

## Academic Writing for Sustainability: Content Analysis of Indonesian Language Curriculum in Senior High School

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*Abstract:* Ecological literacy is a key competency in 21st-century education, essential for addressing the global environmental crisis. However, the integration of sustainability values into the Indonesian language learning curriculum at the high school level has been rarely studied in depth, especially in the context of academic writing. This study aims to explore the extent to which ecological literacy principles are integrated into the Indonesian language curriculum documents and teaching modules at the high school level, and to identify the dominant or neglected dimensions of ecoliteracy in academic writing learning. Using Krippendorff's (2013) content analysis approach, 30 documents were systematically analyzed, covering Learning Outcomes (CP), regular teaching modules, and project modules (P5). The results showed that 60% of the documents demonstrated high integration, with an emphasis on real action, campaigns, and reflection; 23% showed moderate integration, characterized by ecological themes but minimal action; and 17% fell into the low category, focusing on technical aspects of writing without incorporating sustainability content. The dimensions of ecological knowledge and sustainability values were the most dominant, while systemic thinking and ecological action were still underexplored. This confirms that academic writing has not been fully utilized as a means of critical reflection and ecological advocacy, resulting in a gap between curriculum rhetoric and pedagogical practice. This finding indicates the importance of reorienting writing pedagogy towards transformation by emphasizing action-based assignments, value reflection, and socio-ecological participation. This study contributes to the development of curriculum design, teaching modules, and teacher training to support integrative and cross-disciplinary sustainability education.

Keywords: eco-literacy; independent curriculum; sustainability literacy; academic writing; language education

### Introduction

The global environmental crisis characterizing the Anthropocene era demands an active role for education in shaping generations with ecological awareness. In this context, ecological literacy (eco-literacy) has become a critical 21st-century competency that encompasses not only understanding ecosystem principles but also sustainable behavior and moral responsibility toward the Earth's sustainability (Capra, 2002; Ha et al., 2023; Orr, 2004; Syah et al., 2021). To date, the development of ecological literacy has been limited to science and ecology subjects, while the humanities, particularly language, have received little attention. However, environmental issues are complex and interdisciplinary, so an eco-pedagogical approach needs to incorporate language education as a vehicle for fostering critical and reflective awareness (Desmarais, 2024; Kadarisman & Pursitasari, 2023; Kazazoglu, 2025).

Indonesian language learning in senior high schools under the Merdeka Curriculum has provided space for contextual and project-based approaches, including in scientific writing skills such as exposition, argumentation, and articles.

These writing activities have great potential to serve as a platform for training students to think critically, construct data-based arguments, and respond to current issues that are relevant locally (McBride et al., 2013; Zhang et al., 2022). By using environmental issues as writing topics, scientific writing can be directed not only as a linguistic process but also as a practice of social and ecological advocacy (Guo & Asmawi, 2023; Sigit et al., 2023; Yu et al., 2024). Thus, ecoliteracy education and scientific writing skills are two complementary areas of learning in efforts to build a young generation that thinks critically, reflectively, and responsibly toward the environment.

There has been extensive research on the implementation of the Merdeka Curriculum. However, research examining the dimensions of sustainability and ecoliteracy in the context of academic writing is still limited. The integration of ecoliteracy principles into academic writing in secondary schools is still relatively new and has not become a systematic pedagogical practice (Saifulloh et al., 2025). Existing research has focused chiefly on text genres or writing strategies, while aspects such as values, ideology, and sustainability have received little attention. Thus, there is a research gap in evaluating the integration of ecoliteracy, both explicitly and implicitly, in CP, ATP, and teacher teaching modules.

However, previous studies have mostly highlighted text genres and writing strategies in Indonesian language learning, without exploring the integration of sustainability values and explicit ecoliteracy practices. Studies on the implementation of the Merdeka Curriculum have been conducted (Burke & Lehane, 2023; Guerrero & Torres-Olave, 2021; Lynch et al., 2025; Rihatmi et al., 2025), but few have examined the integration of ecological literacy principles in curriculum documents and teaching modules for scientific writing. Saifulloh et al. (2025) state that the integration of ecological literacy principles into academic writing instruction in secondary schools is still relatively new and has not yet become a systematic pedagogical practice. However, to achieve transformative education, a comprehensive mapping of the representation of themes, values, and sustainable practices in educational documents that serve as references for teachers and policymakers is necessary.

Building on this gap, this study aims to explore the integration of ecological literacy principles in Indonesian language curriculum documents and teaching modules at the high school level. This study also analyzes the most dominant and neglected dimensions of ecological literacy in scientific writing instruction. Thus, the research question is: "What is the level and form of ecological literacy integration in Indonesian language curriculum documents and teaching modules at the high school level, particularly in the context of scientific writing instruction?"

Theoretically, this study contributes to the expansion of ecological literacy discourse in the field of language education, which has not been the subject of critical study. Practically, the results of this study provide an empirical basis for the development of more contextual and transformative curricula, teaching modules, and teacher training. This research is relevant for strengthening the agenda of sustainable education that integrates academic literacy with interdisciplinary ecological advocacy, in line with the spirit of the Merdeka Curriculum and the Pancasila Student Profile.

## Theoretical Foundation

### *The Context of Academic Writing at the Senior High School Level in Indonesia*

Academic writing at the senior high school level in Indonesia occupies a strategic position in the development of higher-order thinking literacy. The Merdeka Curriculum places learning outcomes that require students to have the ability to compose simple scientific texts based on formal structures, think logically, present data-based arguments, and use standard language effectively in the Indonesian Language class for grade XI. Scientific writing instruction is guided by a process-oriented approach that encourages students not only to produce written products but also to understand the steps of writing, from planning, drafting, revising, to publication or presentation. Therefore, scientific writing serves as an important tool for developing critical, reflective, and communicative thinking skills (Hyland, 2009; Lee, 2017).

Scientific writing practices in high schools face various challenges. Previous studies have shown that many students struggle to develop ideas, construct coherent arguments, and revise their writing independently (Harshalatha & Sreenivasulu, 2024; Ulfa & Wahyudi, 2023). These obstacles are exacerbated by limited learning time, a lack of scientific genre modeling by teachers, and the unavailability of teaching modules that support strategy-based writing learning (Min, 2006; He & Gao, 2023). The Pancasila Student Profile Strengthening Project (P5) provides space to integrate transdisciplinary themes into learning, including ecological literacy and sustainability. However, practices in schools, both in writing instruction and P5 activities, have not sufficiently explored contextual issues such as sustainability, local culture, or the environment, thereby failing to strengthen students' character and ecological awareness optimally (Hindriyanti et al., 2023; Jeong et al., 2024; Sintiya et al., 2025). Thus, the context of scientific writing at the Indonesian high school level is currently at a crossroads between the demands of a progressive curriculum and conventional teaching practices.

In this context, there is an urgent need to bridge scientific writing with the strengthening of ecological literacy. Scientific writing is not only relevant in the development of logical and argumentative structures, but can also function as a

means of advocacy and expression of ecological values. Theoretically, scientific writing can be integrated into the framework of sustainability literacy through the concept of eco-reflexive writing, which is a writing practice that not only transfers information but also encourages reflection on values and social responsibility towards environmental issues (Nichols, 2024; Jickling & Sterling, 2017). Through this approach, writing is no longer merely a linguistic activity but becomes a transformative tool for change within the framework of sustainable education.

### *Indicators of Eco-Literacy in Curriculum Documents and Teaching Modules*

Ecological literacy is a multidimensional competency that emphasizes not only an understanding of basic ecosystem principles but also the ability to live in harmony with socio-ecological systems sustainably. Ecological literacy is not merely about understanding ecological principles but also about being able to apply these principles in daily life. Capra (2002) suggests that a systems thinking approach should serve as the foundation for integrating ecological insights into interdisciplinary curricula. To expand this framework, Cusick et al. (2010) and Panieri et al. (2024) developed evaluative indicators based on environmental education that can be applied in the analysis of formal education documents. Meanwhile, Goleman et al. (2012) even proposed strengthening ecological literacy through the integration of social-emotional intelligence as the foundation for sustainable behavioral change. Thus, a comprehensive indicator framework rooted in a strong theoretical foundation is essential for measuring the integration of sustainability values in curricula and teaching modules, explicitly covering content, learning objectives, and assessment strategies.

Eco-literacy indicators in the context of educational document analysis can be categorized into four main dimensions as follows.

Table 1. Indicators of Ecological Literacy Dimensions in Document Analysis

<b>Eco-literacy Dimension</b>	<b>Brief Definition</b>	<b>Indicators in Documents</b>
Ecological Knowledge	Understanding of basic ecosystem concepts, human impact on the environment	Content on recycling, water crisis, climate change, biodiversity, etc.
Awareness and Values	Ethical values, empathy towards nature, social-ecological responsibility	Learning objectives include empathy, sustainability, and ecological morality
Systemic Thinking	Ability to see the interconnections between elements in ecological and social systems	Activities involving cause-and-effect analysis, cross-sectoral relationships, and environmental dynamics simulations

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Ecological actions	Active participation in real-world actions for sustainability	Environmental campaign projects, advocacy writing, student publications, action-based reflection
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First, ecological knowledge. This dimension refers to students' understanding of basic environmental and ecological concepts, such as the material cycle, ecosystem balance, biodiversity, climate change, and the impact of human activities on nature (Goleman et al., 2012). In curriculum documents and teaching modules, this indicator can be identified through the presence of thematic content or learning resources that explicitly address environmental concepts. Second, environmental awareness and values. This dimension reflects the development of ethical values, moral responsibility, and empathy towards nature and other living things. Students are guided to see the relationship between humans and the environment as a reciprocal relationship that requires attention and care (Gough, 2005; Sterling, 2009). In the context of teaching modules, these indicators can be found in learning objectives that encourage reflection on sustainability values and ethical decisions regarding environmental issues.

Third, systems thinking. Systems thinking is the ability to understand the interrelationships between parts of an ecological and social system and to predict the long-term impacts of an action or policy (Assaraf & Orion, 2005). Modules or learning activities that involve cause-and-effect analysis, multi-sector relations, or ecosystem dynamics simulations are indicators of a systemic approach in learning. Fourth, ecological action. This dimension emphasizes the drive to take concrete action in daily life to support environmental sustainability. This can take the form of community projects, environmental campaigns, the production of argumentative texts on ecological themes, or critical reflections that lead to solutions (Abo-Khalil, 2024; Monika, 2024; Yu et al., 2024). In documents and modules, these indicators are evident in project-based assignments, ecological citizenship practices, or learning activities that lead to behavioral change. These dimensions complement one another, forming a framework for analyzing whether curriculum documents and teacher instructional modules have explicitly, structurally, and contextually integrated the principles of ecoliteracy into academic writing instruction.

## Method

### *Research Design*

This study employs a *qualitative content analysis* approach. Content analysis is used to investigate the integration of ecological literacy principles in

national curriculum documents and Indonesian language teaching modules at the high school level. This study focuses on the explicit meanings stated in the documents of the curriculum and teaching modules, without using discourse analysis to consider implicit meanings such as educational philosophy.

The content analysis approach used follows the systematic model developed by (Krippendorff, 2018; Neuendorf, 2017). Krippendorff was chosen for its ability to combine quantitative precision and interpretive depth, enabling researchers to explicitly identify contextual meanings while constructing consistent thematic categorizations. Compared to Mayring's more normative-descriptive approach or Elo & Kyngäs' inductive focus on hierarchical category structures, Krippendorff's approach is more flexible in accommodating deductive-inductive combinations and maintains epistemological coherence and coding transparency, particularly in complex and policy-oriented educational contexts.

### *Subject or Unit of Analysis*

The subjects in this study are official educational documents as units of analysis. There are 30 documents analyzed, consisting of 1 Indonesian Language Learning Outcomes (CP) document for Phase F, 9 Learning Objective Flow (ATP) documents downloaded from the Ministry of Education and Culture's Curriculum and Learning Center platform (<https://kurikulum.kemdikbud.go.id>) and 13 teaching modules for Indonesian language subjects and 7 project modules with the theme "Sustainable Lifestyle" that have been curated and disseminated on the Merdeka Mengajar Platform (<https://guru.kemdikbud.go.id>). The selection of modules was based on criteria related to the relevance of content to scientific or argumentative text writing skills and topics or subtopics that address environmental or sustainability issues. Each document was analyzed based on sections, namely learning objectives, student activities and assignments, contextual material and narrative, and assessment and reflection. This stage ensured that the analysis focused on text segments that potentially contained principles of ecological literacy.

### *Data Collection Techniques*

Data is collected through digital documentation of selected curriculum texts and teaching modules. Each document is downloaded in PDF format and organized using a classification system based on source (CP, ATP, regular teaching modules, and project modules). Analysis units within each document include learning objectives, learning activities, contextual narratives, student assignments, and assessment/reflection.

### *Content Analysis Procedure*

The analysis procedure in this study consists of five systematic stages adapted from Krippendorff's (2019) model as follows.

- a) Unitization, which involves identifying relevant text units for analysis. The analysis units in this study are national curriculum documents for the Indonesian language subject at the high school level.
- b) Coding was carried out by labeling predetermined units based on four main categories of ecological literacy. Coding is conducted deductively and inductively, with initial categories derived from ecological literacy theory, including ecological literacy indicators based on four main dimensions: (1) the presence of environmental themes or ecological issues as content or context of the text, (2) emphasis on ecological awareness, sustainability values, and social responsibility, (3) calls for reflective action or attitude change toward environmental issues (Capra, 2002; Cusick et al., 2010; D. Orr, 1992). The coding process was conducted deductively-inductively to identify units of meaning, key phrases, and relevant themes. Coding was performed using four main categories of ecological literacy (see Table 1). The initial categories were derived from ecological literacy theory (Capra, 2002; Goleman et al., 2012) and then refined during the analysis process. All documents were coded using NVivo 12 software to support transparency, manage data systematically, and facilitate the recording of the coding process, revisions, inter-, and inter-researcher validation. After the coding process was completed, each document was classified based on the level of integration of ecoliteracy principles into academic writing instruction. This classification aims to provide a quantitative-qualitative overview of the extent to which ecoliteracy principles are integrated into writing instruction practices in secondary schools.
- c) Data reduction involves filtering out irrelevant information and focusing only on the content of documents that contain potential indicators of ecoliteracy. This is done to maintain the focus of the analysis and ensure that only ecologically meaningful data is analyzed further.
- d) Inference (inferring) is conducted to interpret the meaning of the coded text units. At this stage, the analysis focuses on the extent to which ecoliteracy values are articulated explicitly or implicitly, as well as how the document's narrative reflects the strength of the integration of sustainability principles in the context of writing instruction.
- e) Presentation and Validation. The results of the analysis are organized and classified during the presentation and validation stage. Data is categorized into three levels of eco-literacy integration as follows.

**Table 1. Classification of Eco-Literacy Integration**

<b>Levels of Eco-Literacy Integration</b>	<b>Indicators</b>
High	Explicit, deep, and systematic integration between academic writing activities and eco-literacy themes. Additionally, there are scientific writing assignments based on environmental issues with structured pedagogical guidance.
Moderate	Environmental themes or values are mentioned in the context of writing instruction, but without in-depth exploration or consistent integration.
Low	There is no explicit mention of environmental themes, or they only appear implicitly and are not directly related to the objectives of academic writing.

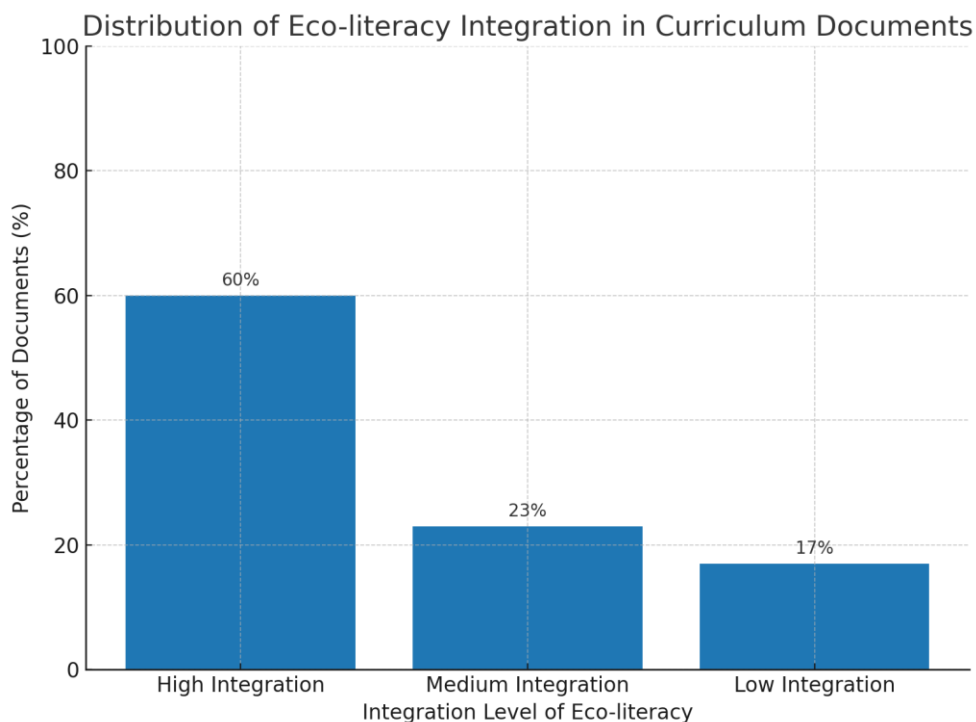
### *Data Analysis Techniques*

Data analysis was conducted through a process of categorization, interpretation, and integrative classification. Thematic coding was performed openly and axially to establish inter-dimensional relationships. Simple quantitative data, such as the frequency of dimensions appearing in documents, were presented to show the distribution of indicator dominance. Triangulation was performed through re-reading of documents by two independent researchers to increase the reliability of interpretation. Validity is enhanced through an audit trail of the coding process and cross-checking between analysis units.

### **Results**

#### *Level of Integration of Ecological Literacy Principles in Curriculum Documents and Teaching Modules*

The results of the analysis of 30 Indonesian language learning documents at the senior high school level, consisting of CP, ATP, regular teaching modules, and project modules (P5), show variations in the level of integration of ecological literacy principles. Based on the four main dimensions of ecological literacy the documents were classified into three categories: high, moderate, and low integration. The following diagram presents the percentage distribution of each category of ecological literacy integration found in all analyzed documents.



**Figure 1. Distribution of Ecoliteracy Integration in Curriculum Documents**

Sixty percent of the documents were categorized as having high integration. These documents explicitly link environmental themes to action-based scientific writing activities. *The module “Manage Your Electronic Waste!” (MA-P5-Ewaste), “My Waste, My Inspiration” (MA-P5-Sampahku), “From Empty Land to Mother’s Kitchen” (MA-P5-DapurIbu), and “Innovations in Sansevieria Plants” (MA-P5-Sansevieria)* demonstrate an integrative solution-based approach. This is evident in how the documents connect academic literacy with ecological citizenship practices, as seen in the quote from MA-P5-Sampahku: *“Students develop reuse program proposals, present them, and implement them in the form of exhibitions, vlogs, and posters.”* This quote demonstrates that writing tasks involve real-world actions such as *exhibitions, vlogs, and posters*.

The strengthening of ecological thinking and community action, demonstrated through activities such as observation, interviews, solution design, and written reflection in the form of articles and campaign media, is evident in the

modules “*Ranumkan Sungai*” (MA-P5-RanumSungai) and “*Food Security and Climate*” (MA-P5-Food). Meanwhile, the regular teaching modules MA-003 (Scientific Writing) and MA-004 (Food Security-Based Argumentation) demonstrate high integration, particularly through scientific writing assignments based on contextual environmental issues. Additionally, the ecological action dimension is explicitly evident in these documents. Quotes from MA-P5-CerdikSampah (“*Students create short videos and social media campaigns about waste management*”) and MA-P5-Hydroponics (“*Students write scientific reports and papers on hydroponics; conduct campaigns at school and create creative videos for public education*”) indicate that academic writing is not only oriented toward linguistic structure but also directed toward social influence and ecological behavioral change among students. These findings align with the study by Ninsiana et al. (2024) and the theory by Goleman et al. (2012) regarding the relationship between ecological literacy, social-emotional intelligence, and experiential learning.

Conversely, 23% of documents showed moderate integration. Documents in this category explicitly featured ecological themes, but these were limited to the content level. Ecological themes were explicitly presented but only at the content or writing context level, without accompanying assignments that encouraged real action, public campaigns, or critical reflection by students. The dominant dimensions are ecological knowledge and value-, while ecological action and systemic thinking appear only implicitly or unsystematically. For example, in MA-005 (*Argumentative Text – Food Security*), students are asked to “*develop arguments based on current issues such as food waste, dependence on food imports, or climate change.*” Although the topics are relevant to ecological literacy, the writing tasks in modules such as MA-005 and MA-009 do not encourage action or reflection, nor are they accompanied by pedagogical strategies to build students' ecological awareness in depth. The dimensions of ecological knowledge and sustainability values are more dominant, while the dimensions of ecological action and systemic thinking appear implicitly. These limitations align with (Boehnert, 2013) critique of “ecological tokenism,” where the representation of environmental issues is not accompanied by transformative pedagogical practices.

The content of MA-009 (*Explanatory Text – Food Security*) shows similar findings. This module does not present ecological dimensions in either teacher instructions or final assessments. This can be seen in the instruction “*observe local food security conditions through interviews and field observations.*” The instruction only directs students to write explanatory texts, without any sustainability instructions in the form of publications, campaigns, or social actions. In MA-010 (*Natural Phenomena and the Environment*), ecological content is

manifested in the quote *“students compose explanatory texts based on natural phenomena in the surrounding environment.”* Although this quote indicates the involvement of ecological themes, pedagogical intervention stops at the descriptive level, without encouraging the processing of ideas into solutions or advocacy.

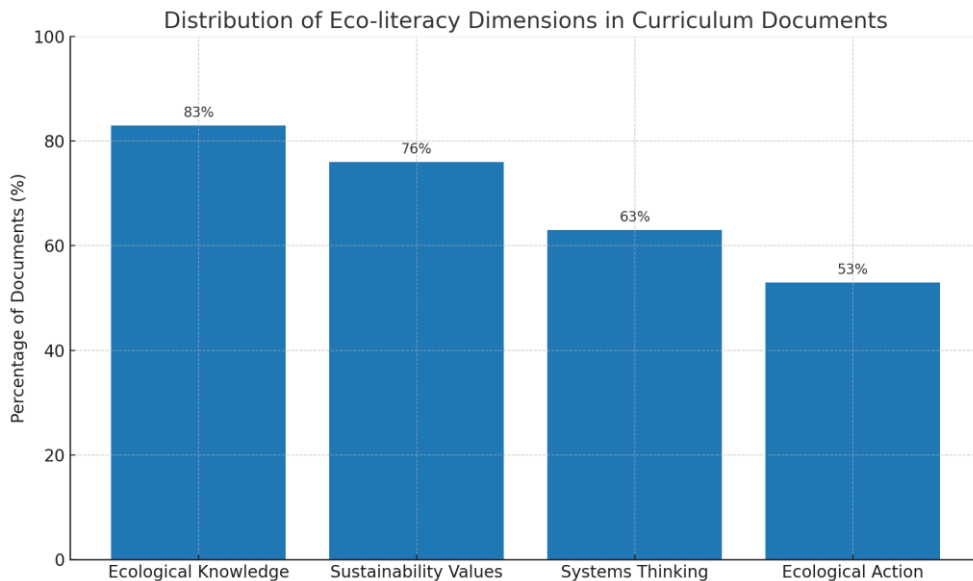
As for 17% of the documents, they fall into the low integration category. These documents tend to emphasize technical aspects of writing, such as text structure and language rules, without including a sustainability context or critical reflection. This is reflected in the module *“Writing Argumentative Texts”* (MA-007), where all activities are directed toward *“developing skills in composing opinion and argumentative texts based on the correct structure and rules of the Indonesian language,”* without any guidance on selecting contextual issues such as the environment, food, or climate crisis. Additionally, the Learning Outcomes and instructional objectives do not include ecological indicators.

Document *MA-011* also shows a similar focus. Students are directed to write scientific papers with an emphasis on *“writing systematics, use of references, and mastery of format,”* but are not given the freedom to explore contextual themes or socio-ecological values in the content of their writing. This demonstrates an academic approach that is procedural but not transformative. In module *MA-013*, students write *“scientific papers based on topics chosen by the teacher,”* but there is no connection to sustainability issues or ecological values. Writing activities are designed as technical simulations rather than part of ecological citizenship practices. Similar symptoms are evident in document *CP-001* (Indonesian Language Learning Outcomes document). Although it provides space for scientific and argumentative writing, there are no indicators of ecological literacy as an attitude or contextual competency outcome. Instructions such as *“composing academic texts based on reading sources and logical reasoning”* indicate a thematically neutral approach. The absence of ecological themes in this document highlights the weak role of the curriculum as a vehicle for eco-citizenship (Guerrero & Torres-Olave, 2021).

#### *Distribution of Ecological Literacy Dimensions in Scientific Writing Instruction*

Further analysis of the frequency of each dimension of ecological literacy shows that the dimension of ecological knowledge is the most dominant, appearing in 83% of documents. Themes such as food security, waste, and water crisis are often used as contexts for scientific writing, especially in the genres of explanation and argumentation. Meanwhile, the sustainability values dimension was identified in 76% of documents, marked by calls for ecological empathy, collaboration, and narratives of social responsibility. Although these two dimensions show an initial awareness of sustainability, their integration is still

focused on cognition rather than action.



**Figure 2. Distribution of Ecoliteracy Dimensions in Curriculum Document**

The ecological knowledge dimension emerged as the most dominant, identified in 83% of documents. Themes such as pollution, food security, electronic waste, and water crisis were raised as writing contexts, especially in explanatory and argumentative genres. This indicates an effort to link academic writing skills with factual issues rooted in real environmental conditions. This fact reflects an initial awareness among curriculum developers to make environmental issues contextual material. Meanwhile, 76% of documents indicate the presence of the sustainability value dimension, marked by the strengthening of ecological empathy, calls for collaboration, and narratives of social responsibility. Several modules encourage students to position themselves as part of the solution through reflective writing or scientific articles based on socio-environmental phenomena. However, these two dimensions appear more in the form of content delivery or thematic illustrations than in action-oriented learning practices.

The systemic thinking dimension appears in 63% of the documents, but only in the form of simple cause-and-effect relationships. No explicit strategies

were found to encourage students to integrate social, economic, and ecological variables in a comprehensive manner. This indicates that interdisciplinary approaches and mapping of socio-ecological systems have not been developed in scientific writing instruction. However, as highlighted by Boehnert (2013), systemic thinking is a crucial foundation for building complex and reflective sustainability awareness.

The most limited dimension is ecological action, which appears in only 53% of documents and is largely concentrated in the project module (P5). Regular modules tend to lack project-based writing assignments or public advocacy. The absence of this dimension indicates that writing skills have not been fully utilized to encourage real action or student participation in environmental issues. This aligns with the criticism by Yu et al. (2024), who state that the dominance of conventional text-based assessments in the " " hinders the expression of ecological participation among students. In the context of critical pedagogy, the tendency for cognitive aspects to dominate without being accompanied by affective reinforcement and action shows that learning is still in the early stages of awareness, indicating that ecological literacy in the context of writing learning is not yet optimal as an instrument of social transformation.

These findings indicate a disparity between the progressive explicit curriculum and writing learning practices that are still normative and technical. The theoretical implications of these findings reinforce the framework of ecological literacy as multidimensional, encompassing cognition, affect, and action. Practically, these results recommend the need to revise the curriculum to strengthen explicit indicators of ecological literacy in Indonesian language learning outcomes. In addition, teachers need to be supported with training and contextual teaching modules that enable them to design issue-based writing tasks, community projects, and digital campaigns. These efforts are crucial to bridge the gap between academic writing skills and students' roles as agents of social and ecological change.

## Discussion

### High Integration: From Discourse to Ecological Action

Findings indicate that 60% of the documents analyzed have a high level of integration with ecological literacy principles, with a direct link between scientific writing and real-world action based on environmental issues. Modules such as *Hydroponics*, *My Waste*, *My Inspiration*, and *Sansevieria* demonstrate writing practices that not only emphasize text structure but also encourage students to conduct field observations, compile data-based articles, and disseminate their findings through digital media or public campaigns. These results support Goleman et al.'s (2012) theory that ecological literacy requires integration

between cognition, emotion, and action.

This approach is also in line with the *eco-reflexive writing* model where writing is positioned as a space for personal reflection and social contribution. Compared to Lee (2017) study, which still emphasizes genre and academic structure, this research shows that documents with high integration have encouraged students to become active subjects in the sustainability discourse. The implications of these findings are the need to institutionalize similar approaches in writing instruction practices by expanding teacher training in designing data-based tasks, value reflection, and social impact.

#### Moderate Integration: Dominance of Theme, Minimal Action

A total of 23% of documents raised ecological themes as writing content, but did not include reflective actions or sustainability projects. Modules such as *MA-005* and *MA-010* only present environmental issues on the surface of the text, without learning mechanisms that foster critical awareness or real action. This condition reflects the practice of ecological tokenism (Boehnert, 2013), where the presence of environmental themes is symbolic and not rooted in values and practices. Leek & Rojek (2022) warns that without an action-based and values-driven approach, ecological literacy risks becoming an empty slogan. While the presence of ecological values in these documents is important as an initial step, the limitations in connecting academic writing with ecological advocacy or participation hinder the creation of transformative education. That the success of ecological literacy in language learning is highly dependent on student involvement in project-based activities and social publishing. This limitation may be due to the lack of adequate instructional support for teachers to develop impact-based assessments or action reflection. Therefore, documents in this category require strengthened learning design so that academic writing does not remain a genre exercise but evolves into a tool for social transformation.

#### Low Integration: Minimal Themes, Minimal Action

Conversely, 17% of documents show very low integration, where academic writing is positioned solely as a technical exercise without explicit links to sustainability issues. Modules such as *MA-007* and *CP-001* do not mention environmental themes or socio-ecological values as part of learning competencies. This finding indicates that the dimensions of ecological action and systemic thinking have not yet become part of the academic literacy construct in these documents.

This condition confirms the findings of (Sezen-Gultekin & Argon, 2022) regarding *surface literacy*, which is a superficial and non-contextual approach to writing. In the context of the Merdeka Curriculum, this is ironic because the

approach emphasized in the curriculum emphasizes contextual, transdisciplinary, and project-based learning. This finding is found that students are more likely to internalize sustainability values if the academic literacy process is linked to locally relevant environmental issues. Without alignment between the curriculum and learning design that builds eco-agency, students will be trapped in technical-instrumental writing practices, unaware of the potential of text as a tool for social-ecological reflection and advocacy. Unlike the approach recommended by (Jickling & Sterling, 2017), where 21st-century literacy must balance knowledge and action dimensions, these documents are stuck in normative and fragmented learning designs. Possible causes include the dominance of exam-based assessments and the absence of explicit indicators related to eco-literacy in the core curriculum.

#### Dominance of Ecological Knowledge and Sustainability Values

In general, the dimensions of ecological knowledge (83%) and sustainability values (76%) are more frequently integrated than systemic thinking (63%) and ecological action (53%). These results support the report by Cusick et al. (2010), which states that the initial implementation of ecological literacy often focuses on cognitive and affective aspects but fails to achieve the action dimension. Interestingly, the action dimension is almost entirely limited to the project module (P5), while the regular modules are still dominated by linguistic structures.

The implication of these findings is that ecological literacy transformation requires systemic interventions, including teacher training, provision of contextual teaching resources, and revision of assessment rubrics. If ecological actions are not critically facilitated, the potential of academic literacy as a tool for social change will be replaced by mechanical writing practices. This is in line with Dale et al. (2020) critique that without strengthening the action dimension, sustainability education will be trapped in ineffective pseudo-activism. The context of the Merdeka Curriculum, which encourages teacher freedom and creativity, can be an opportunity to overcome these obstacles, provided it is balanced with systemic support. This includes teacher training on reflective-ecological pedagogy, the development of contextual teaching modules, and assessment rubrics that accommodate value and action aspects. One recommended form of training is *lesson study for learning communities*, which enables teachers to collaboratively design, reflect on, and revise writing instruction strategies that incorporate sustainability values.

This finding contributes significantly to redefining the orientation of scientific writing pedagogy as an ecological citizenship practice. In the context of writing education, this means that data-driven, multimedia, and locally relevant writing projects should be facilitated with instructional tools that foster critical

reflection and tangible contributions to the community (Akinsemolu & Onyeaka, 2025). Such models have been successfully implemented in educational practices in Korea and Europe Sezen-Gultekin & Argon (2022) and are relevant for adaptation in the Indonesian context through local issue-based assignments, digital campaigns, or community project reflections. The study by Žalėnienė & Pereira (2021) shows that the success of sustainability integration depends heavily on teachers' pedagogical readiness to develop sustainability values, systemic thinking, and guide students in socially and ecologically meaningful literacy practices. Unfortunately, as found in the document analysis in this study, teachers' initiatives in building connections between local contexts and real-world actions remain sporadic, indicating a need for stronger training and policy support.

This study makes a significant contribution to understanding the integration of ecological literacy in Indonesian language learning documents, but there are several limitations that need to be acknowledged. The analysis was only conducted on written documents without including classroom observations or interviews with teachers and students, so the interpretation of implementation is associative and does not fully reflect instructional reality. There may be variations in teaching practices that are not documented in official modules. Therefore, further studies are needed using a classroom ethnography, lesson study, or case study approach to explore the dynamics of reflection, decision-making, and innovation among teachers in integrating ecological literacy into writing instruction.

## Conclusion

This study reveals that the integration of ecological literacy in Indonesian language curriculum documents and teaching modules at the senior high school level is still uneven, with a dominance of the dimensions of ecological knowledge and sustainability values, while the dimensions of systemic thinking and ecological action are still limited. These findings indicate that scientific writing has not been fully utilized as a means of critical reflection and ecological advocacy, which should reflect the principles of 21st-century literacy. The main contribution of this study lies in the systematic mapping of the integration of sustainability values in language education documents and the development of a pedagogical framework that positions writing as an ecological citizenship practice. The implications of these findings emphasize the importance of strengthening action-based learning design, developing impact-based assessment rubrics, and training teachers to apply *eco-reflexive writing* approaches. Therefore, it is recommended that the Merdeka Curriculum and its supporting documents revise writing learning outcomes by adding explicit indicators related to ecological literacy and providing contextual teaching modules that encourage student engagement in real

environmental issues. This study affirms that academic literacy and sustainability are inseparable and must be designed integrally to shape a generation of reflective, participatory, and ecologically responsible learners.

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