



## Environmental awareness and its relationship with plant literacy and green school management

Dellivio Glementino Dumaili, Tinjung Mary Prihtanti\*

Agribusiness, Faculty of Agriculture and Business, Universitas Kristen Satya Wacana, Indonesia

\*Corresponding author: [tinjung.prihtanti@uksw.edu](mailto:tinjung.prihtanti@uksw.edu)

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### ABSTRACT

Climate change and human activities pose serious threats to the environment, making environmental awareness among younger generations increasingly crucial. Schools play a strategic role in shaping environmental attitudes and behaviors through structured and sustainable education. Strengthening environmental awareness in formal education is essential, as young people will become future decision-makers and agents of change in addressing environmental challenges. Environmental awareness is closely linked to understanding the role of plants and agriculture, which ideally develops through early environmental education. In Indonesia, green school initiatives are implemented through the Adiwiyata program across all school levels. This study examines the environmental awareness of senior high school students and its correlation with their understanding of plants and agriculture as well as their perceptions of green school management. Data were collected from 120 grade 11 students in four high schools (two public and two private) in Salatiga City, Central Java, using questionnaires and supporting documentation. Descriptive statistics and the Spearman Rank correlation test were employed. The findings revealed a strong correlation between students' environmental awareness and their understanding of the role of plants and agriculture ( $r = 0.740$ ) and a moderate correlation with green school management ( $r = 0.488$ ). The study recommends integrating comprehensive and experiential environmental education, particularly focusing on plant and agricultural literacy, to enhance students' environmental awareness and support sustainable school practices.

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## INTRODUCTION

Climate and human activities have resulted in negative impacts on the environment. Climate change has a very significant impact on the destruction of nature and has implications for human rights to life, water availability, health, food, and shelter (Faturohman et al., 2024). Environmental damage is also caused by human activities that ignore the balance of nature; as written by Syukur & Manda (2021), various natural disasters, including floods, landslides, and so on, are primarily due to human actions that damage the environment and ecosystems. Environmental damage requires human concern to preserve it.

The presence of plants and agricultural activities are considered to play a role in a sustainable environment. Planting plants for greening around the residence helps reduce pollution. According to research by Salsabila et al. (2020), various types of plants can be used to reduce air pollution levels because plants can absorb various pollutants. Therefore, understanding the role of plants (plant awareness) and the role of agriculture (agriculture literacy) in the ecosystem is considered an effort to encourage concern for the environment. Amprazis and Papadopoulou (2024) wrote that plant blindness or 'lack of awareness of plants' has received attention from researchers over the past few years. Lack of awareness of plants indicates a significant phenomenon related to the destruction/underestimation of plants, with implications in the form of threats to environmental sustainability. Recognizing and understanding the important role of plants and their interconnections in ecosystems can support environmental sustainability education. Plant awareness research has increased in various aspects in recent years (Stagg & Dillon, 2022; Stagg et al., 2024; Brkovic et al., 2024; Parsley, 2020; Prokop & Fancovicova, 2023; Dunser et al., 2024).

In addition to the positive role of plants, agricultural benefits also play a role in maintaining a productive environment. According to Windarto et al. (2020), agricultural activities result in food production, animal husbandry, and preservation of natural resources. Referring to the Committee on Agricultural Education in Secondary Schools (National Research Council, 1988) defines agricultural literacy as 'An agriculturally literate person will understand the food and fiber system, and this includes its history as well as its current economic, social, and environmental significance to all people.' The American Farm Bureau Foundation for Agriculture introduced these stages of agricultural literacy, and further research was improved, such as research by Clemons et al (2018). The five stages are: (a) Awareness, at this stage, students are taught the importance of agriculture in providing the primary needs of food, energy, and shelter; (b) Discovery, this stage focuses on deeper exploration related to agriculture, such as the technology used by farmers, the sustainability process, and the importance of natural resource conservation; (c) Understanding, helping students to understand agricultural practices through concrete examples, including food safety regulations and the impact of agriculture on the economy; (d) Analysis, this stage helps students to analyze the environmental, social, and economic impacts; (e) Application, encouraging students to apply agricultural learning outcomes in real life. Agricultural literacy research has increased in recent years (Bature et al., 2023; Cosby et al.,; Jeong & Choi, 2020; Vallera & Bodzin, 2020; Brune et al., 2020).

The increasing global environmental crisis has heightened the urgency of promoting environmental awareness and sustainability education in formal education settings (UNESCO, 2024; United Nations, 2023). Educational institutions play a critical role in shaping students' environmental attitudes, knowledge, and behaviors, which are essential for achieving sustainable development goals. According to Bal and Karakas (2018), exposure to environmental education during formal schooling significantly influences students' concern and pro-environmental behavior. In addition, outdoor-based learning and local wisdom integration have been found to strengthen environmental literacy and awareness (Firmanshah et al., 2023).

Schools and learning institutions are the main places to accelerate the actions of students and local communities to overcome the negative impacts of climate on the environment and the earth. Efforts are needed to empower teachers and students to understand the dangers of the environment and climate change to contribute to ensuring environmental sustainability due to climate change (Rahmah, 2022). Early character cultivation can be a strong foundation for cultivating environmental care character. The character of environmental care can be instilled based on the school curriculum and programs that the school has planned. Every school must be able to instill the character of environmental care (Muhajir & Rahmatinah., 2024).

Environmental awareness is the focus of UNESCO's attention, developed through the green school concept by issuing quality standards for greening schools and learning environments, covering four core

areas: school governance, facilities and operations, teaching and learning, and community engagement. In the context of education for sustainable development, Oe et al. (2022) emphasized that the development of specific project designs and curricula has become a central focus for policymakers and teachers in integrating sustainability principles into formal education. With the Greening Education Partnership, UNESCO developed the Greening Curriculum Guidance to support sustainability education. School farming activities are important as they provide opportunities for students to learn first-hand about sustainability, natural resources, and environmental conservation (UNESCO, 2024).

In Indonesia, the Green School program is realized through the Adiwiyata Programme initiated by the Ministry of Environment to increase awareness and knowledge of the school community in environmental protection. The four components of the program that become a whole unit in achieving Adiwiyata schools, namely (1) Environmentally sound policies, (2) Implementation of Environment-based Curriculum, (3) Participatory environmental activities, (4) Management of environmentally friendly supporting facilities (Indrianeu, 2020).

Based on this background, the research problem is formulated as follows: (a) What is the level of students' environmental awareness in senior high schools in Salatiga City, Central Java Province?; (b) How is students' understanding of the role of plants and agriculture related to their environmental awareness?; (c) How is students' perception of green school management related to their environmental awareness?; (d) To what extent do these variables correlate with one another? This study aims to analyze the younger generation's environmental awareness and its correlation with students' understanding of the role of plants and agriculture, as well as green school management. This study takes a sample of senior high school students in Salatiga City, Central Java Province. This study provides a unique contribution by analyzing the correlation between students' understanding of the role of plants and agriculture, their perceptions of green school management, and their environmental awareness. It addresses the need to better understand how environmental education strategies are internalized at the student level. Given the growing urgency of climate action, empowering young generations through school-based environmental education is increasingly critical.

## **METHODS**

### **Research Design**

This study was conducted in Salatiga City, Central Java Province, at senior high schools. The schools selected as units of analysis consisted of two public schools and two private schools that were purposively selected, fulfilling 50% of the total eight high schools in Salatiga City and representing public and private school status. The study was conducted from 2 January 2025 to 28 February 2025.

This research employed a quantitative correlational design to examine the relationship between key variables. The main variables in this study consisted of (1) students' environmental awareness as the dependent variable, (2) understanding of the role of plants and agriculture as the first independent variable, and (3) perceptions of green school management as the second independent variable. This design was chosen to identify and measure the strength and significance of the relationships among these variables. The indicators used in this study draw upon the four core areas of the Green School Quality Standard formulated by UNESCO (2024), as well as conceptual frameworks of environmental literacy by referring to several literatures, including Mustofa & Sueb (2023), and plant literacy as described by several literature, such as Brkovic et al (2025).

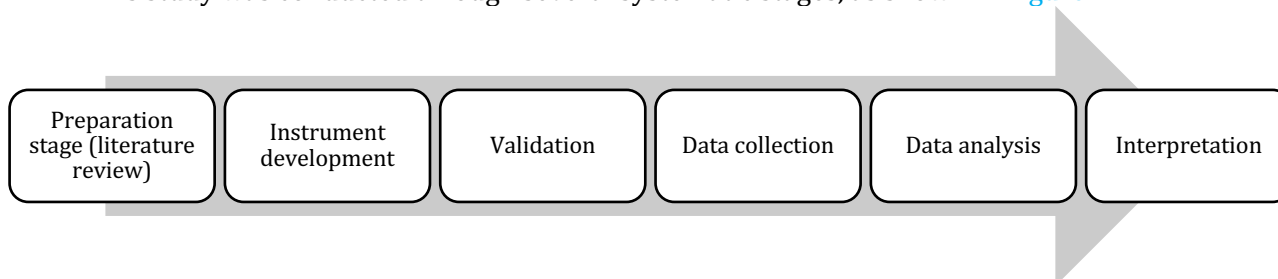
### **Research Instrument and Sampling Technique**

Primary data were obtained through a survey technique using interviews guided by a questionnaire set out in Google Forms. Secondary data was obtained from school documents and other relevant literature for this study. Observation techniques were also carried out to complement the survey findings and to capture the actual implementation of green school management practices. The respondents in this study were grade 11 (second grade) senior high school students from four selected schools. The sampling technique applied was quota sampling, ensuring proportional representation from each participating school. A total of 120 students were selected based on predetermined quotas, which took into account school status (public and private schools) and student diversity. The approach chosen sought to ensure that the study obtained a sample that reflected the variation in respondent conditions, while maintaining data representativeness and efficiency in data collection from all selected schools.

**Table 1.**  
Distribution of Respondent by School

No.	School	Total number of 11 <sup>th</sup> grade students	Sample size
1.	Public school 1	420	30
2.	Public school 2	418	30
3.	Private school 1	310	30
4.	Private school 2	270	30
<b>Total respondent</b>			<b>120</b>

This study was conducted through several systematic stages, as shown in [Figure 1](#).



**Figure 1.** Research procedure

### Data Analysis Techniques

The research instrument was tested for validity and reliability before further analysis. Three main variables were measured through specific indicators and assessed using a Likert scale.

- a. Students' Understanding of the Role of Plants and Agriculture (Independent Variable 1)  
This variable refers to students' knowledge, perceptions, and interest related to the role of plants and agricultural practices in supporting sustainable environments, particularly in the school context. Measurement: Each indicator was measured using statements rated on a 4-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree). Higher scores indicate a higher level of understanding and positive attitudes toward the role of plants and agriculture.
- b. Students' Perceptions of Green School Management (Independent Variable 2)  
This variable measures students' views regarding the school's commitment and efforts toward implementing environmentally friendly programs and green policies. Measurement: Indicators were assessed using a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree). Higher scores reflect more positive perceptions of green school management.
- c. Students' Environmental Awareness (Dependent Variable)  
This variable refers to students' knowledge, attitudes, and behaviors related to environmental protection and their willingness to address environmental issues. Measurement: Students' environmental awareness was measured using statements with a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree). Higher scores indicate stronger environmental awareness and proactive attitudes.

The Rank Spearman correlation test measures the strength of the relationship between two variables with an ordinal scale. It does not have to fulfill the assumption of normal distribution in the variables (Sugiyono, 2014). Spearman's Rank Correlation was used because the data were collected using a Likert scale, which produces ordinal data. This non-parametric technique is appropriate for analyzing the strength and direction of relationships without requiring normality assumptions, making it suitable for the objectives and characteristics of this study.

## RESULTS AND DISCUSSION

### Respondent Characteristic

In [Table 2](#), the research respondents appear slightly more female. Students who became research respondents were in the age range of 16 to 18 years. Kuthe et al.'s (2019) research concluded that adolescents have diverse behaviors and are grouped into four distinct cognitive, affective, and conative aspects of climate change awareness.

**Table 2.**

Respondent Characteristic

No	Criteria	Description	Frequency	Percentage
1.	Gender	Male	55	45.8%
		Female	65	54.2%
		Total	120	100%
2.	Age	16	80	66.7%
		17	33	27.5%
		18	7	5.8%
		Total	120	100%

(Source: primary data, 2025)

The respondents consisted of 45.8% male and 54.2% female students. Although the proportion of female students was slightly higher, both male and female students participated actively in the study. Preliminary descriptive analysis showed that female students tended to score higher on environmental awareness indicators. Buckingham's (2020) article mentions the growing evidence of women in positions of influence over the environment. According to Linderweill et al (2024), plant knowledge differences in the gender demographic showed that male participants were more confident in their plant knowledge. The relatively small differences in age distribution among respondents in Table 2 indicate that there is no significant variation in students' environmental awareness across different age groups. This suggests that students, regardless of age, tend to demonstrate a similar level of concern for environmental issues.

### Students' Understanding of the Role of Plant and Agriculture

High school students' understanding of the role of plants and agriculture in this study showed a positive trend, judging from the mode of answers and the mean.

**Table 3.**

Students' Understanding of the Role of Plants and Agriculture

No	Statements	Modus	Mean
1	Plants types	3	2.93
2	Plants maintenance	4	3.58
3	Positive benefits of plant	5	4.32
4	The plants in the school are sufficient	3	3.03
5	Organic farming	3	2.70
6	Agriculture role to environment	5	3.83
7	Agriculture can improve environment awareness	4	4.10
8	Agriculture in school improves student competencies	5	4.02
9	Agricultural activities in school	3	3.54
10	Participate in agricultural activities in the school and the neighborhood	3	3.39
<b>Mean</b>			<b>3.54</b>

Table 3 presents the descriptive statistics of students' understanding of the role of plants and agriculture. The highest mean score was observed for the statement 'positive benefit of plants' (mean = 4.32), followed by 'agriculture role to the environment' (mean = 3.83) and 'agriculture in school improves student competencies' (mean = 4.02). These results indicate that students have a strong understanding and positive perception of the general benefits of plants and agricultural activities in the school environment. In contrast, the lowest mean score was recorded for the statement 'organic farming' (mean = 2.70), suggesting that students may have less knowledge or exposure to environmentally friendly agricultural practices such as organic farming. This difference may reflect the emphasis of the school's environmental education program, which might focus more on the visible benefits of plants rather than specific sustainable farming practices.

Table 3 shows the relatively low mode and mean values in the statements of plant type recognition and understanding of organic farming; this indicates that there are indications of plant blindness and low agricultural literacy among high school students, even though the students stated that they felt the positive benefits of the presence of plants at school. The research observation found that several large trees were planted in the school environment that supported the coolness of the school environment, and there were even more than 70 types of plants cultivated, including perennials and endemic plants. One of the unique plants owned by one school is the Rejasa (*Elaeocarpus grandiflorus*) Tree, which has become an icon of biodiversity in the school. Some schools also have greenhouses for the cultivation of collectible plants.

Research by Linderwell et al (2024) at students across six different colleges found that participants could identify a total of 10 or less. The types of plants participants knew the most about were food, herbs, and foraging plants, which corresponded with gardening and foraging being the activities that taught them the most about plants.

This study found that high school students who were respondents to the study felt the positive benefits of having plants growing in the school environment, producing coolness, reducing heat, and the benefits of beauty. Respondents also stated that the agricultural aspects carried out in schools supported increased environmental awareness and student competence, including understanding the workings of the interrelationships between ecosystem components.

Referring to Table 3, the plant and agricultural literacy of students in senior high schools in Salatiga City tends to be positive, but there is still room to improve active participation and thorough understanding. The results of this study are similar to those of Dunser et al. (2024), who studied 179 students in the age range of 9-19 years, concluding that students' attitudes towards plants are favorable due to awareness of the services of plants to the ecosystem, but interest in plants is relatively low. Awareness of plants and their important role in ecosystems and global climate will increase support for environmental conservation. The introduction of agriculture can be done through school landscaping. Conducive and beautifully landscaped spaces outside the classroom can also attract students to school, helping the PdP (Learning and Teaching) process more efficiently. Students involved in gardening will improve overall academic performance and increase their interest in learning (Ali et al, 2020; Papadopoulou. 2020).

### Green School Management

A green school is defined as a school that is committed and systematically develops programs that implicate environmental values into all school activities so that students have a character that loves the environment (Lestari, 2021). The purpose of the green school program is to encourage schools worldwide to integrate environmental education into the curriculum and implement environmentally friendly practices in schools (UNESCO, 2024). The green school concept invites all members to form a caring and environmentally friendly lifestyle. This program benefits the world of education and agriculture and helps reduce the impact of global warming, albeit on a small scale (Syukur & Manda, 2021). Education allows students to develop their potential through intracurricular, co-curricular, and extracurricular activities (Nahdiyah et al., 2022). Students' perceptions of school management in supporting the realization of green schools are shown in Table 4.

**Table 4.**  
Green School Management Statement

No	Statement	Modus	Mean
1	The school has a vision and mission related to environmental awareness	3	3.67
2	The school has a curriculum or subject matter related to environmental awareness	3	3.48
3	The school implements a curriculum or extracurricular activities related to environmental awareness	4	3.76
4	The school implements regulations that support environmental awareness	5	3.88
5	The school has segregated waste disposal facilities that support environmental awareness	4	3.71
6	The school has parks or gardens that reduce air pollution	5	4.06
7	The school participates in environmental activities	3	3.49
8	The school has cooperation partners that support environmental stewardship	5	3.47
9	The school has an environmental care management organization structure	3	3.78
10	The school implements regular monitoring and evaluation of environmental awareness	3	3.23
<b>Mean</b>			<b>3.65</b>

Table 4 presents the descriptive statistics for students' perceptions of Green School Management. The statement 'The school has parks or gardens that reduce air pollution' obtained the highest mean score (mean = 4.06), followed by 'The school implements regulations that support environmental

awareness' (mean = 3.88). These high scores indicate that students strongly recognize the visible and tangible environmental initiatives implemented by the school, such as green spaces and environmental regulations. In contrast, the lowest mean score was observed for the statement 'The school implements regular monitoring and evaluation of environmental awareness' (mean = 3.23). This suggests that students may be less aware of or less involved in systematic evaluation activities, which might be less visible or less frequently communicated to them. The statement 'The school has cooperation partners that support environmental stewardship' (mean = 3.47) also scored relatively lower compared to the first two indicators, indicating that external partnerships may not be as strongly perceived by students as the school's direct environmental facilities and rules. These differences among the indicators reflect the varying levels of students' exposure to different aspects of green school management. Tangible, physical elements such as gardens and environmental rules tend to be more easily recognized by students, while programmatic or management aspects such as partnerships and evaluation processes are less visible and therefore perceived less strongly.

Table 3 shows that students' perceptions of green schools tend to be favorable, as seen from the mode and mean. One of the statements that shows a high score is the school's ownership of a garden that is useful in reducing air pollution in the school environment. The statement with a low mean score is that the monitoring and evaluation system for environmental awareness has not been running regularly. Some schools in Indonesia arrange the environment and school gardens to support environmental awareness, such as the results of community service activities Zuhriyah et al. (2023), increased environmental knowledge in schools obtained after education related to Adiwiyata program, especially environmental care and waste management, as well as the use of several technologies to support a green and healthy environment in the form of school landscape redesign, hydroponic training, bio floc catfish cultivation and socialization related to energy conservation using solar electricity. Research by Prabasari et al (2020) at junior high school and senior high school in Semarang Regency, conclude that most teachers had tried to incorporate environmental elements into their learning tools, both in the form of assessment instruments and the media; meanwhile, it was found that the level of environmental awareness of students was classified as high, especially among female students. Research by Hussain et al (2025), the landscape is the importance and had ability of to improve children's cognitive development. One thing that should not be missed in efforts to increase environmental awareness among the younger generation is efforts to overcome the dangers of waste, as concluded by Debrah et al (2021), that students at both secondary and tertiary levels have positive environmental attitudes, and high awareness of environmental issues, but there is a lack of practical education of teachers to guide students to put sustainable waste management into practice. Lack of environmental education in most developing countries is caused by fragilities in practical environmental curricula of teachers to respond to modern-day environmental issues for sustainable development and cleaner production (CP).

### Student's Environment Awareness

Students' awareness of the environment is shown in Table 5.

**Table 5.**  
Student's Environment Awareness

No	Statement	Modus	Mean
1	Benefits of maintaining a healthy environment	3	2.93
2	The role of green space	4	3.58
3	Negative impact of pollution	3	2.70
4	How to reduce pollution	5	3.83
5	Environmental effects on the occurrence of natural disasters	4	4.10
6	Reduce, reuse, recycle of waste	5	4.02
7	Implementing ways to save energy	3	3.54
8	Take full responsibility for protecting the environment	5	4.32
9	Active in environmental maintenance activities at school	3	3.03
10	Reduce the negative impact of climate change on the community	3	3.39
		Mean	3.54

Referring to Table 5, the mode value and mean score show that the lowest score is in students' perceptions of negative impact of pollution. Students' inability to understand the positive benefits of a

healthy environment is because they still feel that no environmental damage events are detrimental to their lives. The results of this study found that many students (the young generation) stated that they were not yet involved in environmental maintenance in society. In [Table 5](#), the level of students' environmental awareness in this research is quite good in terms of understanding, but it still needs to be improved in terms of active involvement from students. The result shows the importance of reinforcement through direct activities to encourage environmentally conscious behavior. Environmental awareness, since being in high school, will be carried over into their lives in the future. Research by Szeberenyi et al. (2022) showed that most students (85.19%) had heard about environmental awareness before starting high school, and 83.61% of them had learned about the importance of renewable energy, environmental awareness or environmental protection in Biology and/or Geography classes. Tadana & Hairulla (2021) wrote that the Developed Local-Based Lessons on Environmental Education integrated to STEM (Science, Technology, Engineering, and Mathematics) lessons have increased the environmental awareness of the learners. Sukiennik & Dziadkiewics (2024) found in their research that there is a high level of knowledge in the field of environmental protection, as well as a great willingness, especially from the younger generation, to carry out environmental projects. Üstün & Ürey (2024) and Supriatna et al (2024) conclude that science self-concept appears to be the strongest predictor of students' environmental awareness, socio socioeconomic status level was also a significant variable explaining students' environmental awareness. Spearman's Rank correlation analysis is shown in [Table 6](#)

**Table 6.**

Results of Correlation Test of Students' Environmental Concern Variables with Understanding of the Role of Plants and Agriculture and Green School Management

No	Variable	Correlation Coefficient ( $r_s$ )	Significance Value ( $\alpha$ )	Strength of relationship
1.	Understanding the Role of Plants and Agriculture ( $X_1$ )	0.740**	0.000	Strong
2.	Management of Green Schools ( $X_2$ )	0.488**	0.000	moderate

(Source: primary data, processed, 2025)

[Table 6](#) shows a significant and strong relationship between the variables of understanding the role of plants and agriculture ( $X_1$ ) and students' Environmental concerns (Y), with a Spearman correlation coefficient of 0.740 and a significance of 0.000. The relationship shown is positive and unidirectional, meaning that the more positive students' perceptions of agricultural activities at school, the greater their concern for the environment. The strong correlation ( $r_s = 0.740$ ) between understanding the role of plants and agriculture ( $X_1$ ) and environmental awareness (Y) suggests that  $X_1$  is a major cognitive driver of Y. The moderate correlation ( $r=0.488$ ) between the perception of green school management ( $X_2$ ) and environmental awareness (Y) indicates that  $X_2$  is a significant, yet secondary, contextual factor.  $X_2$  captures the students' perception of the school environment and management practices. While these practical actions are essential, they do not necessarily equate to deep cognitive awareness. The findings of this study confirm the first research objective, which is to determine the relationship between students' perceptions of agricultural activities and their environmental awareness. The results show that students' active involvement in agricultural activities—such as maintaining school gardens and cultivating plants—significantly strengthens their practical understanding of environmental issues and fosters a greater sense of responsibility toward environmental protection. This supports the idea that hands-on learning experiences contribute more effectively to building environmental attitudes than theoretical knowledge alone.

This finding is consistent with the constructivist perspective, which emphasizes learning through direct experience, and with environmental education theory that positions schools as spaces for developing sustainable behavior. Previous studies have similarly highlighted the role of school-based agriculture in strengthening environmental literacy. Patintingan et al. (2024) found that school gardens increase students' environmental knowledge and participation in maintaining school cleanliness and sustainability. Rahayu et al. (2021) also identified a positive link between agricultural practices such as aquaponics and students' environmental awareness. Papdopolou et al. (2020) further emphasized that school gardens can serve as a "gateway" for introducing environmental education and sustainability in both theory and practice. Together, these studies reinforce the finding that agricultural engagement is a strategic tool for cultivating environmental responsibility among students.

Furthermore, the perception of Green School Management ( $X_2$ ) showed a moderate but significant

correlation with environmental awareness (Spearman's  $\rho = 0.488$ ,  $p = 0.000$ ). This indicates that students who perceive their schools as having stronger environmental policies, facilities, and management practices tend to demonstrate higher levels of environmental concern. Although the correlation was not as strong as with agricultural engagement, it suggests that structural and institutional support remains an important factor in shaping students' environmental behavior. These results align with Paryumi (2021), who found that the Adiwiyata program can strengthen students' environmental character, and with Eriskaputriyani & Novio (2023), who emphasized the importance of green facilities and environmental policies in supporting student awareness. Sholikhah & Shofiyah (2024) also found that environmental perception, attitude, and awareness are strongly interrelated, suggesting that perceptions of school environment management can serve as an entry point for behavioral change. These findings echo broader environmental education theories, which highlight the interaction between institutional factors (such as school governance) and individual awareness in shaping sustainable behavior.

In addition, contextual factors such as socioeconomic background, school ownership, and the quality of educational resources have also been identified as important determinants of environmental literacy (Edsand & Broich, 2019). This may explain why perceptions of school management contribute moderately: while green school management provides the structural foundation, personal experiences and external factors further shape students' environmental awareness. Similarly, Hall et al. (2025) illustrated the importance of creating broader learning networks involving students, teachers, and external stakeholders to strengthen botanical literacy and sustainability practices. Taken together, these findings underline the need for integrated environmental education strategies. Hands-on agricultural engagement provides direct experiential learning, while effective green school management offers institutional support. Both factors complement each other in shaping students' environmental awareness. This dual approach resonates with UNESCO's Green School Quality Standard, which emphasizes governance, facilities, learning, and community engagement as interconnected pillars for environmental education.

## CONCLUSION

A significant and strong relationship between students' understanding of the role of plants and agriculture and environmental awareness ( $r = 0.740$ ). Likewise, a significant but moderate relationship exists between the perception of green school management and students' environmental awareness ( $r = 0.488$ ). The research proves that the more positive students understand the role of plants and agriculture and green school management, the more it is related to increasing students' environmental awareness. This research finding suggests that structured environmental education focusing on the ecological importance of plants is a more powerful predictor of high environmental awareness; while green school initiatives are supportive, their influence is moderate, indicating that the core of strong environmental awareness is predominantly driven by deep scientific and ecological understanding. Based on the findings, the study recommends curriculum Enhancement at schools to strengthen the integration of material on the ecological and economic roles of plants and agriculture, utilizing project-based learning (e.g., school gardening) to bridge theory and practice. This study also suggest to optimizing Green School Programs to be more educational, ensuring students are actively involved in planning and understanding the reasons behind sustainable practices, rather than simply participating in physical upkeep. Further research is recommended to test interventions that explicitly link strong cognitive understanding (role of plants) with active participation in green school practices, aiming to strengthen the currently moderate relationship.

## REFERENCES

- Ali, SM., Othman, N., Latif, FAA., Awang, A.H., & Rostam, K. (2020). The Functions of Landscape in School Learning Process. *Planning Malaysia Journal of The Malaysian Institute of Planners*. Vol 18 (4). 191-202. <https://doi.org/10.21837/pm.v18i14.826>
- Amprazis, A. & Papadopoulou. P. (2024). Key Competencies in education for sustainable development: A valuable frameworks for enhancing plant awareness. *Plants People Planet*. Special Issue: Parasitic plants, people, and planet. <https://doi.org/10.1002/ppp3.10625>.
- Bal, G.H.S, & Karakas G. (2018). Environmental Education at Faculty of Agriculture and Changing Awareness, Attitude and Behavior towards Environment in Turkey. *JAST* 2018; 20 (5) :869-882URL. <http://jast.modares.ac.ir/article-23-14070-en.html>.
- Bature, S., Olorunleke, A., Ibrahim, O., Kayode, A., & Bolakale, J. (2023). Assessing Agricultural Literacy Among Senior Secondary School Students in Kwara State, Nigeria: Implications for Educational

- Interventions. *Indonesian Journal of Curriculum and Educational Technology Studies*, 11(1), 1-8. <https://doi.org/10.15294/ijcets.v11i1.54877>
- Brkovic, I., Sanders, D., & Nyberg, E. (2024). Investigating plant awareness: Methodologies, challenges and possibilities. *Plants People Planet*. <https://doi.org/10.1002/ppp3.10604>.
- Brune, S., Stevenson, K. T., Knollenberg, W., & Barbieri, C. (2020). Development and Validation of a Children's Agricultural Literacy Instrument for Local Food. *Journal of Agricultural Education*, v61 n3 p233-260 2020. <https://doi.org/10.5032/jae.2020.0300233>
- Buckingham, S. (2020). *Gender and Environment* 2nd Edition. Routledge. London. <https://doi.org/10.4324/9781315179926>
- Clemons, C., Lindner, J.R., Murray, B., Cook, M.P., Sams, B., & Williams, G. (2018). Spanning the Gap: The Confluence of Agricultural Literacy and Being Agriculturally Literate. *Journal of Agricultural Education*, 59(4), 238-252. <https://doi.org/10.5032/jae.2018.04238>.
- Cosby, A., Manning, J., Power, D., & Harreveld, B. (2022). New Decade, Same Concerns: A Systematic Review of Agricultural Literacy of School Students. *Education Sciences*, 12(4), 235. <https://doi.org/10.3390/educsci12040235>
- Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising Awareness on Solid Waste Management through Formal Education for Sustainability: A Developing Countries Evidence Review. *Recycling*, 6(1). <https://doi.org/10.3390/recycling6010006>.
- Dünser, B., Möller, A., Anđić, B., Lampert, P., Bergmann-Gering, A., & Pany, P. (2024). (Re) growing plant awareness: A Delphi study. *Plants People Planet*. <https://doi.org/10.1002/ppp3.10617>.
- Edsand, HE. & Broich, T. (2020). The Impact of Environmental Education on Environmental and Renewable Energy Technology Awareness: Empirical Evidence from Colombia. *International Journal of Science and Mathematics Education*. 18, 611-634 (2020). <https://doi.org/10.1007/s10763-019-09988-x>.
- Eriskaputriyani & Novio, R. (2023). Peran Lingkungan Sekolah Terhadap Pembentukan Sikap Peduli Lingkungan Di SMA Pembangunan Laboratorium Universitas Negeri Padang. *Jurnal Pendidikan Tambusai*, 8(2), 10389-10398. <https://doi.org/10.31004/jptam.v8i1.13948>.
- Faturohman, Hidayanto, L., & Fahrurroji. M. (2024). Analisis Dampak Perubahan Iklim Terhadap Hak Pada Manusia. *Terang: Jurnal Kajian Ilmu Sosial, Politik Dan Hukum*, 1(3), 01-08. <https://doi.org/10.62383/terang.v1i3.346>
- Firmanshah, M.I., Abdullah, N., & Fariduddin, M.N. (2023). The Relationship of School Students' Environmental Knowledge, Attitude, Behavior, and Awareness toward the Environment: A Systematic Review. *International Journal of Academic Research in Progressive Education & Development*. 12 (1). P. 471-488. <http://dx.doi.org/10.6007/IJARPED/v12-i1/15707>.
- Hall, Hannah., Stroud, S., Culham, A., Clubbe, C., Batke, S., Medcalf, S., Jones, MG., Baker, L., Lydon, S., McGale, E., Acedo, C., Charmley, J., Warren, JM, & Mitchley, J. (2025). The Botanical University Challenge: Bridging isolation and empowering plant-aware students. *Plants People Planet*. 11 February 2025. <https://doi.org/10.1002/ppp3.10636>.
- Hussain, M.A., Kamaruzaman, M.Y., Raji, M.N.A., Basri, A.Q., Mamat, A.B., Basir, J. M., & Yunos, M.Y.M. (2025). A Review on the Role of Function Landscape in Encouraging the Psychomotor and Cognitive Development of Pre-School Children. *Indonesia Journal of Geography*. 57 (2) 423-429. <https://doi.org/10.22146/ijg.97653>.
- Indrianeu, T. (2020). Model Sekolah Adiwiyata Dalam Meningkatkan Kepedulian Warga Sekolah Terhadap Lingkungan Di SMP Negeri 10 Tasikmalaya. *Geosee*, 1(1). <https://jurnal.unsil.ac.id/index.php/geosee/article/view/1920/pdf>
- Jeong, S. J., & Choi, S. J. (2020). Agricultural literacy in the context of agricultural education in South Korea: using hierarchical linear modeling. *The Journal of Agricultural Education and Extension*, 26(4), 401-419. <https://doi.org/10.1080/1389224X.2020.1748670>
- Kuthe, A., Keller, L., Korfgen, A., Stotter, H., Oberrauch, A., & Hoferl, KM. (2019). How Many Young Generations are there? –A typology of teenagers's climate change awraness in Germany and Austria. *The Journal of Environmental Education*. Vol. 50 (Issue-3). 172-182. <https://doi.org/10.1080/00958964.2019.1598927>.
- Lestari, N. (2021). Planting the Character of Love for the Environment Through The Go Green School Movement. *Social, Humanities, and Education Studies (SHES): Conference Series*. 4(6). 731-737. <https://doi.org/10.20961/shes.v4i6.68541>.

- Linderwell, S., Hargiss, C. L. M., & Norland, J. (2024). Do demographic factors impact plant knowledge and plant awareness disparity? *Natural Science Education*. <https://doi.org/10.1002/nse2.20146>.
- Muhajir, A., & Rahmatinah. (2024). Analisis Penerapan Program Green School Dalam Menanamkan Nilai Karakter Peduli Lingkungan Di SD Inpres Borongunti Kecamatan Bajeng Kabupaten Gowa. *Journal on Education*, 06(02), 11827–11841. <https://doi.org/10.31004/joe.v6i2>.
- Mustofa, A. & Sueb, S. (2023). Analysis of environmental literacy and awareness to maintain environmental sustainability. *Edubiotik : Jurnal Pendidikan, Biologi dan Terapan*. 8, 01 (Jan. 2025), 50–61. <https://doi.org/10.33503/ebio.v8i01.1063>.
- Nahdiyah, U., Imron, A., & Sumarsono, R. B. (2022). Manajemen Kegiatan Intrakurikuler, Kokurikuler Dan Ekstrakurikuler Dalam Upaya Meningkatkan Students Well-Being. *Jurnal Manajemen Pendidikan Islam*, 7(2), 169. <https://doi.org/10.18860/jmpi.v8i2.22499>
- National Research Council. (1988). *Understanding Agriculture: New Directions for Education*. National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC.
- Oe, H., Yamaoka, Y., & Ochiai, H. (2022). A Qualitative Assessment of Community Learning Initiatives for Environmental Awareness and Behaviour Change: Applying UNESCO Education for Sustainable Development (ESD) Framework. *International Journal of Environmental Research and Public Health*, 19(6), 3528. <https://doi.org/10.3390/ijerph19063528>.
- Papadopoulou, A., Kazana, A., & Armakolas, S. (2020). Education for Sustainability Development via School Garden. *European Journal of Education Studies*. Vol 7 (9). <https://doi.org/10.46827/ejes.v7i9.3247>
- Parsley, K. M. (2020). Plant awareness disparity: A case for renaming plant blindness. *Plants, people, planet*, 2(6), 598-601. <https://doi.org/10.1002/ppp3.10153>.
- Paryumi. (2021). Profil Karakter Peduli Lingkungan Peserta Didik Kelas X SMA Negeri 1 Karangrayung Kabupaten Gerobogan. *Jurnal Kualitama Pendidikan*, 2(3), 217–224. <https://doi.org/10.51651/jkp.v2i3.148>
- Patintingan, M., Ruruk, S., & Pare, S. (2024). Pengembangan Kebun Sekolah Sebagai Sarana Edukasi Lingkungan Dan Kewirusahaan Pertanian Di Sekolah Dasar Melalui Program Ekstrakurikuler. *Jurnal Pengabdian Masyarakat*, 04(03), 1779–1786. <https://doi.org/10.47492/eamal.v4i3.3759>.
- Prabasari, RM, Nugraheni, FSAN., & Widyastuti, F. (2020). *Raising Environmental Awareness in School: A Case Study of Education Through Implementation Adiwiyata-based Curriculum*. *Proceeding Biology Education Conference*. 17 (1). 181-190. <https://jurnal.uns.ac.id/prosbi/article/view/54058/32441>
- Prokop, P. & Fancovicova, J. (2023). Enhancing Attention and Interest in Plants to Mitigate Plant Awareness Disparity. *Plants* 2023, 12(11), 2201. <https://doi.org/10.3390/plants12112201>.
- Rahayu, D.R.U.S., Hidayah, H. A., Dwiputranto, U., Lestari, W., & Sastranegara, H. (2021). Menumbuhkembangkan Sikap Peduli Lingkungan Pada Siswa SMPN 1 Sumbang Melalui Budidaya Aquaponik. *Jurnal ABDI*, 7(1), 108–113. <https://doi.org/10.26740/ja.v7n1.p108-114>
- Rahmah, D. M. (2022). Perubahan Iklim dalam Pendidikan IPA Berkelanjutan. *Jurnal Sains Edukatika Indonesia (JSEI)* Vol 4, No. 2, 20-25, Oktober 2022.
- Salsabila, S.H., Nugrahani, P., & Santoso, J. (2020). Toleransi Tanaman lanskap terhadap Pencemaran Udara di Kota Sidoarjo. *Jurnal Lanskap Indonesia*. Vol 12. No. 2. (73-78). <https://doi.org/10.29244/jli.v12i2.32533>.
- Sholikhah, U. & N. Shofiyah. (2024). Analysis of Students' Understanding of Environmental Pollution: Perception, Attitude and Awareness of Students towards Environment in Sidoarjo. *Journal of Research and Educational Research Evaluation*. 13 (1). <https://journal.unnes.ac.id/journals/jere/article/view/1613>.
- Stagg, B. C. & Dillon, J. (2022). Plant awareness is linked to plant relevance: A review of educational and ethnobiological literature (1998–2020). *Plants People Planet Journal*. <https://doi.org/10.1002/ppp3.10323>.
- Stagg, B. C., Hetherington, L., & Dillon, J. (2024). Towards a model of plant awareness in education: a literature review and framework proposal. *International Journal of Science Education*, 47(4), 539–559. <https://doi.org/10.1080/09500693.2024.2342575>
- Sukiennik, K. & Dziadkiewicz, M. (2024). Managing Environmental Social Responsibility in Cities

According to The Young Generation. *Scientific Papers of Silesian University of Technology. Organization and Management Series* No. 198. Silesian University. <http://dx.doi.org/10.29119/1641-3466.2024.198.29>.

- Supriatna, A., Tias, B., Hendayana, S., & Hernani, H. (2024). Global Warming: Promoting Environmental Awareness of Senior Secondary School Students facing Issues in The Sustainable Development Goals (SDGs). *Journal of Engineering Science and Technology*. Vol 19. No 2. 1048-1064. [https://jestec.taylors.edu.my/Vol%2019%20Issue%203%20June%202024/19\\_3\\_21.pdf](https://jestec.taylors.edu.my/Vol%2019%20Issue%203%20June%202024/19_3_21.pdf)
- Syukur, M., & Manda. D. (2021). Penarapan Model Green School Dalam Rangka Membentuk Gaya Hidup Berkelanjutan di SMA Negeri 5 Kota Makassar. *HUMANIS: Jurnal Pengabdian Kepada Masyarakat*, 20(1), 30–33. <https://doi.org/10.26858/humanis.v20i1.19660>
- Szeberenyi, A., Lukacs, R., & Papp-Vary, A. (2022). Examining environmental awareness of university students. *Eng. Rural Dev*, 21, 604-611. <https://10.22616/ERDev.2022.21.TF198>.
- Tadena, M.T.G. & Hairulla, M.A.S. (2021). Raising environmental awareness through local-based environmental education in STEM lessons. *Journal Phys.: Conference Series*. 1835 012092. <https://iopscience.iop.org/article/10.1088/1742-6596/1835/1/012092/pdf>
- UNESCO. (2024). Green school quality standard – Greening every learning environment. In Green school quality standard – Greening every learning environment. UNESCO. <https://doi.org/10.54675/locx2930>
- United Nation. (2023). General Guidelines for the Implementation of Sustainability in Higher Education Institutions. United Nations Educational, Scientific and Cultural Organizations.
- Üstün, N., & Ürey, M. (2024). Investigating Variables Predicting Environmental Awareness in the Context of Education for Sustainable Development: An Analysis Based on TIMSS 2019 Data. *International Journal of Turkish Education Sciences*, 12(1), 85-129. <https://doi.org/10.46778/goputeb.1320538>
- Vallera, F. L., & Bodzin, A. M. (2020). Integrating STEM with AgLIT (agricultural literacy through innovative technology): The efficacy of a project-based curriculum for upper-primary students. *International Journal of Science and Mathematics Education*, 18(3), 419-439. <https://doi.org/10.1007/s10763-019-09979-y>
- Windarto, R. D., Perkasa, R. A., Nur, A. P., Bella, L. A., Hapsari, R. M., & Antriyandarti, E. (2020). Edukasi Pertanian Pada Siswa Dengan Kebun Sekolah Aktif Di SD Muhammadiyah 3 Surakarta. *Jurnal Agribest*, 4(2), 75–80. <https://doi.org/10.32528/agribest.v4i2.3617>
- Zuhriyah, A., Tripatmasari, M., Triajie, H., & Widodo, S. (2023). Pendampingan SDI Al-Mashduqie Menuju Sekolah Adiwiyata Berbasis Pertanian Berkelanjutan. *Jurnal Ilmiah Pangabdhi*. 9 (2). 132-138. <https://doi.org/10.21107/pangabdhi.v9i2.22277>.