

# ENVIRONMENTAL PRACTICES OF SCIENCE STUDENTS: FOUNDATIONS FOR ECOLOGICAL STRATEGIC PLANNING

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**ABSTRACT:** Environmental practices may be considered as activities or even behaviors embraced by the person or a group that lessen their impact on the environment, conserve resources, or support efforts toward sustainability. This study explores the environmental practices of Junior High School science students of Bagong Nayon I National High School to provide foundational insights for developing effective ecological strategic planning within the school settings. Using a mixed-methods approach, the study examines students' environmental knowledge, attitudes, and behaviors while focusing on their engagement in sustainable practices. These aspects are measured through a Likert scale of the quantitative survey component, while thematic analysis from the open-ended responses is done to identify common barriers and motivations affecting the eco-friendly actions of students. The survey results indicate that students possess a high level of environmental knowledge, with a weighted mean of 4.19 and standard deviation of 3.74, and exhibit strong pro-environmental attitudes, reflected in a mean of 4.39 and Standard Deviation of 3.92. However, engagement in sustainable practices is moderate, with a mean of 3.62 and a standard deviation of 3.24, indicating potential gaps between what is known and what is done. Qualitative findings align with these results, identifying limited resources, lack of school support, and behavioral inertia as key obstacles to consistent eco-friendly behavior. In summary, the areas where the school sector could step in and facilitate eco-friendly attitudes in students have been opened through this research, where the strategic planning initiatives being taken to increase accessibility and make resources available, ensure education directed towards changing behavior with a focus on sustainability will need attention. This research serves as a critical basis for developing school-based ecological strategies that foster greater environmental stewardship and sustainability.

**Keywords:** Environmental practices, Behaviors, Sustainability, Ecological strategic planning

## INTRODUCTION

Environmental practices may be considered as activities or even behaviors embraced by the person or a group that lessen their impact on the environment, conserve resources, or support effort toward

sustainability. Such practices could be simple and very habitual in life such as recycling, conserving energy, reducing waste generation, and using green-friendly products. More involved will be the activities done for environmental campaigns, participation or support of green policies, or sustainability initiatives. Environmental practices are considered key in providing solutions to major world problems such as global warming, resource depletion, and pollution, and lie at the core of efforts toward long-term sustainability.

For sustainability, environmental practices are seen to embody the very efficient use of resources with minimal damage to natural eco systems. Sustainability is meeting the needs of the present without compromising the ability of future generations to meet their own needs, and it comprises environmental, social, and economic dimensions. The increasing environmental crises in the world today make sustainability at the individual and institutional levels an urgent priority. The uniqueness of this role of schools is to instill sustainability principles into their operations and curricula to better equip their students to contribute in a more sustainable future. For that reason, science students are especially well-positioned through their academic background to be involved with and encourage environmental sustainability. Those students who have been grounded in the natural sciences often possess a more profound expertise in the systems of the environment, ecological processes, and also the scientific basis of the challenges that are linked to the

environment. Scientific reasoning and problem-solving skills place these students well for leadership and participation in initiatives dealing with environmental issues. Science students representing future professionals in different fields may be influential advocates for sustainability and green solutions.

Involving science students in ecological strategic planning determines sustainability frameworks on both the institutional and community levels. Ecological strategic planning is the process through which policies, practices, and actions are developed systematically concerning environmental sustainability and resource management. Students in such institutions of higher education would be able to bring considerable benefits by including their suggestions, practices, and philosophies in the more integrated sustainability strategies. Environmentalism among science students: that is, their commitment, either personal or to do with the environment in saving energy, reducing waste, or in any other activity leading to the betterment of the environment, may have essential input into the conceptual and operational designs of ecological effectiveness. This cultural sense of sustainability will be built in students by connecting environmental behaviors to strategic planning efforts, transforming sustainability from just a class activity to being practiced in everyday life on campus. Students' and schools' collaboration will also serve as a role model for community involvement where the students' environmental practices influence local actions and policies.

An interesting study highlighted the growing difficulty of translating environmental awareness into habit toward sustainability [11]. It indicated that even powerful pro-environmental attitudes, especially in students, often fail to

result in actual sustainable behavior. Deterrent factors include convenience, social pressures, and competing priorities. The opposite observation was observed when university students cared deeply about their environment but could not undertake simple day-to-day actions such as recycling or conserving energy, which is a knowledge-practice gap that has persisted [15] and the importance of educating students on specific environmental issues, such as waste management, to develop not only their knowledge but also the practical skills and attitudes necessary for adopting pro-environmental behaviors [4].

In addition to the knowledge-practice gap and, more specifically university settings, sustainability education should support ecological behavior development by the students. The impact of sustainability-related coursework on students' environmental practices was evident in higher institutions in the United States and Europe but did not translate to changes in behavior, such as reducing waste and conserving energy [12]. It concluded that sustainability education must be combined with experiential learning opportunities such as school sustainability projects to achieve lasting behavioral change.

A study found that when students have direct engagement in sustainability practices, such as conservation, recycling, and energy conservation, it enhances their environmental awareness and proactive behavior [18]. This approach effectively teaches ecological values by demonstrating the immediate impact of their actions on their communities. However, while students showed cognitive understanding of environmental concepts, their motivation to act on them remained moderate. To address this issue, the recommended school initiatives include establishing environmental clubs, such as the YES-O Club, promoting the material recovery facility, and implementing ecological strategic plans to promote regular, organized participation in sustainability activities [18] and engaging stakeholders such as teachers, parents, and community members is pivotal in promoting and supporting ecological strategic planning [5]. Collaboration ensures that science students' environmental practices align with broader community and educational goals.

An institution with suitable policies like recycling throughout the campus, energy-efficient buildings, and various workshops on sustainability will lead to better participation among students in green behavior [16]. Thus, ecological strategic planning requires student-centric initiatives and much more deeply embedded strategies in the institution that make an appropriate setting for sustainability. The science programs at that time collaborated with other departments in developing a model where education offered to the students follows institutional practices to provide them with chances to promote ecological responsibility.

All this can be because of the academic exposure these students had to the world of ecological and environmental sciences. Knowledge includes matters of great concern such as climatic changes, management of resources, and conservational aspects of ecology. However, the same knowledge hardly finds practical means that work and inspire. Even with their improved knowledge, science students sometimes face serious limitations that hinder them from embracing environmental practices. These barriers

include a lack of supporting facilities within an educational setup, an inability to access sustainability resources and their respective facilities, and a sense of inconvenience in adopting environmentally friendly practice behaviors. All these form key barriers to the actualization of the potential by science students in sustainability. Despite the many studies conducted regarding the environmental awareness and practices of science students, there remain some uncertainties and areas that would require further investigation.

This paper looks to address the present state of environmental awareness and practices among science students, therefore providing foundational input for developing an effective Ecological Strategic Plan. These plans can, therefore, be tailored to leverage strengths and address weaknesses toward cultivating a generation of environmental scientists who are well-poised to address future ecological issues. Developing an Ecological Strategic Plan requires a panoramic view of the existing landscape in terms of environmental awareness and practices.

The objective of this study is to make the schools in basic education more environmentally friendly and to raise a generation of environmentally conscious scientists. The study aimed to determine the levels of environmental awareness and environmental practices among science students in Bagong Nayan II National High School, Antipolo City. The primary purpose of this research is to find valuable information that will assist in the development of ecological strategic planning in the school.

Specifically, it aims to answer the following questions: Environmental practices of science students: How will it help in the formation of an ecological strategic plan?

1. What factors influence these practices?
2. How can science students' environmental behaviors contribute to more effective and participatory ecological strategic planning at the school level?

By bringing these specific problems under consideration, the research study aims to explore various facets of environmental behavior and attitude to provide insight toward strategic planning.

## MATERIALS AND METHODS

The research used a mixed methods approach, which applied both quantitative and qualitative methods in combination to analyze the environmental awareness and practices of students in Bagong Nayan II National High School. The survey provided a quantitative description of how frequently and what types of environmental practices were carried out by the students, and the focus group discussions opened up further understandings of why such behaviors occur and the constraints facing the students. A mixed-method approach ensures that all aspects from the extent of environmental practices to the reasons and factors leading to them are well researched. The primary objectives of this research are based on the collection of information to develop an Ecological Strategic Plan. The use of both these methods allows an in-depth analysis of what students know, how they feel about it, and what they do, including the role of institutional factors in such practices.

**Participants.**

The study surveyed 195 randomly selected students from Bagong Nayon II National High School, Antipolo City. Fifteen (15) of them were recruited for the interview and focus group discussions. To maintain confidentiality, response anonymity was ensured, and the data was safely stored to guarantee the privacy of the participants. The other good aspect of the research was data transparency. Participants were allowed to receive a summary of the findings to encourage continuous engagement and desire to participate in other sustainability initiatives in the future.

**Data Collection Methods**

**Surveys:** Environmental knowledge, attitudes, and self-reported practices from students are measured using a formal questionnaire. The questionnaire, consisting of multiple-choice and Likert-scale items combined with open-ended questions for varied responses, will make the sample size 195 to have statistically significant conclusions.

**Interviews:** In-depth interviews were conducted to students (n=10) to gain more insight into their environmental behavior and the factors that affect their practice. These interviews examine the students' motivation, perceived barriers, and suggestions for improving the sustainability initiative. The interviews were selected based on responses obtained in the survey to represent diversity in terms of experience and view.

**Focus Groups:** Focus groups of 15 students were conducted to provide a social forum for students to discuss issues related to mutual concerns, including curriculum content, peer influence, and the support they receive from the school. The discussions bring in qualitative data on collective attitudes and potential strategies for improvement.

**Observational studies:** Observational studies will be conducted to capture "in the moment" campus environmental practices, like recycling behaviors, usage of energy, or participation in sustainability programs. Observational studies provide contextual data that complement the findings from the survey and interviews.

**Data Analysis**

**Quantitative Analysis:** Use descriptive statistics to summarize Demographics like age and gender, as well as important variables related to environmental practices, such as the frequency of eco-friendly behavior and level of awareness regarding environmental issues. Employ a 5-point Likert scale to measure students' responses, and analyze the data using measures of central tendency, including mean and standard deviation, to assess the environmental practices among students.

To measure the range of responses in the survey on environmental knowledge and attitudes, the following are indices of interpretation:

Score	Limit	Interpretation
5	4.21- 5.00	Strongly Agree
4	3.41- 4.20	Agree
3	2.61- 3.40	Neutral
2	1.81- 2.60	Disagree
1	1.00- 1.80	Strongly Disagree

To measure the range of responses in the survey on environmental practices among students, the following are indices of interpretation:

Score	Limit	Interpretation
5	4.21- 5.00	Always
4	3.41- 4.20	Often
3	2.61- 3.40	Seldom
2	1.81- 2.60	Rarely
1	1.00- 1.80	Never

**Qualitative Analysis:** The analysis of the qualitative data from the open-ended questions would be based on thematic analysis to identify common themes and patterns related to the environmental practices of students and then cross-verifying the findings of the qualitative analysis with the quantitative data to enhance the robustness of the results.

**RESULTS AND DISCUSSION**

**Table 1: Demographic Profile of Respondents**

Demographic Variable	Category	Frequency (n=195)	Percentage (%)
Age	12 years	41	21.03%
	13 years	52	26.67%
	14 years	23	11.79%
	15 years	62	31.79%
	16 years	13	6.67%
Gender	17 years	4	2.05%
	Male	78	40%
	Female	117	60%
Academic Level			
	Grade 7	50	25.64%
	Grade 8	43	22.05%
	Grade 9	42	21.54%
	Grade 10	60	30.77%

Table 1 provides a clear view of the demographic distribution in terms of age, gender, and academic level. The age was predominantly 15 years old, comprising 31.79% of the total population. Gender-wise, females made up 60%, and males accounted for 40% of the total sample. About the level, it was found that the largest group was composed of Grade 10 students, who accounted for 30.77% of the sample, followed by Grade 7 and Grade 8 students. These demographic characteristics provided a diverse representation of students in a cross-section of different age groups, genders, and academic levels, offering a very well-rounded perspective on the focus of the study regarding environmental awareness and practices.

An inclusive demographic profile of students ensures results covering a wide age range of student experiences and attitudes. The diversity would also ensure in-depth inferences can be drawn about comparisons in the age groups, gender, and grade levels in environmental knowledge, attitudes, and behaviors. Examples would include trends in ecologically friendly behavior to determine possible trends among certain

age groups or academic levels. Moreover, the demographics may be used to pinpoint the targeted intervention areas, such as grade-specific programs or gender-sensitive approaches to make a school more sustainable. This strong demographic representation strengthens the study's findings' validity and generalizability.

It can be seen in Table 2 below that the students exhibit a very high level of environmental awareness and positive attitudes. The average weighted mean value regarding knowledge of the environment is 4.19 with a standard deviation of 3.74, and for attitude toward the environment, the slightly higher mean value is 4.39 with a standard deviation of 3.92. There is a consensus among the students about what they understand as issues and concerns in the environment, and on a positive orientation towards environmental stewardship. Students are not only knowledgeable but motivated to take environmentally friendly practices, meaning there is a strong foundation on which ecological strategic planning initiatives may easily be implemented in the school and their environment.

**Table 2: Environmental Knowledge and Attitudes of Respondents**

Category	Description	Weighted Mean	Mean <sup>2</sup>	Standard Deviation	Verbal Impression
<b>Environmental Knowledge</b>					
	1. I am aware of the main causes of environmental pollution.	4.21	18.42	3.77	Strongly Agree
	2. I understand what climate change is and how it affects the planet.	4.34	19.28	3.86	Strongly Agree
	3. I know about the main sources of greenhouse gases that contribute to global warming.	3.82	15.20	3.37	Agree
	4. I know the difference among reducing, reusing, and recycling.	4.50	20.99	4.06	Strongly Agree
	5. I am aware of my own contribution to waste and pollution and how to reduce it.	4.07	17.16	3.62	Agree
	Average	4.19	18.21	3.74	Agree
<b>Environmental Attitudes</b>					
	1. I believe my actions can make a difference in solving environmental problems.	4.35	19.47	3.89	Strongly Agree
	2. I am concerned about climate change.	4.46	20.30	3.98	Strongly Agree
	3. I feel responsible for making environmentally friendly choices in my daily life.	4.57	21.35	4.10	Strongly Agree
	4. I believe that schools should educate students about environmental issues.	4.17	18.04	3.72	Agree
	5. I believe that students can influence their families to adopt more sustainable practices.	4.39	19.87	3.93	Strongly Agree
	Average	4.39	19.80	3.92	Strongly Agree

*Interpretation: 1.00-1.80=Strongly disagree; 1.81-2.60=Disagree; 2.61-3.40=Neutral; 3.41-4.20=Agree; 4.21-5.00=Strongly agree*

Moreover, the high motivational levels to take environmentally friendly actions serve as a sound basis on which ecologically strategic planning initiative scan be implemented within the school and its environs. These findings align with studies indicating that environmental knowledge and favorable attitudes are fundamental precursors to pro-environmental behavior [9]. However, barriers in the form of limited resources and opportunities for action remain significant inhibitors of full engagement and the translation of awareness into consistent sustainable practices increasing environmental sensitivity and stewardship among youth is essential because these are leading determinants of forming behaviors that help in sustainable development [10].

The data further support the potential for schools to be platforms that foster environmental responsibility amongst students. With this strong foundation of awareness and motivation, schools can incorporate focused interventions school- related hands-on activities, eco-clubs, and courses or curricula with a sustainability focus to close the gap between awareness and action on the part of the student population. This ensures that students are imbued not only with knowledge but also with practical skills for ensuring sustainability in everyday life.

Table 3 below illustrates that the average weighted mean of 3.62 with a standard deviation of 3.24 is interpreted as "Often", indicating that students frequently engage in sustainable practices. This result suggests that while students are generally mindful of sustainable behaviors, there may still

be opportunities to increase the consist ency and frequency of the sepractices. Enhancing awareness and providing additional support for sustainable actions could further encourage students to integrate these practices more consistently into their dailyroutines. Playing a central role,schools can provide an environment that encourages and enables students to take on sustainable practices through structured programs, eco- clubs, and curriculum integration.

Recent research [12] supports these findings that an integrated environmental education combined with open possibilities for action leads to a significant intensification of sustainable behavior among students and the significance of institutional support and peer influence in improving the uptake of sustainable practices in school settings [23]. These studies suggest that a holistic approach to knowledge, motivation, or available resources can effectively bridge the gap between awareness and action.

**Thematic Analysis of Open-Ended Responses on Environmental Practices**

*WasteReductionandRecyclingAwareness*

The findings of the study revealed a strong awareness among students regarding environmental practices, particularly in the area of recycling, sorting of waste at school and home, and reusing items such as shopping bags. Supporting quotes from participants included: "I try to recycle bottles and cans whenever I can and reuse items like shopping bags," and "In school, we were taught to reduce waste, so I try to throw away less and recycle more."

**Table3:EnvironmentalPracticesofRespondents**

Category	Description	Weighted Mean	Mean <sup>2</sup>	Standard Deviation	Verbal Impression
<b>SustainablePractices</b>					
	1.Iseparaterecyclablematerials(paper, plastic, cans) from regular waste.	3.62	14.01	3.22	Often
	2. I turn off lights, fans, and other applianceswhenthey are notinuse.	4.56	21.53	4.12	Always
	3.Iavoidusingsingle-useplastic products whenever possible.	3.63	14.19	3.25	Often
	4.Iencouragemyfamilyandfriendsto adopt eco-friendly practices.	3.76	14.89	3.34	Often
	5.Iparticipate in environmental activities, like clean-up drives or tree planting at school or in my community.	2.53	7.61	2.25	Rarely
	Average	3.62	14.45	3.24	Often

*Interpretation: 1.00-1.80=Never; 1.81-2.60=Rarely; 2.61-3.40=Seldom; 3.41-4.20=Often; 4.21-5.00= Always*

The quantitative data from the survey corroborated these findings, with a weighted mean of 3.62 under the "Often" category for recycling behaviors. This suggests that students not only understand the importance of recycling but also engage in the practice regularly,aligningwiththeinsights fromthe qualitative responses. The combination of qualitative and quantitative data indicates a strong commitment to

recycling and waste reduction among the student population, showcasing their awareness and willingness to contribute to environmental sustainability.

*EnergyandWaterConservationEfforts*

The study identified a clear pattern among students regarding the conservation of energy and water. Most students agreed to some common practices such as switching off the lights and

saving water at school and home. The following quotes were in support of the aforesaid: "I always turn off lights and water faucets to save energy and water," and "I encourage my family to save water by using a bucket and dipper (tabo) instead of taking a shower." Such responses reflect a high level of consciousness about the value of resource conservation and directed action in minimizing consumption.

This was further supported by the quantitative data with a mean score of 3.58, where subjects reported that they mostly do energy and water conservations. Indeed, this coherence between the qualitative and quantitative results has started to show that such conservation activities in the form of saving electricity and water are done often among the students. Such consistency seems to manifest in their ability to apply knowledge about the environment in real life.

#### *Challenges to Sustainable Practices*

Further, it was established that most of the students were facing a recurring chain of challenges while practising sustainability. Many students complained that they failed to carry out eco-friendly behaviors on many grounds, including the unavailability of recycling facilities and lack of support from close family members. Some of the supporting quotes were as follows: "I want to recycle more, but we don't have recycling bins at home," and "Sometimes it is hard to convince my family to do eco-friendly things." These quotes express that though the students are aware of the necessity of sustainability, the main problems are the availability of resources and family influence that prevents them from fully participating in eco-friendly activities.

Despite these, the quantitative results point to an average environmental attitude score of 4.39, thus indicating that students entertain predominantly positive attitudes toward sustainability. This suggests, however, that there is a clear indicator that intention and consistent action may not necessarily go together with each other. In this respect, some factors require improvement to recycling facilities and more support from families in coping with potential obstacles that may face students in translating their environmental attitudes into practical, real-world action.

#### *Influence of School Programs on Environmental Behavior*

The study demonstrated that most school programs and activities impacted student environmental behaviors. Quite a few of the students commented on how initiatives such as the YES-Oclub and clean-up drives motivated them to keep the school, and especially the environment, clean. I joined the YES-Oclub in school, which made me much more aware of the issues that affect the environment, and I now participate in clean-up drives. "I learned about conserving resources from school and made me more conscious about using things like water and electricity." These quotes indicate that the school-based programs increase awareness besides inspiring students to take active steps in promoting sustainability.

The survey questionnaires provided support to the quantitative results, with a weighted mean of 4.19 on the knowledge section of the environment. These results thus depict the fact that students have a very high level of awareness about the environment. This reflects good coordination between qualitative findings and quantitative results on the surveyed data and thus provides an insight into

how school-based initiatives are enabling students to have a piece much better environmental knowledge, thus motivating them towards more sustainable behaviors.

#### **Summary of Thematic Analysis and Cross-Verification**

Qualitative results revealed that the students, through waste reduction, conservation, and effects of school-related programs, have very positive attitudes and practices. However, a difficulty seems to be inconsistencies in the availability of resources plus family support for such environmental actions. Weighted means are also consistent with these observations: there is a higher mean in knowledge scores (4.19), attitudes (4.39), and self-reported practices (3.62).

The combined findings indicate that while students are motivated and aware of sustainable practices, additional support such as accessible recycling facilities and community involvement is needed to help students sustain and expand these practices. The robustness of the results is strengthened by the coherence between qualitative themes and quantitative findings, providing a clear direction for future ecological strategic planning in the basic education setting.

#### **Limitations and Future Research**

This research study has several limitations that can impact the interpretation of findings. First, the data applied are based on self-reports that are vulnerable to social desirability bias, with a possible exaggeration of the engagement of students in green behavior. Moreover, the sample is not representative because the research is confined to only one school or area and therefore cannot be generalized across other socio-economic and cultural settings. The cross-sectional design of the study only captures a snapshot of the environmental practices of students that can change with seasons or time. Additionally, the study may be biased towards commonly discussed practices such as recycling and water conservation but could omit other important behaviors, such as sustainable purchasing or participation in digital environmental advocacy. Neither are all the external influences like habits in families, policies of schools, and resources within the community, although most probably these would influence student environmental behavior significantly. Last but not least, qualitative responses' thematic analysis, though insightful, does not represent the range of students' individual experiences and motivation, which might not provide a comprehensive understanding of students' views.

The next generation of research should generalize these studies to different types of diverse students across a range of different schools and geographical locales. This will allow for a more representative study of different environmental practices. Longitudinal studies will better ascertain changes in student environmental attitude and behavior as well as track how this is likely to change over time, especially over periods of particular educational influence. Surveys can be supplemented with in-depth interviews or focus groups to understand the factors motivating, deterring, and influencing students to perform sustainable practices.

In addition, examining the impact that family, community resources, and media have on such external factors will help discover how these elements promote or inhibit sustainable behaviors.

## CONCLUSION AND RECOMMENDATIONS

Findings showed a general degree of awareness and positive attitude toward environmental issues and frequent practice of waste reduction, recycling, and resource conservation. However, the findings indicate points to an improvement in such consistencies of sustainable behaviors as well as the impact of such external factors as family support and accessibility to resources. In this respect, it is crucial to emphasize the need for the targeted ecological education strategies because they have to build up not only knowledge but also supply students with practical means and continued support to translate their environmental values into consistent action.

In conclusion, this study highlights the significance of schools in environmental stewardship and indicates that strategic planning within educational settings can play a very important role in enhancing sustainable practices among young students. Schools can make a better environment for environmental engagement by overcoming the existing barriers, including resource availability, and strengthening family and community involvement. These dynamics can continue further in future studies to push forward student environmental knowledge, attitudes, and practices for the environmentally responsive and responsible generation of the future.

## RECOMMENDATIONS

1. Include hands-on environmental programs on and off campus, such as cleaning drives, recycling programs, and eco-clubs and clubs, to actively include the students in sustainable activity as well as deepen their ecological knowledge.
2. Schools and local governments are given the impetus to provide easier and more accessible recycling facilities; equipment for water-saving devices and other materials that go within the school premises supporting their students to maintain sustained activities.
3. Schools should engage families and communities through awareness campaigns, workshops, and local partnerships to create a supportive environment for students' sustainable practices at home and in their neighborhoods.
4. To ensure lasting environmental stewardship, schools could integrate sustainability concepts across the curriculum, ensuring that students develop a strong foundation in ecological responsibility that extends beyond the classroom.
5. Utilize digital media as a means of sharing knowledge and participating in environmental activism as well as a campaign involvement for ecological action to create an environmentally conscious culture, both online and offline.
6. Provide access to environmental NGO resources for the student to get information related to conservation issues and sustainability.

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