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Perceptions of Grade XI Mathematics and Science Students Regarding Environmental Cleanliness at a Public Senior High School in Pandeglang, Indonesia

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Abstract

This study aimed to determine the perceptions of Grade XI Science students regarding environmental cleanliness at one of the public senior high schools in Pandeglang Regency and to identify the aspects that influence these perceptions. The study used a descriptive quantitative method, with data collected through questionnaires distributed to Grade XI Science students in the 2026/2027 Academic Year. The study population consisted of 153 students The study population was 153 students at a public secondary school in Pandeglang District, Indonesia, with a sample determined 120 respondents who filled out the questionnaire. The data were analyzed using descriptive analysis techniques through the calculation of scores, percentages, and average values for each research indicator. The results showed that students' perceptions of school environmental cleanliness were generally in the good category, with a percentage of approximately 71.06%. The learning environment comfort indicator obtained the highest percentage of 55.8%, while the school environmental cleanliness condition indicator obtained the lowest percentage of 40.5%. The results also showed that school environmental cleanliness plays a role in creating comfort and increasing students' enthusiasm for learning, although there are still several problems related to waste management, toilet cleanliness, and the participation of the school community in maintaining environmental cleanliness. Thus, it can be concluded that students have a good perception of school environmental cleanliness; however, more optimal efforts are needed in cleanliness management and increasing the participation of the entire school community to create a cleaner, healthier, and more conducive learning environment.

Keywords: Student Perception, Environmental Cleanliness, School Environment, Waste Management

INTRODUCTION

Environmental cleanliness at school institutions is one of the vital aspects of ensuring comfort, health, and conducive environment for learning. Environmental concern and awareness can be created by environmental education that enables people to take part in environmental cleanliness and sustainability. This is also in line with the findings by Utari et al. (2022) who assert that environmental education has a role in the formation of environmental responsibility in terms of waste management. Further, the research by Utari et al. (2026) has proved that good perceptions of environmental management such as waste banks help create better environmental quality as well as environmental awareness.

Environmental cleanliness is another important component in ensuring that the learning process is effective. Apart from being a component of health, environmental cleanliness also plays a role in influencing comfort, concentration, motivation, and participation in learning among students. Cleanliness of the school environment creates a favorable learning environment, which facilitates the attainment of the intended education goals. Students' environmental attitude has been found to be a significant aspect in creating sustainable quality

of school environment (Utari et al., 2026). However, a poorly maintained environment will lead to high stress levels among students, negatively influence concentration, demotivate the students to learn, and even cause different health complications which may influence the learning process (Reyes et al., 2024).

In the attempt to ensure that the school environment is kept clean, it becomes necessary to look at the perception held by the students. The word perception comes from the English word "perception," which means an individual's view, reaction, or judgment towards an object. From the Indonesian dictionary (KBBI), perception is defined as the direct response of the individual on or the reception of an individual towards something through his senses. Perception arises when an individual processes the information gathered by him through his senses, leading to the formation of an impression, image, or judgment towards the observed object. Ensuring the cleanliness of the school environment has a direct relationship with how the students view or judge the state of their surroundings. This means that the perception is one of the aspects that needs to be studied. Neesha (2022) defines perception as the mental activity through which individuals are able to make sense out of the stimuli received through their senses, thus helping to form a judgment about the observed object or environment.

This position is supported by Pandit (2017), who defined perception as a process of organizing and interpreting sensory information in order to assign certain meaning to it. During the process of perception, people choose information they consider significant and then organize and interpret it based on their personal experience and knowledge. Otara (2011) defined perception as a process through which individuals comprehend their experience, and hence, use it to take decisions or make judgments. Sharma (2019) noted that selection, organization, and interpretation of information lead to making judgments about certain objects or situations that, in turn, shape one's attitudes and actions. Thus, perception can be understood as a cognitive process that shapes how individuals understand, assess, and determine their responses to an object or event, including the condition of the school environment.

In the context of the school environment, students' perceptions of cleanliness play an important role in shaping environmentally responsible attitudes and behaviors. Students who have positive perceptions of school cleanliness tend to demonstrate greater responsibility in maintaining cleanliness, use sanitation facilities appropriately, manage waste properly, and participate in various activities aimed at preserving the school environment. Conversely, negative perceptions may reduce students' involvement in maintaining the cleanliness of the school environment (Laure et al., 2024).

Several previous studies have shown that students' perceptions of and concern for school environmental cleanliness are generally categorized as good. A study by Laure et al. (2024) showed that students' perceptions of environmental cleanliness at SD GMIT Paliboo were categorized as good in terms of both the physical and psychological aspects experienced by students. Meanwhile, Nazirah and Mustika (2024) found that students' perceptions of the school policy prohibiting the use of plastic were categorized as very good, with an average percentage of 91.12%, indicating a high level of student support for maintaining school environmental cleanliness. Another study by Hasnadelni (2023) explained that school cleanliness activities could increase students' participation and concern for maintaining the cleanliness of the school environment. Nevertheless, these studies have predominantly focused on elementary school students and emphasized aspects related to school policies and cleanliness programs.

From the discussion above, a research gap exists in terms of perceptions of environmental cleanliness by senior high school students especially in a public senior high school in Pandeglang. Student characteristics, school environmental conditions, and education levels could affect their perceptions of environmental cleanliness. This research will therefore be very useful in order to get a more detailed understanding of the perception of students on environmental cleanliness in the school environment. The objectives of this research are to investigate perceptions of environmental cleanliness among senior high school students in a public senior high school in Pandeglang Regency.

METHOD

This study used a descriptive quantitative method aimed at describing and analyzing students' perceptions of environmental cleanliness around the school based on data obtained through the distribution of questionnaires. The descriptive quantitative method was used to describe the conditions or phenomena that occurred based on the data obtained from the respondents without conducting hypothesis testing.

The research was conducted in May 2026, at one of the public senior high schools in Pandeglang Regency, Indonesia. The subjects of the study were Grade XI Science students in the 2026/2027 Academic Year. The population in this study consisted of 153 students. The sample size was determined using the Slovin formula with a 5% error rate, as follows:

$$n = \frac{N}{1 + N\,(e)^2}$$

Description:

- n = sample size

- N = population size
- e = error rate

Based on the formula, the minimum sample size obtained was 111 students. Data collection was carried out by distributing questionnaires to Grade XI Science students, and a total of 120 students completed the questionnaire, so the number of respondents met the required minimum sample size.

Material that was used in the research is the questionnaire instrument that was formed according to the indicators of students' perception of the environmental cleanliness of the school. Such indicators included school environmental cleanliness condition, availability of facilities and infrastructure for the cleanliness, waste management, learning environment comfort, and school community engagement in the environmental cleanliness maintenance. Some statements had relevance to more than one indicator and hence were taken into account during the calculation of the corresponding indicator. The Likert scale was used in the research instrument and had five possible answer options, such as Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD).

The data derived from the survey forms were analyzed quantitatively by calculating the score, percentage, and average value of the respondents' answer per each research indicator. The output of the analysis is presented in the form of tables and figures to describe clearly the perception of students towards environmental cleanliness in one of the senior high schools in Pandeglang. Moreover, the data were interpreted according to the predefined categories in order to determine the level of students' perceptions towards school environmental cleanliness.

Data analysis was conducted descriptively and quantitatively by processing the questionnaire results completed by the respondents. The data obtained were calculated based on the score of each answer on the Likert scale, then converted into percentages and average values to determine the tendency of students' perceptions of school environmental cleanliness. The results of the analysis were then interpreted into certain categories so that they could provide an overview of the level of students' perceptions of environmental cleanliness at one of the public senior high schools in Pandeglang Regency.

RESULTS AND DISCUSSION

The population and sample of this study are presented in Table 1.

Table 1. Research Population and Sample

Number	Number (Students)
Population	153
Respondents	120

Based on Table 1, data collection was conducted with a population of 153 students, of whom 120 students participated as respondents in this study. The data obtained were then analyzed using descriptive quantitative methods to describe students' perceptions of various aspects of school environmental cleanliness, including the cleanliness of the school environment, the availability of sanitation facilities and infrastructure, waste management, the comfort of the learning environment, and the participation of the school community in maintaining environmental cleanliness. The results of the analysis are presented in the form of tables and descriptions to provide a clearer overview of students' perceptions of school environmental cleanliness. The overall perception is presented in Table 2.

Table 2. Students' Perceptions of School Environmental Cleanliness in General

Aspect	Percentage (%)	Category
Overall Perception of School Environmental Cleanliness	71.06	Good

As seen in Table 2, perceptions of cleanliness of the school environment from the perspective of students were at 71.06% in total and were considered to be good. This finding is in agreement with the results of the study conducted by Panoyo et al. (2019) where 70% of students of SMA Negeri 1 Krian perceived the environment of their school to be clean. Furthermore, 76% of the students agreed that the unclean classroom environment can affect their ability to concentrate while studying. From these results, it can be said that most of the students have a positive perception of cleanliness of the school environment. This perception includes cleanliness of the school environment, presence of sanitation facilities, role of teachers and cleaners, as well as the importance of cleanliness for the comfort of learning and students' motivation.

From the high degree of positive perception, it is clear that the process of keeping the school environment clean has been well carried out. The environment being clean will help in creating a comfortable environment which enables students to focus better. According to Jasper et al. (2012), availability of sufficient facilities for Water, Sanitation and Hygiene (WASH) such as provision of water, enough toilets, and provision of hand washing helps in making the learning environment comfortable. Besides, keeping the school environment clean will not only create a comfortable learning environment but will also affect the attendance and learning concentration of the learners (Moelyaningrum et al., 2023).

However, there are several things that need to be improved, such as poor use of waste bins, poor toilet conditions, and clogged drainage systems. These findings are aligned with the study conducted by Sharma et al. (2024) who revealed that poor WASH facilities might impact attendance of students, especially among women during their menstrual period.

According to Adegoke et al. (2022), in low-income countries, only about 51% of schools have sufficient water, whereas 45% of them have sufficient sanitation facilities. Hence, although students' opinions about school cleanliness are considered good, there are certain improvements that still need to be done in terms of cleanliness and sanitation management in sustainable ways. Reyes et al. (2024) suggest several measures to enhance school cleanliness, student satisfaction, and the quality of education environment. Consequently, the environmental cleanliness of schools is expected to continue improving in order to create comfortable and healthy conditions for effective learning for all members of the school community. However, as can be seen from the closer analysis of students' opinions about each statement, there are several cleanliness problems that should be addressed, as described in Table 3.

Table 3. School Environmental Cleanliness Conditions

Indicator	Percentage (%)
My school environment looks clean and well-maintained every day	40.8
My classroom is always clean before and after learning activities	33.3
There is still a lot of litter scattered around the school environment	47.5
School toilets are often dirty and unfit for use	45.8
Drainage systems around the school are often clogged	35.0

From Table 3, it is noted that 40.8% of the students reported that the school environment was clean and well-maintained every day. This clearly demonstrates that some of the students perceive that the school environment is clean. A clean and well-maintained school environment creates a conducive learning environment and helps the students develop environmentally conscious behavior.

The importance of the need to preserve cleanliness should be fostered from the very beginning so that the students can develop a feeling of caring and respect towards the environment. A clean and comfortable environment in the school may make the learning process much more efficient since such an environment will create a favorable learning environment and help the students get actively involved in the process of learning (Cambay & James L. Paglinawan, 2024). This is in line with research results which show that indoor environmental quality, which includes air quality, thermal comfort, visual and acoustic factors, affects students' satisfaction and well-being when they study (Afifi et al., 2025).

Moreover, 33.3% of the respondents answered that the classroom was always clean both before and after the learning process. This is already an indication of concern about the cleanliness of the classroom; however, the number remains low. Cleanliness is one of the major determinants of comfort in the learning process and concentration of the students. A clean learning process contributes to increased comfort and ensures students' concentration in

the learning process (Kanda & Agustin, 2024). This research finding was supported by another study which found out that cleanliness was the most dominant determinant of learning comfort in the classroom with 27.7%, along with air circulation, tranquility, and availability of the facilities (Widiastuti et al., 2020).

On the other hand, 47.5% of respondents stated that there was still a considerable amount of litter scattered around the school environment. This percentage indicates that cleanliness remains an aspect that needs to be addressed. Improperly disposed waste can reduce the cleanliness and comfort of the school environment. It also indicates that students' waste management behavior still needs to be improved through habituation and reinforcement of environmentally responsible attitudes. Students' waste management behavior is related to their attitudes and motivation to maintain school cleanliness (Kanda & Agustin, 2024). In line with this, environmental awareness programs in secondary schools have been shown to change students' attitudes and habits toward disposing of waste more responsibly (Anthonia et al., 2025).

A total of 45.8% of respondents stated that the school toilets were often dirty and unsuitable for use. This finding indicates that school sanitation still requires serious attention. Proper sanitation is an essential component in creating a healthy school environment. Sanitation facilities that do not yet meet health standards need to be improved and upgraded continuously (Fatria et al., 2023). Toilet cleanliness is also one of the main factors influencing elementary school students' toilet-use behavior, in addition to facility conditions, hygiene practices, peer relationships, and previous experiences (Shao et al., 2021).

Moreover, 35.0% of participants reported that there were frequent blockages in the drainage system of the school environment. This problem signifies the problem with the management of environmental sanitation in the school setting. The wastewater drainage system is one element that should be managed effectively to function properly. Those drainage systems that have not yet met the criteria of environmental sanitation need more management (Anggraini et al., 2019). Availability of clean water does not guarantee improvement in sanitation and drainage systems (Pereira et al., 2024). Thus, there is a need for regular cleaning and maintenance of drainage systems to avoid blockages.

Generally, the findings of this study show that the cleanliness of the school environment is not yet at its optimum level. While some respondents perceived the school environment and the classrooms to be fairly clean, the relatively high proportion of students who see litter scattered around the school premises (47.5%), dirty toilet areas (45.8%), and blocked drainage system (35.0%) show that there is still a need for improvement in

cleanliness and sanitation management. In order to solve this problem, collaboration among the school, teachers, and students is necessary through greater awareness and discipline as well as sustainable cleanliness facility maintenance. The aforementioned problems of cleanliness are linked to the state of the cleaning facilities and infrastructure, which are shown in Table 4.

Table 4. Cleaning Facilities and Infrastructure

Indicator	Percentage (%)
Adequate waste bins are available throughout the school area	39.2
Waste bins at school are often not used properly	45.8
School toilet facilities are inadequate for students' needs	43.3

According to Table 4, 39.2% of the participants felt that there were enough waste bins in the school setting. This means that waste bins are available in the school, although they have not yet been deemed enough by all the students. Availability of waste bins that are easy to use, are clean and placed in strategic positions is a very important aspect in ensuring that students dispose of their waste effectively.Ease of accessibility of these waste bins greatly determines proper waste disposal (Cruz et al., 2025).

On the other hand, 45.8% of participants claimed that the waste bins provided by the school were frequently misused. This data suggests that problems with cleanliness are affected not only by the availability of facilities but also by the attitude and approach of the community members towards these facilities. This finding is in agreement with Onde et al. (2025), who indicated that despite the presence of facilities, for example, waste bins that are located separately in many schools, the issue of getting students to use them regularly persists. This claim is supported by Johannes et al. (2021).

Moreover, 43.3% of participants thought that the toilet facilities provided by the school were insufficient for the needs of students. While the toilet statement mentioned above deals with the daily cleanliness of toilets, this statement refers to the appropriateness of facilities. It means that school sanitation facilities need to be paid more attention. Clean and properly maintained toilet facilities are the indicator of healthy school environment since they have a direct impact on students' health. The physical state of toilets and handwashing facilities is an important factor in determining whether and how they will be used by students, according to the findings of the study conducted in dozens of primary schools in New Zealand, where most schools had toilets that were insufficiently adequate for the use of children (M. K. Sharma et al., 2024).

On the whole, the data shown in Table 4 imply that students generally perceive the presence of cleanliness facilities at school rather positively, especially with regard to the

waste bins. Nevertheless, the high frequency of answers stating that waste bins were often not used correctly (45.8%), as well as toilet facilities being inadequate (43.3%), suggests that the efficiency of cleanliness facilities has not been maximized. The mentioned above implies that enhancing the level of cleanliness at school is related not only to the existence of necessary facilities but also to the development of consciousness on their part and responsibility for using the mentioned facilities. Such a conclusion corresponds to the research conducted in Nepal, according to which the absence of sanitation facilities at schools affects student attendance, which means that providing them should be complemented with sustainability and involvement of the whole school community (Sharma et al., 2024).

In addition to the availability of facilities, the effectiveness of sanitation facilities and infrastructure is also influenced by the management and maintenance systems implemented by the school. The provision of waste bins, toilets, handwashing facilities, and access to clean water needs to be accompanied by regular maintenance to ensure that all facilities can be utilized optimally. Sugita (2022) explained that the successful implementation of Water, Sanitation, and Hygiene (WASH) programs in schools is strongly influenced by the condition of sanitation facilities, sustainable maintenance, and the involvement of the entire school community in maintaining environmental cleanliness. Similarly, Crocker et al. (2025) emphasized that the provision of adequate facilities must be supported by an integrated management system to promote sustainable clean and healthy living behaviors.

Furthermore, the quality of school facilities and infrastructure not only affects cleanliness and health but also influences students' comfort during the learning process. A learning environment supported by adequate facilities can increase learning motivation, student engagement in learning activities, and create a more positive learning experience (Miao et al., 2024). In line with this, Li and Xue (2023) stated that a high-quality learning environment contributes to increased student engagement and improved learning outcomes. In addition to the availability and quality of facilities, school environmental cleanliness is also closely related to how waste is managed by the school community. Students' perceptions of waste management are presented in Table 5, which includes several statements that were also analyzed under the previous indicators because of their relevance to waste management.

Table 5. Waste Management

Indicator	Percentage (%)
Cleaning staff perform their duties well.	40.8
There is still a lot of litter scattered around the school environment.	47.5
Waste bins at school are often not used properly.	45.8
Drainage systems around the school are often clogged.	35.0

Based on the data presented in Table 5, approximately 40.8% of respondents stated that the cleaning staff had performed their duties well. This finding reflects students' positive perceptions of the contribution of cleaning staff to maintaining the condition of the school environment. However, maintaining school cleanliness is not solely the responsibility of the cleaning staff; it also requires the active participation of all members of the school community (Suandri et al., 2025).

This is also evident from the finding, likewise presented in Table 3, that 47.5% of respondents reported a considerable amount of litter scattered around the school area. This finding indicates that waste management at the school has not yet been implemented effectively. The results of this study are consistent with a study conducted by Mubarok et al. (2025), which revealed that students' habit of littering is one of the main factors contributing to the decline in the cleanliness of the school environment.

Likewise, as also shown in Table 4, 45.8% of respondents stated that waste bins at school were often not used properly. This situation indicates that students' awareness of maintaining environmental cleanliness still needs to be improved through consistent habits and continuous environmental education. According to Safitri (2020), clean and healthy living behaviors in schools are influenced by individual awareness as well as the presence of a supportive environment.

Meanwhile, the finding in Table 3 that 35.0% of respondents reported frequently clogged drainage systems is also related to waste management. Although this percentage is relatively lower, this situation still requires attention because it can lead to water stagnation and negatively affect sanitation conditions in the school environment. Good sanitation quality is essential for supporting the health of the school community and creating a comfortable learning environment (Amin et al., 2021).

Apart from the cleaning staff's job, the success of waste management in the school setting is highly dependent on the participation of the whole school community, especially students. According to the findings from this study, some students have reported that there was frequent litter in the school compound, ineffective utilization of waste bins, as well as blockage in the drainage systems. This suggests that waste management practices cannot solely be accomplished through the availability of facilities but also through the development of awareness and practice among students for keeping the school environment clean. According to Buthelezi et al. (2025), continuous environmental education will increase students' awareness of the need for waste management in order to maintain cleanliness in the environment.

Effective waste management also requires adequate sanitation facilities that are properly managed and maintained sustainably. According to Crocker et al. (2025), successful school environmental management is influenced by the availability of sanitation facilities, proper facility maintenance, and consistently implemented management systems. Therefore, the provision of waste bins and the maintenance of drainage systems need to be accompanied by regular monitoring and the development of good habits among students so that the available facilities can be utilized optimally to maintain the cleanliness of the school environment.

Furthermore, Debrah et al. (2021) explained that formal education is an effective means of increasing awareness of sustainable waste management. This is supported by research conducted by Mkhonto and Mnguni (2021), which showed that the implementation of waste management programs in schools can improve students' understanding, attitudes, and concern toward recycling activities. Therefore, successful waste management in schools requires synergy between the provision of adequate facilities, the implementation of environmental education programs, and the active participation of the entire school community in maintaining environmental cleanliness sustainably. Beyond the physical conditions and management of cleanliness, it is also important to understand how students experience the impact of school environmental cleanliness on their learning. Students' perceptions of the comfort of the learning environment are presented in Table 6.

Table 6. Learning Environment Comfort

Indicator	Percentage (%)
I feel comfortable being in a clean school environment	58.3
A clean environment increases my enthusiasm for learning	53.3

Based on Table 6, 58.3% of respondents stated that they felt comfortable in a clean school environment, while 53.3% of respondents stated that environmental cleanliness could increase their enthusiasm for learning. These results indicate that most students have a positive perception of a clean school environment as a factor that supports comfort and the learning process. A clean school environment provides a more conducive learning atmosphere, reduces distractions during the learning process, and enhances students' sense of safety and comfort while at school.

This finding is consistent with the results of Brink et al. (2021), who concluded that the quality of the learning environment, particularly Indoor Environmental Quality (IEQ), has a positive effect on learning quality, comfort, and students' academic performance. A comfortable school environment helps students remain more focused on learning and increases their engagement throughout the learning process.

In addition to providing comfort, a clean school environment also contributes to increased student learning motivation. The percentage of 53.3% indicates that more than half of the respondents recognized that a clean environment can increase their enthusiasm for learning. A clean environment reduces visual distractions and unpleasant odors, allowing students to concentrate better during the learning process.

These findings are supported by Barrett et al. (2015), who found that the quality of the physical classroom environment has a significant influence on the learning outcomes of elementary school students. Factors such as classroom cleanliness, natural lighting, air quality, and classroom layout have been shown to contribute to increased comfort and the effectiveness of the learning process.

The findings of this study are further supported by Edgerton and McKechnie (2023), who showed that students' positive perceptions of the school environment are associated with increased well-being, engagement, and academic achievement. A school environment that is safe, comfortable, and well-organized can create a conducive learning atmosphere, encouraging students to remain focused, actively participate, and have more positive learning experiences. Therefore, school environmental cleanliness not only plays an important role in maintaining physical health but also supports students' well-being and the effectiveness of the learning process (Edgerton & McKechnie, 2023).

These findings are supported by research indicating that the school environment is one of the external factors that influence students' learning motivation. A comfortable physical environment, including school environmental cleanliness, has been shown to increase student engagement in learning, foster positive attitudes toward learning activities, and enhance academic motivation. When students feel comfortable with their school environment, they tend to demonstrate better participation in learning compared to students who study in less supportive learning environments (Manda & Darmayanti, 2025).

In addition to this, there are many other international research findings showing the correlation between the quality of the school environment and students' well-being and performance. According to the study done by Toyinbo (2023), it was noted that the cleanliness of the school environment is an element of Indoor Environmental Quality (IEQ) that influences students' health, comfort, well-being and performance. A clean environment creates favorable conditions for learning, and students can focus more on the process of learning. The findings of the above study confirm the findings of the current study showing that the perception of cleanliness of the school environment is not only associated with comfort but also learning quality.

The research performed by UNESCO (2021) on standards for safe and healthy learning environments highlights the fact that the provision of clean, healthy and comfortable physical environments by schools positively influences the students' well-being and helps to increase the quality of the learning process as well. Hence, the results of this research at a public senior high school in Pandeglang show that the school environment cleanliness is viewed as not only an aesthetic issue but also as an important condition that facilitates students' comfort, learning motivation and overall quality of the learning process (UNESCO, 2021). Nevertheless, the maintenance of clean and comfortable learning environment is impossible without the involvement of all school community members. The perceptions of students concerning school community involvement in environmental cleanliness are provided in Table 7.

Table 7. School Community Participation

Indicator	Percentage (%0
I participate in maintaining the cleanliness of the school environment	42.5
Teachers set a good example in maintaining the cleanliness of the school environment.	40.8
Students at this school are less concerned about environmental cleanliness.	45.8
There are no regular activities that support school cleanliness.	39.2
School cleanliness regulations are rarely enforced.	37.5

Based on Table 7, the participation of the school community in maintaining environmental cleanliness is still at a less-than-optimal level. A total of 42.5% of respondents stated that they participated in maintaining the cleanliness of the school environment, while 45.8% of respondents perceived that students still lacked concern for environmental cleanliness. The low level of students' concern for environmental cleanliness indicates that students' awareness and involvement in maintaining the school environment have not yet been evenly developed. This condition may be influenced by the lack of optimal habituation of environmentally responsible behavior through activities that directly involve students.

These findings are consistent with O'Brien et al. (2024), who showed that student participation increases when schools provide opportunities for students to become actively involved in various aspects of school life, such as classroom activities, extracurricular activities, and decision-making processes. A school environment that consistently provides opportunities for student participation can enhance students' sense of belonging, responsibility, and engagement with the school. Iqbal et al. (2025) explained that student participation in environmental management can be increased through various routine activities, such as waste sorting, composting, recycling, and Clean Friday programs. Activities implemented continuously not only increase student involvement but also help develop positive habits in maintaining the cleanliness of the school environment.

Students' lack of concern for environmental cleanliness may also be associated with the suboptimal implementation of cleanliness programs at school. A total of 39.2% of respondents stated that there were no routine activities supporting school environmental cleanliness. This condition indicates that opportunities for students to become directly involved in environmental conservation activities are still limited. Iqbal et al. (2025) emphasized that the existence of well-planned and sustainable environmental programs is an important factor in increasing the participation of the school community in environmental conservation efforts. Through direct involvement in environmental activities, students not only gain knowledge but also develop a sense of responsibility toward the cleanliness and sustainability of the school environment. Anderson et al. (2019) stated that student participation is a multidimensional concept that is not limited to students' involvement in school activities but also includes opportunities to collaborate, express their opinions, influence decision-making, and have choices in various activities conducted at school. Therefore, the implementation of cleanliness programs that directly involve students can increase their engagement and strengthen their sense of responsibility toward the school environment.

In addition to sustainable programs, teachers' role as role models is also important in shaping students' environmentally responsible behavior. A total of 40.8% of respondents perceived that teachers had provided good examples of maintaining the cleanliness of the school environment. However, this percentage indicates that the role of teachers as role models still needs to be strengthened to reach all members of the school community. Ardianti et al. (2024) explained that developing students' environmental awareness is not only achieved through the delivery of learning materials but also through habituation and role modeling demonstrated by teachers in their daily lives. Teachers' consistent behavior in maintaining environmental cleanliness can serve as a concrete example for students, making environmental values easier to instill and apply in daily activities.

In addition to teachers' role modeling, a participatory school culture is also a key element in developing positive attitudes among students. According to Rahayu et al. (2024), schools that foster a democratic culture, provide opportunities for students to participate, and promote mutually respectful relationships are more effective in encouraging student engagement in daily school activities.

The environmental culture at school is also influenced by the implementation of rules that support environmentally friendly behavior. A total of 37.5% of respondents stated that cleanliness regulations at school were rarely enforced. This condition indicates that efforts to

develop a culture of cleanliness have not yet been adequately supported by consistent monitoring and enforcement of regulations. Ardianti et al. (2024) explained that developing environmentally responsible behavior requires the support of a strong school culture, including the consistent implementation of rules by all members of the school community. When environmental regulations are implemented consistently, environmentally responsible behavior can more easily develop into an established school culture among students.

This finding is further supported by Ela et al. (2023), who stated that school involvement can function effectively when supported by efficient school management, detailed work plans, clear task distribution, and regular evaluation. Without a strong system and policies, the implementation of school programs is often less effective in increasing the participation of all members of the school community.

The role of teachers as drivers of an environmentally conscious culture is also emphasized by Najiyah et al. (2025), who stated that teachers have a strategic position in increasing environmental awareness through education and waste management programs at school. Teachers with a good understanding of environmental management can encourage students to actively participate in various cleanliness and waste management activities. In addition, the existence of structured programs, school support, and the involvement of the entire school community are important factors in determining the success of environmental management efforts in schools.

Bandhesa et al. (2024) further asserted that the involvement of the community, parents, and all kinds of stakeholders in education will help in providing resources, ideas, and reinforcement of school culture; this, in turn, makes the learning environment more inclusive and sustainable. This kind of collaboration plays a vital role in building up the characters of students, such as making them aware of the environment around them. Thus, the involvement of the school community can be increased not just by being aware but also by having supportive programs (Najiyah et al., 2025).

Teachers' roles in creating awareness regarding environmental issues in the schools have been highlighted by Najiyah et al. (2025), who noted that teachers play an instrumental role in raising awareness on environmental issues through the education and waste management programs in schools. Teachers who are well versed with the issue of environmental management can motivate students to take part in the waste management program. Furthermore, the implementation of a structured program, school support, and active participation of the whole school community become crucial elements in deciding the success of environmental management in schools.

Bandhesa et al. (2024) further emphasized that the involvement of the community, parents, and other stakeholders of education provides support in the form of resources, ideas, and reinforcements of the school culture, thus making the learning environment more inclusive, responsive, and sustainable. This cooperation becomes an important base for the development of the character of the students, which includes environmental awareness. Hence, the involvement of the school community would need, not only awareness among individuals but also program support, role modeling by teachers, and school policy to create an environmentally aware culture (Najiyah et al., 2025). After analyzing the indicators separately, percentages of all indicators were compared in order to see which aspects of school environmental cleanliness were appreciated most and least by the students. This comparison between the indicators is shown in Table 8.

Table 8. Comparison Between Indicators

Indicator	Percentage (%)
School Environmental Cleanliness Conditions	40.5
Cleaning Facilities and Infrastructure	42.8
Waste Management	42.3
Learning Environment Comfort	55.8
School Community Participation	41.2

According to Table 8, the highest percentage was achieved by Learning Environment Comfort (55.8%), while the lowest percentage was achieved by School Environmental Cleanliness Condition (40.5%). The findings above reveal that despite experiencing many challenges concerning school environmental cleanliness such as litter, poor toilet condition, as well as clogging of drainage systems, the students recognize the significance of having a clean environment in terms of being comfortable and enthusiastic about learning. In other words, the perceived influence of the school environmental cleanliness to learning is perceived to be higher by the students than the actual cleanliness of the school environment.

The high level of comfort experienced by students in the Learning Environment Comfort variable can be aligned with the findings of Reyes et al. (2024), who discovered that student satisfaction with the school environmental cleanliness is correlated with students' comfort when they are in the school environment. From the research conducted, it can be concluded that students' comfort is associated with the school environmental cleanliness as it leads to increased student satisfaction and facilitates learning environment. This situation can be linked with the findings of the current study at a public senior high school in Pandeglang.

Also, it can be seen that the percentages of Cleanliness Facilities and Infrastructure (42.8%), Waste Management (42.3%), and School Community Participation (41.2%) are rather similar to each other. In this way, it can be concluded that students perceive these three

aspects equally. It should be stated that students were aware of the presence of cleanliness facilities, but their utilization was still low because of the low level of participation of all members of the school community. The findings of the current research coincide with findings provided by Reyes et al. (2024), according to which successful school environmental management depends not only on facilities but also on active participation of the school community.

The low percentage for the School Environmental Cleanliness Condition indicator indicates that several aspects still need to be improved, particularly regarding classroom cleanliness, toilet conditions, waste management, and the school drainage system. Nevertheless, the overall findings show that students have a fairly positive perception of the cleanliness of the school environment, with an overall percentage of 71.06%. This indicates that students recognize the importance of maintaining a clean school environment and understand that a clean environment can support comfort and increase learning motivation. These findings are supported by Abe and Hayashi (2023), who explained that the quality of the school environment has a positive relationship with students' learning motivation. The more positively students perceive their school environment, the higher their motivation to participate in the learning process.

Based on the research findings, students' perception of environmental cleanliness in and around the public senior high school in Pandeglang was considered as good in general terms with a total percentage of 71.06%. The findings suggest that most students have a good perception about the significance of school environmental cleanliness as one of the factors contributing to comfort and learning processes. However, there were certain issues, such as school environmental cleanliness, waste management, and community participation, which were considered as low. This means that students' good perceptions have not yet been fully translated into the optimum school environment.

This study's findings corroborate with the research done by Laure et al. (2024), who found that the perceptions of students regarding the school environmental cleanliness fall into good category, both physically and psychologically. Also, Hasnadelni (2023) asserted that the introduction of cleanliness programs at schools will boost the awareness and participation of students in the cleaning of the school environment. In addition, these findings are confirmed by a systematic review carried out by Zynuddin et al. (2023), which showed that a positive school climate fosters the development of the non-cognitive attributes of the students such as responsibility, concern and engagement in different school activities. A clean school environment forms part of a positive school climate.

Nonetheless, the results of the study vary from the results of Nazirah and Mustika (2024), which indicated very good perception at 91.12% for the school policy on the ban of using plastic in the school environment. The discrepancy may be due to the differences between the scopes of the studies. While the study of Nazirah and Mustika was concerned with assessing perceptions of the students on one environmental policy, the current study focused on assessing the students' perceptions on the environmental cleanliness in terms of cleanliness, facilities and infrastructure, waste management, learning comfort, and the involvement of school community. Furthermore, there may also be other reasons for the differences in research findings, including the differences in the respondents' demographics, environmental cleanliness conditions of the schools, and quality of cleanliness facilities. This is in line with the explanation of Barrett et al. (2015), who stated that the quality of the learning environment depends on several components of physical environment, namely cleanliness, lighting, ventilation, space arrangements, and facility maintenance.

These results also mean that despite the good perception of students regarding the significance of ensuring school environmental cleanliness, there is still a problem in managing waste disposal and participation of the school community in ensuring that it happens. This situation shows that mere provision of facilities for cleanliness is not enough as long as there is no school culture to support environmentally-friendly practices. These results can be corroborated with Manca et al. (2020) who found out that the design and physical environment in school influence the satisfaction and comfort of school users as well as their behavior and health. Furthermore, Jamal et al. (2013) in their systematic review indicated that having a healthy school environment requires the integration of physical environment in school, school culture, and participation of all members of the school community in ensuring a safe and comfortable environment. Consequently, the improvement of the quality of school environment is not just about providing facilities; rather, it involves everyone in the school community to ensure environmental cleanliness.

The implications of the current study indicate that increasing the quality of school environmental cleanliness will require a thorough approach that encompasses improving the facilities for school cleanliness, improving waste management, promoting positive teacher role models, and promoting an environmentally responsible culture by means of activities involving the whole school community. All these measures are expected to contribute not only to the improvement of the quality of school environment but also to the well-being and development of the students. This assertion is also corroborated by Edgerton and McKechnie (2023) in their findings that the positive perception of the school environment among the

students leads to increased learning engagement and improved academic performance. Furthermore, according to Nguyen et al. (2020), the success of sustainable school development depends not only on the provision of physical facilities for sustainable development but also on the involvement of the entire school community, proper environmental policy, and incorporation of environmental education into the process of learning. Thus, the improvement of the quality of school environmental cleanliness will have to be conducted continuously through cooperation of school administrators, teachers, and students.

Limitations of this research can be identified as well. Research data were gathered using surveys that are focused on subjective perceptions of respondents and are not backed up by any observation of real cleanliness conditions of the school environment. Also, this study was conducted among students of grade 11 in the science specialization program of a state senior high school in Pandeglang; consequently, results of the study cannot be generalized at the moment. It is recommended for future research to conduct surveys along with observations and interviews in order to get a more profound knowledge about the link between the school environmental cleanliness, behavior of the school community and learning process quality.

CONCLUSION

Based on the research findings, the perceptions of Grade 11 science students at a public senior high school in Pandeglang regarding environmental cleanliness around the school were generally categorized as good, with a percentage of 71.06%. These findings indicate that most students have a positive view of the importance of school environmental cleanliness as a factor supporting comfort, health, and the learning process.

Nevertheless, several aspects still need to be improved, particularly the condition of the school environment, waste management, and the participation of the school community in maintaining cleanliness. Therefore, more optimal efforts are needed through improved management of sanitation facilities, the habituation of environmentally responsible behaviors, and the active involvement of the entire school community to create a cleaner, healthier, and more conducive learning environment.

SUGGESTIONS

Based on the research findings, the school is recommended to improve environmental cleanliness management, particularly in terms of waste management, toilet cleanliness, and the maintenance of drainage systems. In addition, routine activities involving the entire school community, such as community clean-up activities, Clean Friday programs, and

environmental education, should be implemented to increase student participation in maintaining school environmental cleanliness.

For future researchers, it is recommended to examine the factors influencing students' environmental perceptions and environmentally responsible behaviors by involving a larger sample or comparing several schools. This approach may provide more comprehensive findings regarding school environmental cleanliness.

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