

Empowering Students as Environmental Stewards: Awareness, Adaptation, and Involvement in Conservation at Adiwiyata Schools

Rista Anggraini¹, Sugeng Utaya², I Nyoman Ruja³

¹ Universitas Negeri Malang, Malang, Indonesia; rista.anggraini.2307218@students.um.ac.id

² Universitas Negeri Malang, Malang, Indonesia; sugeng.utaya.fis@um.ac.id

³ Universitas Negeri Malang, Malang, Indonesia; nyoman.ruja.fis@um.ac.id

ARTICLE INFO

Keywords:

Awareness;
Adaptation;
Engagement

Article history:

Received 2024-08-21

Revised 2024-10-19

Accepted 2024-12-30

ABSTRACT

Environmental awareness is essential for fostering a culture of conservation and sustainability. Schools, as foundational institutions, play a critical role in promoting environmental education. The Adiwiyata program is one such initiative aimed at integrating environmental values into school activities and curricula. This study analyzes the levels of awareness, adaptation, and involvement of students in environmental conservation at national Adiwiyata schools in Gresik Regency. A mixed-method approach was employed, combining quantitative and qualitative data collection. Quantitative data were gathered through questionnaires and analyzed for validity and reliability. Qualitative insights were obtained through interviews and thematic analysis to enrich the findings. The study revealed that 81.52% of students demonstrated environmental awareness, 81.70% showed adaptation to conservation practices, and 80.41% actively participated in preserving the environment. Students recognized the importance of a clean and sustainable environment in creating a conducive learning atmosphere. Schools supported these efforts by embedding environmental activities into daily routines, fostering active student involvement. The findings underscore the effectiveness of the Adiwiyata program in cultivating environmental values among students. By encouraging active participation and consistent adaptation to conservation practices, schools contribute to long-term environmental sustainability. However, continued efforts, such as routine environmental campaigns, are necessary to maintain and enhance student engagement. The Adiwiyata program effectively fosters environmental awareness, adaptation, and involvement among students. Regular environmental initiatives are recommended to sustain and deepen student participation in conservation efforts.

This is an open access article under the [CC BY-NC-SA](#) license.



Corresponding Author:

Rista Anggraini

Universitas Negeri Malang, Malang, Indonesia; rista.anggraini.2307218@students.um.ac.id

1. INTRODUCTION

Environmental education plays a critical role in fostering awareness and concern for environmental conservation. Schools are among the most effective settings for implementing environmental education, providing structured opportunities to enhance students' knowledge, attitudes, intentions, and behaviors toward the environment (Suryanto et al., 2023; Wetering et al., 2022). Recognizing this potential, the Indonesian government introduced the Adiwiyata school program, which was developed by the Ministry of Environment. The Adiwiyata program aims to cultivate environmentally conscious and responsible school communities, promoting an environmental culture within educational institutions. By encouraging sustainable environmental management practices, the program supports the broader goals of sustainable development (Kementerian Lingkungan Hidup dan Kementerian Pendidikan dan Kebudayaan, 2012).

The Adiwiyata program seeks to form schools that are able to involve school residents in environmental conservation efforts. Schools that implement the Adiwiyata program are expected to be examples for other schools for good environmental management (Syarnubi et al., 2021). The Adiwiyata program includes several aspects, namely waste management, greening, energy saving, and environmental education integrated into the school curriculum (Suprpto et al., 2023). Schools that are able to maintain a good environment receive awards as Adiwiyata schools. There are four categories of Adiwiyata school awards, namely Regency or City Adiwiyata schools, Provincial Adiwiyata schools, National Adiwiyata schools, and Independent Adiwiyata schools (Yunus et al., 2020). The award is given to schools that successfully fulfill the components of an Adiwiyata school. Based on the Regulation of the Minister of Environment Number 05 of 2013, there are four components to achieve an Adiwiyata school, namely (1) environmentally aware policies, (2) environmentally based curriculum, (3) participatory environmental activities, and (4) management of environmentally friendly supporting facilities.

Maintaining, managing, and preserving the environment is the duty of all school residents. The success of a program is seen through the contribution of its school residents (Kamil et al., 2020). Students' concern for the environment is a key factor in the success of the Adiwiyata program (Baihaki et al., 2022). Students who have a high level of concern for the environment are more easily invited to be actively involved in various environmental activities at school, such as tree planting, waste management, recycling, and environmental campaigns (Yeşilyurt et al., 2020).

Despite being recognized as Adiwiyata schools, many institutions still face significant challenges in effectively implementing environmental education. These challenges include limited student awareness of environmental protection (Astuti & Aminatun, 2020), insufficient school facilities to support environmental management and conservation, and a lack of engagement from teachers, parents, and the surrounding community. Research also indicates that not all schools with Adiwiyata status exhibit a high level of environmental concern (Waqidah et al., 2020). Even among award-winning Adiwiyata schools, student awareness, adaptation, and involvement often remain low, highlighting a gap between program recognition and practical outcomes.

This study addresses the research gap by focusing on three critical indicators—awareness, adaptation, and student involvement—within Adiwiyata schools. While prior research has emphasized general environmental education, few studies have comprehensively analyzed these specific dimensions in the context of Adiwiyata schools. This study's novelty lies in its integrated approach to examining how these indicators contribute to cultivating an environmental culture in schools.

The aim of this research is to assess and analyze the levels of student awareness, adaptation, and involvement in environmental conservation at Adiwiyata schools in Gresik Regency. By identifying key factors influencing these indicators, the study seeks to provide actionable insights for enhancing the effectiveness of environmental education programs.

The significance of this research lies in its potential to support the development of more effective strategies for embedding environmental values into school culture. The findings are expected to guide schools and policymakers in overcoming existing challenges and promoting sustainable environmental practices through the Adiwiyata program.

2. METHODS

This study uses a mixed method, namely quantitative descriptive and qualitative. Quantitative data is used to determine students' responses to environmental concerns that focus on awareness, adaptation, and student involvement, while qualitative data is used to determine students' insights into the Adiwiyata program. This research was conducted at UPT SMP Negeri 26 Gresik. The research location used is an educational institution that includes environmental education in the determination of its education curriculum. The population used was students of UPT SMP Negeri 26 Gresik in grades VII, VIII, and IX in the 2023-2024 academic year. The sample used was 139 students, consisting of 47 students in grade VII, 47 students in grade VIII, and 45 students in grade IX. Sampling was carried out using the purposive sampling technique. Determining the number of samples was done using the Slovin formula with a 5% error rate as follows:

$$n = \frac{N}{1 + Ne^2}$$

Information:

n : Sample Size

N : Population Size

e : Margin of error (set at 5% with an accuracy level of 95%).

The data collection techniques used were observation, questionnaires, interviews, and documentation. Observations were conducted at UPT SMP Negeri 26 Gresik. The questionnaire was filled out by students of UPT SMP Negeri 26 Gresik in grades VII, VIII, and IX in the form of an online form to obtain respondents who were in accordance with the research objectives, and the Adiwiyata coordinator. The instruments used consisted of 4 parts, namely (1) respondent identity, (2) student involvement activities in environmental conservation, (3) student ability to adapt and learn about the conditions of the surrounding environment, and (4) students' sense of awareness of the environment. The questionnaire components used closed questions with a Likert scale with 4 choices, namely strongly agree, agree, disagree, strongly disagree, and several open questions to obtain descriptive answers from respondents. Interviews were conducted with the Adiwiyata coordinator, because they knew more about the progress of the Adiwiyata program, while documentation was carried out during the implementation of Adiwiyata activities and school programs that had been implemented.

Validity and reliability tests are used for research instruments with the aim of producing valid and reliable question items. Testing is carried out using the Cronbach's alpha technique using IBM SPSS 21 software. Data analysis is carried out by means of data cleaning, which aims to ensure that the questionnaire is answered properly and correctly. Quantitative data analysis uses frequency tabulation and valid percentages, standard deviations, and averages. The processed data is presented in the form of percentages, and descriptive respondents' answer data is analyzed using a thematic approach and then categorized based on management indicators. Qualitative data analysis uses data reduction, data presentation, and drawing conclusions.

3. FINDINGS AND DISCUSSION

3.1 Findings

Students' awareness of environmental preservation at UPT SMP Negeri 26 Gresik. The results of data analysis show that most students at UPT SMP Negeri 26 Gresik are aware of the importance of environmental preservation. Here are some questions to measure students' awareness of the environment, which can be seen in Table 1.

Table 1. Students' awareness of the environment (affect)

No	Question
Q1	I like to see a clean and healthy environment
Q2	I close the sink (faucet) again after use
Q3	I'm glad the school has lots of trees so the air feels cool
Q4	I always turn off the water tap when not in use
Q5	I use ablution waste water to water the plants
Q6	I always turn off the classroom lights when they are not needed
Q7	I prefer to open the window rather than use a fan when the air feels hot in the classroom
Q8	I prefer to use sunlight to illuminate the room rather than using lamps
Q9	I like songs that support environmental sustainability
Q10	I like attending workshops/seminars about the environment

Based on the data processing results that were carried out on students at UPT SMP Negeri 26 Gresik, the following is the percentage of data obtained, as shown in Figure 1.

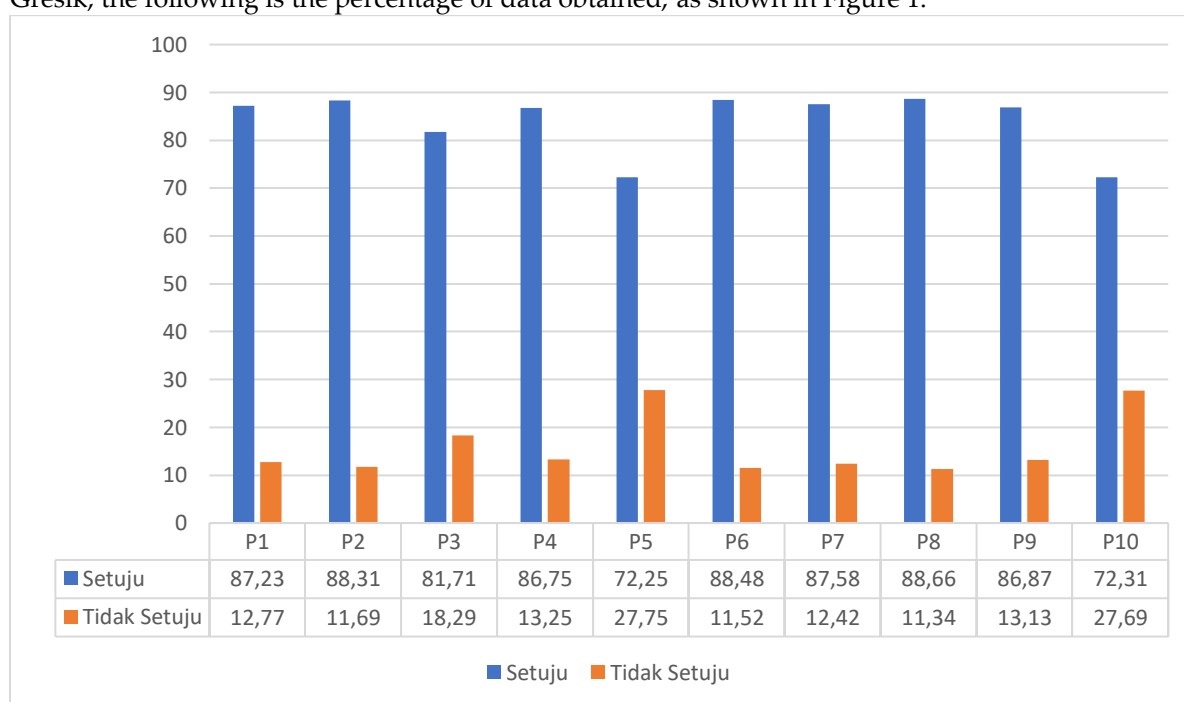


Figure 1. Students' awareness of the environment

Fostering environmental concern in students is essential for developing a strong cultural character and promoting environmental stewardship. At UPT SMP Negeri 26 Gresik, efforts are consistently made to instill awareness about the importance of environmental preservation. A clean and healthy environment significantly enhances the comfort and effectiveness of the teaching and learning process. Data reveals that 87.23% of students expressed happiness when observing a clean environment, reflecting their appreciation for cleanliness. Additionally, the presence of greenery contributes to a positive classroom atmosphere, with 81.71% of students stating that they enjoy having many trees around the school. These findings underscore the role of a well-maintained environment in supporting both learning and student well-being.

The number of trees in the school has a positive impact on the environment. As many as 87.58% of students prefer to open the classroom windows to get fresh air. The arrangement of plants in UPT SMP Negeri 26 Gresik does not block sunlight from entering. This is evidenced by as many as 88.66% of students using lighting from sunlight, so they no longer need lighting from lamps. This step shows that students indirectly learn to carry out energy-saving movements. Wise water management is also embedded in students, as evidenced by 88.31% of students turning off the tap after use, and 86.75% of students not letting water run if not in use. Based on these data, it shows that students' awareness of

the environment is quite good, but in participating in workshops or seminars with environmental themes, not all students can participate as many as 72.31% of students who participate. The following is the percentage of students' awareness of the environment, which is stated in table 6.

Table 2. Percentage of students' awareness of the environment

Interval Value	Category	F	(%)
10-20	Low	0	0
21-30	Medium	58	41.73%
31-40	High	81	58.27%
Total		139	100

Source: (Researcher Data, 2024)

The data in the table indicates that 58 students fall into the medium category, while 81 students are in the high category for environmental awareness. This demonstrates that 58.27% of the students at UPT SMP Negeri 26 Gresik exhibit a high level of environmental awareness. Such a strong sense of environmental awareness is a crucial step in shaping students' character and fostering a culture that values and prioritizes environmental conservation.

Table 3. Question items regarding student adaptation in studying environmental conditions (cognitive)

No	Questions
Q1	I know the impact of littering
Q2	I always wash my hands before and after eating
Q3	I can differentiate between organic and inorganic waste
Q4	I always bring drinking water in a refillable bottle/drinker
Q5	I diligently participate in composting activities at school
Q6	I brought food from home
Q7	I collect used bottles to sell to collectors
Q8	I don't throw trash in the bench locker
Q9	I know wasting water is not good behavior
Q10	I have to participate in preserving the environment

The data processing results for students at UPT SMP Negeri 26 Gresik reveal significant insights into their environmental awareness, adaptation, and involvement. The percentage distribution of these indicators is presented in Figure 2. This data provides a clear overview of students' levels of engagement with environmental conservation efforts. By analyzing the percentages, it becomes evident how effectively the Adiwiyata program is fostering environmental values within the school. The findings also highlight areas where further interventions or enhancements may be needed to strengthen students' commitment to preserving the environment. Figure 2 serves as a critical visual aid to better understand and evaluate the outcomes of environmental education initiatives at the school.

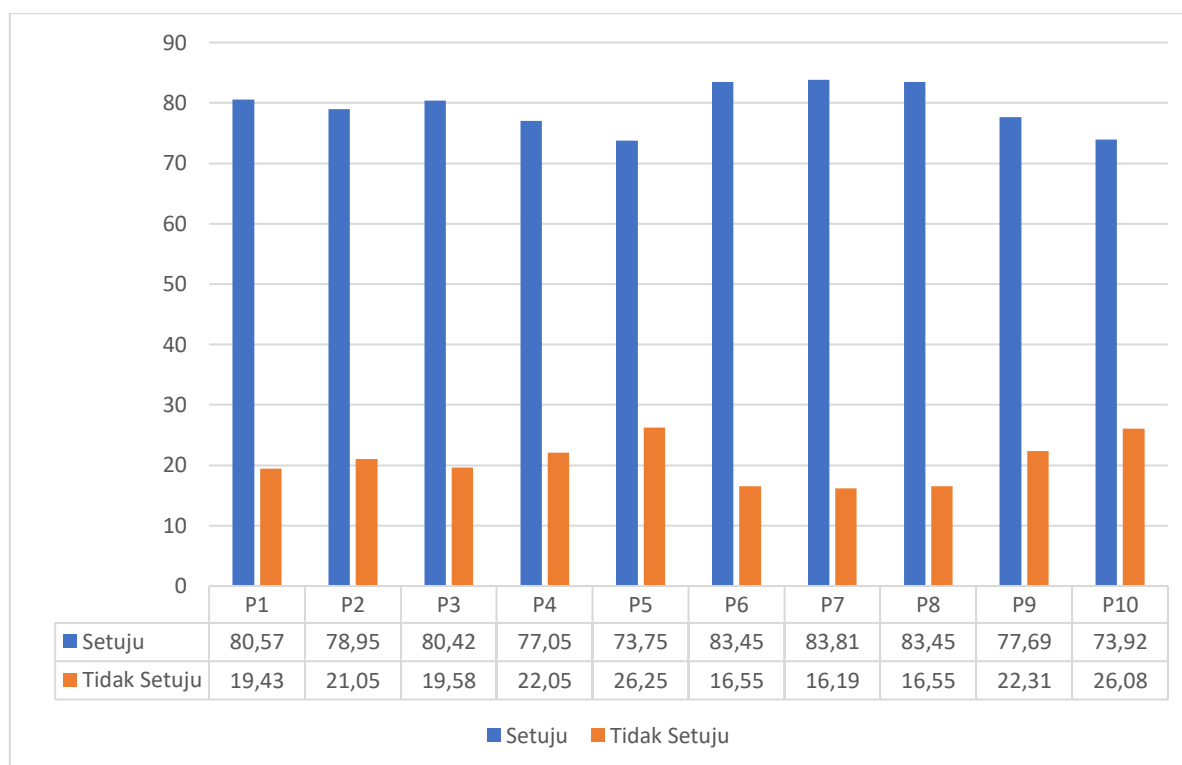


Figure 2. Percentage of results of student adaptation measurements in studying environmental conditions in each indicator

The results of the study showed that 83.81% of students collected used bottles to be resold. Students are aware that plastic waste is one type of waste that is difficult to decompose, it takes a long time to decompose, this is evidenced by 80.57% of students knowing the impacts caused by littering. In addition, 80.42% of students can also know the difference between organic and inorganic waste, so that the two types of waste can be separated directly, where at UPT SMP Negeri 26 Gresik, trash bins have been provided according to their type. This policy is implemented with the aim that students are accustomed to distinguishing between organic and inorganic waste, and can increase their knowledge of the differences between the two types of waste.

The management of plastic and inorganic waste at UPT SMP Negeri 26 Gresik has improved significantly, with ongoing innovations to enhance its development. However, certain aspects of waste management still face challenges, as indicated by the low student involvement in composting activities at school. The question indicator, "participating in composting activities at school," received a less favorable response, reflecting limited engagement in organic waste management. This suggests that the school currently prioritizes inorganic waste management over organic waste. These findings highlight the need for a more balanced approach to waste management, ensuring that organic waste receives equal attention. Table 4 presents the percentage of students adapting to environmental conditions, further illustrating their level of participation in various conservation activities.

Table 4. Percentage of student adaptation in studying environmental conditions

Value Interval	Category	F	(%)
10-20	Low	1	0.72
21-30	Medium	55	39.57
31-40	High	83	59.71
Total		139	100

The table indicates that 1 student falls into the low category, 55 students are in the medium category, and 83 students are in the high category for their ability to adapt and learn about environmental conditions. These results suggest that the majority of students at UPT SMP Negeri 26 Gresik are capable of adapting to and engaging with their school's environmental conditions. Providing students with a clear understanding of environmental issues is a crucial first step in fostering awareness and responsibility for their surroundings. UPT SMP Negeri 26 Gresik has undertaken various initiatives to instill this understanding, including integrating environmental topics into the education curriculum and promoting sustainable habits. These efforts aim to strengthen students' commitment to environmental management and preservation, laying the groundwork for a more environmentally conscious school community.

Table 5. Question items regarding student involvement in environmental conservation (psychomotor)

No	Questions
Q1	I collect plastic waste every time I buy plastic packaged food/drinks
Q2	I collect paper/cardboard that is no longer used
Q3	I take part in preserving the plants and trees at school
Q4	I never pick plants in the school area
Q5	I water the plants every day
Q6	I have never damaged the classroom garden
Q7	I always participate in keeping the school toilets clean
Q8	I always take part in clean Friday activities in class
Q9	I took part in the tree planting movement
Q10	I use used bottles as valuable items (crafts)
Q11	I can make crafts from used goods/plastic waste
Q12	I took part in campaign activities about environmental safety

Based on the data processing results that were carried out on students at UPT SMP Negeri 26 Gresik, the following is the percentage of data obtained, as shown in Figure 3.

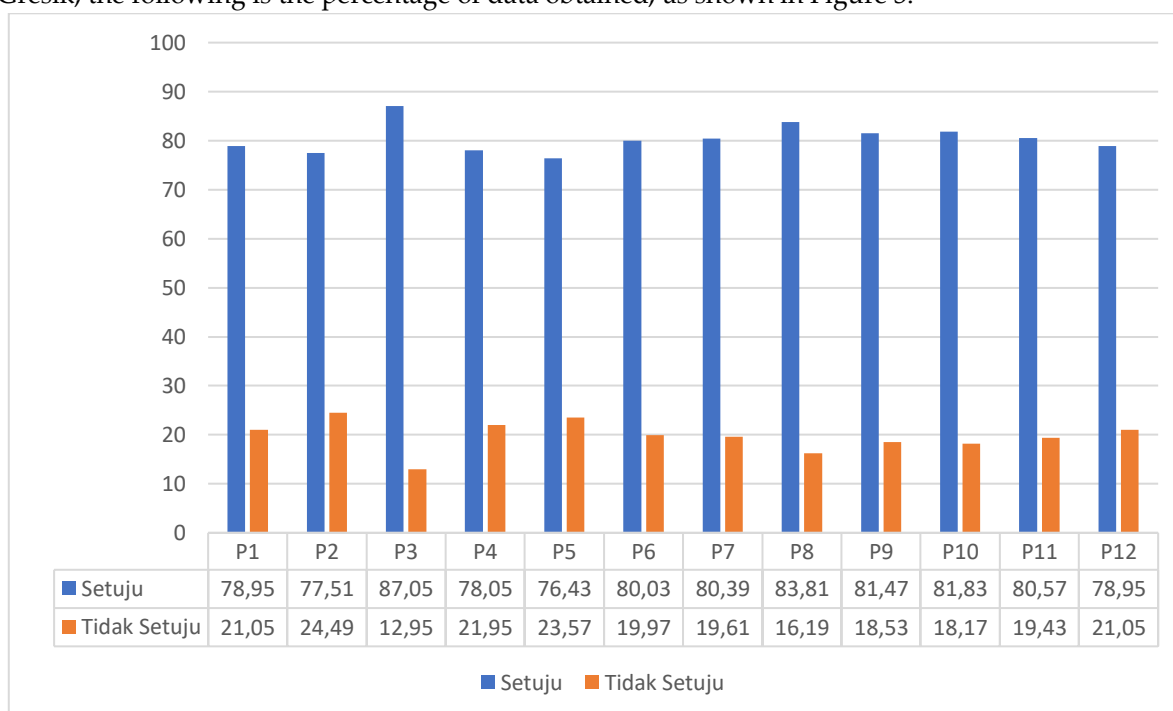


Figure 3. Percentage of results of measuring student involvement in environmental preservation in each indicator

Based on the figure, utilizing used goods is one of the efforts made by UPT SMP Negeri 26 Gresik in minimizing the pile of waste, especially the use of plastic waste. The use of plastic waste cannot be separated from human life; therefore, UPT SMP Negeri 26 Gresik utilizes plastic waste to create valuable items. The results of waste management carried out by students create a sense of pride, because they have succeeded in creating something useful. Through this, UPT SMP Negeri 26 Gresik tries to shape students into individuals who care about the environment.

A clean environment is also the main key in creating a safe, comfortable, and healthy learning atmosphere. Various efforts have been made by UPT SMP Negeri 26 Gresik to maintain environmental cleanliness, such as holding clean Friday activities and toilet pickets. Most students are actively involved in activities to maintain environmental cleanliness, with a maintained environment reflecting the character of a person. Good cultures are the main priority promoted by the school, in order to form good character for students.

Maintaining sustainability of life is not only utilizing used goods and maintaining cleanliness but also maintaining tree sustainability. Efforts made by UPT SMP Negeri 26 Gresik include not picking plants, watering plants, maintaining class gardens, and participating in tree-planting activities for the sustainability and sustainability of plants. Plants in schools have many benefits in the sustainability of the lives of people living around them. On the other hand, UPT SMP Negeri 26 Gresik has challenges in maintaining environmental sustainability, namely the lack of involvement in caring for plants.

The data collected will then draw conclusions based on the level of student involvement in environmental conservation. The following is the percentage of student involvement in environmental conservation at UPT SMP Negeri 26 Gresik in all indicators, which are stated in table 6.

Table 6. Percentage of student involvement in environmental conservation

Interval Value	Category	F	(%)
12-24	Low	1	0,72
25-36	Medium	63	45,32
37-48	High	75	53,96
Total		139	100

The data shows that there is 1 student who has low involvement in conservation, 63 students in the medium category, and 75 students in the high category. This shows that most students participate in environmental conservation in schools. Various efforts are made by the school to familiarize students in environmental-based activities, with the aim of creating a good culture. Students feel proud to be directly involved in environmental conservation activities to create a good environmental culture character and create a beautiful and comfortable school environment for learning activities. Therefore, schools are an important place in shaping the character of students who are integrated through the field of education.

3.2 Discussion

UPT SMP Negeri 26 Gresik is one of the Junior High Schools in Gresik Regency, which is administratively located in Bureng Kidul Hamlet, Kedunganyar Village, Wringinanom District, Gresik Regency, East Java Province. UPT SMP Negeri 26 Gresik is one of the schools located in the middle of a village far from the city. The location of the school does not prevent it from winning an award as an Adiwiyata school. UPT SMP Negeri 26 Gresik in 2022 received an award as a Provincial Adiwiyata school, then with a gap of one year, UPT SMP Negeri 26 Gresik succeeded in winning an award as a National Adiwiyata school in 2023. The awards obtained cannot be separated from the role of school residents in environmental conservation efforts (Nusantari et al., 2020).

Students play an important role in the implementation of the Adiwiyata program. The largest number in the school environment are students. Therefore, it requires more attention in instilling environmental management and preservation programs (Khairani Z et al., 2022). Habituation is also an important thing in increasing students' awareness in environmental management and preservation (Zakiya & Santoso, 2024). Through habituation activities, a high level of environmental awareness is

created among students (Wandira & Muharam, 2022). Based on the research results, the level of student concern is in the high category. Based on these results, it can be seen that the level of environmental concern among students at UPT SMP Negeri 26 Gresik is high.

The data on the level of environmental concern among students at UPT SMP Negeri 26 Gresik reveals a positive trend, with most students demonstrating a high degree of environmental awareness. Of the 139 students surveyed, 89 students (64.03%) fall into the high category, indicating strong environmental concern and engagement. Meanwhile, 50 students (35.97%) are categorized at the medium level of concern, showing moderate awareness and involvement in environmental issues. Notably, no students were classified in the low category (0%). These results underscore a promising level of environmental awareness among students, reflecting the success of school initiatives aimed at fostering a culture of environmental responsibility.

The research data processing results indicate that the level of environmental awareness among students at UPT SMP Negeri 26 Gresik is predominantly in the high category, reflecting a strong sense of environmental care. Specifically, 89 out of 139 students, or 64.03%, demonstrate a high level of environmental concern. Additionally, 50 students are classified in the moderate category, while none fall into the low category for environmental literacy. These findings highlight the effectiveness of environmental education initiatives in fostering awareness among students.

Environmental education plays a crucial role in developing values, knowledge, and skills necessary to understand and appreciate the interrelationship between humans, culture, and the environment (Maurer & Bogner, 2020). The high levels of awareness observed among the students underscore the importance of continued efforts to enhance environmental literacy and promote sustainable behaviors within the school community.

Students' awareness of the environment is important to foster a sense of caring for the environment. Increasing students' awareness and understanding of environmental preservation is important in increasing concern for the environment (Kousar et al., 2022). Environmental awareness among students of UPT SMP Negeri 26 Gresik has a high category of 58.27% and moderate 41.73%. This shows that efforts to increase environmental awareness of UPT SMP Negeri 26 Gresik have succeeded in forming that goal by creating environmental awareness. Forming environmental awareness in students is able to form individuals who are ready to adapt in facing challenges and conditions of environmental change (Barrón et al., 2022).

Various activities are carried out by UPT SMP Negeri 26 Gresik to increase environmental awareness. Energy conservation, water conservation, maintenance of school facilities and infrastructure, sanitation, drainage, waste management, integration in subjects and extracurricular activities, planting and caring for trees (Husin et al., 2023). All school residents are actively involved in maintaining and managing the environment. Various environmental policies and activities are carried out to create a good environmental care culture.



Figure 4. Involvement of school residents in environmental preservation

Maintaining environmental sustainability is important in forming environmentally conscious characters in students. A good environment can form good student characters as well. (Asrial et al., 2021). Character education is also integrated into the curriculum, so that teachers can accustom students to always care about the environment. (Muhtar & Dallyono, 2020). Character education is not only the teacher's task, but involves all aspects of life, such as family, school community, and society that

support the formation of positive character in environmental preservation (Damayanti & Nurgiyantoro, 2018).

Efforts to accustom students to care about the environment require habits. Habits are fostered through routine, programmed, exemplary, and spontaneous activities (Kartini et al., 2024). UPT SMP Negeri 26 Gresik provides habituation to students to be able to adapt by preserving the environment. One of the habits carried out is collecting used plastic bottles to be made into valuable items, 83.81% of students collect plastic bottles to be resold. Students can also distinguish between organic and inorganic waste, which is 80.42%. This shows that students are able to adapt in environmental conservation programs.



Figure 5. Management of used goods into goods of economic value

Student involvement in creating a clean and healthy environment is the first step in increasing understanding and forming student awareness (Rachmadian et al., 2024). Most of the student respondents have a high sense of responsibility towards environmental preservation. Various activities that have been programmed by the school are well followed by students of UPT SMP Negeri 26 Gresik. The activity is the clean Friday activity, 83.81% of students follow it every time the program is held. 80.03% of students also maintain the sustainability of the park in the school. Based on the results of this study, it describes the perception of students in efforts to preserve the school environment. Various policies, activities, and efforts have been made to create the character of students who care about the environment.

Awareness, adaptation, and involvement of students in maintaining environmental sustainability are presented in the following diagram.

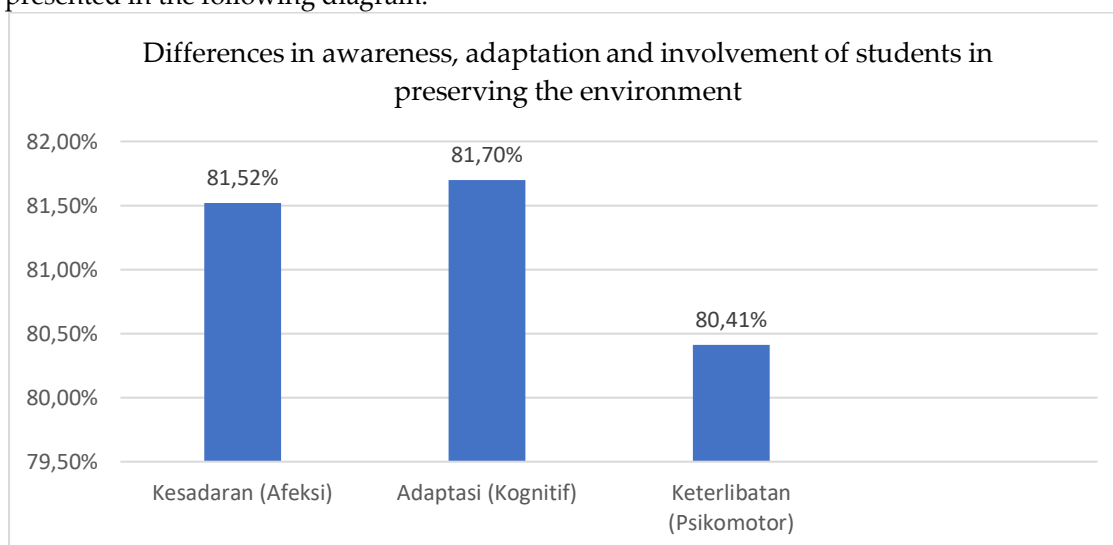


Figure 5. level of awareness, adaptation and involvement of students in maintaining environmental sustainability

The picture shows that students' awareness, adaptation and involvement in preserving the environment are relatively high, namely awareness of 81.52%, adaptation of 81.75, and involvement of

80.41%. Creating environmental awareness from an early age is an important step in shaping the character of students. Environmentally caring characters can be formed through educational institutions, namely by instilling values in students (Mu'ammam & Badri, 2022). If students have environmental care values, then students will not only be able to protect the environment but will also be able to invite or remind other people to care about the environment. (Putri et al., 2021). The data obtained on awareness, adaptation, and involvement of students in protecting the environment at UPT SMPN 26 Gresik shows that students at UPT SMPN 26 Gresik have high values in environmental preservation.

Schools employ various strategies to enhance environmental sustainability, including habituation, integration into the curriculum, and incorporation into specific subjects. Awareness, adaptation, and involvement are key factors that shape students' understanding of environmental culture (Kryukova et al., 2021). Building awareness involves stages such as perception, observation, attention, thinking, and memory. Once awareness is established, students are better equipped to adapt to the knowledge they acquire. Adaptation to this knowledge facilitates their ability to engage actively with their environment (Fazey et al., 2005). When students successfully adapt, they develop a willingness to participate in conservation activities, fostering sensitivity to environmental sustainability. These behaviors enable students to demonstrate environmental care in all settings.

Environmental education has a profound and long-term impact on individuals, equipping them with the skills needed to address various environmental challenges throughout their lives (Pihkala, 2020). The knowledge gained through environmental education not only enhances problem-solving skills but also fosters innovation and solutions for preserving ecosystems. As human life is intrinsically connected to the environment, maintaining its sustainability is a critical responsibility (Yang et al., 2023). Effective environmental management and preservation contribute to a harmonious and sustainable living environment, whereas neglecting these efforts can lead to disruptions in human well-being and ecological balance.

4. CONCLUSION

The research concludes that environmental conservation awareness among students at UPT SMP Negeri 26 Gresik is notably high. Students recognize that a clean and well-maintained environment fosters a safe and comfortable learning atmosphere, encouraging habitual environmental preservation. Their ability to adapt to conservation practices also demonstrates strong results, reflecting their capacity to align with an environmentally conscious culture. Furthermore, all students actively participate in conservation efforts, marking a critical step in developing environmental stewardship as a core aspect of their character. Overall, the study found high levels of awareness, adaptation, and involvement in environmental conservation among students.

The findings highlight the importance of integrating environmental education into school curricula to nurture knowledge, attitudes, skills, and proactive engagement, ultimately preparing future generations for sustainable living. The research underscores the role of schools in shaping environmentally conscious citizens who can contribute to a nation's long-term development.

However, the study has limitations, including its focus on a single school, which may limit the generalizability of the findings to other contexts. Future research should expand to include multiple schools across different regions to provide a broader understanding of student engagement in environmental conservation. Additionally, longitudinal studies could examine the long-term impact of environmental education on students' behaviors and attitudes. These insights could further refine educational strategies for fostering a culture of sustainability.

REFERENCES

- Asrial, A., Syahrial, S., Maison, M., Kurniawan, D. A., & Putri, E. (2021). Fostering Students' Environmental Care Characters Through Local Wisdom-Based Teaching Materials. *JPI (Jurnal Pendidikan Indonesia)*, 10(1), 152. <https://doi.org/10.23887/jpi-undiksha.v10i1.27744>
- Astuti, D., & Aminatun, T. (2020). Student's environmental literacy based on Adiwiyata and non-Adiwiyata at senior high school in Sleman, Yogyakarta. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 6(3). <https://doi.org/10.22219/jpbi.v6i3.13629>
- Baihaki, Rizalie, A. M., & Syaifuddin, A. R. (2022). Implementation of the Adiwiyata School Program in the Implementation of Environment-Based Curriculum. *International Journal of Social Science And Human Research*, 05(06). <https://doi.org/10.47191/ijsshr/v5-i6-61>
- Barrón, N. G., Gruber, S., & Huffman, G. (2022). Student Engagement and Environmental Awareness. *Environmental Humanities*, 14(1), 219–232. <https://doi.org/10.1215/22011919-9481528>
- Damayanti, D., & Nurgiyantoro, B. (2018). Local Wisdom as Learning Materials: Character Educational Values of Sundanese Pupuh. *Journal of Education and Learning*.
- Fazey, I., Fazey, J. A., & Fazey, D. M. A. (2005). Learning More Effectively from Experience. *Ecology and Society*, 10(2), art4. <https://doi.org/10.5751/ES-01384-100204>
- Husin, A., Faisal, M., & Purwaningsih, D. (2023). Adiwiyata schools: Obstacles and expectations of environmental culture implementation at state junior high schools in Palembang. *JPPi (Jurnal Penelitian Pendidikan Indonesia)*, 9(4), 74. <https://doi.org/10.29210/020232261>
- Kamil, P. A., Putri, E., Ridha, S., Utaya, S., Sumarmi, & Utomo, D. H. (2020). Promoting environmental literacy through a green project: A case study at adiwiyata school in Banda Aceh City. *IOP Conference Series: Earth and Environmental Science*, 485(1), 012035. <https://doi.org/10.1088/1755-1315/485/1/012035>
- Kartini, Surachmi, S., & Rondli, W. S. (2024). Analysis Implementation of Character Education Through the Adiwiyata Program in SMP Negeri 1 Batangan Pati. *ASEANA: Science and Education Journal*, 4.
- Kementerian Lingkungan Hidup dan Kementerian Pendidikan dan Kebudayaan. (2012). *Panduan Adiwiyata Sekolah Perawatan dan Budidaya Lingkungan*. Badan Lingkungan Hidup.
- Khairani Z, E., Hanafiah, Iriantara, Y., & Sauri, HR. S. (2022). Community Participation in the Adiwiyata Program for Strengthening Character Education of MAN Students in South Kalimantan. *Jurnal Manajemen, Kepemimpinan, Dan Supervisi Pendidikan*, 7, 399–410.
- Kousar, S., Afzal, M., Ahmed, F., & Bojnec, Š. (2022). Environmental Awareness and Air Quality: The Mediating Role of Environmental Protective Behaviors. *Sustainability*, 14(6), 3138. <https://doi.org/10.3390/su14063138>
- Kryukova, E. M., Khetagurova, V. S., Ilyin, V. A., Chizhikova, V. V., & Kosoplechev, A. V. (2021). Forming students' environmental culture: Modern educational approaches and technologies. *Journal Of Advanced Pharmacy Education And Research*, 11(2), 113–118. <https://doi.org/10.51847/uqUXVBzToq>
- Maurer, M., & Bogner, F. X. (2020). Modelling environmental literacy with environmental knowledge, values and (reported) behaviour. *Studies in Educational Evaluation*, 65.
- Mu'ammad, M. A., & Badri, Moh. (2022). Instillation of The Value of Caring for the Environment at Elementary Students in Pamekasan, Indonesia. *Journal of Pedagogy and Education Science*, 1(02), 108–116. <https://doi.org/10.56741/jpes.v1i02.78>
- Muhtar, T., & Dallyono, R. (2020). Character Education from the Perspectives of Elementary School Physical Education Teachers. *Cakrawala Pendidikan*, 395–408.
- Nusantari, E., Utina, R., Tamu, Y., & Damopolii, I. (2020). Effectiveness of Environmentally-Based Science Learning towards Environmentally-Friendly Character of Students in Coastal Area. *International Journal of Instruction*, 13, 233–246.

- Pihkala, P. (2020). Eco-Anxiety and Environmental Education. *Sustainability*, 12(23), 10149. <https://doi.org/10.3390/su122310149>
- Putri, A. N., Nevrita, Hindrasti, N. E. K., & Sarkity, D. (2021). Penanaman Sikap Cinta Lingkungan Melalui Edukasi Pelestarian Ekosistem Mangrove Pada Siswa. *JPPM (Jurnal Pengabdian Dan Pemberdayaan Masyarakat)*, 5, 103–109.
- Rachmadian, R. H., Sumarmi, S., Masrurroh, H., Utaya, S., & Suharto, Y. (2024). Membentuk Kesadaran dan Keterlibatan Mahasiswa sebagai Aktor Penggunaan Transportasi dan Energi Berkelanjutan di Perguruan Tinggi. *Journal of Education Action Research*, 8(1), 169–178. <https://doi.org/10.23887/jear.v8i1.76919>
- Suprpto, Anah Suhaenah Suparno, & Tri Isti Hartini. (2023). Evaluation of the Implementation of the Adiwiyata Program in Elementary Schools in Grogol Petamburan District, Jakarta, Indonesia. *Community Medicine and Education Journal*, 4(2), 286–292. <https://doi.org/10.37275/cmej.v4i2.312>
- Suryanto, A., Saliman, S., & Sudrajat, S. (2023). Weakness of Character Education in Indonesian Teenager. *Jurnal Penelitian Pendidikan IPA*, 9(5), 3869–3874. <https://doi.org/10.29303/jppipa.v9i5.3721>
- Syarnubi, S., Mansir, F., Purnomo, M. E., Harto, K., & Hawi, A. (2021). Implementing Character Education in Madrasah. *Jurnal Pendidikan Islam*, 7(1), 77–94. <https://doi.org/10.15575/jpi.v7i1.8449>
- Wandira, A., & Muharam, A. (2022). Strengthening Character Education through Daily Habituation Activities. *Prosiding UPI*.
- Waqidah, S. N., Suciati, S., & Ramli, M. (2020). Environmental literacy-based on adiwiyata predicate at junior high school in Ponorogo. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 6(3). <https://doi.org/10.22219/jpbi.v6i3.12468>
- Wetering, J. van de, Leijten, P., Spitzer, J., & Thomaes, S. (2022). Does environmental education benefit environmental outcomes in children and adolescents? A meta-analysis. *Journal of Environmental Psychology*, 81.
- Yang, M., Chen, L., Wang, J., Msigwa, G., Osman, A. I., Fawzy, S., Rooney, D. W., & Yap, P.-S. (2023). Circular economy strategies for combating climate change and other environmental issues. *Environmental Chemistry Letters*, 21(1), 55–80. <https://doi.org/10.1007/s10311-022-01499-6>
- Yeşilyurt, M., Ozdemir Balakoğlu, M., & Erol, M. (2020). The Impact of Environmental Education Activities on Primary School Students' Environmental Awareness and Visual Expressions. *Qualitative Research in Education*, 9(2), 188. <https://doi.org/10.17583/qre.2020.5115>
- Yunus, M., Mukhtar, M., & Akbar, M. (2020). Evaluation of the Implementation of the Adiwiyata Program in Riau Islands Province. *Technium Social Sciences Journal*, 9.
- Zakiya, A., & Santoso, G. (2024). Habituation of the Mutual Cooperation Character in Pancasila Education in Elementary Schools. *International Journal of Entrepreneurship and Business Development*, 07(04).