

# **Integrating Ecolinguistic-Based Writing Pedagogy to Enhance Students' Writing Skills and Environmental Awareness: Evidence from a Pre-Experimental Study**

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DOI: 10.18355/XL.2026.19.01.08

## **Abstract**

This study investigates the effect of an ecolinguistic-based writing pedagogy on students' writing skills and environmental awareness in an English Education Study Program. As global challenges related to climate change and ecological sustainability grow, higher education must integrate environmental values into teaching. Using a pre-experimental single-group pre-test/post-test design, 35 students completed writing and environmental awareness tests before and after a 4-session intervention. Results show significant improvements in both domains: writing skills increased from an average of 63.37 to 88.66 ( $t = 9.36$ ,  $p < 0.05$ , Cohen's  $d = \text{large}$ ), while environmental awareness rose from 62.15 to 87.12 ( $t = 8.92$ ,  $p < 0.05$ , Cohen's  $d = \text{large}$ ). These findings confirm that ecolinguistic-based pedagogy not only strengthens academic writing but also fosters ecological sensitivity. This study extends ecolinguistic research beyond text analysis by applying it pedagogically in higher education writing courses. The implications highlight the potential of integrating ecolinguistics into curricula to cultivate students who are both linguistically competent and environmentally responsible.

**Key words:** Ecolinguistics, writing pedagogy, environmental awareness, quantitative study

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## **Introduction**

Environmental issues are becoming an increasingly urgent global challenge, with climate change, pollution, ecosystem degradation, and biodiversity loss affecting life worldwide (Caro et al. 2022; Hogue and Breon 2022). The solution to this problem requires not only technical policies, but also the active participation of the community, especially the younger generation (Pörtner, 2023). Students, as agents of change, play a strategic role in devising solutions to increasingly complex environmental problems (Sofiani and Magriasti 2023; Altassan 2023). (Altassan, 2023) Higher education plays an important role in shaping students' character to care about environmental sustainability (Husban, 2025). Higher education institutions have the opportunity to incorporate environmental awareness into their curricula, particularly through language teaching (Husban, 2025). Ecolinguistic-based writing instruction can be an effective means of fostering environmental awareness, where writing not only home-linguistic skills, but also enables students to formulate and communicate ideas related to social change and ecological sustainability. Ecolinguistics studies the relationship between language and the environment, and integrating it into writing instruction gives students a new perspective on how language can influence attitudes and behaviour towards nature and address environmental issues (Wang et al. 2022; Penz and Fill 2022). This approach enables students to develop good writing skills while raising their awareness of social and ecological issues (Pulimeno, Piscitelli, and Colazzo 2020; Kazazoglu 2025). This study focuses on the influence of ecolinguistic-based writing pedagogy on students' environmental awareness, filling a gap in the literature that focuses more on text analysis. Based on a quantitative and pre-experimental design, this study aimed to provide empirical evidence on how this approach can improve students' writing skills and environmental awareness.

From a theoretical perspective, this study contributes to the development of ecolinguistic studies, particularly in language education. Until now, ecolinguistics has been widely used to analyze texts, but its application in writing pedagogy remains limited (Cheng and He 2022; Song, Bakar, and Abas 2025; Cheng 2022). This study enriches ecolinguistic research by offering an applicable approach that is relevant to language education. In practical terms, the findings of this study provide insights for the development of higher-education curricula, particularly in language and education study programs, to incorporate environmental education. Ecolinguistic-based writing instruction that integrates environmental issues can improve students' writing skills and deepen their awareness of the importance of nature conservation and sustainability. By integrating sustainability values into the curriculum, universities can produce graduates who are not only academically competent but also concerned with ecological sustainability.

This research can also assist universities in designing teaching strategies that address global challenges, particularly those related to climate change and environmental sustainability. The results of this study support the achievement of Sustainable Development Goals (SDGs), particularly SDG 4 (quality education) and SDG 13 (climate action). This study aimed to measure the influence of an ecolinguistic-based writing pedagogy on students' writing skills and environmental awareness. This study contributes to the development of learning methods that combine language skills with ecological values and provides new insights into preparing students to become agents of change in the context of ecological sustainability.

## **Methods**

### **Research Design**

This study utilized a quantitative approach with a one-group pre-test post-test pre-experimental design (Taylor and Anderson-cook 2012; Selten 1996). This design allows for measuring changes in students' writing skills and environmental awareness after receiving an ecolinguistic-based writing intervention. Although an experimental design with a control group would provide stronger causal inferences, this design is considered appropriate for preliminary research with limited resources and sample size.

### **Population and Sample**

The study population comprised students enrolled in the English Education program at STKIP Taman Siswa Bima, Indonesia. Sampling was conducted using purposive sampling, resulting in 35 third-semester students with the following criteria:

1. Never received ecolinguistic learning materials before.
2. Officially enrolled in the academic writing course during the research semester.
3. Attend all intervention sessions and complete the pre-test and post-test.

This selection ensured that the sample was relatively homogeneous in terms of prior knowledge of ecolinguistics, but still had a range of writing skills to assess the impact of the intervention.

### **Instrument**

#### **1. Writing Skills Test**

Students' writing skills were measured using analytical rubric developed specifically for this study and validated by two language education experts. The rubric consisted of four dimensions:

- a. Coherence and cohesion (logical flow and transitions between ideas).
- b. Argumentation and critical thinking (the ability to construct systematic and evidence-based arguments).
- c. Language accuracy (grammar, vocabulary, and sentence structure).

d. Integration of ecological content (the ability to link environmental issues with sustainability-based solutions).  
 Each dimension was assessed using a five-point scale (1–5) with a maximum score of 20. Inter-rater reliability calculated from two assessors resulted in Cronbach’s  $\alpha = 0.86$ , indicating high internal consistency.

2. Environmental Awareness Test

Environmental awareness was measured using a 20-item questionnaire adapted from previous instruments (Ma et al., 2023). This instrument covers three main dimensions: cognitive, affective, and conative, with a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Reliability testing in a pilot group resulted in Cronbach’s  $\alpha = 0.82$ , indicating good internal consistency.

**Table 1.** Dimensions of Environmental Awareness and Sample Indicators

<b>Dimension</b>	<b>Definition</b>	<b>Example Indicators</b>
<b>Cognitive</b>	Students’ knowledge and understanding of ecological concepts, environmental issues, and sustainability principles.	Explaining the causes and effects of climate change; understanding the impact of pollution and the loss of biodiversity.
<b>Affective</b>	Students’ emotional responses, empathy, and attitudes towards environmental issues.	Concerned about plastic waste; feeling responsible for protecting natural resources.
<b>Conative</b>	Students’ intention, commitment, and readiness to behave in an environmentally friendly manner.	Willing to participate in sustainability campaigns; intent on reducing personal ecological footprint.

**Research Procedures**

The intervention consisted of four 90-minute sessions over four consecutive weeks. The series of activities were as follows:

1. **Session 1:** Introduction to ecolinguistics and discussion of the relationship between language and the environment.
2. **Session 2:** Analysis of sample texts on environmental themes and group discussion.
3. **Session 3:** Writing exercises with an emphasis on coherence, argumentation, and integration of ecological perspectives.
4. **Session 4:** Individual writing assignments, peer review, and lecturer feedback.

Before the first session, students completed a pre-test (writing test + environmental awareness questionnaire). After the fourth session, students completed a post-test using the same instruments.

**Data Analysis**

The data were analyzed using a paired-samples t-test to compare pre-test and post-test scores. A normality test (Shapiro—Wilk) was conducted to ensure that the data met the parametric assumptions. If the assumptions were violated, an alternative nonparametric test, namely the Wilcoxon signed-rank test, was used. Besides significance, the effect size (Cohen’s d) was also calculated to show the magnitude of the intervention’s effect.

Descriptive statistics are visualized through a distribution of scores and a paired bar chart to reinforce the analysis:

Figure 1: Distribution of pre-test writing skill scores.

Figure 2: Distribution of post-test writing skill scores.

Figure 3: Distribution of post-test scores on environmental awareness.

Figure 4: Comparison of the pre-test and post-test averages of both variables.

Figure 5: *Paired bar chart* of individual writing skills (pre vs. post).

Figure 6: Paired bar chart of individual environmental awareness (pre vs. post).

Figure 7: Multi-panel figure of writing skills and environmental awareness for comprehensive comparison.

This visualization confirms the increase, both in aggregate and per individual, thereby strengthening the credibility of the research findings.

### **Ethical Considerations**

This study follows the principles of the Helsinki Declaration and institutional ethical standards. Ethical approval was obtained from the STKIP Taman Siswa Bima Research Ethics Committee (Approval Number: 2025/REC-EL/023). All participants were given an explanation of the objectives, procedures, and their rights, including the right to participate voluntarily and to withdraw. Written informed consent was collected from all participants. Data confidentiality was maintained through anonymisation, and research results were only reported in aggregate form.

### **Efforts to Maintain Research Rigor**

To ensure the accuracy of the research, the following steps were taken:

1. The content validity of the instrument was verified through expert judgement.
2. The reliability of the instrument is guaranteed by Cronbach's  $\alpha > 0.8$ .
3. Triangulation is carried out by combining quantitative scores and qualitative observations in the classroom.
4. Transparency is maintained by documenting all procedures so that they can be replicated in subsequent studies.

### **Results**

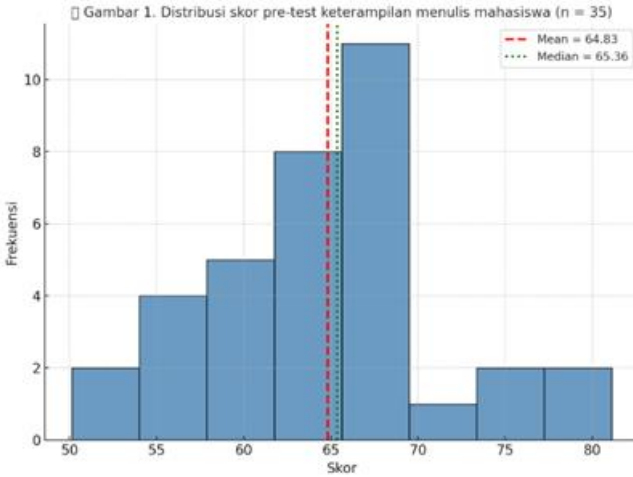
This section presents the main findings on the effects of ecolinguistics-based writing instruction on students' writing skills and environmental awareness. Data were obtained through pre-tests and post-tests of 35 third-semester students of the English Education Study Program at STKIP Taman Siswa Bima. The results are analyzed in the following five subsections.

#### **Writing Skills**

##### **1. Pre-test results**

In the initial stage, students' writing skills scores were relatively moderate, with an average of 63.37 and a standard deviation (SD) of 6.56. The distribution of scores showed that most students were in the 58–68 range, indicating difficulties in text coherence, argument development, and integration of sustainability issues.

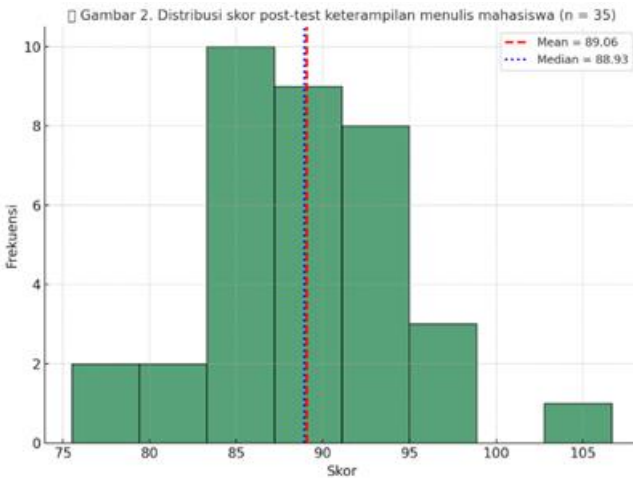
**Figure 1. Distribution of students' pre-test writing skill scores (n = 35)**



## 2. Post-test results

After participating in four sessions of intervention, writing skills scores increased significantly, with an average of 88.66 (SD = 5.25). Nearly all students scored above 85, indicating better mastery of coherence, critical argumentation, and integration of ecological issues.

**Figure 2. Distribution of post-test scores for students' writing skills (n = 35)**



## 3. Statistical Test

The paired t-test analysis showed a significant difference between the pre-test and post-test ( $t[34] = 9.36$ ;  $p = 0.001$ ). The value of Cohen's  $d = 2.25$  indicates a very large effect. Thus, ecolinguistic-based interventions have a strong influence on improving students' writing skills.

## Environmental Awareness

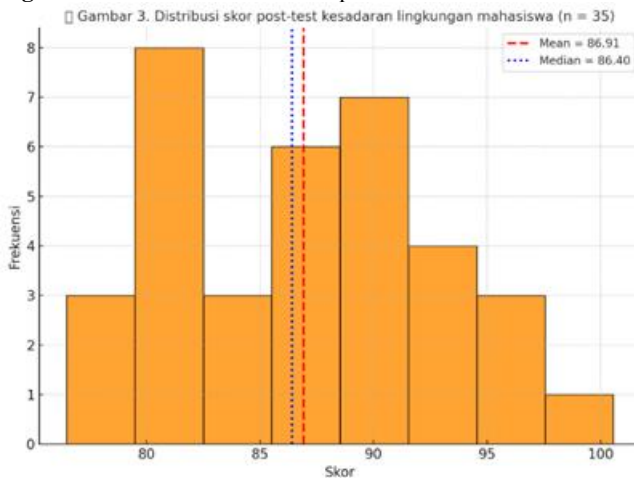
### 1. Pre-test results

Prior to the intervention, the average environmental awareness score of students was 62.15 (SD = 7.43). This indicates that understanding and attitudes towards environmental issues remain limited, with a tendency to recognize problems but not articulate practical solutions.

### 2. Post-test results

After the intervention, the score increased to 87.12 (SD = 5.78). Students demonstrated a better understanding of climate change and biodiversity conservation, as well as a more positive attitude towards sustainability practices.

**Figure 3.** Distribution of students' post-test environmental awareness scores (n = 35)



### 3. Statistical Test

The paired t-test results show a significant difference between the pre-test and post-test ( $t[34] = 8.92$ ;  $p < 0.001$ ). The value of Cohen's  $d = 2.08$  indicates a very large effect, so the intervention can be said to have substantially increased environmental awareness.

### 4. Dimensional Analysis

Scores improved in all three dimensions of environmental awareness:

1. Cognitive: +9.82 points (better understanding of ecological concepts).
2. Affective: +8.05 points (increased concern and empathy).
3. Conative: +7.10 points (stronger intention to behave in an environmentally friendly manner)

**Table 2.** The average increase in environmental awareness scores per dimension.

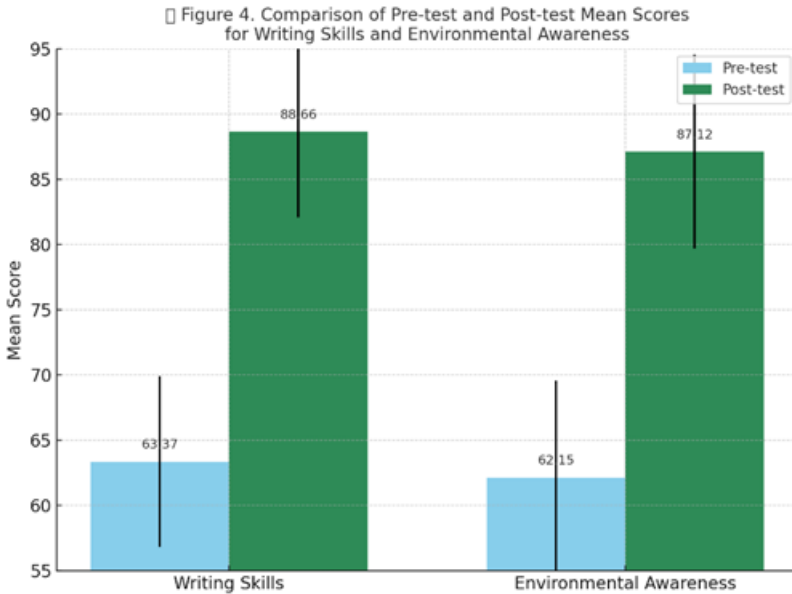
Dimension	Pre-test Mean	Post-test Mean	Improvement
Cognitive	20.41	30.23	+9.82
Affective	21.12	29.17	+8.05
Conative	20.62	27.72	+7.10

Interpretation: all three dimensions increased significantly, with the cognitive dimension showing the greatest increase.

### Integrated Analysis

The comparison of the average pre-test and post-test scores for both variables is visualized in Figure 4. There was an almost equal parallel increase in writing skills (+25.29 points) and environmental awareness (+24.97 points).

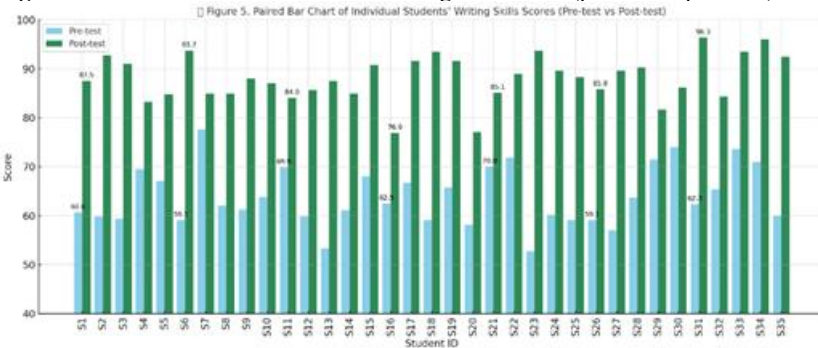
**Figure 4.** Comparison of average writing skills and environmental awareness scores (pre-test vs post-test)



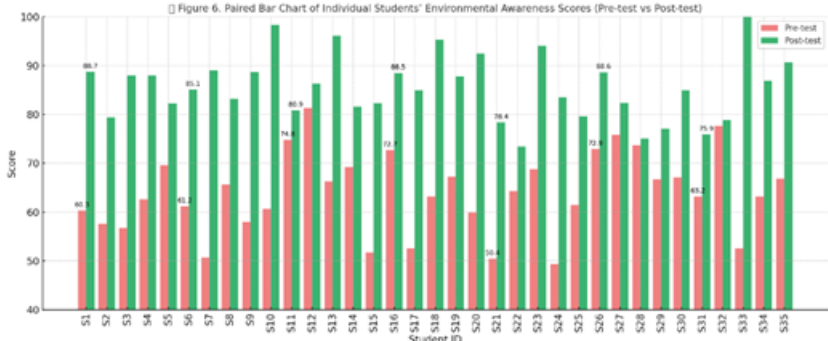
### Individual Differences

In addition to the average increase, almost all students showed an increase in their individual scores. This demonstrates the effectiveness of the intervention across the board.

**Figure 5.** Paired bar chart of individual writing skill scores (pre-test vs post-test)



**Figure 6.** Paired bar chart of individual environmental awareness scores (pre-test vs post-test)



Interpretation: The graph shows that almost all students experienced consistent improvement, although the rate of improvement varied.

**Figure 7.** Multi-panel figure comparing writing skills and environmental awareness scores (pre-test vs post-test)



Interpretation: this visualization confirms that the intervention had a positive and consistent impact on both variables simultaneously.

**Summary of Findings**

1. Writing skills increased significantly from 63.37 to 88.66 (p 0.001; d = 2.25).
2. Environmental awareness increased significantly from 62.15 to 87.12 (p 0.001; d = 2.08).
3. All three dimensions of environmental awareness (cognitive, affective, conative) increased, with the cognitive dimension showing the highest increase.
4. The improvement occurred at both the aggregate level and the individual level, confirming the success of the ecolinguistic-based writing learning intervention.

## **Discussion**

The primary objective of this study was to investigate the extent to which an ecolinguistic-based writing pedagogy can enhance students' writing skills and environmental awareness. The results clearly demonstrate significant improvements in both domains, providing empirical evidence that integrating ecolinguistic principles into writing instruction is both feasible and highly effective. The following discussion elaborates on these findings by linking them to theoretical frameworks, situating them within the broader field of ecolinguistics and language education, considering their global implications, highlighting their alignment with the United Nations Sustainable Development Goals (SDGs), and addressing the study's limitations and future research directions.

### **1. Relationship between Findings and Research Objectives**

The results showed that students' average writing scores increased by 25.29 points, from 63.37 to 88.66, while their environmental awareness improved by 24.97 points, from 62.15 to 87.12. Both improvements were statistically significant, with very large effect sizes (Cohen's  $d > 2$ ). These findings support the research objective of demonstrating that ecolinguistic-based pedagogy can simultaneously enhance students' linguistic competence and ecological sensitivity. Importantly, the results reveal that writing instruction is not only a vehicle for developing academic literacy but also a means of instilling ecological values in students. This dual achievement is consistent with the central claim of ecolinguistics that language plays a crucial role in shaping human understanding and actions toward the environment [Wenjuan Zhou19], [Lei Lei20].

### **2. Interpretation Based on Theoretical Perspectives**

#### **Constructivist Theory**

From a constructivist learning perspective, the significant improvement in writing skills can be attributed to students' active engagement in meaningful tasks. Constructivism argues that knowledge is constructed through interaction with experiences rather than being passively received. In this study, students were asked to write analytical texts on ecological themes, which required them to draw on prior knowledge, organize new information and reflect critically. The iterative process of writing, receiving feedback, and revising fostered deeper learning among the students. This aligns with prior work suggesting that educational practices linking sustainability to literacy enhance cognitive and reflective skills (James 2021; Davis 2015).

#### **Ecocriticism and Ecolinguistics**

Gains in environmental awareness can be interpreted through ecocriticism, which highlights how texts mediate human perceptions of nature and ecological crises. By embedding ecolinguistic elements in writing pedagogy, students were encouraged to treat language as a tool for ecological advocacy. This supports Stibbe's argument that ecolinguistics can inspire "new stories to live by" (Shen, Min Chen, and Wang 2019; Marouli 2021). Similarly, Pratiwi emphasized that integrating sustainability into English language teaching nurtures eco-literacy, fostering ecological sensitivity among learners.

#### **Attitude Change Theory**

From a psychological perspective, the observed increases in environmental awareness are consistent with theories of attitude change, which posit that direct experiences can shift both the cognitive and affective dimensions of behaviour. Writing about ecological issues requires students to confront evidence, reflect on its implications, and position themselves in relation to global challenges. These findings resonate with Baierl et al. (2022), who showed that environmental attitudes strongly support learning outcomes related to ecological issues.

## **Contribution to the Field of Ecolinguistics and Language Education**

This study makes a novel contribution to ecolinguistics by extending its application beyond text analysis. Much of the existing literature has focused on discourse studies, analyzing ecological metaphors, narratives, and ideological framing (Zhou, 2024). Although valuable, such work remains largely descriptive. The present study moves ecolinguistics into the pedagogical realm, demonstrating its potential as a practical teaching approach in higher education. This represents a significant shift from theory to application, showing that ecolinguistics can actively transform students' skills and awareness rather than merely analyzing existing discourses.

For language education, this study illustrates the potential of writing pedagogy to transcend technical instruction. By linking writing with real-world issues, this pedagogy empowered students to see language as a means of social change (A. Annisah et al., 2021, W. dan Annisah, 2024). This is consistent with Micalay-Hurtado and Poole (Micalay-hurtado & Poole, 2022), who argued that eco-critical language teaching promotes justice, well-being, and sustainability, and Davari and Ghorbanpour (2025), who highlighted the role of ecolinguistics in strengthening students' environmental attitudes.

## **International Implications**

Although this study was conducted in Indonesia, its implications are international. Environmental crises, such as climate change, deforestation, and pollution, are global problems that require global solutions (Kushakova and Bayzakova 2024;Maharani et al. 2024;Das et al. 2024). Language education, a nearly universal component of schooling and higher education, provides a powerful platform for fostering sustainability literacy worldwide.

In contexts where English is taught as a foreign or second language, integrating ecolinguistics into writing pedagogy offers a dual advantage: it enhances linguistic proficiency while addressing pressing ecological challenges. Similar claims have been made in global contexts, such as in Jordan, where embedding SDGs into curricula improved students' pro-environmental behaviors (Gharib 2022;Fayyaz, Abbasi, and Aftab 2024). Ecolinguistic pedagogy provides a transferable model for cultivating global citizenship across diverse cultural contexts.

Furthermore, in an increasingly interconnected world, higher education institutions are under pressure to produce graduates who are not only academically competent but also socially responsible. By embedding ecolinguistic values into curricula, universities can contribute to shaping students as agents of change, capable of critically engaging with ecological issues on both local and global scales.

## **Alignment with the Sustainable Development Goals**

This study contributes directly to two key SDGs:

1. SDG 4: Quality Education. By integrating sustainability into writing pedagogy, this study demonstrates a way to enhance educational quality. Students acquired advanced academic writing skills, which are essential for success in higher education, while also developing broader competencies such as critical thinking and reflective judgment (Gunkle et al., 1975).

2. SDG 13: Climate Action. The intervention fostered environmental awareness, aligning with the goal of strengthening the capacity to mitigate and adapt to climate change (Stankuniene and Streimikiene 2020;Shrestha et al. 2025). Students learned not only to understand ecological problems but also to articulate sustainable solutions in writing, positioning language education as a catalyst for climate change action.

Beyond these two, the findings also indirectly support other SDGs, such as SDG 12 (Responsible Consumption and Production) by promoting attitudes conducive to sustainable behaviour, and SDG 17 (Partnerships for the Goals) by offering a replicable model for international collaboration in education for sustainability (Misiaszek, 2022).

### **Factors Influencing the Results**

Although the intervention was effective, several contextual factors may have influenced the magnitude of the results. Students' prior exposure to writing instruction may have varied, with some entering the study with stronger skills than others. Additionally, their personal interest in environmental issues may have amplified their engagement with the intervention. Motivation is a known driver of both learning outcomes and behaviour change, as noted by Howard et al. Howard et al. (2021), who emphasized the importance of civic and ecological literacy in fostering student responsibility.

### **Limitations**

Despite these promising results, this study has some limitations. The absence of a control group prevents the definitive attribution of the observed improvements solely to the ecolinguistic intervention. Although the very large effect sizes suggest that the changes are meaningful, other factors such as concurrent learning experiences can't be ruled out. The small sample size ( $n = 35$ ) also limits its generalizability. Finally, the intervention lasted only four sessions, raising questions about the durability of its effects over time. These limitations are consistent with concerns raised in ecolinguistic pedagogy research, where methodological rigor is often challenged (Baldacci 2012).

### **Directions for Future Research**

Future research should build on this preliminary evidence by employing more rigorous designs, such as randomized controlled trials, to strengthen the causal claims. Expanding the sample size and including students from multiple institutions would enhance the generalizability of the findings. Longitudinal studies are needed to examine whether improvements in writing skills and environmental awareness are sustained over time.

Cross-country comparative studies would be particularly valuable as they could reveal how cultural, linguistic, and institutional factors shape the effectiveness of ecolinguistic pedagogy. For instance, Abdullateef (Zabaniotou, 2020) suggested that eco-composition could be adapted to different cultural contexts, especially in the post-pandemic world. Such research would provide insights into the global applicability of ecolinguistic pedagogy and its potential contribution to international education and sustainability agendas.

### **Conclusion of the Discussion**

In summary, the discussion highlights that an ecolinguistic-based writing pedagogy is a powerful tool for integrating language education with ecological responsibility. By grounding the intervention in constructivist theory, ecocriticism, and attitude change frameworks, this study demonstrates both theoretical significance and practical value. The results advance the field of ecolinguistics and respond to global imperatives for sustainable education. With further refinement and validation, ecolinguistic pedagogy holds the promise of equipping future generations with the linguistic skills and ecological awareness necessary to confront the challenges of the Anthropocene.

### **Conclusion**

This study demonstrates that an ecolinguistic-based writing pedagogy effectively improves students' writing skills and environmental awareness. Students showed substantial gains in text coherence, argument development, and reflective engagement with ecological issues, confirming that language learning can serve as a medium for fostering sustainability values. The novelty of this study lies in extending ecolinguistic research beyond text analysis by applying it pedagogically within higher education writing courses.

Despite these promising results, the study has limitations. The pre-experimental design without a control group reduces causal strength, and the small sample size restricts generalizability. These constraints should be considered when interpreting the

findings. Future research should employ more rigorous experimental designs with larger and more diverse samples. Longitudinal studies are also needed to assess the sustainability of the observed improvements, while cross-country comparisons could reveal how cultural and educational contexts influence the effectiveness of ecolinguistic pedagogy. Such efforts will further clarify the role of ecolinguistics in advancing both language education and environmental sustainability.

### **Acknowledgment**

We would like to express our deepest gratitude to the Ministry of Higher Education, Science, and Technology, Directorate General of Research and Development, Directorate of Research and Community Service (DPPM), for their financial support for the 2025 fiscal year, Fundamental Regular Research Program, LLDIKTI Wilayah VIII, and STKIP Taman Siswa Bima.

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*Words: 4795*

*Characters: 36 169 (20 standard pages)*

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