

## Development and Evaluation of an Ecolinguistics-Based Transformative Writing Textbook for University Students in Yogyakarta

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### Abstract

Indonesian language-education students need writing instruction that combines textual accuracy with critical interpretation of how language frames ecological problems. A documented needs audit found fragmented course materials, a theory-to-task pattern with limited reflective dialogue, and weak integration of linguistic evidence into environmental topics; the baseline writing mean was 66.47, with 10 of 17 students (58.82%) in poor or failing categories. This research developed and evaluated Menulis Transformatif Berbasis Ekolinguistik (MTBE), an ecolinguistics-based transformative writing textbook, using the ADDIE research-and-development model in Indonesian Language and Literature Education contexts in Yogyakarta. The analyzable dataset included one subject-matter validator, one media/learning-design validator, three students in a formative usability trial, 19 students in a response survey, two lecturers/practitioners, 17 students with complete pretest-posttest writing and reflective-journal data, and a 15-student control class. Data were analyzed using descriptive statistics, Shapiro-Wilk tests, paired- and independent-samples t tests, and Cohen's d. The five-chapter textbook operationalizes an ecological trigger–ecolinguistic analysis–critical reflection–transformative dialogue–literacy action cycle. After revision, material feasibility reached 96.00% and media/design feasibility 94.00%; limited-trial practicality increased from 2.10 to 3.74/4. Writing performance increased from 66.47 to 87.35,  $t(16) = -5.071$ ,  $p < .001$ ,  $d = 1.230$ , while the experimental class scored higher than the control class (87.35 vs. 78.33),  $t(30) = 2.530$ ,  $p = .017$ ,  $d = .896$ . Reflective journals averaged 78.53. The findings support the textbook's feasibility and contextual promise for writing-based literacy, while small samples and measurement constraints limit broader causal claims.

**Keywords:** Ecolinguistics; Transformative learning; Writing literacy; Textbook development; Indonesian higher education

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## INTRODUCTION

Academic literacy in language-education programs is more than the ability to reproduce genre conventions. Future teachers, writers, editors, and literacy facilitators are expected to interpret evidence, recognize assumptions, evaluate positions, and produce responsible texts for academic and public contexts. Recent higher-education research in Indonesia has shown that writing performance is closely related to wider literacies and learning strategies. Angguni et al. (2026), for example, found a strong relationship between digital literacy and students' self-perceived academic writing ability, while Samsudin et al. (2026) showed that critical reading is central to strategic engagement with academic texts. Fradana et al. (2025) likewise emphasized that contemporary literacy increasingly requires learners to interpret and produce meaning across modes and contexts. These studies reinforce the need to treat university writing as a meaning-making practice rather than a purely technical exercise. In Indonesian

language education, this issue is especially important because the texts students read and write also frame social and environmental realities.

Fawaid and Wijayanti (2023) demonstrated that terminological precision remains consequential in institutional news writing, whereas Asnawi et al. (2022) showed the pedagogical value of critical reading that moves learners from literal understanding toward reflective judgment. Together, these findings suggest that writing instruction should integrate linguistic precision, critical reading, evidence-based argumentation, and opportunities for revision. Studies of academic writing in Indonesian Language and Literature Education (PBSI) contexts also show that writing quality cannot be separated from the quality of reasoning. Kristiyani (2014) identified variations in deductive and inductive reasoning patterns in scientific articles written by PBSI students at UNY, while Diarani and Syamsi (2019) showed that reading habits, vocabulary mastery, and grammar mastery contribute positively to writing skills. These findings strengthen the view that writing instruction needs to develop the organization of ideas, linguistic resources, and reading habits in an integrated manner.

The documented problem that motivated the present development was not simply a lack of environmental topics. The study's needs audit indicated that existing learning materials were fragmented across the semester, theoretical explanation was commonly followed directly by tasks, ecological issues could remain thematic rather than analytical, reflection and dialogue were not consistently organized as a learning cycle, and assessment more readily captured final products than changes in reasoning and revision. A diagnostic writing sample from 17 students produced a mean of 66.47 on a 0–100 scale, and 10 students (58.82%) were in poor or failing categories. These figures are not treated as population estimates; they are problem-diagnostic evidence for the participating context. Earlier work by Wijayanti and Fujiastuti (2023) also identified the need for a more complete resource that students could use independently before class discussion.

Comparable development studies have shown that structured learning materials can support critical or literacy-oriented learning in varied domains (Hartanto et al., 2020; Hekmah et al., 2019; Peni et al., 2023; Setyawan et al., 2020). However, providing a complete module or digital resource does not by itself ensure that learners will interrogate how language distributes agency, normalizes extraction, foregrounds or erases ecological actors, or frames environmental responsibility. That additional analytical layer is the central reason for incorporating ecolinguistics into writing instruction. In language-materials development, Tomlinson (2011) emphasizes the importance of materials that derive from learners' needs and provide opportunities for meaningful engagement, while McGrath (2016) regards materials evaluation, adaptation, and supplementation as continuing processes. These principles support the decision in this study to begin MTBE development with a needs audit, conduct validation and formative trials, and then revise the product on the basis of evidence from its use.

Ecolinguistics provides a principled way to examine how recurrent language patterns contribute to the stories through which societies understand relationships among humans, other species, and ecosystems (Stibbe, 2021). In educational materials, environmental content can still reproduce anthropocentric assumptions when nature is represented mainly as a resource or passive backdrop; Zahoor and Janjua (2020) demonstrated this problem through an ecolinguistic and ecopedagogical appraisal of school textbooks. In Indonesian higher education, Permatasari and Rahardi (2022) mapped metaphorical and naturalistic ecolinguistic dimensions that can be brought into language learning. The present study extends such work by embedding linguistic evidence into a transformative learning sequence. Transformative learning is understood here as a process in which a potentially disorienting experience is followed by critical

examination of assumptions, reasoned dialogue, reconsideration of a frame of reference, and action based on revised understanding (Mezirow, 1997). Empirical work has shown that reflection can be operationalized and measured as an aspect of transformative learning (Zhang & Dempsey, 2019), and sustainability-focused university experiences can support attitudes, skills, and agency when learners engage with real-world problems (Probst et al., 2019). The conceptual proposition of the MTBE textbook is therefore specific: ecolinguistic analysis supplies textual evidence, transformative learning supplies the pedagogical movement from evidence to reflection and dialogue, and writing-based literacy supplies the observable academic performance through comprehension, analysis-evaluation, production, feedback, and revision. The emphasis on critical reflection also aligns with Brookfield (2017), who places the examination of assumptions through experience, learners' perspectives, colleagues' views, and theory at the core of reflective practice. In literacy contexts, Urbayatun et al. (2018) emphasize the importance of pedagogical communication as part of developing learners' literacy abilities; accordingly, dialogue in MTBE is positioned not as an add-on but as a mechanism for testing evidence and negotiating meaning.

This integration constitutes the study's main novelty. Environmental literacy materials typically emphasize knowledge, awareness, or action, whereas language-focused materials may emphasize genre, vocabulary, or discourse analysis. The MTBE textbook connects these traditions in a five-stage learning architecture: ecological trigger, ecolinguistic analysis, critical reflection, transformative dialogue, and literacy action. The ecology theme is therefore not the endpoint; students must locate linguistic evidence, test assumptions, compare perspectives, reconstruct framing, and produce an alternative text. This design also distinguishes the present study from interventions that assess environmental literacy primarily through knowledge tests, such as Nasaruddin et al. (2025), and from materials-development studies in which critical thinking is the main outcome without an ecolinguistic framework (Setyawan et al., 2020).

Accordingly, the empirical evaluation focuses on traceable product-development, feasibility, practicality, student-response, writing-performance, comparison-group, and reflective-journal data. Claims are limited to measured outcomes and contexts rather than inferring separate cognitive, affective, and psychomotor gains that were not directly operationalized in the final dataset. Support for strengthening writing through activities that require evidence seeking and argument construction is also provided by Prahmana (2017), who showed the role of research-based learning in improving research and academic writing skills among preservice teachers. From the perspective of learning environments, Sulisworo and Toifur (2016) showed that mobile technology can shift learning toward more personalized forms while still requiring collaborative design.

On this basis, the study addresses four questions: (1) What documented learning needs and design principles shaped the MTBE textbook? (2) How feasible and practical was the textbook after expert review and formative user revision? (3) What changes were observed in student responses and writing-based literacy performance after implementation, and how did final writing performance compare with a control class? (4) What did post-implementation reflective-journal scores indicate about the transformative process?

## **METHOD**

### **Research Design**

The study used research and development (R&D) organized through the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) (Branch, 2009). ADDIE was used as a decision framework rather than a linear production

checklist. During Analysis, the researcher audited course plans and learning resources, reviewed available records of teaching practice, examined prior related research, and used baseline writing data to identify design problems. The output was a needs specification. During Design, those needs were translated into a five-chapter blueprint, a repeated transformative learning cycle, authentic local ecological texts, writing tasks, reflective prompts, and assessment rubrics.

During Development, a prototype was reviewed by a subject-matter expert and a media/learning-design expert, revised, and then tested formatively with three students. The decision rule for expert feasibility followed the study's scoring guide: 85–100% = highly feasible, 75–84% = feasible, 55–64% = moderately feasible, and <55% = not feasible. Progression to the next stage also required that substantive comments be addressed rather than relying on percentage scores alone. For the three-student formative trial, the four-point practicality scale was interpreted as 3.26–4.00 = highly practical, 2.51–3.25 = practical, 1.76–2.50 = less practical, and 1.00–1.75 = not practical. During Implementation and Evaluation, the revised textbook was used in writing instruction, user responses and writing products were collected, reflective journals were scored, and final writing outcomes were compared with a class that did not use the textbook. These outputs informed the final revision.

### **Context, Participants, and Sampling**

The completed study data came from Indonesian Language and Literature Education contexts at Universitas Ahmad Dahlan (UAD) and Universitas PGRI Yogyakarta (UPY), Special Region of Yogyakarta, Indonesia. Institutions listed only during the planning phase were not treated as completed research sites in the present analysis. The target context was an undergraduate writing-related course (Keterampilan Menulis/Ekspresi Tulis or an equivalent course). Intact classes were selected through cluster-purposive considerations, including alignment of learning outcomes, institutional permission, instructor availability, and the availability of a comparable class. The course documentation describes the implementation as one semester, 16 meetings, and 2 credits. Because the archived implementation records do not preserve a complete meeting-by-meeting exposure log, 16 meetings is reported as the curricular duration rather than a verified treatment-dose count. The analyzable dataset differed by purpose: one subject-matter validator and one media/learning-design validator; three students in the formative practicality trial; 19 students for the response instrument; two lecturers/practitioners for lecturer response; 17 students with complete pretest-posttest writing and reflective-journal data; and 15 students in the control class. The reflective-journal dataset contained 13 UAD and four UPY students. Sample sizes are therefore reported separately and are not merged across analyses.

### **Product, Instruments, and Scoring**

The product was Menulis Transformatif Berbasis Ekolinguistik (MTBE; Transformative Writing Based on Ecolinguistics), a print-digital textbook consisting of five chapters: (1) foundations of ecolinguistics and language literacy; (2) critical reading of ecological texts; (3) environmental discourse in news and popular articles; (4) creative writing based on ecological awareness; and (5) perspective transformation and self-reflection. Across chapters, students work with lexical choice, evaluation, metaphor, agency, framing, and related meaning-making patterns as evidence for interpretation, followed by reflection, dialogue, rewriting, and literacy action. The broader literacy construct in the study was operationalized as comprehension (25%), analysis-evaluation (40%), and text production (35%). The implementation's writing-performance task required students to produce popular ecological articles scored with a five-aspect analytic

rubric, each aspect rated 1–4, for a maximum raw score of 20 and conversion to a 0–100 scale. The archived scoring sheet preserves total scores and five coded dimensions but not a reliable expansion of every abbreviation. Accordingly, the present analysis uses the validated literacy construct and total writing score as the primary outcome and does not assign unverified labels to the archived dimension codes.

Expert review used structured rating instruments and written comments. The material instrument contained 23 items before revision and 25 items after revision; because the maximum score changed from 92 to 100, comparisons were based on percentages rather than raw-score differences. The media/learning-design instrument contained 25 items (maximum 100) in both rounds. The small-group practicality instrument contained 40 four-point items (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree), and the practicality percentage was calculated as obtained score divided by maximum score  $\times 100\%$ . The student-response instrument initially contained 13 items. Pearson item-total screening at  $N = 19$  retained 10 items and removed items 1, 6, and 7; Cronbach's alpha for the retained items was .875. Reflective journals were scored after implementation using six dimensions: clarity of reflective experience (15%), understanding/application of ecolinguistic concepts (20%), depth of critical reflection (20%), ecological perspective transformation (20%), commitment to ecological action (15%), and presentation/language quality (10%). Each dimension was rated 1–4 and weighted to a 100-point score. Importantly, the journal dataset is post-implementation only; it supports description of reflective processes, not a pre-post test of perspective transformation.

Table 1. Data Sources, Sample Sizes, and Analyses

| Data source                      | N       | Main measurement/analysis                                                                                                        |
|----------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------|
| Subject-matter expert            | 1       | Feasibility percentage and revision comments; pre/post-revision comparison                                                       |
| Media/learning-design expert     | 1       | Feasibility percentage and revision comments; pre/post-revision comparison                                                       |
| Formative student trial          | 3       | 40-item, 4-point practicality questionnaire; descriptive mean and percentage                                                     |
| Student response                 | 19      | 13-item initial instrument; Pearson item-total screening, 10 retained; $\alpha = .875$ ; paired descriptive/inferential analysis |
| Lecturer/practitioner response   | 2       | Descriptive percentage before and after product use                                                                              |
| Writing performance              | 17      | Pretest-posttest popular ecological article; 5 aspects $\times$ 1–4; paired t test and Cohen's d                                 |
| Reflective journal               | 17      | Six weighted dimensions; descriptive mean, SD, range, and categories                                                             |
| Experimental vs. control writing | 17 / 15 | Shapiro-Wilk, Levene test, independent-samples t test, 95% CI, Cohen's d                                                         |

### Data Collection, Analysis, and Ethical Procedures

Data collection followed the ADDIE sequence. Needs evidence was assembled before product design from course documentation, available teaching records, related studies, and baseline writing profiles. Expert scoring and comments were collected on the prototype, followed by revision and a three-student formative trial. Implementation then produced student-response data, lecturer/practitioner responses, popular ecological articles, and reflective journals. Writing scores were analyzed only for students with complete paired data. Descriptive statistics included frequencies, percentages, means, standard deviations, minima, and maxima. For paired writing scores, normality of the

difference scores was checked with Shapiro-Wilk before a paired-samples t test; Cohen's  $d$  was reported as an effect-size estimate. For the experimental-control comparison, normality was examined in each group and homogeneity with Levene's test before an independent-samples t test. Statistical decisions used  $\alpha = .05$ . Analyses were performed on the archived score files, and probabilities below .001 are reported as  $p < .001$  rather than  $p = .000$ . Qualitative expert comments were condensed into problem-revision matrices. Complete verbatim journal texts and a documented inter-rater coefficient were not available in the archived dataset. Consequently, reflective journals are analyzed only as scored process evidence, and no qualitative quotation analysis or inter-rater statistic is presented.

Study documentation records that the research proceeded after institutional permission and ethical approval according to university procedures. Participation was voluntary, academic grades were not to be affected outside agreed course procedures, identities were anonymized for analysis, and data were to be stored securely. No ethics approval identifier was recorded in the study documentation. The researcher's dual role as developer and investigator is treated as a potential source of expectancy effects; lecturer responses and a comparison class were used as partial counterweights, but they do not eliminate this limitation. A spreadsheet audit also identified a formula artifact in one raw aspect-level cell while the participant's total score remained recorded in the analysis file; this row was flagged for verification. Statistical claims therefore follow the reported total-score outputs and are interpreted cautiously rather than extending beyond the archived data.

## RESULTS AND DISCUSSION

### Results

#### Documented Needs and the Resulting Textbook Architecture

The Analyze stage identified five recurring design problems: semester materials were not organized as an integrated independent-learning resource; theory frequently moved directly to a task without sufficient scaffolding; environmental issues risked functioning only as topics; critical reflection and dialogue were not consistently sequenced; and assessment more readily captured a final product than the reasoning, feedback, and revision that preceded it. Baseline writing performance provided convergent diagnostic evidence. Among 17 students with complete baseline writing scores, the mean was 13.29/20 (66.47/100), with scores ranging from 8 to 19; 10 students (58.82%) were in the poor or failing categories. This baseline does not establish a deficit in all Indonesian Language and Literature Education students in Yogyakarta. It establishes a design need in the participating group: students required more explicit support for context, critical analysis, argumentation, ecolinguistic evidence, and revision.

Table 2. Traceability from Documented need to MTBE Design Response

| Documented need                                 | Design response in MTBE                                                                                      | Expected learning function                                 |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Fragmented semester materials                   | Five-chapter print-digital sequence with clear objectives, concept maps, examples, activities, and rubrics   | Support independent and guided study across the course     |
| Theory-to-task pattern with limited scaffolding | Ecological trigger followed by staged analysis, reflection, dialogue, writing, feedback, and revision        | Make reasoning visible before the final product            |
| Environmental issues used mainly as themes      | Explicit attention to lexical choice, evaluation, metaphor, agency, framing, and related linguistic evidence | Turn ecological content into analyzable discourse evidence |

| Documented need                                  | Design response in MTBE                                                                                        | Expected learning function                                         |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Reflection and dialogue not organized as a cycle | Repeated ecological trigger → analysis → critical reflection → transformative dialogue → literacy action cycle | Connect experience, evidence, assumptions, perspective, and action |
| Assessment favors final output                   | Analytic rubrics, peer response, reflective journal, and revision/portfolio tasks                              | Capture process as well as product                                 |
| Baseline writing difficulties                    | Contextual examples from Yogyakarta plus evidence-based article writing and revision                           | Strengthen comprehension, analysis-evaluation, and text production |

The Design stage translated these needs into five chapters and a repeated pedagogical sequence. Chapter 1 establishes the relationship among language, thought, culture, and environment. Chapter 2 focuses on critical reading of ecological texts. Chapter 3 moves into environmental discourse in news and popular articles, including comparison of framing across texts. Chapter 4 emphasizes ecological creative writing. Chapter 5 consolidates perspective reflection and action. The pedagogical mechanism is deliberately cumulative. An ecological trigger first makes a local issue problematic; ecolinguistic analysis requires students to support interpretations with textual evidence; critical reflection asks why particular assumptions or interests are normalized; dialogue exposes claims to alternative positions; and literacy action requires a revised or newly produced text.

The data showed that ecolinguistic dimensions can be mapped within Indonesian-language higher education; MTBE extends that direction by making the dimensions tools for student reading, dialogue, rewriting, and assessment. Earlier environmental-literacy media developed by Wijayanti and Fujiastuti (2023) responded to the need for complete independent materials, but MTBE moves beyond media completeness by making critical reflection and evidence-based reconstruction part of the core learning sequence. In this sense, the textbook does not simply add environmental readings to a writing course. It changes what students are asked to do with language: identify how meanings are constructed, question their consequences, and revise texts on the basis of both linguistic evidence and ecological responsibility.

### Expert Feasibility and Formative Practicality

The Develop stage produced consistently high expert feasibility scores, but the revision process is more informative than the percentages alone. The subject-matter evaluation was 87/92 (94.57%) before revision and 96/100 (96.00%) after revision. Because the material instrument changed from 23 to 25 items, raw-score gain is not interpreted as a direct improvement; percentage feasibility is the appropriate comparison. Initial comments focused on terminology around disorientation, learning sequence, conjunctions, and clarity. After revision, conceptual accuracy, model texts, language, and exercises were strengthened, although alignment with heterogeneous student characteristics remained the comparatively weaker material aspect (83.33%). The media/learning-design evaluation increased from 87/100 (87.00%) to 94/100 (94.00%). Revisions included adding an ecolinguistics glossary, aligning credit-load information, raising exercises toward higher-order thinking, providing more operational examples of ecolinguistic integration, strengthening field-activity guidance, and later improving

concept maps, chapter summaries/evaluations, curriculum linkage, and experiential-learning cues.

Table 3. Expert feasibility and formative practicality before and after revision

| Evidence                     | Before revision | After revision      | Interpretation / revision consequence                                                                     |
|------------------------------|-----------------|---------------------|-----------------------------------------------------------------------------------------------------------|
| Material expert              | 87/92 = 94.57%  | 96/100 = 96.00%     | Highly feasible; compare percentages because item count changed (23 → 25)                                 |
| Media/learning-design expert | 87/100 = 87.00% | 94/100 = 94.00%     | Highly feasible; structural and pedagogical revisions improved the prototype                              |
| 3-student practicality trial | M = 2.10/4      | M = 3.74/4 = 93.54% | Shifted from less practical to highly practical; used for product revision, not population generalization |

The three-student formative trial then tested usability rather than effectiveness. The mean practicality rating increased from 2.10 to 3.74 on the four-point scale, equivalent to 93.54% after revision and the highly practical category. Changes were concentrated in the clarity and sequencing of activities, exercises, reflection, assessment, layout, and rubrics. The small N is important: three students cannot establish general user acceptance. The value of this stage is design-sensitive. It shows that specific observed problems were followed by revision and that the revised version was easier to use in that small-group context. This distinction directly addresses a common problem in R&D reports in which high validation percentages are treated as proof of instructional effectiveness. Feasibility answers whether the product is judged appropriate for use; practicality answers whether users can follow it; neither substitutes for measured learning outcomes. Caution regarding user heterogeneity is also important because learning readiness may vary across educational contexts; Amurdawati et al. (2020) showed variations in learning readiness across school groups. Accordingly, the small-group practicality score in this study is treated primarily as a basis for design revision rather than as a measure of population-level acceptance.

### **Student and Lecturer Responses: Acceptance Improved Descriptively, Not Significantly**

The student-response data provide a useful counterpoint to the stronger writing-performance results. Of the initial 13 response items, 10 met the item-total criterion and were retained; Cronbach's alpha was .875. For 19 students, the response mean increased from 40.84 (SD = 4.91; range = 31–49) to 42.32 (SD = 4.03; range = 34–50). The distribution of difference scores met the Shapiro-Wilk normality assumption,  $W = .928$ ,  $p = .157$ . However, the paired-samples  $t$  test was not significant,  $t(18) = -1.211$ ,  $p = .242$ , with a small effect ( $|d| = .278$ ). Thus, student response should be interpreted as stable-to-positive acceptance rather than as evidence of a statistically reliable improvement in perception. Accordingly, response scores are interpreted as acceptance data and are not used as evidence of separate cognitive, affective, or psychomotor gains. Lecturer/practitioner responses were more positive descriptively, but only two respondents were available, so inferential testing would be inappropriate. The UAD lecturer/practitioner response changed from 82.14% to 87.50%, and the UPY response from 83.93% to 98.21%; the two-person mean increased from 83.04% to 92.86%. These data support perceived usability and acceptability from the instructor perspective, not a population-level claim.

### Writing Performance: Within-Group Change and Comparison-Group Evidence

Writing performance was the main outcome used to evaluate writing-based literacy. Seventeen students had complete pretest-posttest article scores. The mean increased from 13.29/20 (SD = 2.54; range = 8–19), equivalent to 66.47/100, to 17.47/20 (SD = 1.94; range = 14–20), equivalent to 87.35/100. The mean raw-score change was 4.18 points on the 20-point scale (20.88 points on the 100-point scale). Fifteen students improved and two decreased. Normality of the difference scores was supported,  $W = .979$ ,  $p = .947$ . The paired-samples  $t$  test yielded  $t(16) = -5.071$ ,  $p < .001$ , with a large effect,  $|d| = 1.230$ . The negative  $t$  value reflects the software's pretest-minus-posttest subtraction order; the observed direction was improvement. Category movement also changed materially: the proportion in the highest category rose from 5.88% at pretest to 52.94% at posttest.

Table 4. Main Writing-Performance Results

| Comparison         | N  | Mean (0–100) | SD (raw /20 where available) | Statistical result                                                                              |
|--------------------|----|--------------|------------------------------|-------------------------------------------------------------------------------------------------|
| Pretest            | 17 | 66.47        | 2.54                         | —                                                                                               |
| Posttest           | 17 | 87.35        | 1.94                         | Paired $t(16) = -5.071$ , $p < .001$ , $ d  = 1.230$                                            |
| Experimental final | 17 | 87.35        | 1.94                         | —                                                                                               |
| Control final      | 15 | 78.33        | 2.09                         | Independent $t(30) = 2.530$ , $p = .017$ , $d = .896$ ; 95% CI raw mean difference [0.35, 3.26] |

A second analysis compared the final writing scores of the 17 students using MTBE with 15 students in a control class that did not use the textbook. The experimental mean was 17.47/20 (87.35/100; SD = 1.94), whereas the control mean was 15.67/20 (78.33/100; SD = 2.09), a difference of 1.80 raw points or 9.02 points on the 100-point scale. Shapiro-Wilk tests were non-significant for the experimental group ( $W = .926$ ,  $p = .187$ ) and control group ( $W = .952$ ,  $p = .553$ ), and Levene's test supported homogeneity of variance,  $F = .034$ ,  $p = .855$ . The independent-samples test was significant,  $t(30) = 2.530$ ,  $p = .017$ ; the 95% confidence interval for the raw mean difference was 0.35–3.26, and Cohen's  $d = .896$  indicated a large standardized difference. The convergence of within-group pre-post change and a higher experimental final mean provides complementary performance evidence across two comparisons.

Nevertheless, the evidence should not be interpreted as an unrestricted causal estimate. The groups were intact purposively selected classes rather than individually randomized participants, and the reported comparison analysis uses final writing scores rather than an ANCOVA-adjusted posttest based on a complete control-group baseline. Repeated writing practice, instructor feedback, course maturation, or differences between intact classes could therefore contribute to the observed gap. The two students whose scores decreased also show that benefit was not uniform. A larger multi-site study with randomized or better-matched clusters, a complete pretest for both groups, fidelity data for every meeting, and multilevel or covariance-adjusted analysis would provide a stronger causal test. The current result is best described as a large within-group change plus a large final between-group difference in the observed implementation context.

### Reflective Process: Evidence of Facilitation, Not Proof of Deep Transformation

The reflective-journal scores help explain process but require careful interpretation. For 17 students, the mean final journal score was 78.53 (SD = 12.06), with a range of

56.25–100, categorized overall as good. Five students (29.41%) were in the very good category, three (17.65%) good, seven (41.18%) sufficient, and two (11.76%) poor; none failed. The modal category was therefore sufficient, not very good. Across dimensions, commitment to ecological action was highest ( $M = 3.35/4$ ; 83.82%), while understanding and application of ecolinguistic concepts was lowest ( $M = 3.06/4$ ; 76.47%). Clarity of experience, critical reflection, perspective transformation, and presentation/language each averaged approximately 3.12/4 (77.94%). These data suggest that the learning design successfully created occasions for reflection and commitment, but conceptual application remained less secure than expressed intention.

Table 5. Reflective-journal evidence after implementation (N = 17)

| Indicator                                   | Weight | Mean /4 | Percentage | Interpretive note                                                              |
|---------------------------------------------|--------|---------|------------|--------------------------------------------------------------------------------|
| Clarity of reflective experience            | 15%    | 3.12    | 77.94%     | Experiences were generally relevant but varied in specificity                  |
| Understanding/application of ecolinguistics | 20%    | 3.06    | 76.47%     | Lowest dimension; conceptual use needs stronger scaffolding                    |
| Depth of critical reflection                | 20%    | 3.12    | 77.94%     | Reflection was present but often not deeply analytical                         |
| Ecological perspective transformation       | 20%    | 3.12    | 77.94%     | Evidence suggests perspective reconsideration, with variable depth             |
| Commitment to ecological action             | 15%    | 3.35    | 83.82%     | Highest dimension; intentions were easier to articulate than analytic evidence |
| Presentation and language                   | 10%    | 3.12    | 77.94%     | Generally clear, with variation across students                                |

This pattern is compatible with transformative-learning theory but does not by itself demonstrate that every student underwent a deep perspective transformation. In the present study, however, the journal is post-implementation only, and the category distribution is heterogeneous. Archived assessor summaries indicate both strong cases—such as reflection grounded in local waste problems and concrete commitments—and responses that remained general or insufficiently analytical. Because full anonymized journal texts were not available in the analysis archive, direct participant quotations are not presented. A stronger future study should archive anonymized excerpts, code them with an explicit codebook, and report inter-rater agreement alongside the quantitative journal rubric.

Taken together, the five result strands show a coherent but bounded pattern. Needs evidence shaped a textbook that integrates ecolinguistic evidence with a transformative cycle; expert and formative-user feedback led to traceable revisions; student response remained positive but did not significantly change; writing performance showed a large pre-post improvement and a large final experimental-control difference; and reflective scores indicate that reflection and ecological commitment were facilitated, although conceptual depth varied. This mixed pattern is more informative than a uniformly positive claim. It identifies where the design appears strongest (writing products and usability after revision) and where further development is needed (conceptual application, fidelity documentation, reflective depth, validator breadth, and stronger control of alternative explanations).

## Discussion

The present study developed and evaluated the *Menulis Transformatif Berbasis Ekolinguistik* (MTBE) textbook as an instructional innovation that integrates ecolinguistic analysis, transformative learning principles, and academic writing development. The findings demonstrate that the textbook achieved high feasibility, improved practicality after revision, and contributed to significant improvement in students' writing performance. These findings suggest that writing instruction can be strengthened when ecological issues are not merely presented as thematic content but are positioned as objects of linguistic investigation, critical reflection, and meaning reconstruction. This contribution extends previous approaches in language education by demonstrating that ecolinguistics can function not only as an analytical framework for examining environmental discourse but also as a pedagogical foundation for developing students' literacy practices.

The first important finding concerns the successful integration of ecolinguistic principles into a writing textbook architecture. The MTBE design was developed based on identified learning needs, including fragmented learning resources, limited reflective activities, and insufficient connection between environmental issues and linguistic analysis. The resulting five-stage learning cycle—ecological trigger, ecolinguistic analysis, critical reflection, transformative dialogue, and literacy action—provides a structured pathway through which students move from encountering environmental problems toward producing evidence-based texts. This finding confirms Stibbe's (2021) argument that ecolinguistics should examine the “stories we live by,” namely the patterns of language that shape human relationships with ecosystems. Unlike conventional environmental literacy materials that frequently emphasize awareness or knowledge acquisition, MTBE requires students to investigate how lexical choices, metaphors, agency, and framing influence ecological interpretations.

This finding also extends previous research on ecolinguistic education. Zahoor and Janjua (2020) revealed that environmental themes in language textbooks may still reproduce anthropocentric perspectives despite containing ecological content. Their findings indicate that simply including environmental topics does not guarantee the development of ecological consciousness. The present study advances this argument by showing that ecological literacy can be strengthened when students are explicitly guided to analyze how language constructs relationships between humans and nature. Similarly, Permatasari and Rahardi (2022) identified ecolinguistic dimensions in Indonesian language learning, but the present study extends their work by transforming ecolinguistic concepts into a complete instructional sequence involving reading, analysis, dialogue, rewriting, and reflection.

The improvement in writing performance provides further evidence supporting the effectiveness of the MTBE approach. Students' writing scores increased substantially from 66.47 to 87.35, with a large effect size ( $d = 1.230$ ), and the experimental class achieved higher final scores than the control class. These findings support previous research emphasizing that writing development requires more than mastery of linguistic conventions; it depends on critical reading, reasoning, evidence interpretation, and revision processes. Diarani and Syamsi (2019) demonstrated that reading habits, vocabulary mastery, and grammatical knowledge contribute to writing competence, while Kristiyani (2014) emphasized the importance of reasoning structures in academic writing produced by Indonesian language education students. The present study confirms these perspectives by showing that writing improvement can emerge when students engage in deeper processes of interpretation and argument construction.

Furthermore, the findings align with Syamsi's (2012) research on process-genre writing instruction, which highlights the importance of scaffolding writing through stages of planning, drafting, feedback, and revision. However, MTBE extends the process-genre tradition by introducing ecological discourse analysis as the basis for writing development. Students are not only trained to organize ideas and produce coherent texts but are also encouraged to question assumptions embedded within ecological narratives. Therefore, the contribution of MTBE lies in connecting writing competence with critical ecological reasoning. The significant improvement in writing outcomes also supports research highlighting the role of inquiry-based and evidence-oriented learning. Prahmana (2017) reported that research-based learning improves academic writing skills by encouraging students to investigate problems, collect evidence, and construct arguments. Similarly, Samsudin et al. (2026) emphasized that critical reading strategies influence students' engagement with academic texts. The present study extends these findings by demonstrating that ecolinguistic inquiry can serve as a meaningful context for developing writing skills. Through analysis of environmental texts, students learn to evaluate information, identify perspectives, and reconstruct arguments through written communication.

Although writing performance improved significantly, student perception data showed a positive but statistically insignificant increase. This finding is important because it indicates that learning effectiveness cannot always be inferred from students' immediate perceptions. Students may recognize the usefulness of the textbook without demonstrating substantial changes in attitudes within a limited implementation period. This result complements Angguni et al. (2026), who examined relationships between digital literacy and self-perceived academic writing ability. While perception measures provide valuable information regarding acceptance and usability, the present study demonstrates the importance of combining perception data with direct performance assessment. Therefore, writing products provide stronger evidence regarding learning improvement than perception measures alone.

The reflective journal findings provide additional insight into the transformative learning process. Students demonstrated relatively strong commitment to ecological action, but their application of ecolinguistic concepts remained the weakest dimension. This pattern suggests that developing ecological awareness and willingness to act may occur more rapidly than developing sophisticated analytical understanding of discourse. The finding is consistent with Mezirow's (1997) transformative learning theory, which emphasizes that transformation requires critical examination of assumptions rather than simply acquiring new information. It also corresponds with Brookfield's (2017) view that critical reflection involves examining experiences through multiple perspectives. However, the findings also indicate that transformation should not be assumed solely from reflective activities. Because the journals were collected only after implementation, they provide evidence of reflective processes rather than definitive proof of long-term perspective transformation.

The feasibility and practicality findings further demonstrate the importance of iterative instructional-material development. Expert evaluations reached 96.00% for material feasibility and 94.00% for media and learning design feasibility after revision. These findings correspond with Tomlinson's (2011) and McGrath's (2016) arguments that effective learning materials should be developed through systematic evaluation, adaptation, and alignment with learner needs. Similar patterns have been reported in previous development studies, including Hartanto et al. (2020), Peni et al. (2023), and Setyawan et al. (2020), which showed that carefully designed instructional materials can support literacy and critical-thinking development. Nevertheless, MTBE provides an

additional contribution by demonstrating that instructional materials can simultaneously address language competence, ecological awareness, and transformative reflection.

Despite these contributions, several limitations must be considered. The study involved relatively small samples and intact classes, limiting the extent to which causal conclusions can be generalized. The comparison between experimental and control groups was based on final writing scores rather than adjusted posttest comparisons using equivalent baseline measures. Additionally, reflective journals were analyzed quantitatively without extensive qualitative coding. Therefore, future studies should involve larger multi-institution samples, stronger experimental designs, independent assessment, and longitudinal investigation of students' ecological perspectives. Nevertheless, within its research context, the study provides empirical evidence that an ecolinguistics-based transformative writing textbook can serve as a promising model for integrating language education with ecological responsibility.

## **CONCLUSION**

This study successfully developed and evaluated the *Menulis Transformatif Berbasis Ekolinguistik (MTBE)* textbook as an innovative instructional resource for university writing education. The textbook integrates ecolinguistic analysis with transformative learning principles through a structured learning cycle consisting of ecological triggers, ecolinguistic analysis, critical reflection, transformative dialogue, and literacy action. The findings demonstrate that the developed textbook achieved high levels of feasibility and practicality after systematic revision based on expert feedback and formative trials. Furthermore, implementation of MTBE was associated with significant improvement in students' writing performance, with higher achievement observed compared with students who did not use the textbook. These findings indicate that writing instruction becomes more meaningful when students are encouraged not only to produce linguistically accurate texts but also to critically examine how language constructs ecological realities and social responsibilities.

The study contributes theoretically and practically by positioning ecolinguistics as a pedagogical framework rather than merely an analytical approach to environmental discourse. The results suggest that combining ecological perspectives, critical literacy, and transformative learning can support the development of writing competence while encouraging students to engage with environmental issues more responsibly. However, the findings should be interpreted within the limitations of the research design, particularly the small sample size, non-randomized groups, and limited evidence regarding long-term transformation. Future research should examine MTBE implementation across broader educational contexts using stronger experimental designs, longitudinal approaches, and richer qualitative evidence. Despite these limitations, the study provides meaningful evidence that ecolinguistics-based transformative writing materials represent a promising direction for higher education literacy development, particularly in preparing future language educators to produce texts that are analytically rigorous, socially responsible, and environmentally conscious.

## **RECOMMENDATION**

For classroom use, lecturers should retain the full learning cycle rather than using ecological texts only as topics: students should identify linguistic evidence, articulate assumptions, test interpretations through dialogue, revise writing, and document the reasons for revision. For research, the next evaluation should include at least two independent validators in each major domain, complete pretest-posttest data in both experimental and comparison classes, session-level fidelity records, and independent raters for writing and reflective journals. Qualitative data should preserve anonymized

verbatim excerpts so that claims about perspective change can be triangulated with scored performance. Because the strongest reflective dimension was commitment to action while conceptual application was weaker, future versions of the textbook should add more worked examples that explicitly connect language features to ecological interpretations before students formulate action-oriented texts. In practical terms, lecturers may also draw on McGrath's (2016) principles of materials evaluation and adaptation and Tomlinson's (2011) learner-needs-centered approach to materials development when adapting MTBE to different classroom characteristics.

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## Declaration of Using AI Tools

OpenAI ChatGPT (GPT-5.6 Sol, accessed September 2026) was used to assist with English-language editing and consistency checking. All numerical results, interpretations of the dissertation data, source selection, and final scholarly claims were reviewed and approved by the human authors. The tool was not used to generate, alter, or replace research data.

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