



A comparative analysis of environmental literacy skills among Adiwiyata school students: A study at SMA 8 and SMA 12 Banjarmasin

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Abstract

This research aims to analyze the environmental literacy skills possessed by students from SMA 8 Banjarmasin and SMA 12 Banjarmasin, both designated as Adiwiyata schools at the provincial level of Kalimantan Selatan. This study employs the quantitative approach, particularly the comparative method. The study population consisted of 476 students in the XI grade, where 185 students were from SMA 12 Banjarmasin and 133 students from SMA 8 Banjarmasin. The research employed a combination of cognitive and skills tests, and a set of questionnaires to measure students' attitudes and behaviors toward the environment. The

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Mann-Whitney test was used to analyze the data, and the necessary tests included tests of homogeneity and normality. Based on the study's results, there is no significant difference in the environmental literacy skills of Adiwiyata school students at the provincial level. The similarity in the level of environmental literacy for students of SMA 8 and SMA 12 Banjarmasin illustrates the impacts of provincial policy standards and the Adiwiyata program. These research insights could highlight some areas for growth concerning students' awareness and capabilities. On the other hand, they could also support the development of environmental education in integration or interdisciplinary approaches to formal education.

Keywords: *environment; literacy; skills; students; Adiwiyata.*

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INTRODUCTION

Concerns about ecological threats, like forest fires, climate change, rising sea levels, and water pollution, have shifted into focus in the contemporary world (Nayan et al., 2020). These conditions have motivated scholars to investigate the intersection of environmental degradation and human activity in considerable detail. This view is supported by the claim that the natural environment is humanly exploited, resulting in degradation (Sari et al., 2023). Human exploitation of nature leads to increased ecological damage (Choudhary, 2024), like social factors (education, knowledge, income, awareness) and other supporting factors (distance, availability of landfills, cost of waste transportation services, and community culture), which influence this activity (Maulidah et al., 2024; Putra et al., 2016).

As more people learn about the environment and show that they care about the environment, by encouraging them to act in an environmentally friendly manner, use renewable energy, and manage natural resources sustainably in their daily lives, environmental problems will decrease (Ahmadi, 2022; Hastuti et al., 2024; Tabuenca et al., 2023). Promoting environmental literacy, especially in the school setting, is one strategy that may be used to address a variety of environmental issues. This will enable kids to assume more roles and responsibilities for their immediate surroundings (Cincera et al., 2023; Maulana & Aziz, 2022). Solutions to various environmental problems can be found in all disciplines, particularly in the fundamentals of education (Aini et al., 2021; Castellanos & Queiruga-Dios, 2022).

The substantial development and increasing attention to environmental literacy cannot be separated from the contributions made by the Environmental Education Association of North America. NAAEE has developed the concept and elements of environmental literacy and conducted various research studies related to environmental literacy topics (Kusumaningrum, 2018). Environmental literacy is a behavior that is based on awareness to maintain the balance of nature, where individuals are not only aware of environmental issues, but also demonstrate ecological sensitivity and have the capacity to actively respond and develop alternative solutions to various environmental challenges (Kurniati et al., 2022; Nugraha et al., 2022).

Some components used to measure students' environmental literacy skills include cognitive, affective, and psychomotor dimensions, as well as real actions on environmental issues. Based on the Environmental Education Association, key indicators such as attitude orientation, cognitive abilities, conceptual understanding, and responsible actions related to environmental sustainability are used as a basis for evaluating environmental literacy levels (RIEEA, 2019). Therefore, Environmental learning has crucial components like attitudes, behavior, and thinking skills, which enhance it (Erfariyah et al., 2024).

Senior high schools have a program, Adiwiyata, to support the achievement of environmental sustainability in education. This program aims to increase awareness and responsibility as part of an increased active role for schools and students in environmental sustainability (Iswari & Utomo, 2017; Maesaroh et al., 2021; Sunarno et al., 2024), and the achievement of the Adiwiyata school program through environmental education concerning the material and its use (Irawati et al., 2024; Nada et al., 2021; Pahleviannur, 2024; Rakhmawati et al., 2016).

Enhance environmental literacy through the integration of environmental education into the Adiwiyata, enabling it to produce high-quality human resources with an understanding of environmental concepts, addressing environmental issues, and the use of environmental information in everyday life (Indahri, 2020; Iswari & Utomo, 2017). The form of implementation can also be carried out through the integration of environmental education values and the independent curriculum to increase knowledge and participation, from perspectives, and as an evaluation of the condition of the school environment (R. Anggraini et al., 2024; Lutfauziah et al., 2024).

Based on the Banjarmasin City Environmental Service, it was found that the 2023 provincial-level Adiwiyata award was received by SMA 8 and 12 Banjarmasin. SMA 12 Banjarmasin started the program in 2018 and won the award in 2019. SMA 8 Banjarmasin also started the program in 2020 and won the award in the 2020 city-level healthy school competition. Although both schools have implemented various environment-based programs, such as reforestation, Adiwiyata cadres, waste bank management, and the integration of environmental materials into learning, negative habits, including littering and a lack of concern for sorting and managing waste properly, are still evident. So, it means they face challenges in integrating environmental values into their daily lives, even after the program has been implemented.

Environmental literacy can be increased through the Adiwiyata program in senior high schools. But there are barriers to students' environmental literacy, like their participation and understanding of environmental sustainability concepts. It means the Adiwiyata program is still hampered by the seriousness of schools about integrating environmental education and learning curriculum. It supports that teachers' and students' lack of understanding of the program's goals and benefits results in low motivation and participation in its implementation (May &

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Mamluah, 2024). So, this study aims to assess the implementation of the Adiwiyata program in increasing environmental literacy in high schools.

According to the findings of earlier studies, schools that have adopted the Adiwiyata program typically have more positive attitudes toward environmental issues and higher levels of environmental literacy than schools that have not (Budiatman & Kurnia, 2021; Herlina et al., 2021). Comparative studies on environmental literacy abilities in Banjarmasin City's Adiwiyata schools are still scarce, though. As a result, a comparative analysis of the environmental literacy of Banjarmasin City's Adiwiyata schools at the provincial level is required. Thus, this study aims to compare the literacy levels of students at the provincial-level Adiwiyata schools, SMA 8 and SMA 12 Banjarmasin.

Understanding of how effectively the Adiwiyata curriculum enhances students' environmental consciousness through analyzing the program's implementation, as research contributes. The findings are expected to provide educators, policymakers, and schools with insights to refine more effective and sustainable environmental education strategies.

METHOD

Quantitative research with a comparative approach to the environmental literacy abilities of provincial-level Adiwiyata students in SMA 8 Banjarmasin and SMA 12 Banjarmasin. The study population consisted of all grade XI students at SMA 8 Banjarmasin (291 students) and at SMA 12 Banjarmasin (185 students). The proportional random sampling technique obtained 133 students from SMA 8 Banjarmasin and 84 from SMA 12 Banjarmasin.

The instrument to test knowledge, skills, attitudes, and behavior as environmental literacy indicators (Table 1) was a closed-ended questionnaire. The instrument underwent a validity test involving 15 students outside the sample. Reliability testing was conducted using Cronbach's Alpha, with a result of 0.899. The Cronbach's Alpha value for each aspect indicates that all instruments are in the reliable category ($\alpha > 0.70$), making them suitable for use in research data collection.

This study has hypotheses, including:

H_0 : Students in SMA 8 and 12 Banjarmasin do not significantly differ in their environmental literacy levels.

H_1 : Students in SMA 8 and 12 Banjarmasin significantly differ in their environmental literacy levels.

To conduct hypothesis testing, a requirement test is first carried out, including normality and homogeneity tests. Furthermore, the analysis was conducted using the Mann-Whitney test according to the established criteria, such as non-normal data distribution and not requiring the same sample sizes in both independent groups. If the significance value (Sig. 2-tailed) < 0.05 , then the null hypothesis (H_0) is rejected.

Table 1. Environmental literacy ability variables

Variable	Indicator	Sub-Indicator
Environmental Literacy Ability	Knowledge	Ecological knowledge
		Knowledge of environmental concerns and challenges
		Knowledge of solutions to environmental problems
	Skills	Ability to analyze environmental problems
		Ability to identify problems
		Design a plan to solve environmental problems
	Attitude	Environmentally conscious attitude
		Sensitivity to issues
		Feel accountable for protecting the environment
	Behaviors	Desire for action
		Engagement in responsible behaviors

Source: Adaptation of the North American Association for Environmental Education (Hollweg et al., 2011)

RESULTS AND DISCUSSION

SMA 8 and SMA 12 Banjarmasin Students' Participation in Environmental Literacy Capabilities

The environmental literacy abilities of SMA 8 and SMA 12 Banjarmasin students were assessed by evaluating their knowledge, skills, attitudes, and behaviors toward the environment, which are the outcomes of their environmental literacy development (Figure 1).

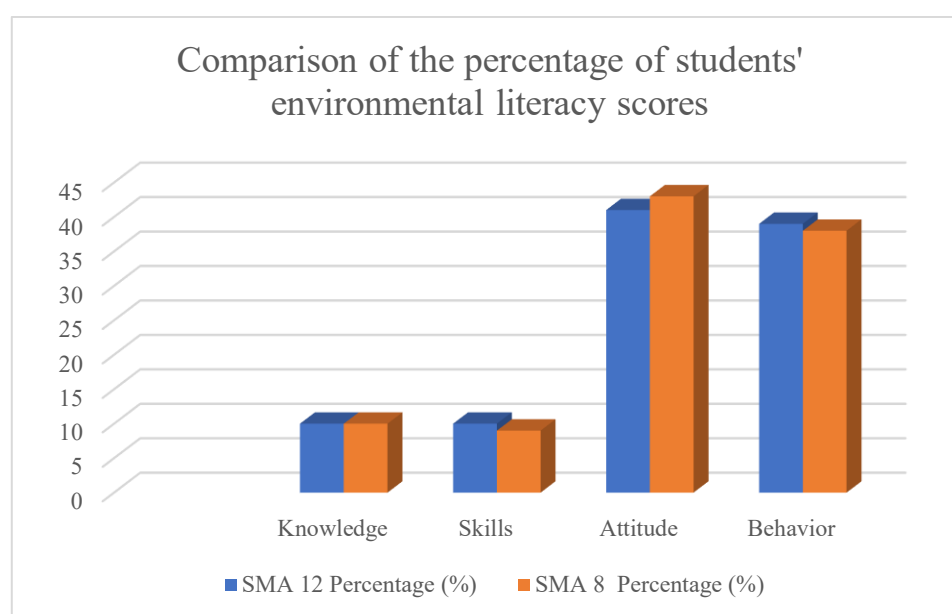


Figure 1. Comparison of students' environmental literacy scores as a percentage

Referring to Figure 1, it can be observed that the achievement of environmental literacy indicates that the environmental literacy abilities of students from SMA Negeri 12 and SMA Negeri 8 Banjarmasin exhibit better environmental attitudes and behaviors compared to their knowledge and skills aspects. This can be seen from both schools that students have real attitudes and actions, such as reducing plastic waste by using tumblers, cleaning the school

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environment regularly (Figure 2), disposing of garbage properly, sorting organic and inorganic waste, and maintaining the cleanliness of school facilities.



Implementation of plastic waste reduction at SMA 8
Banjarmasin



Environmental cleaning at SMA 12
Banjarmasin

Figure 2. Evidence of environmental values in SMA 8 and SMA 12 Banjarmasin

The attitudes and behaviors exhibited by students in both schools demonstrate that the implementation of environmentally based programs has begun to form positive habits in students, not only as a means of compliance with the rules but also as a form of personal awareness and responsibility.



Cleaning up the area around the puddle at SMA 12
Banjarmasin



Water saving by students when not in use at SMA 8
Banjarmasin

Figure 3. Evidence of environmental awareness and responsibility at SMA 8 and SMA 12 Banjarmasin

Comparison of Students' Environmental Literacy Skills in *Adiwiyata* Schools of SMA 8 and SMA 12 Banjarmasin

To test the hypothesis related to students' environmental literacy skills in SMA Negeri 8 and 12 Banjarmasin, the Mann-Whitney test was conducted through prerequisite tests, including a homogeneity and normality test. Normality testing was completed using the Kolmogorov-Smirnov method, while homogeneity of variance was analyzed using the Levene test (Table 2), which indicated that the data from both schools were not normally distributed and not homogeneous.

Table 2. Prerequisite test

No	School	Kolmogorov-Smirnov test		Interpretation	Interpretation		Levene Variances test
		Question	Questionnaire		Question	Questionnaire	
1	SMA 8 Banjarmasin	0.009	0.041	Not Normal	0.009	0.041	Not Normal
2	SMA 12 Banjarmasin	0.002	0.000	Not Normal	0.002	0.000	Not Normal

Hypothesis testing was conducted by applying the Mann-Whitney analysis. The test's outcomes are shown in Table 3.

Table 3. Mann-Whitney test

Test Statistics	
Mann-Whitney U	20293.000
Wilcoxon W	55804.000
Z	-1.612
Asymp. Sig. (2-tailed)	.107

a. Grouping Variable: Uji Mann-Whitney

Using the information in Table 3, the outcomes of the Mann-Whitney test produced an Asymp. signature value (2-tailed) of $0.107 > 0.05$. This indicates that the null hypothesis (H_0) is accepted. Therefore, there is no significant difference in environmental literacy skills between students at SMA Negeri 8 and SMA Negeri 12 Banjarmasin as *Adiwiyata* schools. The *Adiwiyata* program implemented in both schools is equally effective in shaping students' environmental literacy, although each school has a different approach and program implementation. So, it revealed that differences in Students' environmental literacy levels are impacted by the implementation of the *Adiwiyata* program (Herlina et al., 2021; Sari et al., 2023).

Students who are proficient in environmental literacy are able to comprehend environmental ideas and use them to solve environmental problems in their immediate environment. Students at SMA 8 Banjarmasin, for instance, possess a higher cognitive level when it comes to environmental knowledge, including abiotic components, ecosystems, and plant functions. Innovative and contextual learning is the reason for this superior cognitive achievement. This supports the claim that contextual learning can enhance general knowledge comprehension and environmental sensitivity (Ratnasari et al., 2024). Nonetheless, SMA 12 Banjarmasin students actively participate in environmental initiatives, such as encouraging fuel conservation and lowering the amount of waste from single-use plastics. These attitudes and actions by SMA 12 Banjarmasin students have been shown to improve their understanding of environmental concepts and can be directly implemented daily (N. Anggraini & Nazip, 2022; Miterianifa & Mawarni, 2024; Yusuf & Fajri, 2022).

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Based on the results of the data analysis, it was found that there was no significant difference in the environmental literacy skills of students at SMA 8 and 12 Banjarmasin, which are Adiwiyata schools at the provincial level. This is because students at both schools have a good level of knowledge through direct experiences (contextual learning), such as waste sorting, environmental campaigns, or greening projects around the classroom. In addition to practical and direct learning, which includes routine school activities such as Clean Friday, there is also socialization of environmental issues. Students can learn to behave in an environmentally friendly way in the classroom and in everyday life with the help of teachers and other staff. The purpose of the Adiwiyata School Program is to promote the adoption of an environmentally conscious mindset among schools and all school personnel, particularly pupils who will be the country's future generation (Mutia et al., 2025; Putri & Setyowati, 2023).

In addition to the knowledge and skills aspects, implementing this program shapes students' positive attitudes towards the environment. Through habituation in environmentally friendly activities and support from teachers and educational personnel, students gradually develop an understanding of the significance of environmental protection, both within the school environment and outside. The similarity in the methods and approaches applied in both schools is why the environmental literacy levels of SMA 8 and SMA 12 Banjarmasin students tend to be in line. Students' environmental literacy is enhanced through the Adiwiyata initiative's deployment (Khairani & Isaskar, 2024; Mawardi et al., 2023) such as increasing students' concern for the environment, changing student behavior in conservation efforts, and creating a comfortable and sustainable learning environment (Khairani & Isaskar, 2024; N. Y. Sari & Ruja, 2024).

Implementing the *Adiwiyata* program at SMA 12 and SMA 8 Banjarmasin aims to reduce the use of motorized vehicles, contributing to the environmentally friendly school movement. The principal's remarks about "Car Free Day," which lowers motor vehicle emissions and shows the school's dedication to doing so in support of environmental sustainability, lend credence to this. This supports earlier research that indicates the school's proactive role and the Adiwiyata program, which promotes environmental sustainability, are helping students become more environmentally conscious. By influencing students' and school residents' attitudes, behaviors, and habits regarding their environmental concerns, the Adiwiyata program also encourages a sustainable lifestyle (Cahyaningsih et al., 2024; Mujahidin et al., 2023).

Bring personal cups and cutlery, and reduce single-use plastic, are students' actions at SMA 8 and SMA 12 Banjarmasin. That is proof of awareness of living an environmentally responsible lifestyle, especially in terms of reducing plastic waste, transportation use, and energy consumption. Develop a sustainable mentality in students that enhances their actions and attitudes of environmental literacy skills. Positive attitudes and actions that support children's environmental literacy will foster a sustainable mindset (Abdullah et al., 2024; Chen et al., 2022).

Students must have environmental literacy skills, such as understanding sustainability and the environment's responsibility. It helped develop their skills and an attitude of environmental care through actively participating in waste management, keeping the school environment clean, and using energy efficiently. It makes students in SMA 8 and SMA 12 Banjarmasin become environmentally conscious and agents of change who encourage healthy habits. So, students with high knowledge and understanding of the environment are more active in natural resources management and have a positive attitude toward maintaining a sustainable environment (Ariyatun et al., 2024; Fayyaz et al., 2023; Huang & Hsin, 2023).

Based on research findings, environmental education should be improved at both schools. The problems that many students still ignore are reforestation and waste management at SMA 12 Banjarmasin. As seen, students of SMA 8 Banjarmasin still concentrate on understanding the theory rather than implementing it. Therefore, enhance experiential learning methods, actively involve students in environmental programs, and strengthen the school's environment for police. As a result, this research has implications for increasing environmental awareness, students' behavior, and motivating them to actively participate in their school's environment.

CONCLUSION

This research confirms that environmental literacy is more than just an addition to the natural content of the curriculum. To be implemented, it must be truly integrated into the pedagogical approach. Teachers can enhance students' critical thinking abilities while highlighting the sustainability of the learning process by implementing project-based and problem-based learning approaches. To create Adiwiyata Schools that improve the local school environment, legislators must provide regulatory support through collaborations between local communities and schools. With a focus on contextual learning and the experiential learning framework, this research offers a fresh theoretical viewpoint on education for sustainable development through community-based management. As a result, this study advances knowledge about how environmental literacy is implemented in formal education.

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