

Integrating Environmental Education into Natural and Social Sciences (IPAS) Learning to Enhance Ecological Awareness among Fifth-Grade Students at SD Negeri 6 Tinanggea

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ABSTRACT: Ecological problems require elementary education not only to convey environmental concepts but also to cultivate students' concern and concrete action. This study aimed to describe the integration of environmental education into Natural and Social Sciences (IPAS) learning, the development of students' ecological awareness, and the supporting factors and constraints in Grade 5 at SD Negeri 6 Tinanggea. This field study employed a descriptive qualitative approach during the second semester of the 2025/2026 academic year. The informants included the principal, the vice principal for curriculum, Grade 5 teachers, and Grade 5 students. Data were collected through observation, interviews, and documentation and were analyzed through data reduction, data display, and conclusion drawing. Data trustworthiness was established through source, method, and time triangulation. The results showed that environmental education was integrated through content selection, adaptation of teaching modules, analysis of learning objectives, assessment, use of contextual methods and media, and routines consisting of daily classroom cleaning duties and collective clean-up activities. These practices contributed to the development of students' ecological knowledge, attitudes, skills, participation, and concern. Support from the school community and the availability of cleaning facilities strengthened implementation, whereas limited time, variation in student characteristics, and inconsistent routines were the principal constraints.

Keywords: Environmental Education, IPAS Learning, Ecological Awareness, Elementary School

INTRODUCTION

Environmental problems, including climate change, pollution, deforestation, and biodiversity loss, are closely linked to how humans treat nature (United Nations Environment Programme, 2021). Ecological responses should therefore begin through education that develops both knowledge and responsibility. Elementary education is a strategic stage for cultivating these habits because students' values and patterns of behavior are still developing. Hsu (2020) demonstrated that environmental education from an early age supports the development of ecological awareness.

The Merdeka Curriculum provides opportunities for contextual learning and character development through learning outcomes and objectives tailored to students' needs (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2022). At the elementary school level, Natural and Social Sciences (IPAS) is relevant to

these aims because it connects natural phenomena, human activities, the social environment, and citizens' responsibility for sustainability.

Integrating environmental education allows topics such as plants, changes in states of matter, culture, and norms to be connected with cleanliness, waste management, and plant care. Hasanah and Astuti (2023) showed that incorporating environmental issues into IPAS supports conceptual understanding, while Ramadhani and Fadli (2020) emphasized students' engagement in everyday actions. Pedagogically, linking content to real-life experiences is consistent with contextual learning (Lestari & Widodo, 2022) and experiential learning (Sari et al., 2024).

Ecological awareness encompasses environmental knowledge, caring attitudes, action skills, participation, and pro-environmental behavior. Zhang and Wang (2023) identified knowledge, attitudes, and behavior as interrelated components. Among elementary school students, ecological awareness may be reflected in habits such as disposing of waste properly, caring for plants, maintaining cleanliness, and participating in conservation activities (Akbar & Sulistiani, 2024).

Implementation nevertheless faces constraints related to time, variation in student characteristics, teacher competence, and the availability of learning media (Nurhayati, 2022; Hidayat & Mulyani, 2021). Preliminary observations at SD Negeri 6 Tinanggea indicated that environmental topics had been taught, but lectures and textbooks remained dominant. Some students also continued to require reinforcement in proper waste disposal, maintaining cleanliness, and caring for plants. At the same time, the school had established classroom cleaning duties and collective clean-up activities as opportunities to apply environmental values.

Unlike studies that assess the effects of a particular model, this study examined naturally occurring integration practices, from instructional planning to school routines. It aimed to describe the integration of environmental education into IPAS learning, the development of ecological awareness among Grade 5 students, and the supporting factors and constraints at SD Negeri 6 Tinanggea, without making causal claims that would be inconsistent with a qualitative design.

METHOD

This field study employed a descriptive qualitative approach. This approach was used to gain an in-depth understanding of how environmental education was integrated into IPAS learning within the school's natural context. The study was conducted at SD Negeri 6 Tinanggea, Tinanggea District, South Konawe Regency, Southeast Sulawesi Province, during the second semester of the 2025/2026 academic year.

The data sources included the principal, the vice principal for curriculum, the Grade 5A and Grade 5B teachers, and Grade 5 students. These groups of informants provided data according to their respective roles in planning and implementing IPAS learning, conducting environmental education activities, and observing students' ecological behavior at school.

The observations focused on content selection, teaching materials, learning objectives, assessment, methods, media, routine activities, students' ecological behavior, and the support for and barriers to implementation. These boundaries enabled data from different informants to be compared across the same themes without altering the phenomena occurring at the school.

Data were collected through non-participant observation, open-ended structured interviews, and documentation. Observations focused on the implementation of IPAS learning, the use of the school environment as a learning resource, classroom cleaning duties, collective clean-up activities, and students' practices in maintaining cleanliness and caring for plants. Interviews were conducted with school leaders, teachers, and students using questions tailored to their respective roles. Documentation was used to complement and corroborate the observation and interview data. The supporting instruments were interview and observation guides, as presented in the study appendices.

The data were analyzed interactively in three stages: data reduction, data display, and conclusion drawing. During data reduction, the data were selected and grouped according to the study's focus on instructional integration, the development of ecological awareness, routine activities, supporting factors, and constraints. The data were then presented in thematic narratives and summary tables so that relationships among the findings could be examined systematically. Conclusions were drawn inductively by tracing consistent patterns across the observation, interview, and documentation data.

Data trustworthiness was established through source, method, and time triangulation. Source triangulation involved comparing information obtained from the principal, the vice principal for curriculum, teachers, and students. Method triangulation involved comparing interview, observation, and documentation data concerning the same focus. Time triangulation was conducted by checking data at different times and in different situations to assess the consistency of the findings.

RESULTS AND DISCUSSION

RESULTS

The findings were grouped into four themes: the integration of environmental education into IPAS learning, the development of students' ecological awareness, routine activities that supported the integration, and supporting factors and constraints. This grouping was based on recurring patterns in the observation, interview, and documentation data.

Integrating Environmental Education into IPAS Learning

At SD Negeri 6 Tinanggea, environmental education was not offered as a separate subject; instead, it was connected with IPAS learning and the school's cleaning program. The Grade 5A and Grade 5B teachers stated that environmental issues were incorporated into relevant topics and reinforced through weekly routines. The principal viewed a clean and comfortable environment as a prerequisite for the learning process, while the vice principal for curriculum emphasized connecting instruction with events and practices in the surrounding community.

Content selection was the first stage because IPAS topics varied in their relevance to environmental education. The teachers identified plants, changes in states of matter, Indonesia's cultural diversity, and manners and norms as topics that could be connected with environmental issues. When teaching about plants, for example, the teachers linked plant functions to the responsibility to care for them. When addressing social topics and norms, instruction was connected with habits of maintaining cleanliness and assuming shared responsibility.

Planning was conducted using the available syllabus and teaching modules, which were then adapted to classroom conditions and students' needs. Before determining the activities, the teachers analyzed the learning outcomes, learning objectives, and sequence of learning objectives. FNH, the Grade 5A teacher, explained that the available modules were not used mechanically but were adapted to students' circumstances and needs. This practice indicates that integration occurred through the teachers' interpretation of instructional materials and the school context.

The learning objectives were subsequently linked to environmental problems in the students' surroundings. The teachers not only explained the textbook content but also discussed the consequences of failing to protect the environment. FNH stated, "Integrating environmental education into IPAS learning is intended to deepen students' understanding of local environmental issues and problems by connecting them with the material in the textbook." These data indicate that the environment served as a context for interpreting concepts rather than merely as an additional object introduced after the content had been taught.

Assessment was conducted after instruction through exercises generally drawn from the students' printed textbooks. When time permitted, the exercises were completed in class; otherwise, they were continued as homework. These assessments were primarily used to determine students' understanding of the content discussed. This finding indicates that knowledge assessment was already in place, whereas attitudes, skills, and ecological participation were assessed mainly through teacher observations during lessons and cleaning activities.

Instructional methods were selected according to the content. The teachers used lectures, discussions, and demonstrations, although lectures remained relatively dominant. Methodological variation was intended to increase student motivation and engagement. IPAS was taught twice a week, with each meeting lasting 2 x 35 minutes. This time allocation was an important consideration because the teachers had to balance content delivery, contextual activities, and assessment within a limited period.

The learning media included whiteboards, markers, readily available simple materials, and the school environment. Using the schoolyard, garden, drainage channels, and the general state of cleanliness at the school enabled students to observe the objects under discussion directly. FNH emphasized that the school environment was an appropriate learning medium because IPAS concerns the natural world and can help students understand their surroundings. Nevertheless, media use still depended on simple facilities and did not consistently shift instruction away from a teacher-centered approach.

Overall, the integration comprised a sequence of content selection, adaptation of teaching materials, analysis of objectives, connection of concepts with environmental problems, determination of assessment, selection of methods, and use of learning media. This sequence demonstrates that environmental education had been incorporated into IPAS planning and implementation, although the depth of integration varied according to the topic, time available, and strategies selected by the teachers.

Developing Students' Ecological Awareness

The development of students' ecological awareness was evident in six interrelated dimensions: awareness, knowledge, attitudes, skills, participation, and concern. Initial awareness was developed through explanations of environmental issues and routines for maintaining cleanliness. Knowledge developed as students connected content about plants and the environment with the consequences of human behavior. Attitudes and concern were reflected in responsibility for classroom cleaning duties, classroom cleanliness, and plant care.

In the knowledge dimension, the teachers connected textbook content with conditions around the school. Students were guided to understand the importance of

plants as a source of life, the effects of waste on cleanliness, and the consequences of failing to care for the environment. Outdoor learning helped students recognize the relationship between the teachers' explanations and the objects they observed. Thus, ecological knowledge was reflected not only in the ability to answer exercises but also in the ability to identify problems and appropriate actions.

In the attitude dimension, the teachers provided motivation and reinforcement during activities. Responsibility was developed through the assignment of duties and consequences when students did not perform them. The consequences described by the teachers included additional tasks involving planting, maintaining, or caring for plants. Although this practice was intended to build discipline, it still required guidance so that the consequences would be understood as part of the educational process rather than merely as punishment.

Student participation was evident in their involvement in lessons and cleaning activities. Students reported that they enjoyed lessons more when they were occasionally conducted outside the classroom. Teachers and school leaders also observed that students actively asked questions, completed assignments, and participated in collective activities. These findings indicate that authentic contexts and group activities supported student engagement, although participation levels varied among students.

In terms of skills and behavior, the teachers and vice principal for curriculum observed changes. Students who had previously required reminders began disposing of waste properly, picking up visible litter, cleaning drainage channels, and watering plants without always waiting for instructions. The vice principal for curriculum stated, "Initially, the students were not accustomed to these activities; over time, however, they began to demonstrate positive behavioral changes." This statement reflects a gradual process of habituation rather than a uniform or immediate change.

Ecological concern was also evident in students' attention to the comfort of the learning environment. HF, a Grade 5B student, explained that collective clean-up activities made the school environment cleaner and tidier, thereby creating a comfortable place to learn. In these findings, concern was not limited to compliance with instructions; it had begun to develop into an understanding that cleanliness benefits the entire school community. A summary of the findings for each dimension is presented in Table 1.

Table 1. Summary of Findings on Students' Ecological Awareness

Dimension	Key Findings	Behavioral Indicators
Awareness	Recognized the importance of cleanliness and environmental conservation.	Began maintaining the learning area and responding to waste-related problems.
Knowledge	Connected IPAS content with environmental conditions and the consequences of environmental degradation.	Explained the importance of plants, cleanliness, and a well-maintained environment.
Attitudes	Demonstrated responsibility, discipline, and cooperation.	Performed classroom cleaning duties and accepted the allocation of group tasks.
Skills	Performed environmental maintenance activities directly.	Swept, cleaned drainage channels, watered plants, and cared for plants.
Participation	Participated in learning and collective cleaning activities.	Actively asked questions, completed assignments, and joined collective clean-up activities.
Concern	Recognized the benefits of a clean environment for shared comfort.	Disposed of waste properly and maintained cleanliness without always being reminded.

Routine Activities Supporting the Integration

Instructional integration was reinforced through routine activities conducted beyond the explanation of subject matter. Each class had a daily cleaning duty schedule, while collective clean-up activities were held every Saturday before lessons began. These activities involved students, teachers, the principal, staff, and other members of the school community. The routines provided opportunities to apply the environmental values addressed in IPAS learning.

During collective clean-up activities, students were divided into groups and assigned different tasks. The tasks included cleaning classrooms, the front and rear schoolyards, toilets, gardens in front of the classrooms, and drainage channels. CA, a Grade 5A student, explained that each group was assigned a different work area, including watering and sweeping the garden. This division of labor helped students understand that school cleanliness is a shared responsibility that requires coordination.

The activities were carried out using equipment provided by the school, including brooms, waste bins, mops, dustpans, and cleaning cloths. The teachers not only gave instructions but also worked alongside the students and modeled the expected behavior. Teacher involvement reduced students' difficulties while reinforcing positive role modeling. One student stated that the tasks felt easier because they were performed together and the teachers also provided assistance.

The routines served as a bridge between knowledge and action. During lessons, students learned why the environment should be protected; through classroom cleaning duties and collective clean-up activities, they practiced how to care for it. Repetition encouraged the formation of routines, while interaction with peers and teachers fostered participation and cooperation. However, the observations also indicated that some students still needed reminders, particularly after recess.

Supporting Factors and Constraints

The first supporting factor was the school's accessible location within a residential area. This accessibility supported community involvement and waste collection. The school collaborated with a waste collection service that removed waste regularly. This finding indicates that school environmental management depended not only on student activities but also on an available final waste disposal system.

The second factor concerned facilities and infrastructure. Each classroom had waste bins and cleaning equipment, while the garden, schoolyard, and drainage channels could function both as objects of study and learning spaces. Support from the school committee and the government was reported to facilitate the provision of these resources. The availability of equipment made it easier to distribute tasks and enabled students to practice cleaning skills directly.

The third factor was the support of school leadership, teacher and student participation, and the involvement of multiple stakeholders. The principal required members of the school community to participate in the program, and the teachers served as role models during its implementation. AI, the Grade 5B teacher, stated that the activities were sustained through the support of students, teachers, the principal, and the school committee. This collaboration strengthened the consistency between the messages conveyed in the classroom and the practices carried out throughout the school environment.

The primary constraint was limited time. Environmental education activities often required time outside regular lessons, while IPAS instruction also had content and assessment targets. The principal and vice principal for curriculum considered it difficult to determine an appropriate schedule. Consequently, teachers had to choose among

extending the activities, condensing the subject matter, or assigning part of the assessment as homework.

A further constraint involved differences in students' characteristics and backgrounds. Some students performed their duties independently, whereas others disregarded instructions or required repeated reminders. These differences required patience, guidance, and differentiated reinforcement strategies. The routines were also not yet fully consistent; litter was still found after recess, and cleanliness practices remained dependent on teacher direction.

From an instructional perspective, lectures remained dominant, and the learning media were generally simple. The school environment had been used as a resource, but not for every topic or lesson. The teachers addressed these constraints through evaluation, feedback from colleagues, monitoring of student development, and adjustments to their methods. These findings indicate that sustaining the integration requires stronger activity design, behavioral assessment, and time management so that instruction and routine activities do not operate as two separate programs.

DISCUSSION

The findings demonstrate that environmental education at SD Negeri 6 Tinanggea was integrated through two complementary pathways: IPAS learning and the school's culture of cleanliness. The instructional pathway connected content, objectives, methods, media, and assessment with environmental issues. The routine-based pathway enabled students to apply their knowledge through classroom cleaning duties, collective clean-up activities, plant care, and school cleanliness management. This pattern is consistent with Tilbury's (2019) view that environmental education should develop both knowledge and the capacity to act in daily life.

The stages of integration identified in this study were also consistent with Afandi's (2019) framework, particularly in terms of content selection, preparation of teaching materials, analysis of learning outcomes and objectives, determination of assessment, selection of methods, and use of media. This alignment indicates that the teachers' practices included the basic elements of curricular integration. However, the integration was not yet evenly implemented because only certain topics were considered relevant and contextual activities depended on the time available. This implies that teachers need a more systematic content map so that environmental values can serve as a coherent thread without being forced into every topic.

Using the school environment as a learning medium supported meaning-making through concrete experience. This finding is consistent with contextual learning, which connects subject matter with situations in students' lives (Lestari & Widodo, 2022), and

with Nurhayati's (2023) findings regarding the use of the surrounding natural environment as a medium for science learning. From a constructivist perspective, students did not merely receive explanations about cleanliness, plants, or waste; they developed understanding through observation and action. From an experiential learning perspective, the experiences of cleaning, caring for plants, and reflecting on environmental conditions became sources for developing concepts and attitudes.

The results support Hasanah and Astuti's (2023) finding that incorporating environmental issues into IPAS can strengthen students' understanding of human-environment relationships. The studies are similar in connecting concepts with ecological situations. However, the present study did not measure learning outcomes statistically; instead, it described how teachers adapted modules, used the environment, and observed changes in student behavior. The findings should therefore be interpreted as evidence of process and pedagogical contribution rather than evidence of causal effectiveness.

The identified development of ecological awareness encompassed knowledge, attitudes, skills, participation, and concern. This multidimensional structure is consistent with Zhang and Wang (2023), who linked environmental knowledge, attitudes, and pro-environmental behavior. Behaviors such as disposing of waste properly, cleaning drainage channels, and caring for plants also correspond to the indicators of pro-environmental behavior discussed by Palupi et al. (2025). The findings indicate that knowledge becomes more meaningful when students have opportunities to translate it into repeated action.

Students' involvement in classroom cleaning duties and collective clean-up activities strengthened participation. Akbar and Sulistiani (2024) identified active participation as an important element of environmental conservation programs in elementary schools. In this study, participation was reflected not only in students' attendance but also in the division of tasks, cooperation, initiatives to remove litter, and plant care. However, the fact that some students still required reminders indicates that participation developed at different rates and required repeated reinforcement.

Regular routines made an important contribution because ecological behavior cannot be developed through a single lesson. Repeated actions, teacher modeling, and social reinforcement helped integrate environmental values into students' daily lives. This finding supports Pranoto et al. (2024), who demonstrated a relationship between environment-based learning and ecological awareness among elementary school students. Nevertheless, the present data also confirm that routine activities did not always result in independence; some behaviors were still prompted by supervision or consequences imposed by the teachers.

The support of facilities, school leadership, teacher role modeling, and school committee involvement demonstrates that environmental education requires a whole-school approach. Henderson et al. (2021) emphasized the importance of education for sustainable development that extends beyond the formal curriculum. At SD Negeri 6 Tinanggea, the environmental message became more consistent because facilities, rules, activities, and teachers' behavior were directed toward the same goal. Without such support, environmental learning risks remaining knowledge without opportunities for practical application.

Time constraints, the dominance of lectures, and the use of simple media indicate areas for improvement. Arsyad (2019) positioned media as a means of making learning experiences more concrete, while Hidayat and Mulyani (2021) demonstrated the benefits of visual media in science learning. The school could strengthen the integration through brief activities aligned with the learning objectives, such as guided observations, cleanliness journals, documentation of changes in the garden, or reflections after collective clean-up activities. These strategies could reduce the need for additional time while generating assessable evidence of learning.

One implication of this study for IPAS learning is the need to align knowledge outcomes with indicators of attitudes, skills, and participation. Assessment based solely on written exercises does not fully capture the development of ecological awareness. Teachers could complement conceptual assessment with observation notes, student reflections, simple project outputs, or participation rubrics. This measure is consistent with the learning and assessment orientation of the Merdeka Curriculum, which emphasizes both the learning process and the achievement of learning objectives (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, 2022).

Overall, this study contributes by describing the mechanisms of integration at the level of school practice. The findings do not demonstrate a statistical increase and cannot be generalized broadly, but they identify consistent changes based on observations and informants' perceptions. The integration of instructional planning, contextual experiences, routines, role modeling, and school-system support was perceived to facilitate the development of students' ecological awareness. The principal strength of this approach lies in the continuity among what students learn, practice, and routinely perform.

CONCLUSION

Environmental education was integrated into Grade 5 IPAS learning at SD Negeri 6 Tinanggea through the selection of relevant content, adaptation of the syllabus and teaching modules, analysis of learning outcomes and objectives, connections between

the subject matter and environmental problems, assessment, use of varied methods, and use of the school environment as a learning medium. This integration was reinforced through daily classroom cleaning duties, collective clean-up activities every Saturday, the division of students into cleaning groups, and garden maintenance. Based on the observations and interviews, these practices contributed to the development of students' ecological knowledge, attitudes, skills, participation, and concern, as reflected in habits of maintaining cleanliness, disposing of waste properly, cleaning the environment, and caring for plants.

Implementation was supported by the school's accessible location, cleaning facilities, school leadership, teacher role modeling, student participation, and support from the school committee and government. The identified constraints included limited time, variation in student characteristics, the dominance of lectures, the continued use of simple media, and inconsistent routines. Thus, the central significance of the findings lies not in a causal increase but in an integration process that was perceived to help connect students' understanding of IPAS with ecological behavior in school life.

Teachers are advised to map IPAS content relevant to environmental issues, reduce the dominance of lectures through observations or short projects, and complement written exercises with assessments of attitudes, skills, and participation. Schools should maintain the availability of facilities, establish schedules that do not interfere with instructional time, and strengthen the consistency of routines after recess. Future researchers are encouraged to examine integration in more than one school, provide detailed accounts of the number and selection of informants, and employ designs capable of assessing changes in ecological awareness more systematically.

REFERENCES

- Afandi, M. (2019). Integrasi pendidikan lingkungan hidup pada pembelajaran IPA sekolah dasar. *Jurnal Pendidikan Lingkungan*, 8(1), 23–35.
- Akbar, R., & Sulistiani, D. (2024). Partisipasi aktif siswa dalam program pelestarian lingkungan di sekolah dasar. *Jurnal Pendidikan Berkelanjutan*, 12(2), 45–56.
- Arsyad, A. (2019). *Media pembelajaran*. RajaGrafindo Persada.
- Hasanah, U., & Astuti, W. (2023). Pengaruh integrasi isu lingkungan dalam pembelajaran IPAS terhadap pemahaman konsep siswa. *Jurnal Pendidikan Dasar dan Pembelajaran*, 13(2), 89–101.
- Henderson, K., Tilbury, D., & Moore, D. (2021). Education for sustainable development in primary schools. *Environmental Education Research*, 27(4), 567–582.
- Hidayat, A., & Mulyani, S. (2021). Pengaruh penggunaan media visual terhadap hasil belajar IPA siswa sekolah dasar. *Jurnal Pendidikan Sains Indonesia*, 9(1), 12–21.

- Hsu, S. (2020). Early environmental education and the development of ecological awareness. *Journal of Environmental Education*, 51(3), 145–158.
- Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia. (2022). *Kurikulum Merdeka: Panduan pembelajaran dan asesmen*. Kemendikbudristek.
- Lestari, D., & Widodo, S. (2022). Pembelajaran kontekstual dalam pendidikan dasar. *Jurnal Pendidikan Dasar*, 15(1), 55–68.
- Nurhayati. (2022). Kompetensi guru dalam implementasi pendidikan lingkungan di sekolah dasar. *Jurnal Pendidikan Lingkungan*, 10(2), 101–112.
- Nurhayati. (2023). Implementasi penggunaan alam sekitar sebagai media pembelajaran IPA kelas V di SDN Tulung Pasik Kecamatan Mataram Baru Kabupaten Lampung Timur. *Jurnal Pendidikan Dasar*, 12(2), 145–156.
- Palupi, D., Suryani, T., & Kurniasih, M. (2025). Perilaku pro-lingkungan siswa sekolah dasar melalui pendidikan lingkungan. *Jurnal Pendidikan Lingkungan dan Berkelanjutan*, 14(1), 67–79.
- Pranoto, Y., Hidayati, N., & Saputra, R. (2024). Environmental-based learning dalam meningkatkan kesadaran ekologis siswa sekolah dasar. *Jurnal Pendidikan Lingkungan dan Pembangunan Berkelanjutan*, 25(1), 45–58.
- Ramadhani, A., & Fadli, M. (2020). Integrasi pendidikan lingkungan dalam pembelajaran IPA di sekolah dasar. *Jurnal Pendidikan Lingkungan*, 7(2), 101–115.
- Sari, R., Pratama, Y., & Hadi, S. (2024). Pembelajaran berbasis pengalaman untuk meningkatkan motivasi dan keterlibatan siswa SD. *Jurnal Teknologi Pendidikan Dasar*, 7(2), 98–110.
- Tilbury, D. (2019). *Education for sustainability: An agenda for action*. IUCN.
- United Nations Environment Programme. (2021). *Global Environment Outlook: GEO-6*. United Nations Environment Programme.
- Zhang, L., & Wang, X. (2023). Environmental knowledge, attitudes, and pro-environmental behavior of elementary school students. *Journal of Environmental Education Research*, 29(3), 201–218.