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Homepage : https://journal.ia-education.com/index.php/ijorer
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p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 6, November 2025
Page 2041-2059
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International Journal of Recent Educational Research

Development of Nature-Themed Language Literacy Teaching Materials to Enhance Language Skills and Environmental Awareness of Elementary School Students

Ifah Hanifah[1], Isroyati[2] Ton Thi Thuy Trang[3],
[1]Universitas Kuningan, Kuningan, Indonesia
[2]Universitas Indraprasta PGRI, Jakarta, Indonesia
[3]Viet Nam National University, Ho Chi Minh, Vietnam

DOI: https://doi.org/10.46245/ijorer.v6i6.1134

Sections Info

Article history:
Submitted: October 05, 2025
Final Revised: Nov. 21, 2025
Accepted: November 29, 2025
Published: November 30, 2025

Keywords:
Teaching Materials; Language Literacy; Elementary School; Nature Theme; Contectual Teaching

ABSTRACT

The **objective** of this study is to develop and test the effectiveness of nature-themed language literacy teaching materials that are relevant, engaging, and able to foster environmental awareness among elementary school students. The **method** used is the Research and Development (R&D) model proposed by Jolly and Bolitho, involving 30 fifth-grade students and teachers at SDN 1 Bungurberes, Kuningan. Data were collected through questionnaires, interviews, expert validation, and pretest–posttest instruments. The **results** show that 83% of students prefer nature-themed readings and that teachers need contextual materials supported by illustrations and character-building content. Expert validation indicates a high feasibility level of 88.5%, while the effectiveness test shows a significant increase in students' literacy scores from 64.3 to 81.7, with 89% student satisfaction. Furthermore, the module effectively enhances ecological awareness, with 85.5% of students demonstrating positive attitudes toward environmental care. The **novelty** of this study lies in integrating literacy skill development with ecological character education through contextual, nature-based materials that reflect students' real-life experiences. These findings confirm that the materials developed are valid, practical, and effective in improving literacy skills and fostering environmental awareness of elementary school students.

INTRODUCTION

Language literacy skills are the main foundation for the learning success of elementary school students. In the context of education, literacy is not only defined as the ability to read and write but also includes the skills of critical thinking, understanding texts, expressing ideas, and connecting reading with real experiences (Prastyaningrum et al., 2024); (Supriyanto & Insani, 2025). Early literacy has been shown to make an important contribution to students' academic achievement at the next level, especially in science and other subjects that require strong language skills.

Although literacy is recognized as an essential competency, various studies have shown that students' literacy abilities in many countries, including at the primary school level, are still not optimal. One of the reasons is that the teaching materials used in elementary schools are often general, abstract, and less relevant to the context of students' lives (Yao et al., 2025); (Hanifah et al., 2022b). This condition makes literacy learning less interesting and prevents the generation of motivation to learn sustainably. In other words, non-contextual teaching materials can hinder the development of literacy skills, especially in elementary school students who are still in the stage of concrete cognitive development.

In recent years, place-based education and nature-based learning approaches have emerged as alternatives for improving literacy. This approach emphasizes the use of the surrounding environment as a learning resource, both through direct activities in nature

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Page 2041-2059
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and the integration of ecological themes into teaching. A study by Tabaru Örnek and Yel (2024) showed that place-based learning practices can improve the environmental literacy of elementary school students, while Trina et al. (2024) reported that nature-based learning has a positive impact on the formation of literacy and STEAM skills in early childhood.

In addition, the integration of nature themes in language teaching materials has been shown to strengthen metacognitive aspects and student engagement. A systematic review conducted by Lyesmaya et al. (2025) found that ecologically themed writing pedagogy not only improves writing skills but also builds students' reflective awareness of environmental issues. In the context of 21st century learning, the integration of these themes can be strengthened through the development of literacy teaching materials that utilize interactive technology, so that students can access texts, images, videos, and other immersive digital-based literacy activities. Thus, nature-themed literacy teaching materials are relevant not only in terms of content but also in accordance with the demands of the digital era, which emphasizes multimodal literacy.

In addition to improving cognitive skills, natural themes in language learning also support the formation of students' affective attitudes. (Cincera et al., 2023) emphasized that education and environmental sustainability positively impact students' environmental literacy, especially in terms of ecological attitudes and behaviors. This is reinforced by Yildirim et al. (2025), who found a significant relationship between environmental literacy and students' ecological behavior. Thus, it is hoped that this literacy teaching material can also be a medium for learning character related to students' attitudes in protecting the environment.

However, despite international evidence demonstrating the effectiveness of nature-based approaches to learning, there is still little research that specifically develops language literacy teaching materials by following systematic development procedures. Most previous research has focused on outdoor programs or science literacy rather than on the development of language teaching products that are validated and tested in the classroom (Hamilton & Marckini-Polk, 2023); (Yemini et al., 2025). In fact, the availability of valid, practical, and effective teaching materials is urgently needed in elementary schools, especially to strengthen language literacy with themes that are close to students' lives.

Furthermore, Kizys et al. (2025) emphasize that the development of relevant literacy must involve local community assets, place-based approaches, and the use of digital technologies that allow for students' active participation. By involving the environmental context, literacy teaching materials not only improve language skills but also build relationships between students, the community, and the surrounding environment. This is in line with the vision of basic education, which emphasizes meaningful, contextual, and technology-based learning.

Based on the description above, it can be emphasized that the development of natural-themed language literacy teaching materials is an important and relevant effort that must be made. This research aims to fill the literature gap related to the development of ecology-based contextual literacy teaching materials, with the stages of needs analysis, expert validation, and effectiveness testing. The resulting teaching materials are expected to improve students' reading and writing skills and foster environmental awareness through interactive learning experiences.

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Page 2041-2059
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To address these needs, this study developed nature-themed language literacy teaching materials using the Jolly & Bolitho model in the R&D process. Unlike generic R&D steps, this research procedure follows the Jolly and Bolitho stages explicitly: identification of student needs, initial design of teaching materials, production of teaching materials, and limited trials product. This approach ensures that each stage systematically integrates needs analysis, expert validation, and effectiveness testing. The results are expected to improve reading and writing skills and build environmental awareness through interactive learning experiences.

Although there is much international evidence showing the effectiveness of place-based and nature-based approaches in increasing environmental literacy and awareness (Trina et al., 2024); (Tabaru Örnek & Yel, 2024), there is still a substantive void in the literature in Indonesia. The novelty of this research lies in its dual focus and systematic approach to product development. First, this study specifically aims to fill the literature gap regarding the development of valid, practical, and effective language literacy teaching material products, where most previous research has focused more on science literacy or outdoor programs (Hamilton & Marckini-Polk, 2023); (Yemini et al., 2025). Second, by explicitly integrating the theme of ecology into the design of language literacy teaching materials, this study not only improves students' conventional reading and writing skills but also fosters an attitude of caring for the environment from an early age. Therefore, this study offers a model of nature-themed language literacy teaching materials developed through systematic procedures as a real contribution to overcoming the limitations of generic teaching materials in elementary schools, as well as addressing the need for meaningful literacy education. Thus, this study presents a model of nature-themed language literacy teaching materials developed through the Jolly and Bolitho procedure systematically, as a real contribution to overcoming the limitations of generic teaching materials in elementary schools and answering the need for meaningful literacy education.

RESEARCH METHODS

This study uses a Research and Development (R&D) approach with the Jolly & Bolitho model, which is suitable for developing language literacy teaching materials because it provides systematic stages ranging from needs analysis to product evaluation. This model emphasizes the direct involvement of users (teachers and students) so that the teaching materials produced are relevant and contextualized (Tomlinson & Farajnezhad, 2022).

Research Design

This study uses research and development (R&D) with the Jolly and Bolitho model, which focuses on the systematic and contextual preparation of teaching materials. The stages of the research included: (1) identification of learners' needs, (2) exploration of learning context and objectives, (3) formulation of ideas and initial design of teaching materials, (4) realization and production of teaching materials, and (5) limited trials to obtain feedback from the students.

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IJORER, Vol. 6, No. 6, November 2025
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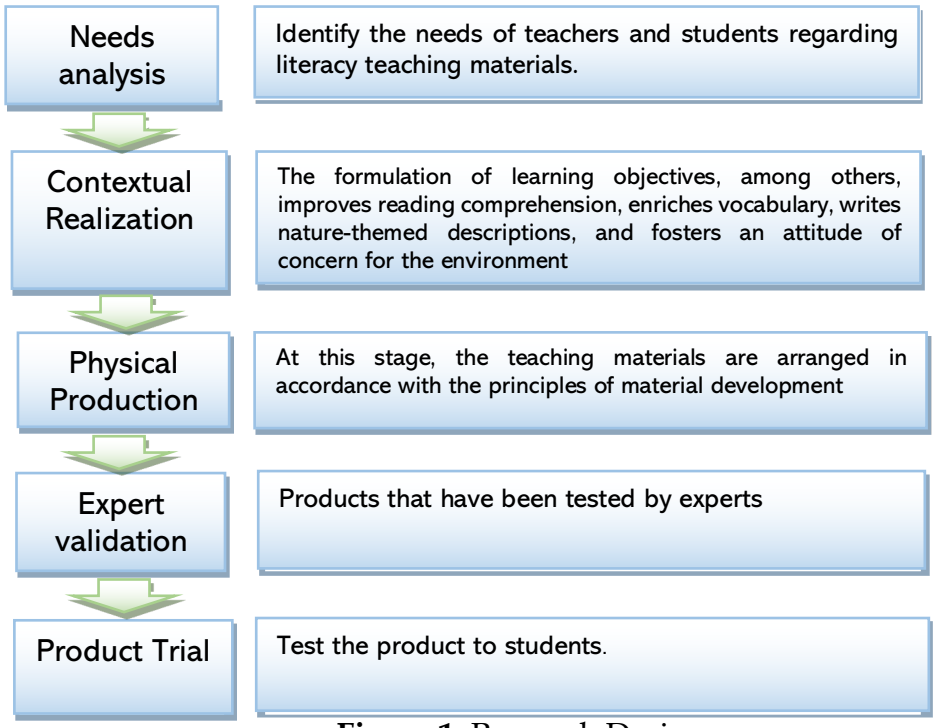

Figure 1. Research Design

Procedure

The first stage was a Needs Analysis through questionnaires to 30 students and interviews with classroom teachers at SDN 1 Bungurberes Kuningan, which aimed to determine reading preferences, literacy difficulties, and teachers' needs for contextual teaching materials (Hanifah et al., 2022a).

The second stage involved formulating learning objectives, including improving reading comprehension skills, enriching vocabulary, writing nature-themed descriptions, and fostering an attitude of caring for the environment.

The third stage, Product Design and Development, is in the form of a literacy module with narrative and descriptive readings with natural themes, interesting illustrations, and writing activities, following the principles of readability and content relevance (Dluha et al. 2024). The fourth stage, Expert Validation, is conducted by linguists, learning experts, and basic education practitioners to assess the feasibility of the product content, language, presentation, and graphics (Burhan et al., 2025).

The fifth stage, Limited Trial and Product Revision, was applied to 30 students using a pretest-posttest design to measure the effectiveness of the teaching materials. Revisions are carried out based on student and teacher input, which is important to ensure quality and sustainability (Andiopenta, 2023). Following these stages, this study is expected to produce valid, practical, and effective natural language literacy teaching materials.

Research Instruments

This study used three main instruments: questionnaires, interviews, and tests. The questionnaire was used for student needs analysis, expert validation, student satisfaction with teaching materials, and students' attitudes towards the environment. The student needs questionnaire contains questions about interests, difficulties, and preferences regarding learning materials and activities. The student satisfaction questionnaire was

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Page 2041-2059
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used to assess students' assessment of teaching materials in terms of readability, attractiveness, and others. The student attitude questionnaire was used to measure students' attitudes towards the environment. Expert validation questionnaires were used to assess the feasibility of the content, language, and appearance of the developed teaching materials.

Interviews were conducted with teachers to obtain in-depth information regarding their needs, constraints, and expectations for teaching materials. The interviews were semi-structured to allow the researchers to explore the teachers' opinions flexibly while still focusing on the research objectives.

Tests were used in the product trial phase to measure the effectiveness of the teaching materials. The test consisted of a pretest and posttest administered before and after the use of teaching materials. The test results were analyzed to determine the improvement in students' abilities, which were then calculated using the N-Gain score. These three instruments complement each other to ensure that the teaching materials developed are in accordance with needs, valid in terms of content, and effective in improving students' learning abilities.

Data Analysis Techniques

This study used *a mixed methods approach* to obtain an in-depth picture of user needs while testing the effectiveness of teaching materials in a measurable manner. Therefore, the data analysis also consisted of qualitative and quantitative data analysis.

Qualitative data analysis was conducted to explore teachers' needs through interviews that were analyzed through the stages of collection, reduction, data presentation, and conclusion drawing. Relevant information, such as the learning needs and obstacles faced by teachers, is presented in the form of thematic narratives as the basis for designing teaching materials.

Quantitative data analysis was used to process the questionnaire data and pretest–posttest results. The questionnaire was analyzed using descriptive statistics to determine the tendency of students' responses related to the feasibility, satisfaction, and practicality of the teaching materials. Questionnaires are also used to measure students' attitudes towards their environment. Meanwhile, learning outcome data were analyzed using a pair sample t-test through SPSS to determine the significance of differences before and after the use of teaching materials. In addition, the N-gain calculation was carried out to assess the level of improvement in student learning outcomes in more detail.

RESULTS AND DISCUSSION

Results

Needs Analysis Results

Needs analysis was carried out through the distribution of questionnaires to 30 students and in-depth interviews with teachers at SDN 1 Bungurberes Kuningan.

Table 1. Results of Analysis of Student Needs of Nature-Themed Literacy Teaching Materials

Needs Aspect	Indicator	Student Percentage	Implications/follow-up
Reading Theme Interest	Like Nature themes (animals, plants, environment	83%	The theme of nature is the main foundation for the development of teaching

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Page 2041-2059
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Needs Aspect	Indicator	Student Percentage	Implications/follow-up
	Like Social/Tech/Other themes	17%	materials to be more relevant and meaningful
Existing text difficulty level	Admitting difficulty understanding abstract reading (technical terms, long sentences)	76%	It requires the use of simple, communicative, and vocabulary that is appropriate to the cognitive level of elementary school students
	Have no difficulty understanding abstract reading	2d4%	

The questionnaire results showed that the majority of students (83%) liked readings with natural themes, such as stories about animals, plants, and environmental phenomena. Only a small percentage of students stated that they were more interested in social- or technology-themed texts. These findings show that nature is a theme that is close to children's daily lives because they are used to interacting directly with the environment around their home and school. This has great potential as a basis for developing more relevant and meaningful teaching materials.

In addition, as many as 76% of students admitted that they had difficulty understanding abstract reading in ordinary textbooks that used many technical terms and long sentences. Students feel that the content of reading is often not related to their experience, so their motivation to read is low. This difficulty also affects writing skills, as most students can only copy sentences without being able to develop their own ideas. These findings reinforce the importance of using simple, communicative, and vocabulary texts that are appropriate for the cognitive development of elementary school-age children. The interviews with the teachers reinforced the questionnaire results.

Table 2. Results of Analysis of Teachers' Needs on Nature-Themed Literacy Teaching Materials

Discovery Categories	Details of Findings	Needs/Recommendations
Learning Context	The material tends to be monotonous, taken from the package book.	Diverse and contextual teaching materials are needed.
Student Preferences	Students are more enthusiastic about reading about daily activities (planting, observing insects).	Teaching materials must be relevant to the student's daily life and environment.
Understanding Strategy	The majority of students find it easier to understand reading supported by simple pictures/diagrams.	Teaching materials must be accompanied by adequate visual illustrations.
Character Building	Literacy learning does not consistently foster an attitude of concern for the environment	Nature-based teaching materials must integrate the goal of ecological character formation

Teachers assessed that the materials used in schools tended to be monotonous, centered on general texts taken from package books, and lacked room for student creativity. The teacher also stated that students were more enthusiastic when given examples of readings related to daily activities, such as planting trees, observing insects, and keeping the river clean. However, these teaching materials are rarely available in the form of structured modules. Teachers also emphasized the need for visual illustrations,

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Page 2041-2059
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as the majority of students found it easier to understand reading supported by simple pictures or diagrams.

Furthermore, the teacher also said that existing literacy learning has not consistently fostered an attitude of caring for the environment in students. Elementary school is an important phase for instilling character values, including ecological concerns. With nature-themed teaching materials, students are expected not only to learn to read and write, but also to develop curiosity about the environment and awareness of the need to preserve nature. This shows that the need for nature-based literacy teaching materials is not only academic but also supports the formation of students' character from an early age.

Product Development Results

Based on the findings of the needs analysis, the researcher prepared a draft of the teaching materials in the form of a nature-themed literacy module. This module is designed to meet the needs of primary school students who prefer reading near their surrounding environment. The initial product contained three main types of reading texts tailored to the cognitive abilities of grade IV students: (1) simple narrative texts that describe the child's experiences when interacting with nature, for example, playing in the river or planting trees; (2) expository texts about animals and plants around the student's environment, with an emphasis on easy-to-understand vocabulary; and (3) short explanatory texts related to natural phenomena, such as rain, water cycles, and the benefits of trees for daily life. The following figure illustrates the teaching materials used.

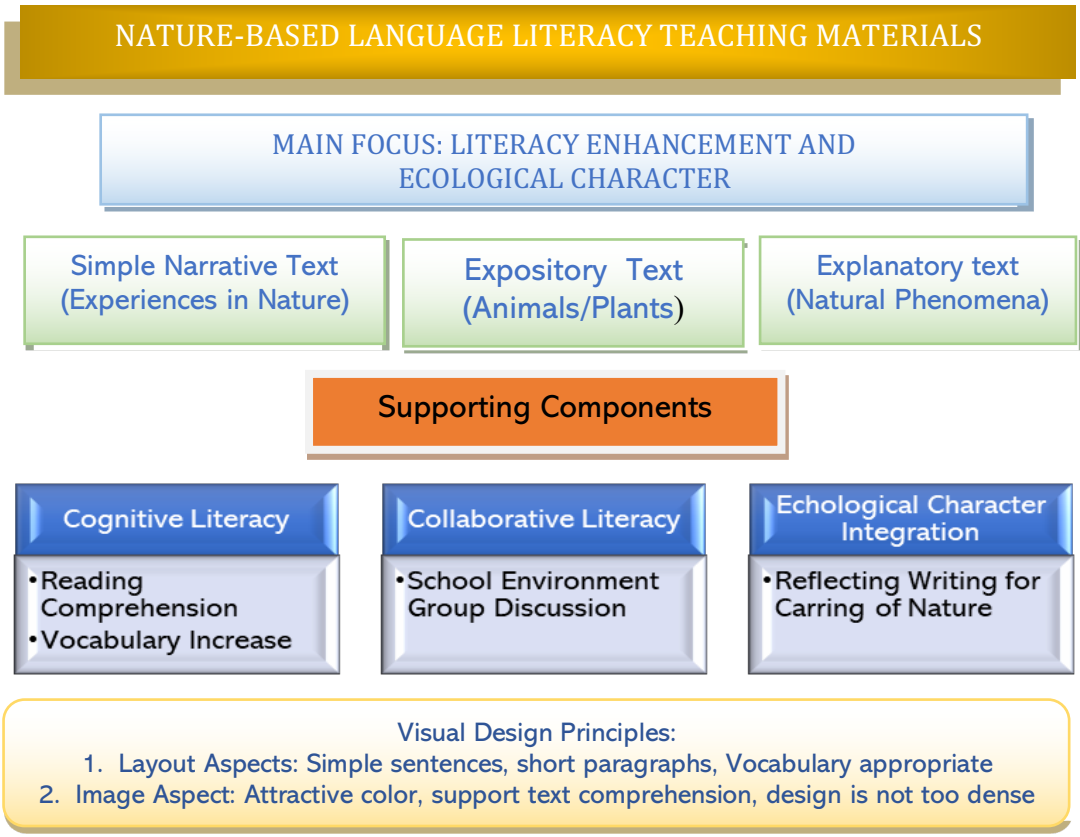

Figure 2. Product Design of Teaching Materials

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Page 2041-2059
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In addition to the main reading, the module is equipped with various literacy activities, including reading comprehension exercises, vocabulary enrichment activities, and writing simple descriptions of the surrounding nature. To strengthen social and communication skills, the module also provides collaborative activities in the form of group discussions on school environmental issues, such as maintaining cleanliness in the yard or the importance of caring for plants in the school garden. This kind of activity is expected to not only develop literacy skills, but also to build an attitude of caring for the environment and cooperation skills.

An example of part of the teaching material is shown below. The following teaching materials consist of several main components: the introduction, text reading, practice, and enrichment sections. In addition, this teaching material is equipped with simple illustrations that are attractive and in accordance with the characteristics of elementary school students.

The introductory section serves as the initial stage that connects students' daily experiences of the surrounding environment with the material to be studied. This section is designed to focus students' attention so that they are ready to receive and understand the next material.

In the reading activity section, expository texts were presented on the function of trees. The text explains the various benefits of trees for humans and their role in maintaining the ecosystem balance. Through this reading activity, students are expected to gain a conceptual understanding of trees and their benefits to the environment. This activity is part of environmental literacy developed through language literacy, especially reading skills.

To test students' comprehension, exercises related to the content of the text were provided. The exercise also contains questions that encourage students to submit arguments regarding efforts to preserve trees. Thus, this exercise not only assesses the comprehension of the content of the reading but also develops critical and creative thinking skills. In addition, the training session instilled character values in the form of concern for the environment, especially in caring for and preserving trees.

The enrichment section is structured to deepen students' learning experience through exploration of their environment. In this section, students are shown simple illustrations of different types of plants that are easy to find. Next, the students were asked to explain the benefits of these plants in their own language. This activity aims to train the ability to remember, understand, and choose the right words to describe objects in the surrounding environment.

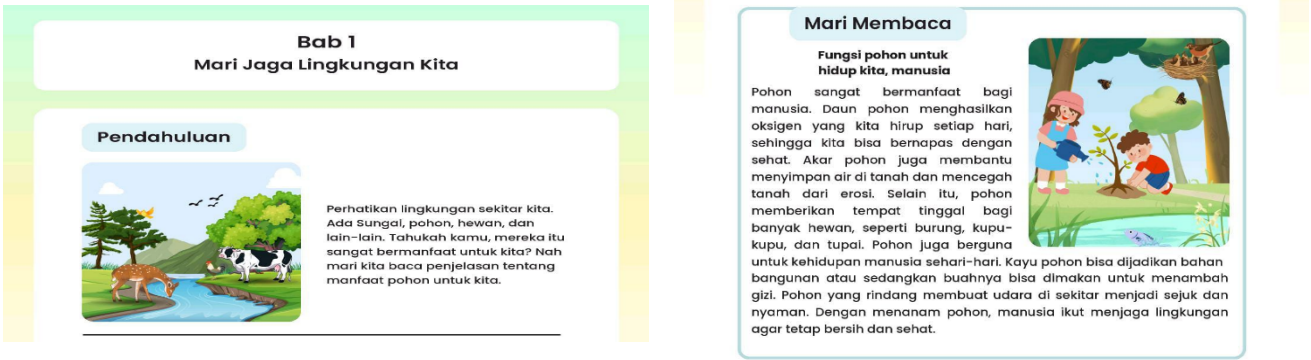

Figure 3. Display of teaching materials in the form of text

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Page 2041-2059
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Figure 4. Display of Training/Enrichment Teaching Materials

In terms of design, the module pays attention to the principle of readability with the use of simple sentences, short paragraphs, and vocabulary that is appropriate for the students' age. Each reading is equipped with attractive colored illustrations to make it easier for students to understand the text content while increasing reading motivation. The visual design is also made less dense, thus giving room for students to write their answers or reflections. This strategy was chosen because the majority of elementary school students are more interested in teaching materials that present a balance between texts and images.

Furthermore, the module integrates aspects of character and ecological value, for example, through reflective writing instructions on how to keep rivers clean or the benefits of trees for humans and animals. Thus, teaching materials not only function as a means to improve reading and writing skills but also as a medium to instill the value of caring for the environment from an early age. This initial product was then prepared for the expert validation stage to obtain further input before being tested on students.

Expert Validation Results

The following are the results of the expert's analysis

Table 3. Expert Validation Results for Teaching Material Products

Aspects Assessed	Linguist	Learning Expert	Basic Education Practitioner	Average (%)	Notes/Feedback
Content Eligibility	90%	88%	87%	88,3%	Fill in the context of the student, it is necessary to add real examples.
Language	89%	86%	88%	87,7%	Vocabulary needs to be simpler so that it is easy for students to understand.
Serving	87%	88%	89%	88,0%	The structure of the module is systematic; it is necessary to vary the HOTS questions.
Graphic	90%	89%	87%	88,7%	The illustration is good; it is necessary to add collaborative activities.
Overall Average	**89,0%**	**87,8%**	**87,8%**	**88,5%**	Category: **Highly Worth It**

The developed product was validated by three experts with different backgrounds: a linguist, a learning expert, and a basic education practitioner. The assessment was carried out based on four aspects: feasibility of content, language, presentation, and graphics. In general, the validation results showed an average score of 88.5% in the "very feasible" category. Linguists assess that the material is in accordance with the level of development of students but suggest simplification of some technical vocabulary.

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Page 2041-2059
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Learning experts assessed that the module structure was systematic but proposed the addition of a variety of questions based on high-level thinking skills. Basic education practitioners provide input to add collaborative activities so that students can interact and exchange ideas with each other. All of these inputs were accommodated at the revision stage to ensure that the final product was more comprehensive.

Effectiveness Test Results

After being validated by experts, the teaching material products were tested on a limited basis on 30 students of SDN 1 Bungurberes Kuningan. The trial was conducted for three meetings using a pre-test-posttest design to measure the improvement of students' language literacy skills. The test instruments used included reading comprehension skills, vocabulary mastery, and simple description writing skills.

Table 4. Increasing Student Literacy Score (Pretest–Posttest)

Score	Pretest	Pretest (%)	Posttest	Posttest (%)
< 60	10	33%	2	6%
60–75	15	50%	8	27%
> 75 / ≥ 80	5	17%	20	67%
Grade Point Average	64,3	–	81,7	–

The results of the pretest showed that the average score of students was 64.3, which indicated that literacy ability was in the medium category. The distribution of grades showed that 10 students (33%) obtained grades below 60, 15 students (50%) were in the range of 60–75, and only 5 students (17%) were able to achieve grades above 75. This condition confirms the gap in students' literacy skills and the need for teaching materials that are more contextual and easier to understand. Based on this data, the following statistical data was obtained.

Table 5. Statistical Data

Statistics	Pretest	Posttest
N	30	30
Average (X)	64,3	81,7
Average difference		**17,4**
Standard deviation (SD)	10,38	7,14

Based on Table 5, from the 30 research participants, an average *pretest* score of 64.3 and *posttest* score of 81.7 were obtained, with a difference of 17.4 points. The standard deviation decreased from 10.38 to 7.14, indicating that the participants' learning outcomes after treatment were higher and more even than before treatment.

Next, a prerequisite test, namely a normality test, was carried out. This normality test is used to see if the data is distributed normally, before the t-test is performed. The following are the results of the normality test.

Table 6. Normality Test Results

Variabel	Shapiro–Wilk Statistic	df	Sig. (p)	Information
Pretest	0.967	30	0.438	Normal
Posttest	0.962	30	0.318	Normal
Difference (Post–Pre)	0.964	30	0.364	Normal

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Page 2041-2059
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Based on the results of the normality test using Shapiro–Wilk, the significance value (Sig.) for *the pretest* data was 0.438, *the posttest* was 0.318, and the difference (*post-pre*) was 0.364. The entire Sig. value is greater than 0.05, so it can be concluded that the data is normally distributed. Thus, the data meets the assumption of normality and is suitable for analysis using parametric statistical tests, such as paired sample t-tests. After the data is declared to be normally distributed, then a pair of sample t-tests are carried out to see the difference in *pretest* and *posttest results.*

Table 7. Paired Sample T-Test Results

	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)
Pair 1 (Posttest – Pretest)	17.40	7.93	1.45	14.44 – 20.36	12.02	29	0.000

Based on Table 7, the results of the paired sample t-test showed that there was a mean difference between *the posttest* and *pretest* scores of 17.40 with a standard deviation of 7.93 and a standard mean error of 1.45. The t-value is calculated as 12.02 with df = 29 and the significance value (Sig. 2-tailed) = 0.000, which is smaller than 0.05. These results show that there is a significant difference between students' literacy skills before and after the use of nature-themed literacy teaching materials. Thus, it can be concluded that the use of nature-themed literacy teaching materials has a significant effect on improving students' literacy skills.

Table 8. N-Gain Calculation Results

No	Variabel	Average	N-Gain	Category
1	Pretest	64.30	–	–
2	Posttest	81.70	–	–
3	N-Gain (g)	–	0.49	Medium

Based on the results of the analysis, the average pretest score of 64.30 increased to 81.70 in the posttest. The calculation results showed an N-Gain value of 0.49, which is in the medium category. This shows that the use of nature-based thematic literacy teaching materials is quite effective in improving the literacy skills of elementary school students. In addition to the cognitive test, **a student satisfaction questionnaire** was also conducted to find out their responses to the teaching materials.

Table 9. Student Satisfaction with Teaching Materials

Assessment Aspects	Percentage of Students Who Agree
Easy to read	87%
Interesting illustration	92%
Writing activities are easier	85%
Learning literacy is more fun	90%
Average Satisfaction	**89%**

The results of the questionnaire show that 90% of the students were happy to use this module. As many as 87% of students stated that the readings in the modules were easy to understand, 92% considered the illustrations presented interesting, and 85% felt that descriptive writing activities were easier to do because the themes were close to daily

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Page 2041-2059
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life. Students also admitted that they were more excited when learning literacy because the material felt real and relevant.

Overall, the results of this effectiveness test show that the developed nature-themed literacy modules not only provide a significant improvement in students' reading and writing skills, but also have a positive impact on their motivation, engagement, and attitude of caring for the environment. Thus, this teaching material is suitable for wider implementation in literacy learning in elementary school.

In addition to measuring the improvement in literacy skills and the level of student satisfaction with the teaching materials developed, this study also focused on the formation of an attitude of caring for the environment through nature-based learning. To determine the change in attitude, a questionnaire was used that contained a number of statements related to students' behavior and awareness of the environment. The results of this questionnaire are expected to provide an overview of the extent to which nature-themed literacy teaching materials foster students' sense of responsibility and concern for the preservation of the nature around them. The following table presents the results of the questionnaire.

Table 10. Results of the Questionnaire on Students' Attitude of Care for the Environment

No.	Statement	SA	A	DA	Percentage Agree
1	I love reading stories or texts with a nature theme.	15	11	4	87%
2	I understand the importance of keeping nature clean and sustainable.	18	10	2	93%
3	I participate in maintaining the cleanliness of the school environment.	17	10	3	90%
4	I try to reduce the use of single-use plastics.	10	12	8	73%
5	I help take care of plants or gardens at school.	13	11	6	80%
6	I feel responsible for protecting the environment.	16	11	3	90%
Average percentage agree					85,5%

Information
SA : Strongly agree
A : Agree
DA : Disagree

Based on the results of the questionnaire administered to 30 students, it was found that the level of awareness and concern for the environment increased after the use of nature-themed literacy teaching materials. As many as 93% of students stated that they understood the importance of protecting nature, 90% were active in keeping their schools clean, and 87% liked nature-themed texts. In addition, most students have started to implement eco-friendly habits, such as reducing plastic use (73%) and taking care of plants at school (80%).

Overall, the average student approval rate for the environmental care attitude indicator reached 85.5%, which shows that learning with nature-based literacy teaching materials is effective in fostering ecological awareness and a sense of environmental responsibility from an early age.

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p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 6, November 2025
Page 2041-2059
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Discussion

The results of the needs analysis showed that elementary school students had a high interest in nature-themed readings, such as stories about animals, plants, and environmental phenomena. This is in line with the findings of Yao et al. (2025), who emphasized that reading materials that are close to children's daily experiences are easier to understand and can increase learning motivation. The fact that 83% of students prefer nature-themed reading indicates that this topic has high relevance to their world, so it is very appropriate to be used as a basis for the development of literacy teaching materials.

The difficulty students have in understanding abstract texts and the use of technical vocabulary in package books shows that there is a gap between the child's cognitive level and the available teaching materials. This condition strengthens the argument of Tomlinson and Farajnezhad (2022) that language teaching materials need to be designed with the principle of readability, namely simple language, short paragraphs, and vocabulary that is appropriate for the age of students. Therefore, the results of the needs analysis are an important foothold in designing contextual literacy modules.

The development of nature-themed literacy modules containing narrative, descriptive, and simple expository texts is designed to bridge the needs of students. In addition to the main readings, the module also provides reading comprehension activities, vocabulary enrichment, descriptive writing activities, and group discussions. This supports the idea (Dluha et al., 2024); (Nafisah et al., 2025) which emphasized that good teaching materials must integrate various language skills at once, as well as provide a collaborative space for students to build common knowledge.

From a design perspective, the module focuses on legibility and visual appeal through color illustrations and simple layouts. The emphasis on illustrations not only supports reading comprehension but also increases students' motivation to read. These findings are in line with the research of Trina et al. (2024), who showed that the visual environment and natural stimuli can strengthen early childhood literacy through multisensory engagement.

The results of expert validation, which achieved an average score of 88.5% in the category of "very feasible" confirmed that this module met the quality standards of content, language, presentation, and graphics. This validation is important to ensure that the resulting product is not only practically attractive but also of academic quality that can be accounted for. According to Wulandari et al. (2021), the involvement of experts in the R&D of teaching materials is an essential step to ensure the quality and acceptance of products in the educational environment.

Input from experts, such as simplifying vocabulary, adding a variety of questions based on higher order thinking skills (HOTS), and providing collaborative activities, show that this module is designed not only for basic literacy skills, but also to support the development of critical thinking skills and student cooperation. This is in line with the ideas of Lyesmaya et al. (2025), who emphasized the importance of ecology-themed writing pedagogy in encouraging metacognition and student engagement.

The effectiveness test showed that the use of teaching materials significantly increased literacy skills. The results of the paired-sample t-test obtained a significance value of $p = 0.000$. Because $p < 0.05$, the research hypothesis (H_1) is proven, that is, there is a significant difference between pre-test and post-test scores after the use of teaching materials. Thus, the developed teaching materials were effective in improving students'

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 6, November 2025
Page 2041-2059
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literacy skills. In addition, an N-Gain value of 0.49, which belongs to the moderate category, supports the findings, indicating that the improvement in learning outcomes occurred at a moderate level. This increase is consistent with research by Hamilton and Marckini-Polk (2023) and Abduh et al. (2025), who found that place- and nature-based learning improves literacy outcomes as well as student engagement. These results reinforce the belief that nature-based teaching materials can make a real contribute to improving the quality of literacy learning in elementary schools.

In addition to cognitive improvement, the results of the questionnaire showed that 89% of students felt happy using this module, with a particularly positive response to the illustration and writing activities. This confirms that the success of teaching materials is not only measured by the results of the test but also by how students respond to the learning process. In line with Cincera et al. (2023), environment- and sustainability-based education significantly influences student attitudes, which, in this case, is reflected in increased motivation to learn.

The integration of environmental care values into the literacy module also shows its relevance to the formation of students' character. (Yildirim et al., 2025) found a close relationship between environmental literacy and students' ecological behavior. Thus, nature-themed literacy modules not only serve as a means of improving language skills but also as a character education instrument that supports the vision of sustainable education.

Overall, this study shows that the natural-themed language literacy teaching materials developed with the Jolly and Bolitho model met the criteria of being valid, practical, and effective. This product successfully addresses the needs of students and teachers in elementary schools and is aligned with international findings that emphasize the importance of contextual learning. Although the trial is still limited to one school, the results show great potential for wider implementation, while opening up space for further research in different contexts and on different scales.

Implications of Nature-Themed Language Literacy Teaching Materials on Improving Environmental Awareness

The development of nature-themed language literacy teaching materials not only improves reading, writing, and text comprehension skills but also plays an important role in fostering a character of caring for the environment in students. Language literacy associated with children's real experiences, such as the observation of plants, animals, and natural phenomena, makes students more aware of their surrounding environment and increases their responsibility for preserving nature (Lustyantie, 2015). In other words, contextual reading of the everyday environment becomes a bridge between academic ability and the formation of ecological attitudes.

The integration of character values in literacy teaching materials can also strengthen the attitude of caring for the environment. For example, reading and writing about local ecosystems or simple practices, such as keeping school gardens clean, can foster empathy and a sense of responsibility towards nature (Hendriana et al., 2025); (Jubaidah et al., 2023). Research shows that students who are used to learning environment-based materials tend to have more positive ecological behaviors than those who only learn theoretical concepts (Tomás et al., 2022).

In addition, nature-based literacy helps build students' emotional connections with the environment (Arsyad et al., 2024). Through texts that describe flora, fauna, and

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 6, November 2025
Page 2041-2059
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natural phenomena, students learn to appreciate the existence of living things and ecosystems, which are then reflected in tangible actions, such as participation in reforestation and waste management activities. This emotional experience reinforces the internalization of the value of environmental care, making it part of the student's character.

The use of nature-themed language literacy teaching materials also facilitates project-based and collaborative learning that emphasizes ecological practices. For example, students may be asked to report on plant observations in the surrounding environment or write stories about endangered animals. Such activities not only improve language skills but also foster collective awareness of environmental protection (Nugraha et al., 2022); (Sholihat, 2023); (Setyowati et al., 2024). Multisensory approaches in teaching materials, such as color illustrations and descriptive texts about nature, also strengthen students' cognitive and emotional involvement in environmental issues (Khasawneh, 2024).

In addition to building ecological awareness, environmental literacy through nature-themed teaching materials also supports the development of other characteristics, such as responsibility, cooperation, and creativity. Group discussion activities about environmental problem solutions or writing collaborative stories encourage students to think critically and share ideas while accustoming them to caring for others and the surrounding environment (Mutmainnah & Kahfi, 2023); (Prasetiyo et al., 2024). Thus, language literacy functions not only as an academic tool but also as a means of comprehensive character education.

Overall, nature-themed language literacy teaching materials are effective in fostering environmental care because they combine cognitive, affective, and psychomotor aspects. Contextual approaches, integration of character values, collaborative activities, and the use of visual media help students not only understand the concept of literacy but also internalize the value of environmental concern that can be brought to adulthood (Kazazoglu, 2025); (Jordan, 2023); (Barrette et al., 2024).

The success of nature-based literacy teaching materials for SDN 1 Bungurberes students is strengthened by the context of their lives, which is very close to nature. Other studies have shown that the use of teaching materials that combine the surrounding environment and ecological themes makes it easier for students to understand and be interested in literacy (Hanifah et al., 2025). In addition, research in public elementary schools in various regions found that environmental literacy programs involving nature exploration, direct observation, and outdoor activities caused students to be more motivated, and their interest in reading increased significantly (Nurlaela et al., 2021). Because the students of SDN 1 Bungurberes live in a village with a sustainable nature, teaching materials that utilize natural themes are not only relevant but also strengthen their real experiences so that language literacy develops faster and more meaningfully.

Furthermore, integrating environmental care values through nature-based teaching materials strengthens the character of SDN 1 Bungurberes students. Research at Adiwiyata Elementary Schools, such as SDN Karang Mulya, show that science literacy and environmental education through a scientific approach can foster a real character of environmental care in students (Lustianti et al., 2024). Teaching materials that combine cognitive (text comprehension), affective (love/care for nature), and psychomotor aspects (through observational activities, projects, direct practice) have proven effective in several studies, for example, picture storybook materials based on local wisdom that

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 6, No. 6, November 2025
Page 2041-2059
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improve the ecoliteracy of Indramayu Elementary School students (Yonanda et al., 2023) and other environmental literacy strategies in elementary schools that use visual media and collaborative activities(Maesaroh et al., 2021). Thus, SDN 1 Bungurberes students not only understand the concept of language literacy but also internalize the value of environmental concern from an early age.

CONCLUSION

This study aims to develop nature-themed language literacy teaching materials for elementary school students using the Jolly & Bolitho R&D model. Based on the results of the needs analysis, most students prefer nature-themed readings because they are close to their daily lives, while teachers emphasize the need for teaching materials that are simple, communicative, and equipped with interesting illustrations. The module products developed contain narrative, descriptive, and simple expository texts accompanied by reading, writing, vocabulary enrichment, and collaborative discussions.

Based on the results of the research and data analysis, it can be concluded that the use of nature-themed literacy teaching materials has a significant influence on the literacy skills of SDN 1 Bungurberes Kuningan students. The results *of the paired sample t-test* showed a *value of* $t = 8.76$ with $p < 0.05$, indicating an increase in students' literacy skills after using the module. The average pretest score of 64.3 increased to 81.7 in the posttest, with an N-Gain value of 0.49 (medium category), demonstrating the effectiveness of the module in improving students' reading and writing skills.

In addition to improving literacy skills, students' responses to nature-themed literacy modules were very positive. Students show high motivation and enthusiasm in reading, writing descriptions, and group discussions. This module is not only effective in the academic aspect but also helps foster awareness and a caring attitude towards the environment, so that literacy learning becomes more contextual, interesting, and has an impact on the formation of students' character.

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***Ifah Hanifah (Corresponding Author)**
Department of Indonesian Language of Education, Kuningan University,
Jalan Cut Nyak Dien No. 36 A Kuningan, Indonesia
Email: ifah.hanifah@uniku.ac.id

Isroyati
Department Industrial Engiering, Insraprasta PGRI University, Jakarta, Indonesia,
Jalan Nangka Raya No.58C. Tanjung Barat, Jakarta Selatan
Email: isroyati@unindra.ac.id

Ton Thi Thuy Trang
Department of Linguistics, Viet Nam National University, Ho Chi Minh, Vietnam,
P. Linh Trung, TP. Ho Chi Minh City
Email: trangtondph@hcmussh.edu.vn