the activity. The educational value of the component should therefore be interpreted through its potential learning mechanism rather than as evidence of increased climate literacy.

The integration across activities can be summarized by distinguishing the dominant learning domains addressed by each intervention. As shown in Table 2, no single activity needs to represent all learning domains because the program distributes cognitive, affective, psychomotor, and creative functions across complementary activities. Waste education emphasizes cognitive and psychomotor development, the recycled-art competition strengthens creative and social engagement, study tours emphasize experiential learning, and gardening combines affective and psychomotor experiences. This diversification is consistent with evidence that environmental education can influence environmental outcomes through multiple educational pathways rather than through knowledge transmission alone (van de Wetering et al., 2022). However, the LPJ provides insufficient evidence to determine whether these learning opportunities produced measurable changes in literacy, attitudes, skills, or behavior. Table 2 therefore functions as an analytical mapping of the program's learning potential, not as a measurement of student achievement.

Alignment with the Green School Quality Framework

The SEHAT program can be further examined through the four domains of the UNESCO Green School Quality Standard: teaching and learning, facilities and operations, community engagement, and school governance. This framework provides a whole-school perspective in which environmental education is not limited to classroom activities but is connected to the physical environment, external stakeholders, and institutional management (UNESCO, 2024a). The SEHAT program demonstrates different levels of alignment across these four domains based on the activities and documentation contained in the 2024 LPJ. The strongest alignment is visible in teaching and learning because the program contains multiple environmental education activities using lectures, practice, competitions, study tours, films, miniatures, and gardening. The facilities and operations domain is represented through waste bins and the school garden, while community engagement is reflected in external participation and environmental visits. School governance, in contrast, remains less visible because formal policies, organizational structures, targets, and monitoring mechanisms are not sufficiently documented.

The teaching and learning domain represents the most developed dimension of the SEHAT program at the implementation level. Six substantive intervention types demonstrate that environmental topics were delivered through varied pedagogical approaches rather than through a single instructional method. This variation is consistent with Education for Sustainable Development approaches that encourage the integration of sustainability concepts into learning processes and student experiences (Ferguson et al., 2022). The waste workshop, recycled-art competition, study tours, school gardening, and climate-change education also provide opportunities to connect environmental knowledge with practical and contextual experiences. Research on green-school practices indicates that school-based environmental education can contribute to the development of students' environmental attitudes and behavior when environmental learning is connected with the school environment (Efizariza et al., 2021). However, the LPJ does not document curriculum integration, explicit learning outcomes, pre-post

assessments, or competency rubrics, limiting the extent to which implementation can be interpreted as demonstrated educational achievement.

The facilities and operations domain shows an initial level of alignment through the provision of three-color waste bins and the development of a school garden with TOGA plants. These physical elements can function as environmental learning resources because they provide students with visible and accessible settings for practicing environmental principles. School-ground characteristics can influence students' environmental experiences and preferences, particularly when natural elements become integrated into everyday school life (Lindemann-Matthies & Köhler, 2019). The SEHAT facilities therefore have potential to extend environmental education beyond scheduled activities and into the physical learning environment. Nevertheless, the available documentation does not provide evidence of waste audits, standard operating procedures for waste separation, systematic facility-use records, garden maintenance procedures, or water and energy management. The facilities consequently indicate an emerging operational foundation rather than a fully established environmental management system.

Table 3. Mapping of the SEHAT Program to the Four Green School Domains

Domain	Program Alignment	Evidence in the 2024 LPJ	Institutional Gap
Teaching and Learning	Strong	Six environmental interventions using lectures, practice, competitions, study tours, films, miniatures, and gardening	No documented curriculum integration, learning outcomes, pre-post assessment, or competency rubrics
Facilities and Operations	Emerging	Three-color waste bins; school garden and TOGA	No waste audit, waste-sorting SOP, facility-use data, garden maintenance system, or water/energy management
Community Engagement	Present but episodic	Participation of the Education Office; environmental study tours	No documented family program, community partnership, waste-bank collaboration, or routine external engagement
School Governance	Limited documentation	Program and activities were implemented	No documented environmental policy, dedicated team, targets, role allocation, monitoring, or periodic evaluation

Source: Authors' analysis based on the 2024 SEHAT Program Report and UNESCO (2024a)

As summarized in Table 3, the four domains show an uneven pattern of program alignment. Teaching and learning has the strongest implementation evidence because the LPJ provides clear documentation of diverse environmental activities and learning methods. Facilities and operations have begun to develop through physical environmental infrastructure, but their continuity and management procedures remain unclear. Community engagement is present through the involvement of the Education Office and visits to environmental locations, although these forms of engagement remain episodic. This pattern is important because whole-school environmental education requires connections between learning activities and the institutional and social environments surrounding students (Husin et al., 2025). The SEHAT program therefore demonstrates several elements of a green-school approach, but these elements have not yet been documented as an integrated institutional system.

The community engagement domain provides evidence that environmental learning in SEHAT was not completely confined to the internal school environment. The participation of the Gorontalo City Education Office indicates involvement from an external educational institution, while the study tours

connected students with environmental settings beyond the school. Such external connections can broaden students' environmental experiences and provide social contexts for understanding environmental issues (Robina-Ramírez & Medina-Merodio, 2019). Evidence from school environmental education programs also suggests that engagement can extend beyond students and potentially influence pro-environmental practices within families and wider social contexts (Jaime et al., 2023). However, the SEHAT LPJ does not document sustained collaboration with families, community organizations, waste banks, environmental groups, or other external partners. Community engagement should therefore be classified as present but episodic rather than institutionalized.

School governance represents the most significant institutional gap in the documented SEHAT program. Although the implementation of activities is recorded, there is insufficient evidence of formal environmental policies, dedicated implementation teams, measurable targets, defined responsibilities, monitoring mechanisms, or periodic evaluation. UNESCO (2024a) positions governance as an important component of whole-school greening because environmental objectives need to be embedded in decision-making and institutional processes. The absence of these elements makes it difficult to determine whether SEHAT functioned as a sustained school-wide transformation or primarily as a collection of environmental activities conducted during the program period. This limitation also affects the continuity of facilities, community engagement, and learning practices because their sustainability depends partly on institutional responsibility and monitoring. The overall alignment can therefore be interpreted as strongest at the pedagogical level, emerging at the operational level, present but episodic at the community level, and insufficiently documented at the governance level. This evaluation does not indicate that the program failed to address the UNESCO framework, but rather that the available evidence demonstrates stronger activity-level implementation than institutional integration.

Evidence Strength, Outcome Boundaries, and Evaluation Development

The evaluative interpretation of the SEHAT program needs to distinguish between evidence of implementation, evidence of outputs, and evidence of outcomes. The 2024 LPJ provides relatively clear documentation that environmental activities were conducted, including orientation, waste workshops, competitions, study tours, gardening, and climate-change education. This evidence is sufficient to establish implementation, but it does not demonstrate the extent to which students acquired environmental knowledge, developed stronger attitudes, or changed their environmental behavior. Such a distinction is important because environmental education outcomes can vary according to intervention characteristics, learning context, and opportunities for continued engagement (van de Wetering et al., 2022). The available documentation therefore supports an implementation-level evaluation rather than a causal assessment of program effectiveness. The strength of the evidence should be interpreted according to what the LPJ actually records rather than according to what the program was intended to achieve.

A useful evidence hierarchy for SEHAT begins with documented activities, followed by tangible outputs, observed or measured learning outcomes, and longer-term behavioral or institutional outcomes. Activity records such as photographs, descriptions, and implementation reports provide direct evidence that program components were delivered. Outputs may include completed recycled products, installed waste bins, planted TOGA, or documented study visits, but these outputs still do not establish whether students learned or behaved differently. Learning outcomes require evidence such as knowledge assessments, student reflections, competency rubrics, or other structured measures, while behavioral outcomes require repeated observations or behavioral records over time. Environmental education research emphasizes that behavioral change involves multiple factors and cannot be inferred solely from exposure to educational activities (Huoponen, 2024). Table 4 organizes this hierarchy and proposes indicators that could strengthen evaluation in subsequent implementation phases.

Table 4. Evidence Hierarchy and Proposed Evaluation Indicators

Evidence Level	What Can Be Claimed	Existing Evidence in the LPJ	Proposed Evaluation Indicators
Implementation	Activities were conducted	Activity descriptions,	Activity completion, attendance, frequency,

Output	Immediate products or facilities were produced	photographs, and program records Ecobricks, pencil cases, recycled-art products, waste bins, school garden	facilitator and student participation Number and quality of products, facility use, planted areas, waste-sorting practice
Learning Outcome	Students acquired knowledge, skills, or competencies	Not systematically documented	Pre-post environmental literacy test, competency rubric, student reflection
Behavioral Outcome	Students demonstrated changes in environmental behavior	Not documented	Waste-sorting compliance, waste reduction, reuse frequency, observation records
Institutional Outcome	Environmental practices became embedded in school systems	Limited documentation	Environmental policy, team structure, targets, SOPs, monitoring, periodic evaluation

Source: Authors' analysis based on the 2024 SEHAT Program Report and relevant environmental education literature

Table 4 indicates that the strongest existing evidence is concentrated at the implementation and immediate-output levels. This pattern is understandable for a program report because LPJ documentation generally prioritizes records of completed activities and program deliverables rather than systematic measurement of educational change. However, the absence of learning and behavioral indicators creates an important boundary around the conclusions that can be drawn from the program. A multi-component environmental education program may influence knowledge, attitudes, and behavior through different pathways, but these pathways require empirical measurement to establish whether intended outcomes actually occurred (Keller et al., 2024). The SEHAT program should therefore not be described as having increased environmental literacy or pro-environmental behavior solely on the basis of documented activities. Its contribution is more appropriately characterized as creating educational opportunities and environmental conditions that could support such outcomes.

The possibility of behavioral change remains analytically relevant because several SEHAT activities provide mechanisms that could encourage repeated pro-environmental practices. Three-color waste bins provide environmental cues, while waste workshops introduce practical knowledge and school gardening creates opportunities for repeated interaction with the physical environment. Environmental education interventions can become more effective when learning is reinforced through behavioral prompts and social norms rather than delivered as isolated information (Kurokawa et al., 2023). The recycled-art competition may also create peer-based visibility around environmentally oriented practices, potentially strengthening social recognition of environmental participation. Climate-change education similarly has potential to connect environmental knowledge with behavioral considerations, although the relationship between climate concern, social norms, and observed action is complex (Galeotti et al., 2024). These mechanisms indicate plausible routes toward behavioral development, but they should not be treated as evidence that behavioral change occurred among SEHAT participants.

The next evaluation phase should therefore move from documenting activities toward measuring changes at several levels of the program logic. Environmental literacy can be assessed through indicators covering knowledge, interpretation of environmental problems, and application of environmental concepts, while affective dimensions can include environmental attitudes, concern, interest, and perceived responsibility. Psychomotor and behavioral indicators can assess waste-sorting practices, reuse activities, gardening participation, and adherence to environmental routines through structured observation. Institutional indicators should examine whether environmental activities become incorporated into school policies, responsibilities, routines, and monitoring systems. A multi-level evaluation design would allow the program to distinguish immediate educational effects from longer-term behavioral and institutional changes, consistent with evidence that school environmental education can influence both children and broader social contexts when adequately implemented and

evaluated (Jaime et al., 2023). Such an evaluation would also provide stronger evidence for determining which components of SEHAT should be maintained, modified, expanded, or integrated into regular school practice.

CONCLUSION

The evaluation indicates that the 2024 SEHAT (Sekolah Hijau Tenda) Program has a relatively comprehensive implementation design by combining environmental orientation, waste literacy and management practices, recycled-material creativity, place-based learning through study tours, school-garden activities, climate-change education, and the provision of three-color waste bins. The documented activities demonstrate that the program incorporated diverse learning approaches involving cognitive, affective, psychomotor, and creative dimensions. The program's strongest contribution is evident at the implementation level, where the LPJ provides clear evidence of the delivery of multiple environmental education components. The mapping against the Green School Quality Standard further indicates that teaching and learning represents the strongest domain, while facilities and operations have begun to provide supporting environmental infrastructure. Community engagement is present through external participation and environmental visits, but remains episodic, whereas school governance is not sufficiently documented through formal policies, teams, targets, monitoring, or periodic evaluation. The evidence available therefore supports the conclusion that SEHAT successfully established diverse environmental learning opportunities and immediate program outputs, but does not demonstrate measurable changes in students' environmental literacy or behavior. Because the LPJ lacks baseline and post-test data, repeated behavioral observations, waste audits, evidence of garden continuity, and institutional indicators, claims of causal improvement in environmental outcomes would exceed the available evidence.

The next phase should shift the program from a collection of environmental activities toward a whole-school green system supported by consistent institutional mechanisms. Environmental themes should be integrated into regular learning, accompanied by the establishment of an environmental team with clearly defined responsibilities and targets. Operational practices should be strengthened through waste-sorting SOPs, periodic waste audits, routine monitoring of waste-bin use, and structured schedules for school-garden maintenance. Simple pre-post assessments can be introduced to measure environmental literacy, while repeated observations can be used to document changes in waste management and other pro-environmental behaviors. Family and community participation should also be developed through sustained partnerships rather than limited participation in individual activities. Each program component should have clear indicators, baseline conditions, follow-up measurements, and documentation of subsequent actions. Through simple but repeated monitoring, SEHAT can generate stronger evidence regarding changes in environmental knowledge, behavior, school environmental conditions, and institutional sustainability while strengthening its contribution to Education for Sustainable Development.

REFERENCES

- Amiri, A., Geravandi, S., & Rostami, F. (2021). Potential effects of school garden on students' knowledge, attitude and experience: A pilot project on sixth grade students in Iran. *Urban Forestry & Urban Greening*, 62, 127174. <https://doi.org/10.1016/j.ufug.2021.127174>
- Christodoulou, A., & Korfiatis, K. (2019). Children's interest in school garden projects, environmental motivation and intention to act: A case study from a primary school of Cyprus. *Applied Environmental Education & Communication*, 18(1), 2–12. <https://doi.org/10.1080/1533015X.2017.1419104>
- Efiariza, R. R., Dewi, O. C., Panjaitan, T. H., & Felly, R. (2021). The green-based school and the creation of student's environmental attitude and behavior. *ARTEKS: Jurnal Teknik Arsitektur*, 6(2), 249–258. <https://doi.org/10.30822/arteks.v6i2.715>
- Ferguson, T., Roofe, C., Cook, L. D., Bramwell-Lalor, S., & Hordatt Gentles, C. (2022). Education for Sustainable Development (ESD) infusion into curricula: Influences on students' understandings of sustainable development and ESD. *Brock Education Journal*, 31(2), 63–84. <https://doi.org/10.26522/brocked.v31i2.915>

- Galeotti, F., Hopfensitz, A., & Mantilla, C. (2024). Climate change education through the lens of behavioral economics: A systematic review of studies on observed behavior and social norms. *Ecological Economics*, 226, 108338. <https://doi.org/10.1016/j.ecolecon.2024.108338>
- Hoque, F., Yasin, R. M., & Sopian, K. (2022). Revisiting Education for Sustainable Development: Methods to inspire secondary school students toward renewable energy. *Sustainability*, 14(14), 8296. <https://doi.org/10.3390/su14148296>
- Huoponen, A. (2024). From concern to behavior: Barriers and enablers of adolescents' pro-environmental behavior in a school context. *Environmental Education Research*, 30(5), 677–699. <https://doi.org/10.1080/13504622.2023.2180374>
- Husin, A., Helmi, H., Nengsih, Y. K., & Rendana, M. (2025). Environmental education in schools: Sustainability and hope. *Discover Sustainability*, 6, 41. <https://doi.org/10.1007/s43621-025-00837-2>
- Jaime, M., Salazar, C., Alpizar, F., & Carlsson, F. (2023). Can school environmental education programs make children and parents more pro-environmental? *Journal of Development Economics*, 161, 103032. <https://doi.org/10.1016/j.jdeveco.2022.103032>
- Kalla, M., Jerowsky, M., Howes, B., & Borda, A. (2022). Expanding formal school curricula to foster action competence in sustainable development: A proposed free-choice project-based learning curriculum. *Sustainability*, 14(23), 16315. <https://doi.org/10.3390/su142316315>
- Keller, J., Eichinger, M., Bechtoldt, M., Liu, S., Neuber, M., Peter, F., Pohle, C., Reese, G., Schäfer, F., & Heinzel, S. (2024). Evaluating the Public Climate School, a multi-component school-based program to promote climate awareness and action in students: A cluster-controlled pilot study. *The Journal of Climate Change and Health*, 15, 100286. <https://doi.org/10.1016/j.joclim.2023.100286>
- Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia. (2019). *Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor 52 Tahun 2019 tentang Gerakan Peduli dan Berbudaya Lingkungan Hidup di Sekolah*.
- Kementerian Lingkungan Hidup/Badan Pengendalian Lingkungan Hidup Republik Indonesia. (2025). *Peraturan Menteri Lingkungan Hidup/Badan Pengendalian Lingkungan Hidup Nomor 5 Tahun 2025 tentang Penyelenggaraan Program Adiwiyata*.
- Kurokawa, H., Igei, K., Kitsuki, A., Kurita, K., & Managi, S. (2023). Improvement impact of nudges incorporated in environmental education on students' environmental knowledge, attitudes, and behaviors. *Journal of Environmental Management*, 325, 116612. <https://doi.org/10.1016/j.jenvman.2022.116612>
- Lindemann-Matthies, P., & Köhler, K. (2019). Naturalized versus traditional school grounds: Which elements do students prefer and why? *Urban Forestry & Urban Greening*, 46, 126475. <https://doi.org/10.1016/j.ufug.2019.126475>
- Makrooni, G., Zen, S., Azhar, K., Ali, M., Dewi, L., & Ropo, E. (2026). Once upon a time: Teachers' narratives on climate change education. *International Review of Education*, 72, 37–60. <https://doi.org/10.1007/s11159-024-10114-5>
- Neurohr, A.-L., Pasch, N., Bergmann-Gering, A., & Möller, A. (2024). Linking students' interest in nature to their self-reported pro-environmental behavior and nature activities: A cross-sectional study in grade 5 to 9. *The Journal of Environmental Education*, 55, 460–479. <https://doi.org/10.1080/00958964.2024.2364182>
- Nurwidodo, N., Al Muhdhar, M. H. I., Rohman, F., Iriani, D., Herlina, H., & Fausan, M. M. (2019). Building pro-environmental behavior among school community of Adiwiyata green school. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 5(1), 23–32. <https://doi.org/10.22219/jpbi.v5i1.723>
- Prastiwi, L., Sigit, D. V., & Sedayu, A. (2018). The correlation between students perception about school garden with the attitude of school environmental management. *Biosfer: Jurnal Pendidikan Biologi*, 8(1), 29–33. <https://doi.org/10.21009/biosferjpb.8-1.4>
- Program SEHAT. (2024). *Laporan Program SEHAT (Sekolah Hijau Tenda) 2024*. Dokumen internal program.
- Robina-Ramírez, R., & Medina-Merodio, J.-A. (2019). Transforming students' environmental attitudes in schools through external communities. *Journal of Cleaner Production*, 232, 629–638. <https://doi.org/10.1016/j.jclepro.2019.05.391>

- Rokhmah, Z., & Fauziah, A. N. M. (2021). Analisis literasi lingkungan siswa SMP pada sekolah berkurikulum wawasan lingkungan. *PENSA E-Jurnal: Pendidikan Sains*, 9(2), 176–181. <https://doi.org/10.26740/pensa.v9i2.37765>
- Salazar, C., Jaime, M., Leiva, M., & González, N. (2024). Environmental education and children’s pro-environmental behavior on plastic waste: Evidence from the green school certification program in Chile. *International Journal of Educational Development*, 109, 103106. <https://doi.org/10.1016/j.ijedudev.2024.103106>
- Serrano-Jiménez, A., Marques-Valderrama, I., Jiménez-Expósito, R. A., Díaz-López, C., Barrios-Padura, Á., Molina-Huelva, M., Becerra-Villanueva, J. A., & Chacartegui, R. (2025). Schoolyard revegetation as a dual mechanism for environmental education and overheating mitigation. *Environmental Development*, 54, 101144. <https://doi.org/10.1016/j.envdev.2025.101144>
- Tanu, D., & Parker, L. (2018). Fun, ‘family’, and friends: Developing pro-environmental behaviour among high school students in Indonesia. *Indonesia and the Malay World*, 46(136), 303–324. <https://doi.org/10.1080/13639811.2018.1518015>
- UNESCO. (2024a). *Green school quality standard: Greening every learning environment*. United Nations Educational, Scientific and Cultural Organization.
- UNESCO. (2024b). *Greening curriculum guidance: Teaching and learning for climate action*. United Nations Educational, Scientific and Cultural Organization.
- van de Wetering, J., Leijten, P., Spitzer, J., & Thomaes, S. (2022). Does environmental education benefit environmental outcomes in children and adolescents? A meta-analysis. *Journal of Environmental Psychology*, 81, 101782. <https://doi.org/10.1016/j.jenvp.2022.101782>
- van Dijk-Wesselius, J. E., Maas, J., Hovinga, D., van Vugt, M., & van den Berg, A. E. (2018). The impact of greening schoolyards on the appreciation, and physical, cognitive and social-emotional well-being of schoolchildren: A prospective intervention study. *Landscape and Urban Planning*, 180, 15–26. <https://doi.org/10.1016/j.landurbplan.2018.08.003>
- Yusuf, R., & Fajri, I. (2022). Differences in behavior, engagement and environmental knowledge on waste management for science and social students through the campus program. *Heliyon*, 8(2), e08912. <https://doi.org/10.1016/j.heliyon.2022.e08912>