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INTEGRATING ECOLOGICAL LITERACY IN INDONESIAN LANGUAGE LEARNING TO PROMOTE ENVIRONMENTAL BEHAVIOR

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Abstract
The increasing complexity of environmental problems requires learning approaches that connect knowledge, literacy skills, and responsible environmental behavior. However, classroom practices often remain focused on cognitive achievement and have not sufficiently linked language learning with students' real-life ecological actions. This study aimed to examine the integration of ecological literacy in Indonesian language and literature learning to improve students' literacy skills and promote pro-environmental behavior. The study employed a quantitative approach with a pre-experimental one-group pretest-posttest design involving 30 fourth-grade students at a resource-limited primary school in Enrekang Regency, Indonesia. Data were collected through reading comprehension tests, essay writing tests, ecoliteracy questionnaires, classroom observations, document analysis, and teacher interviews. The intervention integrated ecological values into reading, writing, and literary activities through Project-Based Learning, Problem-Based Learning, and Experiential Learning. The results showed that students' reading comprehension increased from 4.80 to 6.87, with a significant improvement based on the Wilcoxon signed-rank test ($p < .001$; $r = 0.92$). Students' essay writing skills also improved from 11.23 to 15.73, with a significant difference based on the paired-sample t-test, $t(29) = 18.15$, $p < .001$, $dz = 3.31$. Classroom observations further indicated increased ecological awareness and participation in school-based environmental practices. These findings suggest that ecoliteracy-based Indonesian language and literature learning can create meaningful, contextual, and action-oriented learning experiences that support both literacy development and pro-environmental behavior.
Keywords: *Ecological literacy; Indonesian language learning; literacy skills; pro-environmental behavior*

Abstrak
Meningkatnya kompleksitas masalah lingkungan membutuhkan pendekatan pembelajaran yang menghubungkan pengetahuan, keterampilan literasi, dan perilaku lingkungan yang bertanggung jawab. Namun, praktik di kelas seringkali masih berfokus pada pencapaian kognitif dan belum cukup menghubungkan pembelajaran bahasa dengan tindakan ekologis siswa dalam kehidupan nyata. Studi ini bertujuan untuk meneliti integrasi literasi ekologis dalam pembelajaran bahasa dan sastra Indonesia untuk meningkatkan keterampilan literasi siswa dan mendorong perilaku pro-lingkungan. Studi ini menggunakan pendekatan kuantitatif dengan desain pra-eksperimental satu kelompok pretest-posttest yang melibatkan 30 siswa kelas empat di sebuah sekolah dasar yang terbatas sumber daya di Kabupaten Enrekang, Indonesia. Data dikumpulkan melalui tes pemahaman bacaan, tes menulis esai, kuesioner ekoliterasi, observasi kelas, analisis dokumen, dan wawancara guru. Intervensi tersebut mengintegrasikan nilai-nilai ekologis ke dalam kegiatan membaca, menulis, dan sastra melalui Pembelajaran Berbasis Proyek, Pembelajaran Berbasis Masalah, dan Pembelajaran Eksperiensial. Hasil penelitian menunjukkan bahwa pemahaman membaca siswa meningkat dari 4,80 menjadi 6,87, dengan peningkatan signifikan berdasarkan uji peringkat bertanda Wilcoxon ($p < 0,001$; $r = 0,92$). Keterampilan menulis esai siswa juga meningkat dari 11,23 menjadi 15,73, dengan perbedaan signifikan berdasarkan uji t sampel berpasangan, $t(29) = 18,15$, $p < 0,001$, $dz = 3,31$. Observasi kelas lebih lanjut menunjukkan peningkatan kesadaran ekologis dan partisipasi dalam praktik lingkungan berbasis sekolah. Temuan ini menunjukkan bahwa pembelajaran bahasa dan sastra Indonesia berbasis ekoliterasi dapat menciptakan pengalaman belajar yang bermakna, kontekstual, dan berorientasi pada tindakan yang mendukung pengembangan literasi dan perilaku pro-lingkungan.
Kata Kunci: Literasi ekologi; pembelajaran Bahasa Indonesia; keterampilan literasi; perilaku pro-lingkungan

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Introduction

The increasing intensity of global environmental problems has become a critical issue that requires serious attention from various sectors, including education. Climate change, ecosystem degradation, pollution, and the excessive exploitation of natural resources are no longer isolated phenomena but interconnected challenges that affect human sustainability (Akhtar et al., 2021; Mondal & Palit, 2022). In this regard, education plays a strategic role in fostering environmental awareness, ecological responsibility, and sustainable behavior from an early age. One important approach is the development of ecological literacy, or ecoliteracy, which emphasizes students' understanding of the interdependence between humans and the environment, as well as the formation of values, skills, and actions that support sustainable living (Folke et al., 2021; McBride et al., 2013).

In the Indonesian educational context, ecoliteracy has been introduced through various subjects, including Indonesian language and literature learning. However, its implementation remains suboptimal because classroom practices are still largely dominated by cognitive-oriented instruction that prioritizes content mastery rather than the development of attitudes and real-life environmental behavior (Latief et al., 2025). Consequently, students may understand environmental concepts theoretically but are not always able to translate such knowledge into concrete ecological practices. This condition indicates the need for learning strategies that connect knowledge, values, literacy skills, and environmental action in a more contextual way.

Indonesian language and literature learning provides a relevant pedagogical space for integrating ecoliteracy. As a subject that develops reading, writing, speaking, listening, and critical thinking skills, it also functions as a medium for transmitting values through texts. Environmental themes can be embedded in literary and non-literary materials, allowing students to explore ecological issues while improving their language skills. Reading activities can involve environmental texts, writing tasks can encourage persuasive ecological messages, and literary discussions can uncover ecological values embedded in stories, poems, folklore, and other forms of literary expression (Hollstein & Smith, 2020; Rohmah, 2019). Through this integration, language learning becomes more meaningful because it connects linguistic competence with students' lived experiences and social responsibilities.

Several studies have demonstrated that ecoliteracy-based learning can improve students' awareness, attitudes, and engagement with environmental issues. Utari et al. (2020) and Yonanda et al. (2021) found that ecoliteracy-oriented models enhance students' scientific attitudes at the primary level. Yonanda et al. (2023) further emphasized the need for local wisdom-based teaching materials to foster ecoliteracy among elementary school students, while Mustakim et al. (2025) and Vioreza et al. (2022) showed that the availability of teaching materials designed to develop ecoliteracy remains limited and needs further development. Rintoni et al. (2025) also highlighted that environmentally caring character can be strengthened through information transfer, training, habituation, modeling, and conditioning in school learning. These findings indicate that ecoliteracy requires not only conceptual explanation but also systematic instructional support, contextual teaching materials, and repeated practice in the school environment.

The relevance of ecoliteracy integration is also strengthened by studies on literacy learning and innovative instructional models in elementary schools. Sutisnawati et al. (2022) reported that project-based constructivist learning can improve students' literacy skills, while Mahpudin et al. (2024) found that discovery learning has a positive effect on elementary students' narrative writing skills. Fauziyyah et al. (2024) showed that Indonesian language learning through the RADEC model supports collaboration and communication skills, and Fauziyyah et al. (2025) confirmed the effectiveness of the RADEC model in improving students' reading comprehension skills. In addition, Saputra et al. (2020) demonstrated that digital teaching materials can improve literary literacy, interest, and motivation among primary school students. These studies suggest that literacy learning becomes more effective when it is supported by active, contextual, and student-centered instructional strategies.

Despite these findings, classroom practices often reveal a gap between theory and implementation. Teachers frequently face difficulties in linking language instruction with environmental contexts, resulting in learning activities that are limited to grammatical exercises, general text comprehension, or decontextualized language tasks. This condition reduces students' engagement and limits their awareness of the relevance of language skills to environmental issues. Environmental knowledge, when combined with attitudes and behavioral intentions, can significantly influence pro-environmental behavior (Geiger et al., 2019; Liu et al., 2023; Liu & Dong, 2023; Tian & Liu, 2022). Therefore, Indonesian language learning needs to be designed not only to improve literacy skills but also to enable students to use language as a tool for ecological reflection, communication, and action.

These challenges are particularly evident in schools with limited resources, such as SD Negeri 60 Tondon in Enrekang Regency. The school is located in a remote area with limited infrastructure and restricted access to digital technology. Such conditions constrain the implementation of innovative learning approaches and limit access to relevant teaching materials. However, this context also offers opportunities for developing adaptive learning strategies that utilize students' immediate environment, local ecological issues, and simple school-based practices as learning resources. Atmojo & Wardhana (2025) Atmojo and Ritonga et al. (2023) showed that technology-assisted learning can support scientific and digital literacy, while Apdelmi et al. (2025) emphasized that local wisdom-based multimedia can make learning more valid, practical, and meaningful. Nevertheless, in resource-limited schools, technological innovation needs to be adapted to local realities so that ecoliteracy integration remains feasible and inclusive.

From a literary perspective, ecoliteracy integration is also highly relevant. Literary works often depict the relationship between humans and nature, offering critical reflections, emotional experiences, and moral messages about environmental sustainability. Indonesian folklore, for example, frequently contains ecological wisdom that can be explored through an ecocritical approach. By analyzing such texts, students can develop empathy, imagination, and critical awareness toward environmental issues (Ardoin et al., 2020; Brown, 2025; Starr, 2023). This approach allows literature learning to function not only as an aesthetic experience but also as a means of environmental education that connects cognition, emotion, and action.

The development of digital technology also provides opportunities to enrich ecoliteracy-based language learning. Digital modules, e-books, and interactive media can present environmental content in engaging and multimodal forms, which can enhance students' motivation and participation (Alegre, 2023; Ismail et al., 2024). This is in line with the demands of twenty-first-century learning, which emphasize critical thinking, creativity, collaboration, and communication skills (Erdoğan, 2019; Supena et al., 2021). However, the use

of digital resources should not be seen as the only pathway for ecoliteracy integration. In contexts with limited technological access, teachers can still integrate ecological values through printed texts, school projects, environmental observation, collaborative discussion, persuasive writing, and literary appreciation.

From a broader perspective, the integration of ecoliteracy in education contributes to global and national agendas, including the Sustainable Development Goals, particularly quality education and climate action. Education is increasingly recognized as a key strategy for addressing environmental challenges in the Anthropocene era (Folke et al., 2021). In Indonesia, this effort aligns with the need to develop environmentally responsible, literate, and socially aware citizens. Therefore, strengthening ecoliteracy through Indonesian language and literature learning is academically, pedagogically, and socially significant.

Although previous studies have discussed ecoliteracy, local wisdom-based teaching materials, environmental character, digital media, literacy skills, and active learning models, limited attention has been given to how ecoliteracy can be systematically integrated into Indonesian language and literature learning to simultaneously improve students' literacy skills and promote pro-environmental behavior. Most existing studies tend to examine ecoliteracy in relation to environmental education or science learning, while studies on Indonesian language learning generally focus on reading, writing, or literary literacy without explicitly connecting these skills to ecological awareness and environmental action. This gap indicates the need for a more integrative study that positions Indonesian language and literature learning as a medium for connecting ecological knowledge, literacy development, and behavioral transformation.

The novelty of this study lies in its integrative and contextual approach to ecoliteracy-based Indonesian language and literature learning. Unlike previous studies that tend to discuss ecoliteracy, literacy skills, teaching materials, or environmental character separately, this study integrates ecological values into reading, writing, and literary activities through project-based, problem-based, and experiential learning strategies. This approach connects students' comprehension of environmental texts, their ability to express ecological ideas, and their participation in concrete environmental practices. In this way, the study offers a contextual model for implementing ecoliteracy in a resource-limited primary school and demonstrates how Indonesian language and literature learning can function as a medium for developing literacy competence, ecological awareness, and pro-environmental behavior at the same time.

Accordingly, this study aims to: (1) describe the current implementation of ecoliteracy in Indonesian language and literature teaching at the primary level; (2) develop strategies for integrating ecoliteracy into language and literature learning to enhance literacy skills and pro-environmental behavior; and (3) analyze the effectiveness of this integration in improving students' ecological understanding, attitudes, and practices.

Research Methods

This study employed a quantitative approach with a pre-experimental one-group pretest-posttest design. This design was used to examine changes in students' literacy skills and pro-environmental behavior before and after the implementation of ecoliteracy-based Indonesian language and literature learning. Descriptive data from classroom observations, document analysis, questionnaires, and teacher interviews were used to explain the initial condition of ecoliteracy integration and to support the interpretation of quantitative findings. This design was appropriate because the study was conducted in a natural classroom setting

without a control group and focused on comparing students' learning outcomes before and after the intervention (Fraenkel et al., 2011).

The study was conducted at SD Negeri 60 Tondon, Enrekang Regency, South Sulawesi, Indonesia. The school was selected purposively because it represents a resource-limited primary school context, characterized by limited learning infrastructure, restricted access to digital technology, and the need for contextual environmental literacy materials. The sample consisted of 30 fourth-grade students enrolled in Indonesian language learning during the research period. Total sampling was used because all students in the class participated in the intervention. The participants had basic reading and writing competence and were familiar with simple school-based environmental practices, such as maintaining classroom cleanliness, disposing of waste properly, and participating in school greening activities. One Indonesian language teacher was also involved as an informant to provide information about classroom practices, teaching materials, and challenges in integrating ecoliteracy into language learning.

The research procedure consisted of three main stages. The first stage was a preliminary diagnostic study to identify the initial implementation of ecoliteracy in Indonesian language and literature learning. Data were collected through classroom observations, analysis of lesson plans and teaching materials, an ecoliteracy questionnaire, and a semi-structured teacher interview. This stage aimed to describe how environmental themes were integrated into reading, writing, and literary activities, as well as to identify students' initial ecological awareness and behavior.

The second stage was the development and implementation of the ecoliteracy-based learning intervention. The intervention integrated Project-Based Learning, Problem-Based Learning, and Experiential Learning because these approaches support active participation, contextual problem solving, and direct environmental practice. Learning activities included reading literary and non-literary texts with environmental themes, discussing ecological messages in texts, writing persuasive texts and short literary works related to environmental care, analyzing ecological values in folklore or poetry, and participating in contextual activities such as waste sorting, environmental campaigns, classroom cleanliness programs, and school greening. Before the intervention, students completed a reading comprehension pretest, an essay writing pretest, and an ecoliteracy questionnaire. After the intervention, students completed equivalent posttests and the ecoliteracy questionnaire to measure changes in literacy skills, ecological awareness, and pro-environmental behavior.

The instruments consisted of reading comprehension tests, essay writing tests, an ecoliteracy questionnaire, observation sheets, document analysis guidelines, and interview guidelines. The reading comprehension test measured students' ability to identify main ideas, interpret information, infer meaning, and understand ecological messages in texts. The essay writing test was assessed using a rubric covering content relevance, organization, vocabulary, language accuracy, coherence, and ecological message. The ecoliteracy questionnaire used a Likert scale to measure ecological knowledge, environmental attitudes, responsibility, and pro-environmental practices.

Instrument validity and reliability were examined before the instruments were used in the main data collection. Content validity was assessed through expert judgment involving experts in Indonesian language education, elementary education, and environmental education. The experts reviewed item relevance, language clarity, suitability for fourth-grade students, and alignment with the indicators of ecoliteracy, literacy skills, and pro-environmental behavior. Revisions were made based on their suggestions. The ecoliteracy questionnaire was then tested using corrected item-total correlation to examine item validity.

The item validity analysis showed that all questionnaire items had corrected item-total correlation values above the minimum acceptable criterion, indicating that the items were valid for measuring students' ecoliteracy. Reliability was examined using Cronbach's alpha, and the result indicated that the ecoliteracy questionnaire had acceptable internal consistency, as shown by a Cronbach's alpha coefficient above 0.70. The reading comprehension and essay writing scoring rubrics were also reviewed by experts to ensure content validity, indicator alignment, and scoring consistency (Cohen et al., 2017; DeVellis & Thorpe, 2021; Field, 2024).

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to describe students' ecoliteracy profile, literacy achievement, and pro-environmental behavior. The normality of pretest-posttest difference scores was examined using the Shapiro-Wilk test because the sample consisted of 30 students. If the data were normally distributed, a paired-sample t-test was used; if the data were not normally distributed, the Wilcoxon signed-rank test was applied. The significance level was set at 0.05, and effect size was calculated to determine the magnitude of the intervention effect.

Qualitative data from observations, document analysis, and teacher interviews were analyzed thematically by identifying relevant information, coding the data, grouping similar codes into themes, and interpreting the themes in relation to the research objectives. Ethical considerations were applied throughout the study. Permission was obtained from the school, and the teacher, students, and guardians were informed about the purpose and procedures of the study. Students' participation was voluntary, their identities were kept confidential, and the intervention was integrated into regular classroom learning to avoid disruption to the learning process.

Results and Discussion

Ecoliteracy Integration in Classroom Practice

The first research question examined the initial implementation of ecoliteracy in Indonesian language and literature learning at the primary school level. The diagnostic findings showed that ecoliteracy had been introduced in classroom practice, although its implementation was not yet fully systematic. Environmental themes appeared in several reading and writing activities, particularly through literary and non-literary texts containing ecological messages. However, these themes were not consistently integrated into lesson objectives, learning activities, and assessment. In some meetings, ecoliteracy functioned only as a supporting theme rather than as a structured instructional orientation.

Table 1. Ecoliteracy Questionnaire Results

No.	Statement	Mean	SD	% Agree
1	Understanding environmental balance	3.27	0.94	80%
2	Reducing plastic use	3.20	0.98	73%
3	Discussing environmental issues	3.60	0.80	87%
4	Small actions impact the environment	3.47	0.85	83%
5	Responsibility for the environment	3.53	0.76	87%
6	Energy-saving behavior	3.07	1.01	73%
7	Choosing eco-friendly products	3.47	0.88	80%
8	Waste management knowledge	3.60	0.77	87%
9	Shared responsibility awareness	3.73	0.65	93%
10	Participation in environmental activities	3.53	0.77	87%

The questionnaire results show that students' ecoliteracy was generally positive, with mean scores ranging from 3.07 to 3.73. The highest score was found in shared responsibility awareness, while the lowest score appeared in energy-saving behavior. This finding indicates that students had developed a basic understanding of environmental responsibility, but practical ecological habits, such as energy saving and reducing plastic use, still required reinforcement through regular school-based activities. The distribution of students' ecoliteracy index is presented in Figure 1.

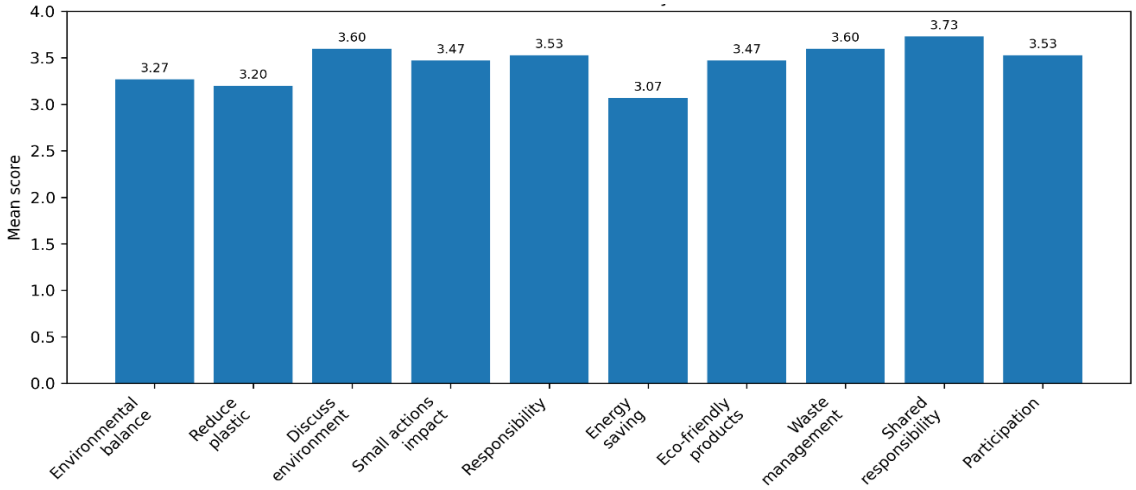

Figure 1. Students' Ecoliteracy Index

Figure 1 confirms that students showed stronger awareness in general ecological responsibility than in specific daily practices. This pattern indicates that ecoliteracy cannot be understood only as environmental knowledge. It also includes values, attitudes, and responsible action (McBride et al., 2013). Environmental knowledge does not automatically produce pro-environmental behavior when it is not supported by habituation, modeling, and contextual opportunities for action. Geiger et al. (2019) and Tian & Liu (2022) explain that pro-environmental behavior is shaped by the interaction of knowledge, attitudes, behavioral intention, and contextual conditions. Rintoni et al. (2025) also emphasize that environmentally caring character can be strengthened through information transfer, training, habituation, modeling, and conditioning. Therefore, the relatively lower score in energy-saving behavior suggests that ecoliteracy learning needs to be supported by repeated and observable ecological routines in the school environment. The classroom observation results are presented in Table 2.

Table 2. Observation of Ecoliteracy Integration

Aspect	Frequency	Description
Environmental texts	4/5 meetings	Frequently used
Environmental writing	3/5 meetings	Moderately applied
Ecocritical analysis	2/5 meetings	Limited
Sustainability values	3/5 meetings	Partially integrated

Table 2 shows that environmental texts were used in most meetings, while ecocritical analysis was still limited. This indicates that teachers were more familiar with using environmental themes as reading materials than guiding students to critically interpret ecological values in literary texts. Environmental writing and sustainability values were present in several meetings, but their implementation was still partial.

These findings answer the first research question by showing that ecoliteracy integration had begun, but remained at a developing stage. From a pedagogical perspective, the integration of ecoliteracy needs to move beyond the selection of environmental themes. Teachers need to guide students to interpret ecological meanings in texts, connect them with real environmental issues, and express their responses through oral and written language. Literary works can function as an important medium for ecological reflection because they often represent the relationship between humans, nature, morality, culture, and local wisdom (Ardoin et al., 2020; Brown, 2025; Starr, 2023).

Ecoliteracy-Based Learning Strategies in Indonesian Language and Literature Learning

The second research question focused on the strategies used to integrate ecoliteracy into Indonesian language and literature learning. The intervention was implemented through Project-Based Learning, Problem-Based Learning, and Experiential Learning. These strategies were selected because they support active learning, contextual problem solving, and direct environmental practice.

Table 3. Implementation of Ecoliteracy-Based Learning Strategies

Strategy	Frequency	Description
Project-Based Learning	4/5 meetings	Writing projects and environmental activities
Problem-Based Learning	3/5 meetings	Environmental problem solving
Experiential Learning	2/5 meetings	Direct environmental actions

Project-Based Learning was the most frequently implemented strategy because it was easier to integrate into Indonesian language learning activities. Students wrote texts related to environmental care and participated in simple projects such as waste sorting, classroom cleanliness, and environmental campaigns. Through this strategy, students did not only practice writing, but also used written language to communicate ecological messages. This finding is consistent with Sutisnawati et al. (2022), who reported that project-based constructivist learning can improve elementary students' literacy skills. In the present study, project-based tasks helped students understand that writing can function as a medium for expressing environmental responsibility.

Problem-Based Learning was implemented by encouraging students to identify environmental problems around the school and propose possible solutions. Students discussed issues such as waste management, plastic use, and classroom cleanliness. This activity supported students' critical thinking, collaboration, and oral communication. However, its implementation required more intensive teacher facilitation because elementary students needed guidance in formulating problems, organizing ideas, and developing feasible solutions. This finding is consistent with the principle of problem-based learning, which emphasizes active inquiry and solution-oriented thinking, while still requiring scaffolding to help students construct knowledge meaningfully.

Experiential Learning was implemented less frequently, but it contributed directly to the behavioral dimension of ecoliteracy. Activities such as cleaning the school environment and participating in greening activities allowed students to experience environmental responsibility directly. This is important because ecoliteracy-based learning should not stop at discussion or written expression. Students need direct experience to internalize ecological values and transform knowledge into action.

These findings answer the second research question by showing that ecoliteracy can be integrated into Indonesian language and literature learning through complementary strategies.

Project-Based Learning supports written production and ecological communication, Problem-Based Learning strengthens critical thinking and problem solving, while Experiential Learning develops direct environmental responsibility. The combination of these three strategies creates a learning process that connects cognitive, affective, and behavioral dimensions.

Effects of Ecoliteracy Integration on Students' Literacy Skills

The third research question examined the effectiveness of ecoliteracy integration in improving students' literacy skills and pro-environmental behavior. The effects on literacy skills were measured through reading comprehension and essay writing tests administered before and after the intervention.

Table 4. Students' Literacy Skills Before and After the Intervention

Aspect	N	Pretest Mean ± SD	Posttest Mean ± SD	Mean Gain	Test Statistic	p-value	Effect Size
Reading comprehension	30	4.80 ± 0.66	6.87 ± 0.86	2.07	Z = -5.03	< .001	r = 0.92
Essay writing	30	11.23 ± 2.06	15.73 ± 2.42	4.50	t(29) = 18.15	< .001	dz = 3.31

Table 4 shows that students' reading comprehension and essay writing scores increased after the ecoliteracy-based intervention. Reading comprehension increased from a pretest mean score of 4.80 (SD = 0.66) to a posttest mean score of 6.87 (SD = 0.86), with a mean gain of 2.07. Because the difference scores were not normally distributed, the Wilcoxon signed-rank test was used. The result showed a significant increase in students' reading comprehension scores after the intervention, Z = -5.03, p < .001, with a large effect size, r = 0.92.

Essay writing also improved from a pretest mean score of 11.23 (SD = 2.06) to a posttest mean score of 15.73 (SD = 2.42), with a mean gain of 4.50. Because the difference scores were normally distributed, a paired-sample t-test was used. The result showed a significant improvement in students' essay writing skills after the intervention, t(29) = 18.15, p < .001, with a very large effect size, dz = 3.31. The improvement in students' literacy skills is illustrated in Figure 2.

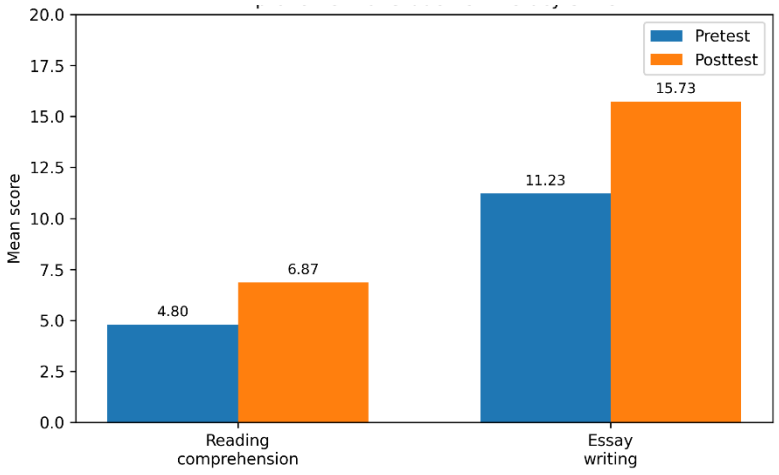

Figure 2. Improvement of Students' Literacy Skills

Figure 2 shows that both reading comprehension and essay writing improved after the intervention. The increase in reading comprehension suggests that environmental texts helped

students connect textual information with familiar contexts in their daily lives. When students read texts related to waste, environmental care, natural balance, and school cleanliness, they were able to relate the content to concrete experiences. Reading therefore became more meaningful because students did not only identify information, but also interpreted ecological messages and connected them with real situations.

The improvement in essay writing shows that ecoliteracy-based writing tasks gave students clearer purposes for composing texts. Students were encouraged to organize ideas, develop arguments, and express persuasive messages related to environmental care. Writing activities became more meaningful because students wrote about issues close to their lives. This finding is consistent with Saputra et al. (2024), who found that teaching materials designed to strengthen literary literacy can improve students' literacy skills, interest, and motivation. It also supports the broader view that contextual writing tasks can improve students' ability to produce coherent and purposeful texts because the topics are connected to lived experiences.

Effects of Ecoliteracy Integration on Students' Pro-Environmental Behavior

In addition to improving literacy skills, the intervention also encouraged students' ecological awareness and participation in environmental activities. Observation data showed that students became more active in maintaining classroom cleanliness, discussing environmental issues, sorting waste, and participating in school environmental practices. These behavioral indicators suggest that literacy learning can support ecological character formation when it is connected to direct action. This finding indicates that pro-environmental behavior is more likely to emerge when students are not only exposed to ecological concepts, but also given opportunities to practice them in familiar school contexts.

This finding strengthens the argument that Indonesian language and literature learning can serve as a bridge between ecological knowledge and pro-environmental behavior. Yonanda et al. (2020, 2023) found that ecoliteracy-oriented learning models enhanced students' scientific attitudes at the primary level, while Ivanka & Nurani (2025) showed that ecoliteracy-based media supported students' conceptual understanding and literacy development. The present study extends these findings by demonstrating that environmental awareness can also be developed through language and literature learning, particularly through reading, writing, literary appreciation, project-based activities, problem solving, and experiential learning. In this sense, language learning does not only develop linguistic competence but also functions as a medium for ecological reflection and responsible action.

The findings are consistent with recent international evidence on ecoliteracy. Murti et al. (2025) in a systematic review of ecoliteracy competencies, identified five important domains of ecoliteracy: ecological knowledge, critical thinking, environmental awareness, practical application, and active participation. These domains are reflected in the present study. Students' ecological knowledge was developed through environmental texts, critical thinking was stimulated through problem-based discussion, environmental awareness appeared in students' concern for school cleanliness, practical application was observed in waste sorting and greening activities, and active participation emerged through environmental campaigns. This comparison confirms that effective ecoliteracy learning should integrate cognitive, affective, and behavioral dimensions rather than treating environmental education as a separate or supplementary topic.

The results also support studies in sustainable language education. Kazazoglu (2025) reported that eco-literacy-focused writing activities in English language teaching improved

students' environmental vocabulary, critical thinking, and engagement with sustainability issues. Similarly, Dhanyamol & Sethunarayanan (2025) through a systematic review of environmental sustainability in English Language Teaching, found that interdisciplinary curriculum design, project-based learning, and authentic environmental texts can enhance both language proficiency and environmental awareness. These findings are closely aligned with the present study because students' pro-environmental behavior was strengthened through reading environmental texts, writing ecological messages, and participating in environmental activities. The comparison suggests that language classrooms can become strategic spaces for sustainability education when environmental content is integrated into meaningful communication tasks.

From the perspective of pro-environmental behavior theory, the findings show that knowledge must be supported by attitudes, intentions, contextual opportunities, and repeated practice. Geiger et al. (2019) and Tian & Liu (2022) argue that pro-environmental behavior is shaped by the interaction between environmental knowledge, attitudes, behavioral intentions, and situational factors. Burgos-Espinoza et al. (2025) and Vicente-Molina et al. (2013) also found that environmental knowledge contributes to environmental attitudes and pro-environmental behavior, but practical experience plays an important role in strengthening the link between knowledge and action. This theoretical position explains why the students in this study became more engaged in classroom cleanliness, waste sorting, and environmental campaigns after participating in experiential and project-based learning. Their behavior improved not merely because they received information, but because they were placed in learning situations that required ecological action.

Theoretically, the findings confirm that ecoliteracy involves cognitive, affective, and behavioral dimensions. The cognitive dimension appeared in students' improved understanding of environmental texts. The affective dimension was reflected in students' awareness of shared responsibility and concern for environmental problems. The behavioral dimension appeared in students' participation in classroom cleanliness, waste sorting, and environmental campaigns. This pattern supports the idea that ecological learning should not separate knowledge from action. Learning should guide students to understand ecological problems, feel responsible for them, and participate in solving them through appropriate actions. Therefore, ecoliteracy-based Indonesian language and literature learning can be understood as an integrative pedagogical approach that connects text comprehension, value formation, and environmental practice.

Viewed comprehensively, the findings show that the three research questions were answered clearly. First, the initial implementation of ecoliteracy in Indonesian language and literature learning had begun, but it was still partial and needed more systematic integration. Second, ecoliteracy could be integrated through Project-Based Learning, Problem-Based Learning, and Experiential Learning, each of which contributed to literacy development and ecological awareness. Third, the intervention improved students' reading comprehension, essay writing skills, ecological awareness, and participation in pro-environmental activities. The relationship among ecoliteracy, Indonesian language and literature learning, instructional strategies, and learning outcomes is summarized in Figure 3.

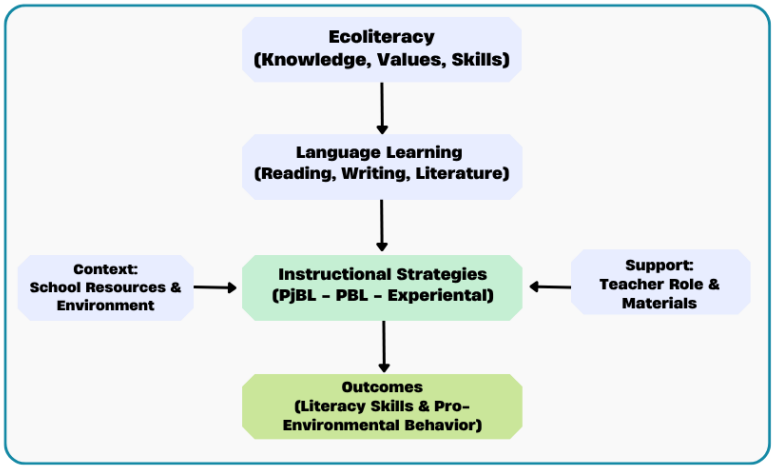

Figure 3. Conceptual Framework of Ecoliteracy Integration in Language Learning

Figure 3 illustrates that ecological knowledge and values serve as the content foundation. Indonesian language and literature learning becomes the pedagogical medium through reading, writing, discussion, and literary appreciation. Project-Based Learning, Problem-Based Learning, and Experiential Learning function as instructional strategies that connect text-based learning with environmental action. The expected outcomes are improved literacy skills, stronger ecological awareness, and more visible pro-environmental behavior.

This model is particularly relevant for resource-limited schools because it allows teachers to use available texts, local environmental issues, and simple school-based activities as meaningful learning resources. Thus, Indonesian language and literature learning can function not only as a subject for developing linguistic competence, but also as a medium for strengthening ecological awareness and environmental responsibility. The model also supports international discussions on sustainability-oriented language education, which emphasize the need for authentic environmental materials, interdisciplinary learning, project-based activities, and teacher support in integrating sustainability into language classrooms.

Despite these positive findings, this study has several limitations. First, the study involved only 30 students from one primary school, so the findings cannot be generalized to all elementary school contexts. Second, the intervention was conducted within a limited learning period, whereas behavioral change requires longer and continuous observation. Third, the study focused on school-based environmental behavior and did not examine students' long-term ecological habits outside the school environment. Fourth, the study did not use a control group, so the interpretation of intervention effects should be made cautiously. Future studies are recommended to involve more schools, use a longer intervention period, include a comparison or control group, and examine the sustainability of students' pro-environmental behavior in both school and home contexts.

Conclusion

This study demonstrates that the integration of ecoliteracy in Indonesian language and literature learning at the primary school level has been initiated but remains at a developing stage. In relation to the first research question, the findings show that ecoliteracy had begun to appear in classroom practice through environmental texts, writing activities, and the introduction of sustainability values, although its implementation was still partial and not yet systematically embedded across lesson objectives, learning activities, and assessment. In relation to the second research question, the study found that ecoliteracy could be integrated

through Project-Based Learning, Problem-Based Learning, and Experiential Learning. Project-based activities were the most feasible strategy in a resource-limited school context because they allowed students to produce environmental texts while engaging in simple ecological projects, whereas problem-based and experiential activities supported critical thinking, collaborative problem solving, and direct environmental responsibility. In relation to the third research question, the results indicate that the intervention improved students' reading comprehension, essay writing skills, ecological awareness, and participation in pro-environmental activities. These outcomes suggest that ecoliteracy, as a combination of ecological knowledge, values, and practical skills, can be transformed into meaningful language practices and observable environmental behavior when supported by contextual, active, and experience-based learning strategies. The conceptual framework proposed in this study further indicates that the effectiveness of ecoliteracy integration is shaped by contextual factors, including school resources, teacher support, and the availability of relevant learning materials. Taken together, this study confirms that Indonesian language and literature learning can function as an effective medium for ecological education when supported by contextual, active, and experience-based pedagogical approaches. Future research is recommended to explore broader implementation across diverse school contexts, involve a comparison group, extend the intervention period, and develop more structured instructional models to strengthen the consistency and sustainability of ecoliteracy integration.

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