RESEARCH ARTICLE

Environmental literacy profile in Bantul, Special Region of Yogyakarta

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Abstract: Environmental issues are occurring more frequently, both due to natural causes and human activities. If left unchecked, human activities can worsen environmental conditions. Bantul Regency in the Special Region of Yogyakarta, Indonesia, is one of the regions grappling with this issue, primarily due to waste management and industrial activities. Environmental issues are related to environmental literacy. The lack of education, awareness, and knowledge in society can degrade environmental quality. Environmental literacy plays an important role in enhancing knowledge as well as changing the attitudes and behaviors of society towards the environment. Therefore, it is important to instill environmental literacy in individuals to improve our attitudes towards the environment. This study aims to provide an overview of students's environmental literacy in Bantul Regency. The research uses a survey method conducted in Bantul Regency from September to November 2023. The population of this study includes all 10th-grade students from public high schools in Bantul Regency. The sample consists of 300 10th-grade students from public high schools in the sub-districts of Bantul, Banguntapan, Sewon, Jetis, Piyungan, Imogiri, Pajangan, Srandakan, Sedayu, and Dlingo. The study's results show that the environmental literacy profile of 10th-grade students in Bantul Regency falls into the "average" category, with a percentage score of 65.96%. The highest score in the competency domain is found in Bantul City (81.90%) and falls into the "good" category, while the lowest score is in Dlingo Sub-district (60.93%), categorized as "average" The highest score in the affective domain is in Dlingo Sub-district (70.25%), categorized as "average" while the lowest score is in Jetis Sub-district (66.67%), also categorized as "average." The highest score in the behavior domain is found in Imogiri Sub-district (64.91%), categorized as "average" while the lowest score is in Srandakan Sub-district (55.30%), categorized as "low."

Keywords: affective domain; behavior domain; competency domain; environmental literacy

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Introduction

Environmental issues have become a global concern due to their increasingly evident impact on human life and ecosystems, including in Indonesia. Several environmental problems in Indonesia include deforestation, water pollution, air pollution, and waste. Natural factors or human activities can cause the emergence of these various environmental issues. If human activities continue, intentional or unintentional, they can further worsen environmental conditions. The deteriorating environment can lead to an ecological crisis with widespread impacts, such as the loss of natural resources, climate change, and increased pollution (Ramadhan et al., 2019).

One of the regions in Indonesia experiencing environmental issues is the Special Region of Yogyakarta, specifically Bantul Regency. One of these problems is poor waste management by the community, which leads to waste accumulation in several locations. This inadequate waste management resulted from the Piyungan Landfill (TPA) closure in Bantul Regency, which has exceeded its capacity. It should be noted that the waste received by the Piyungan Landfill comes from Bantul, Yogyakarta City, and Sleman. Therefore, based on Keputusan Bupati Bantul No 333 Tahun 2023 regarding the Emergency Status of

Waste Management, it was declared that the emergency status is effective from July 24, 2023, to September 24, 2023, and can be extended until the Piyungan Landfill resumes operation. Residents must manage waste independently during this period to prevent accumulation that may disrupt daily activities.

Environmental problems are not only caused by poor waste management; industrial activities are another contributing factor. Some industrial activities can cause environmental issues, such as residential development, river sand mining, batik production, and brick-making. The brick industry in Potorono Village, Banguntapan Sub-district, has caused various environmental damages, such as the destruction of land topography, reduced soil quality, and damage to the irrigation systems of nearby rice fields (Effendi et al., 2021). Additionally, slope cutting and re-excavation for residential lot development in the Imogiri Sub-district have led to landslides in residential areas that should function as buffer zones (Lisan & Jamaluddin, 2023).

Industrial activities not only damage the land but also affect water areas. Sand mining in Pajangan Sub-district has led to river branching, making riverbanks more prone to erosion (Fridtriyanda et al., 2023). Furthermore, the batik industry in Bantul Regency has caused slight water pollution in the Bedog River. Chemically, the BOD and COD levels in the Bedog River have increased, indicating a decline in water quality at the batik industry's outlet. Physically, the river water has changed to a purplish-black hue and emits an unpleasant odor (Utama & Fitriyani, 2022). Environmental issues are closely related to environmental literacy. A lack of education, awareness, knowledge, and community approaches toward the environment can lead to a decline in environmental quality (Yadav et al., 2022). Several studies have been conducted to assess students understanding of environmental topics. Some of these studies indicate that students have low literacy levels on environmental pollution, climate change factors, water pollution management, ozone depletion, and eutrophication (Wardani et al., 2018; Veisi et al., 2019).

The North American Association for Environmental Education (NAAEE) defines environmental literacy as understanding and using knowledge to sustain, improve, and enhance environmental conditions (Hollweg et al., 2011). Additionally, environmental literacy responds to an individual's knowledge, attitudes, and skills toward various environmental issues (Liang et al., 2018). Furthermore, environmental literacy measures a person's knowledge of human interactions with the environment, environmental issues, and understanding of the various relationships within ecological components (Putra et al., 2021). Therefore, environmental literacy is essential for preparing a society that is knowledgeable and capable of addressing environmental problems (Ginting et al., 2023).

Environmental literacy aims to enhance knowledge and change individuals attitudes and behaviors toward the environment through education. This approach enables everyone to have a high level of environmental knowledge, Average environmental attitudes, and proper environmental behavior (Zheng et al., 2018). Environmental literacy focuses on four main aspects: knowledge, skills, attitudes, and behavior (Maurer & Bogner, 2020). Research by Lu & Shon, (2012) showed that students who participated in ten days of environmental science education exhibited higher levels of environmental knowledge and more optimistic and positive attitudes toward the environment. Based on this, it is crucial to instill environmental literacy in individuals to improve our attitudes and behaviors toward the environment.

Method

This research is a descriptive study with a quantitative approach. The survey method is used to describe environmental literacy (Sugiyono, 2018). The study was conducted from September to November 2023 in Bantul Regency. Bantul was chosen as the research location, considering that it is a brick and river sand mining site and a Final Disposal Site (TPA). In addition, Bantul Regency pioneered the establishment of waste banks in Indonesia (Antin et al., 2017). This study's population includes all 10th-grade students in senior high schools in Bantul Regency. The sampling technique used was random sampling, with a total sample consisting of 300 students from public high schools in the sub-districts of Bantul, Banguntapan, Sewon, Jetis, Piyungan, Imogiri, Pajangan, Srandakan, Sedayu, and Dlingo. The research sample map is presented in Figure 1.

This study measures environmental literacy using three domains: knowledge, cognitive skills, attitudes, and environmental behavior (Table 1). The data collection techniques involve both test and non-test instruments. The test instrument measures the student's knowledge and cognitive skills, while the non-test instrument assesses their affective domain and environmental behavior.

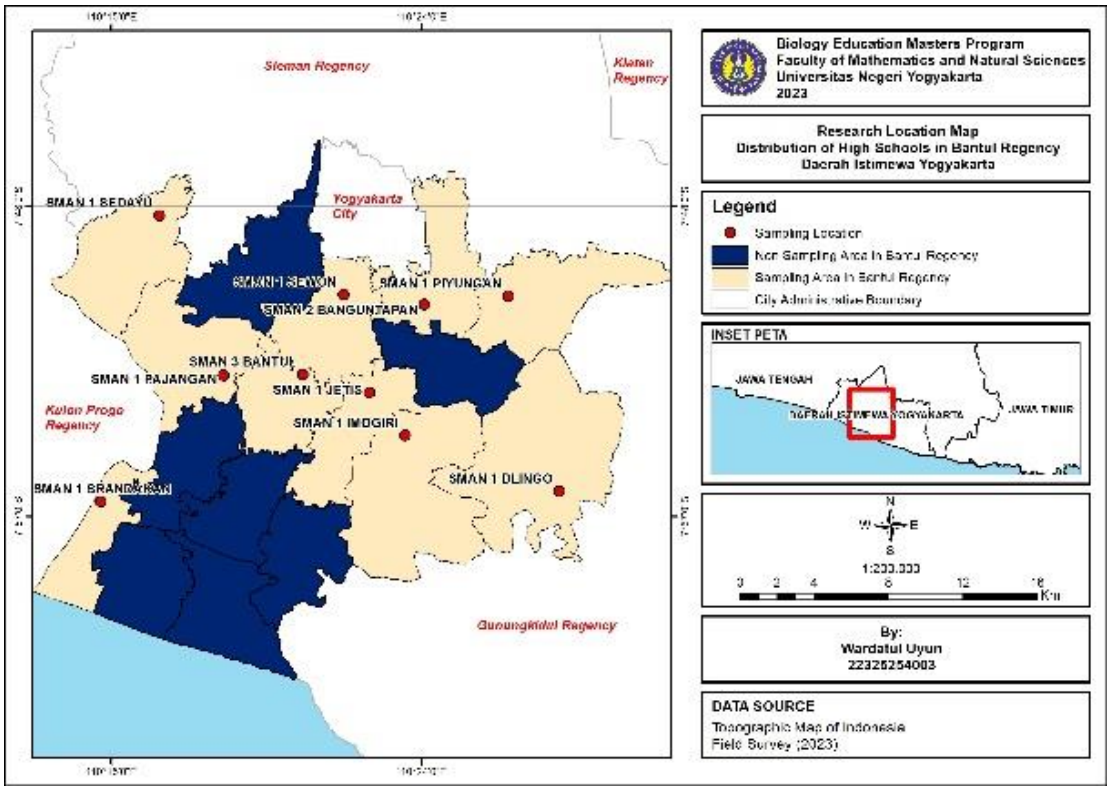

Figure 1. Research Map Location

Table 1. Methods and Instruments for Data Collection

Domain	Aspect	Method	Instrument
Competency Domain	Environmental Knowledge	Test	Multiple-choice questions
	Cognitive Skill	Test	Multiple-choice questions
Affective Domain	Environmental affect	Non-Test	Questionnaire (Likert scale)
Behavior Domain	Environmental behaviour	Non-Test	Questionnaire (Likert scale)

The analysis used was quantitative descriptive analysis using Ms. Excel 2019. This method was used to determine the results of measuring students environmental literacy in all aspects, providing an overview of environmental literacy in Bantul Regency. The students environmental literacy ability was analyzed based on the Formula 1.

$$\text{Nilai} = \frac{Scores\ Obtained}{maximal\ score} \times 100\% \quad (1)$$

Table 2. Score interpretation

Interval Percentage (%)	Criteria
86 < N ≤ 100	Very Good
72 < N ≤ 86	Good
58 < N ≤ 72	Average
43 < N ≤ 58	Low
N ≤ 43	Very Low

(Sources: Djaali *et al.*, 2008; Ginting *et al.*, 2023)

Results and Discussion

Environmental Literacy in Bantul Regency

This study aims to describe the environmental literacy of 10th-grade high school students in Bantul Regency. The study uses three domains of environmental literacy: the competence domain, the affective

domain, and the behavior domain (Hollweg *et al.,* 2011; Sarlita, 2022). The results of environmental literacy in Bantul Regency are presented in Table 3.

Based on the table above, it can be seen that the environmental literacy score of 10th-grade high school students in Bantul Regency falls into the "average" category with a score of 65.96%. Research by Septiyani *et al.,* (2022) indicates that the environmental literacy of high school students in Demak Regency is also categorized as "average," with a score of 65.94%. Similarly, Wulandari & Roshayanti, (2022) reported that the environmental literacy of students at Madrasah Aliyah Negeri in Demak Regency falls into the "average" category with a score of 60.48%. Additionally, Ruqoyyah, (2016) provided an overview showing that the environmental literacy of 10th-grade high school students in Samboja is categorized as average, with an average pretest score of 146 and a posttest score of 161 from a score range of 27-240.

Table 3. Environmental Literacy in Bantul Regency

Environmental Literacy Domain	Percentage
Competency Domain	68.87
Affective Domain	68.71
Behavior Domain	60.29
Average	65.96

Environmental Literacy Achievement in Each Domain in Bantul Regency.

Bantul Regency is in the southern part of the Special Region of Yogyakarta. Yogyakarta City and Sleman Regency border it to the north, the Indian Ocean to the south, Gunung Kidul Regency to the east, and Kulon Progo Regency to the west (Badan Pusat Statistik, 2023). The characteristics of Bantul Regency include highlands, lowlands, sandy beaches, and urban areas (Dinas Lingkungan Hidup Kabupaten Bantul, 2020). The highland areas include the districts of Banguntapan, Imogiri, Piyungan, Sedayu, and Dlingo. The lowland areas include the cities of Bantul, Pajangan, Sewon, Jetis, and Srandakan. Additionally, the sandy beach areas are found in the district of Srandakan, while the urban areas include the districts of Sewon and Banguntapan. Figure 2 presents a more detailed description of environmental literacy. Based on the research results in Figure 2, each domain of environmental literacy has a varied score. The following provides a more detailed explanation of each domain of environmental literacy in Bantul Regency.

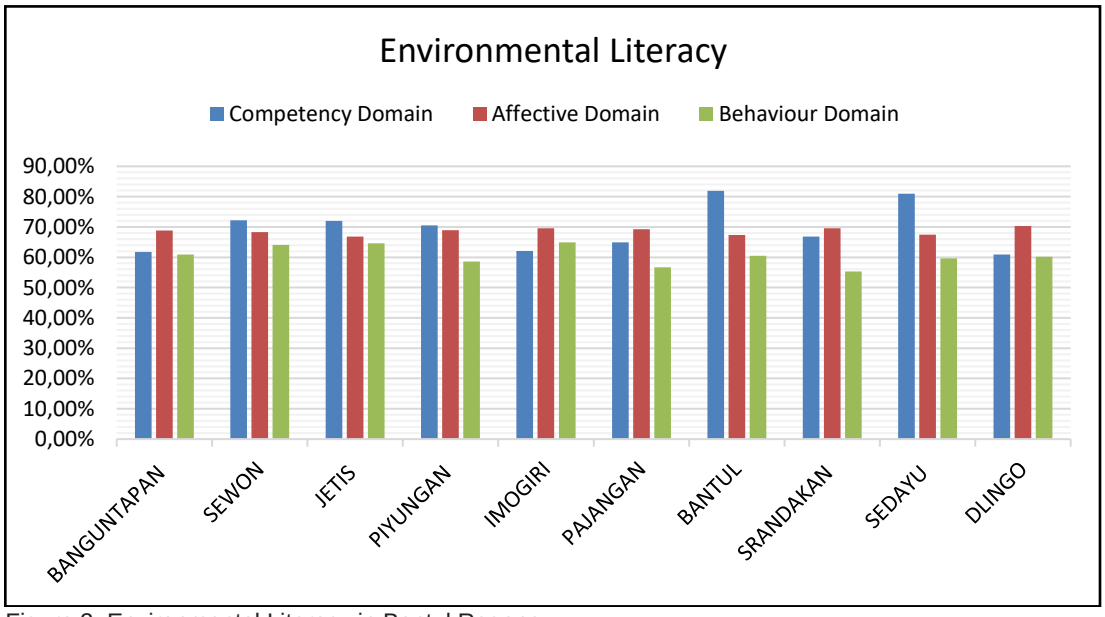

Figure 2. Environmental Literacy in Bantul Regency

Competency Domain

Competence is a person's ability to apply skills in daily life. Environmental literacy within the competence domain includes environmental knowledge and cognitive skills. A person is considered competent if they can perform a task repeatedly with a certain level of quality. For example, someone is deemed competent regarding the environment if they can identify environmental issues and interpret them based on prior knowledge and experience (Hollweg et al., 2011). Furthermore, the competence domain includes

understanding environmental terms and characteristics, identifying and analyzing environmental issues, and investigating these issues using knowledge to address environmental problems. Environmental literacy in the competence domain shows varied scores in Bantul Regency. The percentage of environmental literacy within the competence domain is presented in Figure 3.

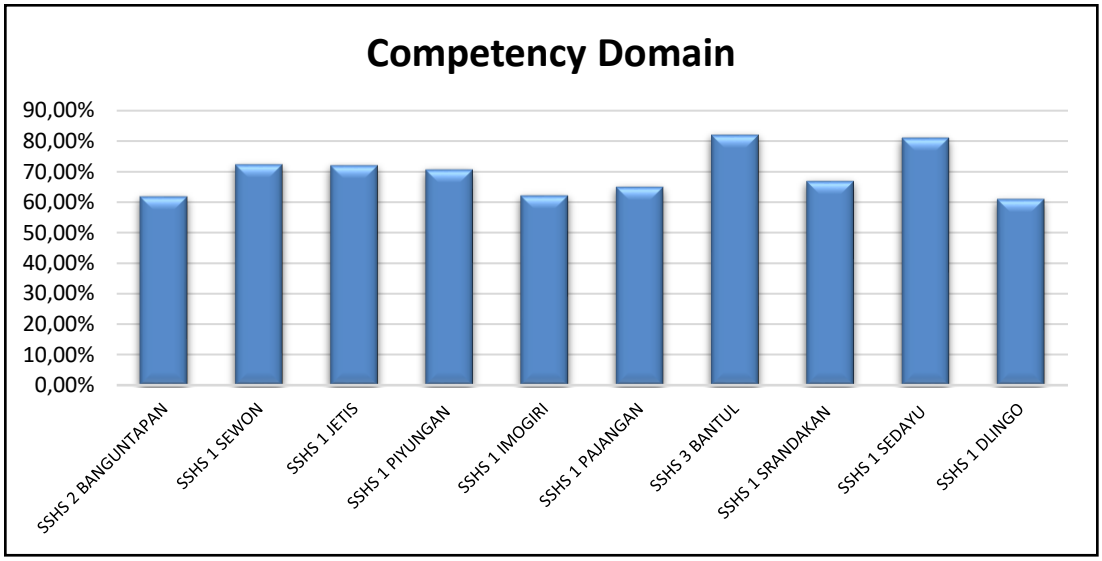

Figure 3. Environmental Literacy in the Competency Domain

Figure 3 shows that environmental literacy in the competence domain in Bantul Regency is categorized into two levels: "good" and "average." Areas classified as "good" include Bantul City (81.90%), Sedayu District (80.95%), and Sewon District (72.22%). Meanwhile, areas categorized as "average" are Jetis District (71.99%), Piyungan District (70.56%), Srandakan District (66.80%), Pajangan District (64.88%), Imogiri District (62.10%), Banguntapan District (61.76%), and Dlingo District (60.93%).

Bantul City, Sedayu District, and Sewon District have characteristics of lowland areas but are located in urban regions. The main factors contributing to these regions' high environmental literacy scores are the faster development of infrastructure and average resources in urban areas (Dinas Lingkungan Hidup Kabupaten Bantul, 2020). This result is consistent with Zhao et al., (2022) which shows that environmental literacy levels are higher in urban areas than rural areas. Additionally, urban environments present unique challenges and opportunities for students and are better supported by infrastructure and resources (Razali et al., 2022). Conversely, areas categorized as "average" are characterized by highland regions. Hills dominate highland areas and are prone to weathering (Dinas Lingkungan Hidup Kabupaten Bantul, 2020). These environmental conditions make construction activities more challenging and costly. As a result, facilities and infrastructure are generally more complete in lowland areas compared to highland or mountainous regions (Adinugroho et al., 2016). Sumirat et al., (2023) research explains that environmental literacy in rural areas requires special attention, particularly regarding understanding environmental literacy.

Various factors, such as the physical environment and geographical conditions, can influence the low environmental understanding of highland areas. Physical environmental factors, like a calm and pleasant school environment, can help students focus better, making the learning process more effective. Additionally, geographical factors are crucial in determining the opportunities and challenges during teaching and learning. For example, schools and educational institutions located far away and with difficult access can impact the student's learning experience (Gul Mazloum Yar & Ishaq Shaheedzooy, 2023).

The districts of Sedayu and Piyungan, located in highland areas, have relatively high scores in the competency domain. The high competency scores in these districts are attributed to the influence of the local environment and community involvement in environmental management. Social habits and norms have a positive relationship with individual participation in waste management (Ridayani et al., 2022). The Sedayu district government has an environmental management education program called Marsekal (Masyarakat Sedayu Kelola Lingkungan) (Dinas Kesehatan Kota Yogyakarta, 2023). This program has successfully created a movement for collecting plastic bottle waste involving schools, offices, government agencies, and local communities.

Additionally, Piyungan is a former landfill site that used to receive waste from three areas: Bantul, Sleman, and Yogyakarta City. The Piyungan landfill has been closed, and the government has urged the community to manage waste independently until the landfill can resume normal operations. As a

result, the community has shifted towards more responsive waste management behavior in their environment (Soemarti & Kundrat, 2022). This opinion is supported by Wyss et al., (2022) who state that communities experience changes when the environment has undergone significant impacts.

Affective Domain

Attitude is a crucial component of environmental literacy and refers to a person's tendency to engage in certain behaviors (Ruhimat et al., 2021). Students attitudes toward the environment influence their willingness to recognize and choose among different values and motivations for participating in environmental protection and improvement (Hollweg et al., 2011). The affective domain or attitude includes aspects such as attitude, sensitivity, and locus of control. The percentage of environmental literacy in the affective domain is presented in Figure 4.

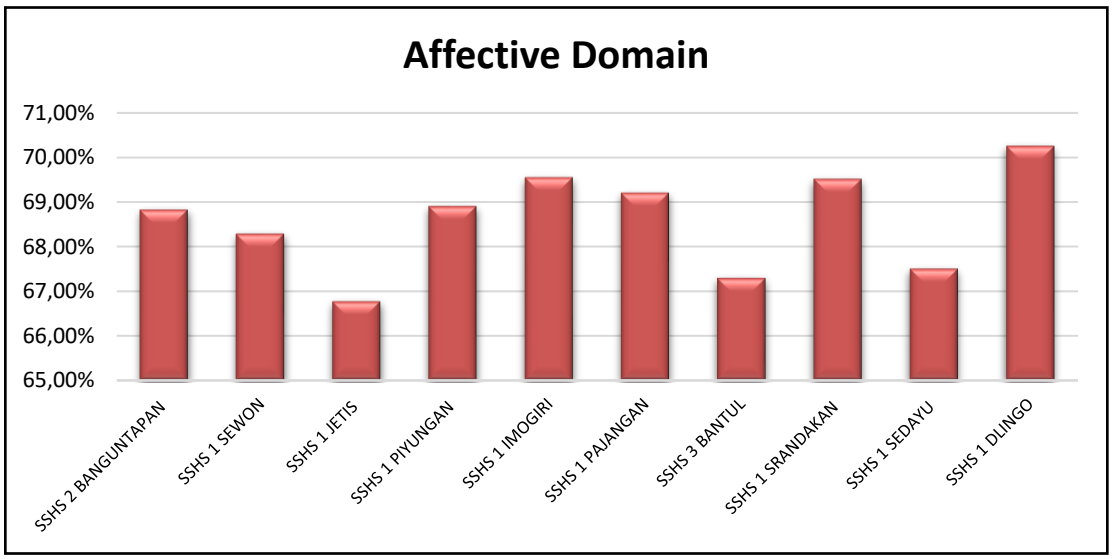

Figure 4. Environmental Literacy in the Affective Domain

Figure 4 shows that environmental literacy in the Affective Domain in Bantul Regency falls into the "average" category. The district of Dlingo has the highest Affective Domain score (70.25%), while the lowest score is found in the district of Jetis (66.67%). This result indicates that regions with good knowledge competence do not necessarily have good attitudes. It is consistent with the research by Ruhimat et al., (2021) which found a significant linear relationship between environmental knowledge and environmental attitudes. However, this relationship is relatively weak. The emergence of attitudes in the affective domain is derived from environmental knowledge and influenced by intentions (Priadi et al., 2020).

Geographically, the districts of Dlingo and several other highland areas, such as Imogiri, Srandakan, Piyungan, Banguntapan, and Sedayu, have well-preserved ecosystems and abundant biodiversity. The well-maintained environmental conditions indicate a strong relationship between individuals and nature. Individuals' lack of time in nature leads to increased environmental problems (Kleespies & Dierkes, 2023). It is consistent with the research by Deville et al., (2021)s which states that time spent in nature can improve environmental attitudes toward a more positive direction. Although the district of Dlingo has an Affective Domain score in the "good" category, its Competence Domain score is in the "average" category. Similarly, other regions with good scores in the Competence Domain have scores in the "average" category for the Affective Domain. Lowland areas in Bantul Regency are used for agriculture, fisheries, industry, and residential purposes (Pemerintah Kabupaten Bantul, 2020). Using land for housing and industry disrupts the environmental balance and causes ecosystem changes (Anisah et al., 2021). Ecosystem changes affect the relationship between individuals and nature. When ecosystems are well-preserved, the relationship between individuals and nature remains strong. Conversely, this relationship weakens with less interaction between individuals and nature (Kleespies & Dierkes, 2023). The research findings show that even if individuals have good environmental knowledge, it does not guarantee good environmental attitudes.

Behaviour Domain

Behavior refers to human actions that do not hold any special meaning for the individual. It is considered a reflection of what occurs, thereby requiring an object to generate the behavior. In the environmental context, behavior is defined as the response of a system or living organism to various environments

(Fang et al., 2023). The behavioral domain includes physical action, a form of responsible behavior in environmental literacy. The environmental literacy score in the behavioral domain can be seen in Figure 5.

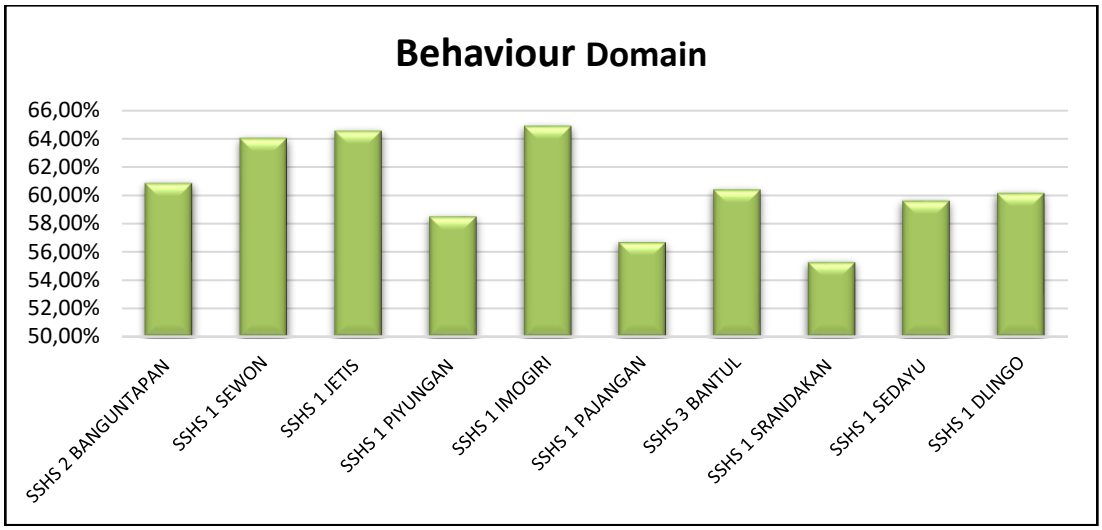

Figure 5. Environmental Literacy in the Behavior Domain

Based on Figure 5, it can be seen that the behavior domain score in Bantul Regency falls into the "average" category. Sequentially, the areas with environmental literacy scores in the "average" category are Imogiri District (64.91%), Jetis (64.58%), Sewon (64.06%), Banguntapan (60.88%), Bantul (60.43%), Dlingo (60.17%), Sedayu (59.64%), and Piyungan (58.53%). However, there are two districts with environmental behavior classified in the "low" category, i.e., Pajangan District (56.70%) and Srandakan District (55.30%). The lower behavior scores are found in lowland areas, such as Pajangan and Srandakan Districts, while highland areas obtain better environmental behavior scores.
The acquisition of scores in the affective domain and the behavioral domain shows the same results. Students in lowland areas have lower scores in both domains compared to students in highland areas. Except for the Srandakan and Pajangan areas, these two regions obtained scores in the affective domain that fall into the sufficient category, but in the behavioral domain, they fall into the low category. The Pajangan area, located near the city of Bantul, has better access to educational facilities and supporting resources. Unlike Pajangan, the Srandakan area is farther from the city, but this area shows a good environmental attitude. This is influenced by the condition of society dominated by industrial activities. Referring to Wyss *et al.,* (2022) society tends to undergo changes when the environment has experienced significant impacts. The Srandakan area is famous for its tofu industry, which is well-known among the people of Yogyakarta. Trimurti Village is a center for the tofu industry that has been running for generations. Ayu *et al.,* (2017) Although this industry has been running for a long time, the community still struggles to manage tofu industry waste. So many training activities have been conducted to manage tofu waste, such as making liquid organic fertilizer from tofu waste. (Susilawati *et al*., 2023). This encourages higher environmental awareness through activities related to waste management and local resource management.

Conclusion

The research results show that the environmental literacy level of 10th-grade high school students throughout Bantul Regency falls into the 'average' category, with a score of 65.96%. The study indicates that the mastery of environmental literacy in the competency domain is highest in the lowland area (Bantul City) and lowest in the highland area (Dlingo District). The highest score in the affective domain is found in the highland area (Dlingo District) and the lowest in the lowland area (Jetis District). Finally, the highest score in the behavior domain is found in the highland area (Imogiri District), while the lowest score is in the lowland area (Srandakan District).

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

W.Uyun: draft preparation, methodology, data analysis, writing original, editing; and **S. Suhartini:** methodology, review and approval.

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