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ECOTOURISM AND LOCAL WISDOM-BASED SCIENCE LEARNING INNOVATION IN SUPPORTING HOTS AND ENVIRONMENTAL LITERACY OF STUDENTS

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Abstract

The rapid growth of tourism has significant impacts on the natural environment and the socio-cultural fabric of tourist destinations, with Lombok being no exception. As the global tourism industry continues to emphasize sustainable development, there is an increasing focus on tourism practices that maximize the economic, environmental, and social benefits of ecotourism. To ensure that ecotourism does not harm the environment, tourists must engage with actively and appreciate the natural environment, which can be achieved through environmental literacy and higher-order thinking skills (HOTS). This study aims to develop an ecotourism-based science learning program that integrates local wisdom to support HOTS and ecological literacy. The research adopts a Research and Development (R&D) approach using the ADDIE model, consisting of five stages: analysis, design, development, implementation, and evaluation. The developed tools include lesson plans, Student Worksheets (LKM), pocketbooks on ecosystems and environmental pollution, and instruments for measuring HOTS and environmental literacy. The findings demonstrate that the learning tools and instruments were deemed feasible, practical, and effective for implementation.

Keywords: Ecotourism; Environmental Literacy; HOTS; Local Wisdom; Science

INTRODUCTION

Learning Natural Sciences is intrinsically linked to the exploration of natural phenomena, fostering the development of students' knowledge, skills, and attitudes (Arizona, 2020a, 2020b; Saputra et al., 2016; Sucilestari & Arizona, 2020). The scientific phenomena studied gain significance when contextualized within the natural and cultural environments in which they occur (Syahidi et al., 2023; Syahrial et al., 2022c, 2022a). Therefore, educators should guide students not only toward a textual understanding of

the material in their books, but also encourage a deeper, active engagement with the natural phenomena they directly observe (Suryaningsih, 2018) .

Studying phenomena in context enhances students' awareness of the various environmental changes they observe (Arizona, Sucilestari, et al., 2024; Sucilestari et al., 2024). Environmental issues, such as environmental degradation, the negative effects of technological advances, and climate change, significantly impact environmental sustainability. These issues are closely linked to the development of environmental literacy, which should be cultivated among students at all levels of education. Science education is a crucial component of the educational system, aimed at enhancing students' understanding of natural phenomena and processes (Arizona, Rokhmat, et al., 2025; Arizona, Sucilestari, Mutiara, et al., 2025). Additionally, science learning plays a key role in developing students' higher-order thinking skills. However, there are still numerous challenges in improving the quality of science education in higher education, particularly in actively engaging students as the central subjects of learning (Arizona et al., 2023; Asyari et al., 2024).

Science education in the 21st century emphasizes the application of more interactive, collaborative, and technology-driven approaches (Sucilestari & Arizona, 2018; Syahrial et al., 2022b). 21st-century science education encourages students to work collaboratively in teams. They are taught to communicate, cooperate, and collectively build knowledge through discussions, group projects, and collaborative tasks. This approach mirrors real-world scenarios, where most scientists work in teams to address complex problems (Charzyński et al., 2022; Winarno et al., 2024). 21st-century science education aims to foster critical, creative, and collaborative scientific thinking. Students are encouraged to link scientific concepts to real-world issues and develop the skills necessary to address them.

21st-century science education focuses on developing students into individuals with a deep understanding of science, essential 21st-century

skills, and the ability to tackle complex challenges in an ever-evolving society (Desmet & Sternberg, 2024). The rapid advancement of technology and information worldwide necessitates an enhancement in human resource quality. This presents a significant challenge for improving the quality of learning in higher education. To elevate the quality of education and foster better critical thinking skills among students, learning must be focused on innovative teaching models. The goal of such innovative learning is to equip students with the skills they need both in their daily lives and in the professional world (Siew et al., 2015) .

In recent years, there has been a growing focus on tourism activities, leading to an increase in the number of tourists. However, the rapid growth of tourism has significant impacts on both the natural environment and the socio-cultural fabric of these destinations. The sustainability of tourism growth is closely linked to the health and preservation of the tourist area's environment.

The global tourism industry has highlighted the increasing importance of sustainable development, emphasizing tourism practices that aim to maximize the economic, environmental, and social benefits of ecotourism. As members of society, students can play a crucial role in ensuring that ecotourism does not harm the environment. Additionally, they can actively engage with and appreciate the natural environment. As stakeholders in tourism, students are well-positioned to promote conservation, education, and restoration practices within the field of ecotourism (Arfan et al., 2024; Budiyanto et al., 2020; Khakhim, 2021).

The negative impacts of foreign cultural influences and the development of tourist infrastructure without considering sustainability aspects must be closely monitored. Beaches, waterfalls, and other once-pristine tourist destinations are increasingly being degraded due to a lack of attention to sustainability. Therefore, it is essential to shift tourism efforts towards sustainable development, emphasizing the principles of ecotourism

and local wisdom (Arizona, Rokhmat, et al., 2024; Ramdani et al., 2025; Sari et al., 2023).

Exploring the context of science will support various thinking skills, attitudes and various literacies, especially environmental literacy. Therefore, students as prospective teachers need to be equipped with Higher Order Thinking skills (HOTs) and environmental literacy to be wise in tourism behaviour that still pays attention to the sustainability of the ecosystem of tourist areas. Based on this, this research developed an ecotourism-based science learning model and local wisdom in supporting HOTs and environmental literacy of students (Arizona, Sucilestari, & Suhardi, 2025; Sakina, 2022; Sucilestari et al., 2023, 2025, 2025).

Exploring the context of science enhances various thinking skills, attitudes, and literacies, particularly environmental literacy. Therefore, students, as future educators, must be equipped with Higher Order Thinking skills (HOTs) and environmental literacy to make informed decisions about tourism behavior that prioritizes the sustainability of tourist ecosystems. In this regard, this research developed an ecotourism-based science learning model, integrating local wisdom, to support the development of HOTs and environmental literacy among students (Merta et al., 2022; Sucilestari et al., 2024; Umami et al., 2021). The development of environmental literacy and HOTs can be achieved through the learning process. Educators have the responsibility to cultivate students' environmental literacy and HOTs, ensuring that, in the future, they are capable of making informed decisions to protect the environment and ensure its sustainability. A person who is able to recognize and safeguard their environment will grow into an adult with a critical understanding, becoming a valuable and active member of society. Goldman (2020) stated that teachers' environmental literacy affects students' environmental literacy.

In addition to being grounded in ecotourism, the developed science curriculum also incorporates local wisdom, specifically the wisdom of

Lombok Island. Local wisdom comprises the values and norms upheld by a society that are considered true and serve as guidelines for daily behavior. As such, local wisdom plays a vital role in shaping the dignity of individuals within their community. In this context, local wisdom is seen as a primordial identity, guiding the behavior and actions of the community, while remaining dialectically engaged with the social conditions they encounter daily (Saputra et al., 2016; Sari et al., 2023).

In the context of education, the values of local wisdom are a key focus of the independent curriculum. In addition to offering differentiated learning, the independent curriculum also accommodates education that is closely connected to the natural environment, taking into account the local context where students live. As revealed by Isrotun (2022), Indonesians adhere to local wisdom as a guiding principle in their daily lives. Education based on local wisdom emphasizes the importance of keeping learners engaged with the everyday challenges they encounter, ensuring relevance and focusing on the empowerment of local skills and potentials in each region. Furthermore, learning materials should be meaningful and closely aligned with the realities students face, empowering them in practical ways.

Integrating the potential of a region, including both ecotourism and local wisdom, into science education can offer students valuable insights into the area's ecotourism potential and the associated values of local wisdom. Therefore, research on innovative science learning models that incorporate ecotourism and local wisdom to support HOTs and environmental literacy among students is crucial.

METHOD

1. Preliminary Study

   At this stage, the activities involve analyzing the problems identified in the field, which are then supported by critical studies based on emerging research trends. The analysis and identification of the needs of researchers

in developing science learning tools based on ecotourism and local wisdom are thus obtained. Additionally, the preliminary study focused on assessing the needs of students through the distribution of questionnaires, observations, and interviews regarding the developed learning tools.

2. Time and Place of Research

   This research was conducted at the Madrasah Ibtidaiyah Teacher Education Study Programme, Faculty of Tarbiyah and Teacher Training, Mataram State Islamic University., between August and September 2023.

3. Product Development

   In this phase, researchers gathered information from preliminary studies that served as a reference for the development of the ecotourism-based science learning model, tools, and local wisdom. Through this stage, the most suitable guidelines were documented to achieve the objectives of the developed learning models and tools. Consequently, the models and learning tools were outlined in the form of Semester Learning Plans, Student Worksheets, Learning Media, and Assessment Instruments, including Higher Order Thinking (HOTs) Tests and environmental literacy instruments. Each learning tool was tested for validity and practicality through expert validation and student feedback after the implementation of the ecotourism-based science learning process integrated with local wisdom. Revisions were made at each stage as part of the refinement process for the developed models and learning tools.

4. Research Instruments

   The research instruments used in this study were tests, questionnaires, and interviews. Prior to their use, all instruments underwent validity and reliability testing. The validity tests conducted included content validity, construct validity, and empirical validity. Content and construct validity were assessed by experts in the fields of science and education, while empirical validity was determined by administering the same instrument to a higher class (students who had already covered the

same material to be tested), ensuring the instrument's validity and reliability.

Higher-order thinking skills (HOTS) refer to students' cognitive abilities demonstrated through tests that assess critical thinking, creative thinking, and problem-solving when students are confronted with real-life, authentic problems. In this study, HOTS were measured using a higher-order thinking skills test instrument.

Environmental literacy was assessed through two aspects: efforts to prevent environmental damage and efforts to restore environmental damage. The first aspect includes environmental care practices such as reducing plastic use, managing waste by type, lowering carbon emissions, and conserving energy. The second aspect includes indicators such as tree planting and the reuse of materials. A questionnaire was used to measure students' environmental care attitudes.

The interview guidelines included questions on the importance of developing ecotourism-based science learning models and tools, as well as incorporating local wisdom.

5. Data Collection Technique

The research data were collected through interviews, questionnaires, and tests. Interviews were conducted to gather information from the initial study related to the development of the learning models and tools. Questionnaires were used to assess the feasibility of the developed science learning models and tools, as well as to capture students' responses to these models and tools, including their environmental literacy. The test instrument was employed to obtain data on students' higher-order thinking skills (HOTs) and environmental literacy.

6. Data Analysis Technique

Data analysis employed two techniques: qualitative descriptive analysis and descriptive statistics. Qualitative descriptive analysis was

used to process data on the feasibility of the developed models and tools. Descriptive statistics were applied to analyze the results of the questionnaires and tests, including the expert validation outcomes, higher-order thinking test results, and environmental literacy data.

RESULTS AND DISCUSSION

The development of science learning models based on ecotourism and local wisdom follows the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). The five stages are summarized as follows:

1. Analysis Stage

The analysis phase of this research includes needs analysis, problem identification, and task analysis. The first step in this phase is to identify and define the course outcomes, expected competencies (basic competencies), and indicators for the MI/SD 1 science courses, in alignment with the graduate competencies and learning outcomes outlined in the curriculum of the PGMI FTK UIN Mataram.

Table 1
Profile of Graduates from the PGMI Study Program, Faculty of Tarbiyah and Teacher Training, UIN Mataram

No.	Profile	Description
1	**Educators at the MI / SD Level**	**Bachelor of education with expertise as a class teacher/tutor/instructor at primary education institutions at the MI / SD level** who masters the psychology and development of learners; learning materials, strategies and media; madrasah / school management; education policy, and **is able to build communication and *networking*** both locally and globally, as well as digital literacy in accordance with **Islamic values and Indonesian culture.**

2	**Research Assistant for Basic Education**	Bachelor of education who is able to apply the theory of **research methodology correctly and appropriately through the practice of research and writing scientific works in the field of basic education.**
3	**Entreprenuer Field** **Primary Education**	Education graduates who become entrepreneurs in the field of media and learning resources; extracurricular, **creative** and **innovative** workshops and arts **based on information technology (IT) based on Islamic values and Indonesian culture.**

(Source: Curriculum Document of FTK UIN Mataram Year 2022)

Based on the profile presented in Table 1, the PGMI Study Program at FTK UIN Mataram seeks graduates who are competent in professional, pedagogical, personal, and social aspects. As prospective teachers, students need to be equipped with quality content knowledge. One of the subjects taught to elementary/MI level students is science (natural science). In addition to mastering content, the graduate profile also emphasizes the importance of communication and networking skills (collaboration). These aspects should be fostered by encouraging students to work cooperatively in every lesson. One effective method to facilitate collaborative work among students is cooperative learning.

In addition to becoming classroom teachers, PGMI FTK UIN Mataram graduates are also prepared to work as research assistants in the field of basic education. Graduates are expected to apply research methodology theory accurately and effectively through hands-on research practice and scientific writing. This requires the use of the scientific method in every assignment or project. To achieve this, scientific-style learning can be implemented, where lecturers facilitate students in learning through inquiry-based steps.

The third profile for PGMI FTK UIN Mataram graduates is to become entrepreneurs in the field of creative and innovative education. Project-

based learning, which fosters creativity and results in the production of creative and innovative ideas or products, is considered one of the most effective methods by education experts. The first two profiles are closely linked to Islamic and cultural values, and it is essential to integrate these values into every lesson to strengthen student character.

Based on the subjects spread across 8 semesters in the PGMI Study Program at FTK UIN Mataram, one of the most urgent and interesting science topics to be researched and developed is the MI/SD Science Subject 1, which covers biology content. This subject is often considered challenging by students. Results from a questionnaire distributed to students who have taken this course revealed that more than 50% of them struggle with mastering the content of Science-Biology.

Initial observations at PGMI FTK UIN Mataram, conducted through classroom visits and interviews with lecturers teaching the MI/SD 1 science courses from June to August 2023, were carried out to explore information about the facts and challenges in the field regarding the teaching process and the implemented learning products. The needs analysis revealed that first-semester students (Classes A-E) have been using learning resources from various textbooks prepared by the lecturers based on the Semester Learning Plan (RPS).

However, the existing content has not fully explored or supported the development of important skills, particularly higher-order thinking skills (HOTs) and environmental literacy. After analyzing the content in the RPS and the MI/SD Science Teaching Book used by students, it became apparent that the learning outcomes primarily focus on lower-level thinking skills. The CPMK (Course Learning Outcomes) in the RPS states, "Students will have the ability to understand the principles of natural science and their application in everyday life, in order to gain a comprehensive insight into the field of science." However, the learning process is still dominated by direct instruction, which does not sufficiently

encourage students to be creative or engage in activities that support the development of critical thinking, creativity, and problem-solving skills.

Based on the curriculum analysis and initial observations, researchers identified the need to develop learning models and tools that foster students' higher-order thinking skills and environmental literacy. The proposed learning model integrates local wisdom and ecotourism values to create a more holistic and relevant approach to science education.

2. Design Stage

This stage begins with the preparation of lesson plans, learning implementation, evaluation, and follow-up activities based on ecotourism and local wisdom. The learning planning tools are compiled in the form of Semester Learning Plans (RPS). The learning implementation tools include Student Worksheets (LKM) and a pocketbook on MI/SD 1 Ecosystem and Environmental Pollution material. Evaluation instruments are developed in the form of higher-order thinking tests and environmental literacy questionnaires.

3. Development Stage

At this stage, the development of the model and all supporting tools has been completed and tested prior to implementation. The developed tools and instruments include the RPS, LKM, pocket book, Higher Order Thinking Instrument, and Environmental Literacy Instrument. Prior to implementation, all learning tools and instruments underwent validation by three experts.

Based on the results of the validation test conducted by three experts, the ecotourism-based science learning model and tools, as well as local wisdom, are categorized as highly feasible for use. The assessed devices include lesson plans, ecotourism-based science learning guides, local wisdom, student worksheets, and pocket books. Overall, the assessment results indicate that the ecotourism-based science learning

tools and local wisdom are very feasible for use, with a score of 96.33% (see Table 2).

Table 2
Learning Device Validation Test Results

No.	Aspects assessed	Value				
		1	2	3	Total	Mean
1. Lesson Plan						
1	Appropriateness between indicators and basic competencies	4	4	4	12	4
2	Appropriateness of indicator formulation	4	4	4	12	4
3	Conformity between indicators and learning objectives	4	4	3	11	3,67
4	Clarity of learning objective formulation	4	3	4	10	3,3
5	Appropriateness of learning steps integrating local wisdom and ecotourism	4	4	4	12	4
6	Clarity of language use and easy to understand	3	4	4	11	3,67
2. Student Worksheet						
1	Completeness of identity	4	4	4	12	4
2	Relevance to learning content	4	4	4	12	4
3	Clarity of sentences and punctuation	3	4	4	11	3,67
4	Clarity of image display	4	4	4	11	3,67
5	Clarity of instruction sentences	4	4	4	12	4
6	Clarity of language use (easy to understand)	3	3	4	11	3,67
1. Handbook of Ecosystems and Environmental Pollution						
1	Completeness of identity	4	4	4	12	4
2	Relevance to indicators and learning objectives	4	4	4	12	4
3	Clarity of sentences and punctuation	4	4	4	12	4
4	Clarity of image display	4	4	4	12	4
5	Attractiveness of display	4	4	4	12	4
6	Clarity of language use (easy to understand)	3	4	4	11	3,67
Total		94	97	98	96,33	
Average		3,76	3,88	3,92	(96,33%)	
Overall average		**3,85 (96,33%)**				
Category		**Very Good to Use**				

Description:

The score range is filled with numbers as follows:
4 = very feasible to use
3 = worth using
2 = less feasible to use
1 = not worth using

Determination of criteria in percentages:
Score 76-100% : ***very feasible to use***
Score 51-75% : ***worth using***
Score 26-50% : ***less feasible to use***
Score ≤ 25%: ***not worth using***

Several points have been noted for improvement and reference: 1) In general, each aspect has been described in detail; however, it is necessary to carefully review each section independently for thoroughness. 2) There are several terms that need to be adjusted to conform to correct Indonesian spelling. 3) The descriptions of images or charts should be enlarged for better readability. 4) The pocket book is well-designed, but further examination could reveal areas for refinement. 5) The value of local wisdom and ecotourism should be explored more deeply to ensure that the intersection or integration with concepts such as ecosystems and environmental pollution aligns with the intended context. The results of the improvement notes from the expert validators then became a reference for revising the device, the resulting product is presented in Figure 1.

Figure 1. Ecosystem and Environmental Pollution MFIs

Based on the results of the validation test for the Higher Order Thinking Skills (HOTs) instrument, it was rated as highly suitable for use (94.46%), with some suggestions for improvement. The input for improvement includes: 1) the naming of the question rubric should be changed to a scoring rubric (assessment), and 2) the observation guidelines

should, if possible, be simplified by reducing the number of items to be observed. A summary of the assessment by three experts is presented in Table 3.

Table 3
Results of the Higher Order Thinking Skills Instrument Validation Test

No.	Aspects assessed	Value				
		1	**2**	**3**	**Total**	**Mean**
1	Suitability of statements with indicators of higher order thinking skills	4	4	4	12	4
2	Clarity of the question sentence	4	4	4	12	4
3	Depth of question sentence	4	4	3	11	3,67
4	The attractiveness of the instrument format to read	3	3	4	10	3,3
5	Clarity of guidelines for filling out the instrument	4	4	4	12	4
6	Appropriateness of number and/or length of statement sentences according to education level	3	4	4	11	3,67
Total		22	23	23	22,67	
Average		3,67	3,83	3,83	(94,46%)	
Overall average		**3,77 (94,46%)**				
Category		**Very Good to Use**				

The results of the validation test for the Environmental Literacy Instrument achieved a very feasible assessment for use, with some suggestions for improvement. The input for improvement includes: 1) the naming of the question rubric should be replaced with a scoring rubric (assessment), and 2) the observation guidelines should, if possible, be simplified by reducing the number of items to be observed. A summary of the assessment by three experts is presented in Table 4.

Table 4

Environmental Literacy Instrument Validation Test Results

No.	Aspects assessed	Value				
		1	2	3	Total	Mean
1	Suitability of statements with environmental literacy indicators	4	4	4	12	4
2	Clarity of statement sentences	4	4	4	12	4
3	Depth of statement sentence	4	4	4	12	4
4	The attractiveness of the instrument format to read	3	3	4	11	3,67
5	Clarity of guidelines for filling out the instrument	4	4	4	12	4
6	Appropriateness of number and/or length of statement sentences according to education level	3	4	4	11	3,67
Total		22	23	24	23 95,83%)	
Average		3,67	3,83	4		
Overall average		**3,83 (95,83%)**				
Category		**Very Good to Use**				

4. Implementation Stage

Through this stage, learning plans and tools are implemented in the classroom as a basis for reviewing the practicality of the learning tools that have been developed. One of the things that becomes a source of information related to the practicality of learning is the student's response to the learning tools used.

Table 5

Student Response to the Science Learning Model based on ecotourism and local wisdom

No.	Statement	Score				
		Sum	Min	Max	Mean	Std Dev
1	Learning science with learning tools integrated with local wisdom and ecotourism is fun	105	3	4	3.50	0.58
2	Interesting learning tools	104	3	4	3.47	0.58

No.	Statement	Score				
		Sum	Min	Max	Mean	Std Dev
3	Learning tools that integrate local wisdom and ecotourism are easy to use	102	3	4	3.40	0.57
4	Instructions for using learning tools that integrate local wisdom and ecotourism are easy to understand and apply.	104	3	4	3.47	0.58
5	Science material about ecosystems and environmental pollution is easier to understand by using learning tools that integrate local wisdom and ecotourism.	108	3	4	3.60	0.49
6	Science learning with learning tools and media increases student curiosity	107	3	4	3.57	0.58
7	Science material about ecosystems and environmental pollution is easier to understand by using learning tools and media.	106	3	4	3.53	0.58
8	Science learning with learning tools integrated with local wisdom and ecotourism increases student curiosity	108	3	4	3.60	0.49
9	Understanding materials that are abstract (not real) becomes easier to understand after using learning tools that integrate local wisdom and ecotourism.	106	3	4	3.53	0.58
10	Learning tools that integrate local wisdom and ecotourism provide ample opportunities to try to analyse and make predictions/hypotheses.	107	3	4	3.57	0.58
11	Insight into ecosystems and environmental pollution is increased by using learning tools that integrate local wisdom and ecotourism.	108	3	4	3.60	0.57
Number of Respondents		30 students				
Sum		1165				
Overall average		**3.53 (88,25%)**				
Category		**Strongly Agree**				

The score range is filled with numbers as follows:
4 = strongly agree
3 = agree d
2 = less agree
1 = disagree

Score 76 - 100% : ***strongly agree applied***
Score 51- 75% : ***agree applied***
Score 26 - 50% : ***less agree applied***
Score ≤ 25% : ***disagree applied***

Based on the results of students' responses to the learning tools, they gave a very agreeable response to be applied. All students involved in learning (30 students) responded 88.25% strongly agreed to be applied. As presented in Table 5.

5. Evaluation Stage

This stage is conducted to see the effectiveness of the learning system implemented in the classroom. Based on the pretest and post-test scores on the aspects of higher order thinking and environmental literacy have increased.

Based on the results of the overall higher order thinking test and the scope of material studied, it is presented in Table 6.

Table 6.

Mean Score of Pretest and Posttest of Higher Order Thinking

N	Pretest Average	S. Dev	Posttest Mean	S. Dev
30	67.27	10,59	86,66	3,14

Based on the data above, the average N-gain value of students' higher order thinking test is 0.56 (medium category).

Based on the results of effectiveness in terms of students' pretest post-test scores in the learning process through ecotourism-integrated science learning and local wisdom, it shows an increase in students' thinking skills on ecosystem material and environmental pollution descriptively. While based on paired t-test can be reviewed in Table 7.

Table 7.

Paired t-test on students' higher-order thinking scores

Paired Samples Test			
Paired Differences	t	df	Sig. (2-tailed)

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	19.36667	9.83478	1.79558	15.69430	23.03904	10.786	29	.000

The results of the paired t-test show a highly significant difference between the pre-test and post-test scores, with an average difference of 19.37. This indicates a significant effect of the implementation of ecotourism-integrated science learning and local wisdom on the material of ecosystems and environmental pollution in the PGMI Program at the FTK UIN Mataram.

Environmental literacy refers to an individual's ability to understand and interpret environmental conditions. Based on this understanding and interpretation, individuals can take appropriate actions to maintain, restore, and improve environmental conditions. It encompasses a person's awareness of various environmental issues, including the ability to identify problems and find solutions to address them in the surrounding environment. Environmental concern is essential for preventing various forms of environmental degradation, especially those caused by human activities. However, the level of environmental concern in Indonesian society, as part of its environmental literacy, remains relatively low. This has resulted in several environmental problems that arise from a lack of awareness and care for the environment (Arizona et al., 2022; Handayani et al., 2022; Leksono et al., 2015).

Table 8 below displays data on students' environmental literacy. From the data, it can be interpreted that the minimum score of environmental literacy from 30 respondents is 71.25 and the maximum score is 100 with an average of 85.88.

Table 8

Student Environmental Literacy Data

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Environmental Literacy	30	71,25	100.00	85,88	7,54

The students' environmental literacy data were also analyzed based on four categories: very good, good, sufficient, and less. Table 9 below presents the categorization of the environmental literacy data of PGMI students.

Table 9

Percentage of environmental literacy achievement per category

No.	Criteria	Value Range	Frequency	Percentage
1	Very good	81-100	23	76,67%
2	Good	61-80	7	23,33%
3	Simply	41-60	0	0%
4	Less	≤40	0	0%
	Total		84	100%

The criteria for environmental literacy of MI / SD prospective teachers who have the largest percentage are in the excellent criteria with a frequency of 23 (76.67%) followed by good criteria (7 people or 23.33%).

These findings suggest that most PGMI students already have a high level of environmental literacy, reflecting their awareness and understanding of environmental issues. This also indicates the effectiveness of the learning methods applied, particularly in integrating ecotourism concepts and local wisdom. However, there is still room for improvement for students in the *good* category.

CONCLUSION

The analysis of environmental literacy data from PGMI students reveals that the majority possess a high level of environmental awareness and understanding, with 76.67% of students categorized as *very good* in environmental literacy. This reflects the effectiveness of the ecotourism and local wisdom-based learning approach integrated into the curriculum. The overall average score of 85.88, along with a small standard deviation, suggests that most students have a strong grasp of environmental concepts. There were no students in the *sufficient* or *less* categories, with only a small percentage falling into the *good* category. Based on these findings, it is recommended that efforts to further strengthen the integration of ecotourism and local wisdom into the curriculum continue to enhance students' understanding and practical application of environmental concepts. Additionally, targeted support for students in the *good* category could help elevate their literacy to the *very good* level. Expanding field-based learning opportunities could further improve environmental literacy, and continuous evaluation should be carried out to monitor the long-term impact and identify areas for improvement in fostering environmental literacy among future educators.

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