Environmental Practices and Their Role in Promoting Environmental Awareness Among High School Students: A Case Study of Zliten Municipality, Libya.

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Abstract:
This study investigates the reality of environmental practices and their relationship with environmental awareness among high school students in the Municipality of Zliten, Libya, using a descriptive analytical approach. Data were collected from 372 participants, including principals, teachers, and students, who were proportionally selected from five educational service offices. The research examined various dimensions of environmental practices, such as general cleanliness, ventilation, waste management, health and safety procedures, green spaces, and environmental awareness programs. Findings indicated that most environmental practices in Zliten high schools were implemented at a low to moderate level, with the most significant weaknesses identified in student engagement, infrastructure, and the execution of environmental programs. Challenges such as a lack of financial resources, inadequate infrastructure, and limited institutional support were identified as major barriers to adopting sustainable development practices. Statistical analysis revealed significant positive correlations between environmental practices in the high schools of Zliten municipality and students' environmental awareness, with the strongest relationship observed in health and safety procedures (r = 0.922). Results emphasize the importance of implementing integrated environmental strategies within educational institutions to promote sustainability and enhance environmental behavior among Zliten high school students. This study underscores the urgent need for schools to strengthen environmental infrastructure, increase funding and training, and activate awareness programs in collaboration with local communities and government institutions.

Keywords: Environmental Practices, Zliten High Schools, Environmental Awareness, High School Students, Municipality of Zliten.

الممارسات البيئية ودورها في تعزيز الوعي البيئي لدى طلاب المرحلة الثانوية: دراسة حالة لبلدية زليتن، ليبيا

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الملخص

تفحص هذه الدراسة واقع الممارسات البيئية وعلاقتها بالوعي البيئي لدى طلاب المرحلة الثانوية في بلدية زليتن، ليبيا، باستخدام منهج وصفي تحليلي. جُمعت البيانات من 372 مشاركًا، من مديري المدارس والمعلمين والطلاب، تم اختيارهم بشكل تناسبي من خمسة مكاتب خدمات تعليمية. استكشف البحث أبعادًا متعددة للممارسات البيئية، بما في ذلك النظافة العامة، والتهوية، وإدارة النفايات، وإجراءات الصحة والسلامة، والمساحات الخضراء، وبرامج التوعية البيئية. كشفت النتائج أن معظم الممارسات البيئية في المدارس الثانوية طُبقت بمستوى منخفض إلى متوسط، مع تحديد أبرز نقاط الضعف في مشاركة الطلاب، والبنية التحتية، إضافة إلى تنفيذ البرامج البيئية. كما اعتُبرت تحديات مثل نقص الموارد المالية، وعدم كفاية البنية التحتية، ومحدودية الدعم المؤسسي، عوائق رئيسية أمام تبني ممارسات التنمية المستدامة. أشارت التحليلات الإحصائية إلى وجود ارتباطات إيجابية ذات دلالة إحصائية بين الممارسات البيئية في المدارس الثانوية والوعي البيئي لدى الطلاب، مع ملاحظة أقوى علاقة في إجراءات الصحة والسلامة (r = 0.922). وتؤكد النتائج على أهمية تطبيق استراتيجيات بيئية متكاملة داخل المؤسسات التعليمية لتعزيز الاستدامة والسلوك البيئي لدى طلاب المرحلة الثانوية. وتسلط هذه الدراسة الضوء على الحاجة الملحة للمدارس إلى تعزيز البنية التحتية البيئية، وزيادة التمويل والتدريب، وتفعيل برامج التوعية بالتعاون مع المجتمعات المحلية والمؤسسات الحكومية.

الكلمات المفتاحية: الممارسات البيئية، المدارس الثانوية الليبية، الوعي البيئي، طلاب المدارس الثانوية، بلدية زليتن.

Introduction

The environment is one of the fundamental components necessary for the continuation of life on planet Earth. Given the rapid environmental changes the world is experiencing, such as global warming, ozone depletion, pollution, and desertification, caring for the environment has become an urgent necessity. These challenges now threaten sustainable development and the health of individuals and communities [1]. In this context, educational institutions, especially high schools, play a central role in promoting environmental awareness. They are essential in shaping high school students' attitudes and behaviors toward the environment from the early stages of education [2].

Based on Ahmad-Kamil *et al.* (2022), many studies have shown that schools are the second most influential environment, after families, in instilling environmental values and knowledge in children and youth [3]. By integrating environmental practices into daily activities and high school curricula, schools can foster an environmentally conscious generation capable of adopting sustainable behaviors to help protect natural resources for future generations. In the Libyan context, amid increasing environmental challenges such as water scarcity, air quality deterioration, and solid waste, it is crucial to enhance environmental practices within high schools. Despite some individual or local initiatives, a significant disparity exists in the implementation of these practices across high schools, which affects students' environmental awareness [4].

This study aims to explore the reality of environmental practices in Zliten high schools and analyze the impact of these practices on developing environmental awareness among students. This is in light of the urgent need to promote positive environmental behaviors within Libyan society through educational institutions, with schools being one of the most important tools for early environmental upbringing and education. The study seeks to connect daily practices in Zliten high schools (such as cleanliness, waste management, maintaining green spaces, and rational consumption) with students' awareness of the environment's importance and their behavior toward it. Therefore, there is a pressing need to examine the reality of environmental practices in Zliten high schools and analyze their impact on building sustainable environmental awareness among students, supporting national and regional efforts to achieve sustainable development goals.

2. Problem Statement

The high school environment plays a crucial role in shaping students' behaviors and values toward the environment, as the school, following the family, is considered the most important institution for developing environmental awareness. However, the reality reveals a noticeable disparity in the level of environmental practices within Zliten high schools regarding general cleanliness, air quality, waste management, health and safety, and green spaces. This disparity could negatively affect the development of sustainable environmental awareness among students. Consequently, the study's problem centers around the following main question:

What is the reality of environmental practices in Zliten high schools, and how do these practices affect the development of environmental awareness among students? This main question leads to several sub-questions, the most prominent of which are:

1. How well are general cleanliness and environmental safety upheld in Zliten high schools?
2. What is the current state of classroom ventilation and air quality in high schools in Zliten?
3. How is waste management addressed, and what environmental awareness programs are available in high schools in Zliten?
4. How rigorously are health and safety procedures enforced in Zliten high schools?
5. How important is the focus on green spaces and environmentally friendly facilities?
6. How do these practices resonate from the perspectives of students, school principals, and teachers, and how are they related to the level of environmental awareness among high school students in Zliten?

3. Research Hypotheses

Based on the research problem and its objectives, the following hypotheses are proposed:
- There is a statistically significant positive relationship between the level of implementation of general cleanliness practices and environmental safety, and the level of environmental awareness among Zliten high school students.
- There is a statistically significant positive relationship between the quality of ventilation and air in classrooms and the level of environmental awareness among Zliten high school students.
- There is a statistically significant positive relationship between waste management and awareness programs and the level of environmental awareness among Zliten high school students.
- There is a statistically significant positive relationship between the implementation of school safety and health measures and the level of environmental awareness among Zliten High School students.
- There is a statistically significant positive relationship between the presence of green spaces and environmentally friendly facilities and the level of environmental awareness among Zliten high school students.

4. Methodology

4.1 Research Design
The study uses a descriptive-analytical approach, as it is the most suitable for examining reality as it exists and analyzing the relationships between variables.

4.2 Participants and Sampling
The study population includes all high school students in the municipality of Zliten, as outlined in the 2025 report from the Zliten Office of High Education Supervision, totaling 11,311 students. A stratified random sample was selected based on the three grade levels (first, second, and third year) and the educational service offices (Zliten City Center, Western Branch, Eastern Branch, Majer, and Azdo). The sample size was determined using the Krejcie and Morgan table, resulting in a total sample of 372 male and female students.

Additionally, samples were selected from the principals and teachers of Zliten High School to analyze the challenges and propose solutions. A total of 62 principals and vice principals were included, representing all high school principals in the municipality of Zliten. Furthermore, 306 teachers (both male and female) were selected from a total teaching population of 1,535 teachers in Zliten's high schools, following the Krejcie and Morgan table.

4.3 Research Instrument
A questionnaire was designed that included five main axes: (1) public cleanliness and environmental safety, (2) ventilation and air quality, (3) waste management and environmental awareness, (4) school safety and health, and (5) green spaces and eco-friendly facilities. This instrument was utilized to assess the level of environmental practices and their impact on building environmental awareness among Zliten High School students.

Table 1: The Distribution of the Study Samples and Population by Educational Service Offices.

Sequence	Office	Principals	Teachers	Students	Total Population by Office	Sample
1.	Zliten City Center	2	568	4816	5386	177
2.	Eastern Branch	2	287	2166	2455	81
3.	Western Branch	2	357	2639	2998	99
4.	Majer	2	158	666	826	27
5.	Azdo	2	165	1024	1191	39
Total		**10**	**1535**	**11311**		**372**

The study population consists of 11,311 individuals, including principals, teachers, and students from five educational service offices within the Zliten Education Sector. The Zliten Center Educational Office represents the largest share (47.6%), followed by the Western (26.5%) and Eastern (21.7%) branches, while Majer and Azdo account for 7.3% and 10.5%, respectively. According to Krejcie and Morgan's sampling table, a sample size of 372 was considered appropriate. To enhance representation and objectivity, 400 questionnaires were proportionally distributed among the offices. Of these, 381 were returned, and after excluding 9 invalid responses, 372 valid questionnaires were retained for analysis, meeting the required sample size.

4.4 Study Tool
Considering the numerical distribution of the study population presented in Table 1, which shows a noticeable imbalance in the number of teachers and students across the educational service offices in the municipality of

Zliten, a questionnaire was designed as the primary tool for data collection. This questionnaire was carefully developed to align with the study's objectives and its target groups. It was meticulously structured to fit the nature of the study and its descriptive-analytical methodology, addressing both target groups: teachers and administrators on one hand, and students on the other.

The version of the questionnaire aimed at teachers and administrators featured six main themes:

(1) General cleanliness and environmental safety, (2) Ventilation and air quality, (3) Waste management and environmental awareness, (4) School safety and health, (5) Green spaces and eco-friendly facilities, and (6) Challenges in implementing environmental practices in schools.

This version included a total of 33 items.

However, the student version also included six themes: (1) General cleanliness and environmental safety, (2) Ventilation and air quality, (3) Waste management and environmental awareness, (4) School safety and health, (5) Green spaces and eco-friendly facilities, and (6) Environmental awareness and the development of environmental behavior, with a total of 29 items. The items were rated using a five-point Likert scale: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree.

The tool was designed with comprehensiveness and balance in mind, addressing various environmental aspects within the school setting. This approach aimed to explore the extent to which these practices relate to the level of environmental awareness among students. The questionnaire was reviewed by a panel of experts and specialists in the fields of education and environmental science to ensure its validity. Subsequent statistical tests will be conducted to verify the reliability of the tool and its suitability for quantitative analysis. The following table presents the study responses and their implications for assessing the respondents' attitudes.

Table 2: Tool Responses and Their Implications.

Sequence	Response	Average	Assessment
1.	Strongly Disagree	1.00 – 1.79	Less than 20%
2.	Disagree	1.80 – 2.59	From 20% to less than 40%
3.	Neutral	2.60 – 3.39	From 40% to less than 60%
4.	Agree	3.40 – 4.19	From 60% to less than 80%
5.	Strongly Agree	4.20 – 5.00	From 80% to 100%

4.5 Reliability and Validity

The validity of the questionnaire was ensured by presenting it to a panel of experts in the fields of education and environmental sciences. This step aimed to verify the appropriateness of the items in measuring the targeted variables and to ensure that the statements were formulated clearly and accurately. Necessary modifications were made based on their feedback.

Regarding the reliability of the questionnaire, it was evaluated using Cronbach's Alpha coefficient to measure the internal consistency of its items. The results indicated that the coefficient values for all dimensions were high, signifying a strong level of reliability. This confirms that the study instrument is appropriate for data collection and achieving the research objectives.

5. Results
5.1 Demographic Characteristics
5.1.1 Distribution of the Sample According to Gender

Table 3: Distribution of the Study Sample by Gender.

Sequence	Target Group	Number	Percentage
1.	Male	258	69%
2.	Female	114	31%
Total		**372**	**100%**

Table 3 presents the gender distribution of the study sample, showing that 258 participants (69%) were male, while 114 (31%) were female.

5.1.2 Distribution of the Sample According to the Respondent Category

Table 4: Distribution of the Study Sample Across the Target Group.

Sequence	Target Group	Number	Percentage
1.	Manager	68	18.3%
2.	Teacher	102	27.4%
3.	Student	202	54.3%
Total		**372**	**100%**

Table 4 indicates that students comprised the largest segment of the study sample (54.3%), followed by teachers (27.4%) and principals (18.3%).

5.2 Answering the Research Questions

To answer the research questions, themes were developed that consisted of several items measuring aspects related to environmental practices within high schools in the Zliten Municipality. The responses of the sample participants were analyzed using appropriate statistical measures. Arithmetic means were calculated to assess the degree of agreement with each item, and standard deviations were used to determine the extent of dispersion and consistency of opinions. The items were then ranked in descending order based on their arithmetic mean, which helps identify improvement priorities and pinpoint environmental shortcomings within high schools in the Zliten Municipality from the perspectives of students, followed by the perspectives of principals and teachers.

5.2.1 Sustainable Practices from the Perspective of High School Students

Question 1: To what extent are general cleanliness and environmental safety provided in Libyan high schools?

Table 5: General Cleanliness and Environmental Safety in High Schools in Zliten Municipality.

Sequence	Item	Average	Standard Deviation	Order
1.	The cleanliness of the classrooms and public facilities in your school is good.	4.36	0.618	1
2.	I contribute to keeping the school clean through my daily actions.	2.26	0.858	4
3.	There are scheduled cleaning times at school, and they are adequate	2.64	0.877	2
4.	I have noticed an improvement in the cleanliness of the school in recent months	2.59	0.875	3
	The overall average	**2.96**	**0.698**	

The overall evaluation of general cleanliness and environmental safety received a moderate average score of 2.96. Students rated the visible cleanliness of classrooms and facilities highly at 4.36, but personal contributions to cleanliness were lower at 2.26. Scheduling and the improvement of cleaning efforts were also rated below average.

Question 2: What is the reality of classroom ventilation and air quality in schools?

Table 6: The Reality of Classroom Ventilation and Air Quality Inside Zliten High Schools.

Sequence	Item	Average	Standard Deviation	Order
1.	The air in your classroom is clean and suitable for learning.	2.55	0.911	2
2.	There are ventilation problems or unpleasant odors in the classrooms.	2.50	0.938	3
3.	The windows, fans, and air conditioning units are regularly maintained in the school.	3.25	0.851	1
	The overall average	**2.77**	**0.670**	

Classroom ventilation and air quality received an overall rating of 2.77, which is considered moderate. The maintenance of ventilation equipment scored the highest at 3.25, whereas air cleanliness and ventilation issues received lower scores of 2.55 and 2.50, respectively.

Question 3: How are waste management and environmental awareness programs implemented in high schools in Zliten?

Table 7: School Practices for Waste Management and Environmental Awareness.

Sequence	Item	Average	Standard Deviation	Order
1.	I know how to sort waste at my school (paper, plastic, glass, etc.)	3.19	0.834	1
2.	I participate in recycling activities at school.	2.40	0.981	3
3.	The school provides me with the opportunity to participate in solving the waste problem	1.96	0.993	5
4.	My school has designated bins for sorting waste into different categories (paper, plastic, organic waste) to facilitate the recycling process.	2.36	0.960	4
5.	The school organizes regular awareness campaigns about the importance of waste reduction, recycling, and promoting environmental sustainability	2.57	0.913	2
	The overall average	**2.50**	**0.703**	

Students demonstrated acceptable knowledge of waste sorting (3.19), but participation in recycling and problem-solving was low (2.40 and 1.96). The availability of sorting bins and the effectiveness of awareness campaigns were also rated below average.

Question 4: To what extent are health and safety procedures in schools implemented?

Table 8: Implementation of School Health and Safety Procedures.

Sequence	Item	Average	Standard Deviation	Order
1.	I feel safe in my school during emergencies.	2.35	0.956	3
2.	I am trained on how to act in emergencies, such as fires	1.99	0.977	5
3.	There are good sanitation facilities in the school.	3.27	0.851	1
4.	Water tanks are regularly inspected and cleaned.	2.06	0.985	4
5.	A first aid kit is available.	2.65	0.857	2
	The overall average	**2.47**	**0.631**	

The overall average score for implementing health and safety procedures was 2.47, suggesting a below-average level. The highest score was for the availability of sanitation facilities (3.27), whereas the lowest was for student emergency training (1.99). Other items, such as emergency preparedness and water tank inspections, also received low ratings.

Question 5: How much attention is given to green spaces and eco-friendly facilities?

Table 9: Level of Attention to Green Spaces and Eco-Friendly Facilities.

Sequence	Item	Average	Standard Deviation	Order
1.	There are gardens or green areas in my school.	2.41	0.929	3
2.	I contribute to caring for the school's plants and green areas.	2.42	0.966	2
3.	My school has eco-friendly facilities such as waste sorting bins and the use of renewable energy sources.	2.66	0.920	1
4.	The school uses eco-friendly methods in designing green spaces, such as water-saving irrigation systems	1.83	0.988	4
5.	The school encourages students to participate in activities that promote environmental sustainability, such as natural lighting, tree planting, and maintaining biodiversity.	1.74	0.964	5
	The overall average	**2.21**	**0.759**	

The overall average score was 2.21, indicating a low level of attention to environmental sustainability in schools. The aspect rated most positively was the availability of eco-friendly facilities (2.66), while the lowest scores were associated with sustainability activities and green design methods (1.74–1.83).

Question 6: What is the state of environmental awareness and the cultivation of environmental behavior among students?

Table 10: The Reality of Environmental Awareness and the Development of Environmental Behavior among Zliten High School Students.

Sequence	Item	Average	Standard Deviation	Order
1.	I learn at my school about the importance of the environment and how to preserve it.	3.22	0.843	2
2.	I participate in environmental awareness campaigns within the school.	1.94	0.990	9
3.	I use environmental practices in my daily life, such as conserving water and energy.	2.07	0.991	4
4.	I learn how to interact with the environmental challenges facing the	2.66	0.904	3
5.	I am encouraged to participate in environmental activities that contribute to sustainability, such as recycling or tree planting	1.97	0.985	7
6.	I learn at my school how I can reduce my environmental footprint through daily changes in my behavior.	2.05	0.994	5
7.	Environmental topics are continuously and effectively integrated into the curriculum.	3.23	0.832	1
8.	My school encourages the adoption of sustainable transportation methods, such as walking or biking instead of using cars.	1.94	0.985	9
9.	I believe that our schools play an important role in educating a generation capable of facing future environmental sustainability challenges.	2.03	0.991	6
10.	I participate in school group activities aimed at solving real environmental problems within the school or the local community.	1.95	0.980	8
	The overall average	**2.31**	**0.705**	

The overall average score was 2.31, indicating a generally weak implementation of programs that promote environmental awareness and behavior among students. While items related to theoretical knowledge, such as curriculum integration (3.23) and understanding the importance of the environment (3.22), received higher ratings, practical involvement remained low. Specifically, participation in awareness campaigns, environmental activities, sustainable practices, and group projects scored below 2.10.

5.2.2 Sustainable Practices from the Perspective of High School Principals and Teachers
Question 1: To what extent are general cleanliness and environmental safety evident in high schools within the Municipality of Zliten?

Table 11: General Cleanliness and Environmental Safety in High Schools in the Municipality of Zliten.

Sequence	Item	Average	Standard Deviation	Order
1.	Classrooms and school facilities are cleaned regularly each day.	4.37	0.620	1
2.	There are sufficient cleaning supplies and hygiene items available in the restrooms.	2.69	0.875	2
3.	The school yards and common areas are cleaned regularly.	2.67	0.894	3
4.	There is enough trash bins distributed throughout the school.	2.63	0.913	4
5.	Students are trained on the importance of maintaining the cleanliness of the school environment through environmental activities.	2.56	0.943	5
	The overall average	**2.98**	**0.715**	

The results of the first question, from the perspective of principals and teachers, indicate a noticeable gap in environmental practices in Zliten high schools. Regular classroom cleaning received a high score of 4.37, demonstrating strong administrative efforts to maintain internal cleanliness. However, training students on how to maintain cleanliness had the lowest average at 2.56. Other factors, such as the availability of restroom supplies, trash bins, and yard cleanliness, also received lower scores. The overall average was 2.98, suggesting a moderate to low level of cleanliness and environmental safety.

Question 2: What is the reality of classroom ventilation and air quality within schools?

Table 12: Reality of Classroom Ventilation and Air Quality within High Schools in Zliten.

Sequence	Item	Average	Standard Deviation	Order
1.	Classrooms are well-ventilated and allow natural air to enter.	2.55	0.911	2
2.	Windows, fans, and air conditioning units are maintained regularly.	2.50	0.939	3
3.	The air inside classrooms and corridors is free of unpleasant odors or pollutants	3.26	0.851	1
	The overall average	**3.77**	**0.670**	

The findings from the second inquiry, which focused on classroom ventilation and air quality according to the perspectives of principals and teachers in Zliten, indicate mixed results. The highest-rated item, air free of unpleasant odors, scored 3.26, showing moderate satisfaction with air quality. However, natural ventilation received a score of 2.55, while regular maintenance of ventilation equipment scored 2.50, emphasizing infrastructural and maintenance shortcomings. While the reported overall average was 3.77, this seems to be a calculation error; based on the item scores, a more accurate overall average would be around 2.77.

Question 3: How are schools managing waste management and environmental awareness programs?

Table 13: Handling of Waste Management and Environmental Awareness Programs in Zliten High Schools.

Sequence	Item	Average	Standard Deviation	Order
1.	Waste is disposed of in a healthy and organized manner within the school.	3.22	0.794	1
2.	There are programs or activities for environmental awareness among students.	2.42	0.973	3
3.	Waste is sorted (plastic, paper, organic) if possible.	1.99	0.995	5
4.	There is cooperation between the school and the relevant cleaning or environmental authorities.	2.38	0.952	4
5.	The students are encouraged to participate in environmental awareness campaigns aimed at reducing waste and improving sorting and recycling practices.	2.58	0.912	2
	The overall average	**2.52**	**0.695**	

The analysis of the third question regarding waste management and environmental awareness in Zliten high schools, from the perspective of principals and teachers, reveals a basic level of awareness but weak implementation of sustainable practices. The highest-rated item, "waste is disposed of in a healthy and organized manner," received an average score of 3.22, indicating some level of organizational effort. In contrast, waste sorting scored significantly lower at 1.99, highlighting a lack of essential infrastructure and practices. Student involvement in awareness campaigns showed moderate engagement (2.58), while collaboration with environmental authorities (2.38) and the presence of structured environmental programs (2.42) were also rated poorly. The overall average was 2.52, reflecting a moderate but insufficient level of environmental engagement.

Question 4: To what extent are school safety and health procedures implemented?

Table 14: Implementation of School Safety and Health Procedures.

Sequence	Item	Average	Standard Deviation	Order
1.	The school is equipped with safety procedures for emergencies (such as fires).	2.38	0.954	3
2.	Fire extinguishers are available and are regularly maintained.	2.02	0.982	5
3.	The school environment does not contain any hazards that may threaten the health of students.	3.25	0.846	1
4.	Water tanks are regularly inspected and cleaned.	2.06	0.985	4
5.	A first aid kit is available.	2.67	0.854	2
	The overall average	**2.66**	**0.856**	

The results of the fourth inquiry into the implementation of school safety and health procedures in Zliten's high schools, from the perspective of principals and teachers, reveal inconsistent application of essential measures. The statement "The school environment does not contain any hazards" received the highest average score of 3.25, indicating some awareness of maintaining a generally safe environment. The availability of first aid kits also scored moderately at 2.67, suggesting a basic level of emergency preparedness.

However, significant gaps were identified. Fire extinguisher maintenance received the lowest score (2.02), and the cleaning of water tanks scored 2.06, highlighting neglect in essential safety practices. Furthermore, the statement "There are emergency procedures" scored only 2.38, pointing to inadequate training and planning. The overall average score was 2.66, indicating that safety and health procedures are only partially applied and lack consistency.

Question 5: What is the level of attention given to green spaces and environmentally friendly facilities?

Table 15: Level of Attention to Green Spaces and Eco-friendly Facilities.

Sequence	Item	Average	Standard Deviation	Order
1.	There are green spaces inside or around the school.	2.42	0.921	3
2.	The trees and plants in the school are maintained.	2.43	0.959	2
3.	The school encourages planting trees and maintaining general cleanliness.	2.67	0.909	1
4.	The school encourages students to participate in activities that promote environmental sustainability, such as natural lighting, tree planting, and preserving biodiversity.	1.84	0.987	4
5.	The school encourages students to participate in activities that promote environmental sustainability, such as natural lighting, tree planting, and preserving biodiversity.	1.76	0.964	5
	The overall average	**2.22**	**0.753**	

The findings concerning the fifth question, which examined the attention given to green spaces and eco-friendly facilities in Zliten high schools from the perspective of principals and teachers, reveal that this area remains underdeveloped. The highest-rated item, which is encouraging tree planting and overall cleanliness, had an average score of 2.67, indicating minimal environmental initiatives. Maintenance of plants and trees scored 2.43, and the presence of green areas received a score of 2.42, reflecting weak integration of natural elements into the school environment. The lowest scores were associated with student engagement in sustainability activities: tree planting scored 1.76, and biodiversity preservation scored 1.84. The overall average was 2.22, signaling that efforts to promote green spaces and eco-friendly practices are insufficient and largely superficial.

Question 6: What are the challenges facing the implementation of environmental practices within schools?

Table 16: Challenges Facing the Implementation of Environmental Practices within High Schools in Zliten.

Sequence	Item	Average	Standard Deviation	Order
1.	The school faces difficulty in providing the necessary financial resources to implement sustainable environmental programs.	4.35	0.615	1
2.	There is a lack of environmental awareness among some teachers and students, which affects the success of environmental activities in the school.	4.20	0.686	6
3.	The school faces difficulty in obtaining support from governmental or community organizations to implement environmental programs.	4.21	0.929	5
4.	The school faces challenges in providing the necessary equipment and facilities for effective waste sorting and recycling.	4.22	0.877	4
5.	There is difficulty in maintaining green spaces within the school due to climatic conditions, lack of resources, or limited space.	4.29	0.761	2
6.	Students face difficulty in understanding sustainable environmental practices due to a lack of training programs or specialized educational curricula.	4.27	0.779	3
7.	There are challenges in implementing energy and water conservation techniques due to a lack of awareness or the absence of appropriate infrastructure.	4.18	0.937	7
8.	The school environment is not adequately equipped to support environmental activities, such as gardens or recycling bins in every classroom.	4.29	0.716	2
The overall average		**4.25**		

The findings from the sixth question, which explored challenges to implementing environmental practices in Zliten's high schools from the perspectives of principals and teachers, reveal a high level of awareness regarding several significant barriers. The overall average score was 4.25, indicating strong consensus on the severity of these challenges. The most critical issue identified was the lack of financial resources, with an average score of 4.35. This was closely followed by difficulties in maintaining green spaces and inadequate school infrastructure for environmental activities, both scoring 4.29. Additional major challenges included the absence of specialized curricula and training programs (4.27), insufficient recycling equipment (4.22), and limited support from government or community organizations (4.21). Cultural barriers were also acknowledged, particularly a lack of awareness among some teachers and students (4.20). The lowest-rated yet still significant challenge was the difficulty in applying energy and water-saving techniques (4.18).

Question 7: What is the relationship between environmental practices and the level of environmental awareness among students?

Table 17: The Relationship Between Environmental Practices and the Level of Environmental Awareness among High School Students in Zliten.

		Sustainable Practices	Environmental Awareness
Sustainable Practices	Pearson Correlation	1	0.694**
	Two-Tailed Significance (p-value)		0.000
	Sample Size (N)	372	
Environmental Awareness	Pearson Correlation	0.694**	1
	Two-Tailed Significance (p-value)	0.000	
	Sample Size (N)	372	

Table 17 illustrates a strong and statistically significant positive correlation between sustainable environmental practices in schools and students' environmental awareness, based on the perspectives of principals and teachers in Zliten. The Pearson correlation coefficient was r = 0.694, with a significance level of p = 0.000, indicating a robust relationship. This suggests that enhanced practices, such as cleanliness, waste management, and green

space initiatives, are directly associated with higher levels of student environmental awareness and more responsible environmental behavior.

5.2.3 Study Hypothesis Testing

The study aimed to verify several hypotheses regarding the relationship between the level of implementation of environmental practices in high schools in the Zliten municipality and the level of environmental awareness among students. The Pearson Correlation Coefficient was employed to measure the strength, direction, and statistical significance of this relationship, with a significance level set at ($\alpha \leq 0.05$). The hypotheses were designed to explore the influence of sustainable educational environments on students' environmental awareness and related behaviors.

- There is a statistically significant positive correlation between the degree of implementation of general cleanliness and environmental safety practices and the level of environmental awareness among high school students in Zliten.

Table 18: Results of Testing the First Hypothesis.

		Sustainable Practices	Environmental Awareness
General Cleanliness and Environmental Safety Practices	Pearson Correlation	1	0.550**
	Two-Tailed Significance (p-value)		0.000
	Sample Size (N)	372	
Environmental Awareness	Pearson Correlation	0.550**	1
	Two-Tailed Significance (p-value)	0.000	
	Sample Size (N)	372	

The test results for the first hypothesis indicate a statistically significant moderate-to-strong positive correlation (Pearson's r = 0.550, p = 0.000) between the implementation of cleanliness and environmental safety practices and students' environmental awareness. The null hypothesis is rejected.

- There is a statistically significant positive correlation between the quality of ventilation and air inside classrooms and the level of environmental awareness among high school students in Zliten.

Table 19: Results of Testing the Second Hypothesis.

		Sustainable Practices	Environmental Awareness
Quality of Ventilation and Air Inside Classrooms	Pearson Correlation	1	0.561**
	Two-Tailed Significance (p-value)		0.000
	Sample Size (N)	372	
Environmental Awareness	Pearson Correlation	0.561**	1
	Two-Tailed Significance (p-value)	0.000	
	Sample Size (N)	372	

The test results for the second hypothesis indicate a statistically significant moderate positive correlation (Pearson's r = 0.561, p = 0.000) between classroom ventilation, air quality, and students' environmental awareness. The null hypothesis is rejected.

- There is a statistically significant positive correlation between waste management, the implementation of awareness programs, and the level of environmental awareness among high school students in Zliten.

Table 20: Results of Testing the Third Hypothesis.

		Sustainable Practices	Environmental Awareness
Quality of Ventilation and Air Inside Classrooms	Pearson Correlation	1	0.763**
	Two-Tailed Significance (p-value)		0.000
	Sample Size (N)	372	
Environmental Awareness	Pearson Correlation	0.763**	1
	Two-Tailed Significance (p-value)	0.000	
	Sample Size (N)	372	

The results of the third hypothesis indicate a strong and statistically significant positive correlation (Pearson's r = 0.763, p = 0.000) between waste management and awareness programs and students' environmental awareness. The null hypothesis is rejected, and the alternative hypothesis is accepted.

- There is a statistically significant positive correlation between the implementation of school safety and health procedures and the level of environmental awareness among high school students in Zliten.

Table 21: Results of Testing the Fourth Hypothesis.

		Sustainable Practices	Environmental Awareness
Implementing school safety and health procedures	Pearson Correlation	1	0.922**
	Two-Tailed Significance (p-value)		0.000
	Sample Size (N)	372	
Environmental Awareness	Pearson Correlation	0.922**	1
	Two-Tailed Significance (p-value)	0.000	
	Sample Size (N)	372	

The fourth hypothesis analysis indicates a very strong and statistically significant positive correlation between the implementation of school safety and health procedures and students' environmental awareness (Pearson's r = 0.922, p = 0.000). The null hypothesis is rejected.

- There is a statistically significant positive correlation between attention to green spaces and the provision of eco-friendly facilities, and the level of environmental awareness among high school students in Zliten.

Table 22: Results of Testing the Fifth Hypothesis.

		Sustainable Practices	Environmental Awareness
Implementing school safety and health procedures	Pearson Correlation	1	0.856**
	Two-Tailed Significance (p-value)		0.000
	Sample Size (N)	372	
Environmental Awareness	Pearson Correlation	0.856**	1
	Two-Tailed Significance (p-value)	0.000	
	Sample Size (N)	372	

The results of the fifth hypothesis indicate a strong and statistically significant positive correlation between attention to green spaces and eco-friendly facilities and students' environmental awareness (r = 0.856, p = 0.000). Therefore, the null hypothesis is rejected.

6. Discussion
6.1 Distribution
The demographic results indicate a male predominance in the study sample. This may reflect structural and organizational characteristics of higher education in the studied regions, where males typically dominate

leadership and teaching roles or where male student enrollment exceeds that of females. Despite the disparity, female representation remains sufficient to contribute valuable insights, enriching the gender-based analysis of the findings.

The findings are consistent with previous research, which suggests that basic environmental awareness among students often does not lead to sustained behavioral change without institutional backing. Studies such as those by Suwaed (2022) and Salleh *et al.* (2015) in Malaysia highlight common challenges, including weak school policies, lack of teacher training, and the pivotal role of school leadership in promoting environmental education. Additionally, U.S.-based research (EBSCO) points to the importance of access to digital learning tools in enhancing environmental awareness [5][6], which remains underutilized in Zliten schools.

The sample distribution aligns with the study's focus, particularly emphasizing students as the primary recipients of educational outcomes. This perspective is supported by Dbab & Azam (2021), who stressed the importance of involving students in assessing the effectiveness of environmental education programs [7].

As shown in Table 7, inadequate infrastructure and practical support for waste management hinder student engagement. Although awareness campaigns exist, actual behavioral change is still limited, aligning with Dbab & Azam's (2021) findings about the gap between knowledge and action [7].

6.2 Interpretation of Results: Questions for Sustainable Practices from the Perspective of High School Students

As shown in Table 5, these results indicate a gap between visible cleanliness and active responsibility among students. Despite maintaining good physical cleanliness, engagement in environmental practices remains limited, consistent with findings by Dbab & Azam (2021) on the disconnect between awareness and action (Aslanova *et al.,* 2017) [7][8].

As shown in Table 6, although equipment maintenance indicates some institutional effort, air quality concerns persist. This may affect the well-being and academic performance of students and teachers, highlighting the need for enhanced ventilation and pollution control, consistent with Salleh *et al.* (2014) [6].

As demonstrated in Table 7, inadequate infrastructure and practical support for waste management hinder student engagement. Despite awareness campaigns, actual behavioral change remains limited, consistent with Dbab & Azam's (2021) findings regarding the gap between knowledge and action [7].

As shown in Table 8, the implementation of health and safety measures in schools seems inconsistent. While basic health infrastructure, such as sanitation, is generally sufficient, essential safety elements like emergency training and student preparedness are significantly lacking. This disparity indicates a pressing need for thorough safety programs, including drills, training sessions, and safety awareness initiatives.

As presented in Table 9, the data reveal a weak institutional commitment to green practices and environmental education. Although there is some eco-friendly infrastructure, the lack of engagement in sustainability initiatives, along with limited green space, suggests a missed opportunity to incorporate environmental awareness into the school culture. To address this, schools should invest in green infrastructure and embed environmental stewardship into student activities and curricula.

As shown in Table 10, there is a clear gap between environmental knowledge and behavioral application among students. Although the curriculum seems to cover environmental topics, this does not translate into meaningful action or behavioral change. Students reported low engagement in awareness campaigns, sustainable lifestyle practices, and real-life problem-solving initiatives. These findings support Kim *et al.* (2019), who emphasized that fostering environmental responsibility requires applied learning and community-based experiences [9]. Schools must adopt a more holistic and experiential approach, integrating classroom knowledge with practical activities that engage students in sustainability within the school and the broader community.

6.2 Interpretation of Results: Questions for Sustainable Practices from the Perspective of High School Principals and Teachers

These results highlight a lack of student engagement and awareness activities in environmental practices (Table 11). Despite satisfactory efforts in classroom cleanliness, other areas show neglect, indicating an imbalance in the overall approach to school hygiene. The findings indicate a need for greater student involvement and improved infrastructure. This situation aligns with the observations of Dbab & Azam (2021), who noted weak implementation of environmental practices in Libyan schools despite general awareness [7].

From Table 12, these findings indicate that current classroom ventilation conditions need substantial improvement, particularly in enhancing airflow and ensuring proper maintenance of ventilation systems. The data reveal a significant infrastructure gap that may adversely affect students' comfort and health. This area remains underexplored in Libyan education research, underscoring the contribution of this study. The results are consistent with Salleh *et al.* (2014), who emphasized the adverse effects of poor physical environments on student wellbeing and environmental awareness [6].

As shown in Table 13, these results indicate a clear gap between environmental awareness and practical implementation in Zliten high schools. The low scores in key areas such as waste sorting and institutional

partnerships suggest that while there is some awareness, it is not translating into consistent or effective action. This highlights the urgent need to strengthen awareness programs, integrate waste sorting systems, and build partnerships with local environmental organizations. The findings align with Kim *et al*. (2019), who found that despite students' recognition of environmental responsibility, institutional efforts such as recycling and behavior-change programs remain underdeveloped in many Arab schools [9][10].

In Table 14, these findings reflect critical shortcomings in the implementation of school safety measures. While some basic precautions are in place, essential practices such as fire safety, water hygiene, and emergency response protocols are insufficiently addressed. This inconsistency poses potential risks to students and staff. The results align with Elhaj (2020), who emphasized the lack of structured safety protocols and proactive maintenance in Libyan schools. The data underscore the urgent need for institutional support, regular safety drills, and the establishment of preventive systems to ensure a secure and healthy learning environment [11].

These results indicate a clear deficiency in strategic planning and student engagement in environmental sustainability within Zliten high schools (Table 15). The low engagement scores reveal missed opportunities to cultivate environmental awareness through practical, hands-on learning experiences. The findings align with those of Salleh *et al*. (2014) and Dbab & Azam (2021) who highlighted that without tangible green initiatives and student participation, environmental education has a limited impact. Addressing these challenges necessitates stronger administrative leadership, integration of environmental themes into the curriculum, and active student participation in sustainability projects to inspire meaningful and lasting change [6][7].

From Table 16, these results highlight a complex mix of material, infrastructural, and cultural barriers that obstruct the effective implementation of environmental practices in Zliten's high schools. The high level of agreement among respondents emphasizes the urgency of addressing these issues through comprehensive strategies. Solutions should include increased funding, integration of environmental content into curricula, focused teacher training, and stronger engagement with local communities and government bodies. These findings align with broader regional research, such as that by Kim *et al*. (2019) and Elhaj (2020), which also identify systemic barriers to environmental sustainability across Arab educational contexts [9][11].

These findings confirm that the practical implementation of sustainability within schools significantly contributes to strengthening students' theoretical understanding and awareness of environmental issues (Table 17). The results highlight the importance of integrating real-world environmental practices into the school environment to promote behavioral change. This aligns with the work of Al-Mutairi (2021), who noted that awareness programs, when not paired with experiential learning and tangible actions, are often ineffective in shaping long-term student attitudes and behaviors toward the environment (Al-Qataee, 2023) [12][13].

6.3 Hypothesis

These results support the idea that schools with better cleanliness and safety measures tend to have students who demonstrate higher environmental awareness. This suggests that a clean and safe school environment plays a key role in shaping students' environmental behavior and awareness (Table 18).

These findings confirm that improved air quality and ventilation lead to greater levels of environmental awareness among students. This supports the view that a healthy classroom environment enhances students' understanding of environmental issues and encourages environmentally responsible behavior (Table 19).

In Table 20, these findings indicate that effective waste management and active awareness programs play a crucial role in translating students' environmental knowledge into practical behaviors. This, in turn, fosters a stronger sense of environmental responsibility among students.

This result highlights that emphasizing health and safety in schools significantly enhances students' awareness and attitudes toward environmental responsibility. It reinforces key behaviors such as safety, hygiene, and preparedness (Table 21).

This finding underscores that incorporating natural elements and sustainable infrastructure in schools greatly improves students' environmental knowledge and behavior by promoting direct engagement with the environment (Table 22).

7. Conclusions

In conclusion, this study found that environmental practices in high schools play a crucial role in fostering students' environmental awareness. Enhancing this role requires coordinated efforts among school administration, teachers, and official educational bodies.

The results indicated that the visible cleanliness of facilities and classrooms is rated as good; however, the individual practices of students and staff continue to be weak. This highlights the gap between the existing cleanliness and the behavioral commitment to maintaining it.

Regarding classroom ventilation and air quality, the evaluations fell within the moderate range, highlighting significant deficiencies in air purity and ventilation effectiveness. Although efforts to maintain windows and ventilation equipment are acceptable, there is an urgent need to enhance ventilation systems to ensure a healthy learning environment.

While students' awareness of waste sorting is relatively good, their practical engagement and participation in environmental activities are lacking. This reflects a deficiency in implementation tools and motivational programs within schools and emphasizes the need to enhance environmental infrastructure.

Regarding school safety and health procedures, the findings indicated insufficient training and emergency preparedness, despite the availability of basic facilities such as health units and first aid kits. This underscores the necessity to enhance safety measures and implement awareness training programs for both students and staff.

Regarding green spaces and eco-friendly facilities, the overall assessment was low, reflecting limited availability of green areas and environmental amenities. There is a noticeable lack of eco-friendly practices, such as water-saving irrigation systems or student-led tree planting initiatives.

8. Recommendations:

- Environmental awareness in schools must be enhanced through both curricular and extracurricular activities that promote a culture of sustainability and environmental responsibility among students and teachers.
- School health environments must be enhanced by keeping restrooms clean, supplying cleaning materials, and prioritizing air quality and proper classroom ventilation.
- Waste management systems should be implemented by providing dedicated bins for waste sorting and launching recycling initiatives in coordination with relevant authorities.
- Establishing school safety procedures involves implementing emergency plans and ensuring the availability of safety equipment like fire extinguishers and first aid kits.
- Encouraging school gardening initiatives and student involvement in environmental preservation to support green spaces and eco-friendly facilities within the school.
- Community partnerships with local municipalities and institutions should be broadened to enhance sustainability initiatives and supply the required resources for their implementation.
- Integrating sustainability concepts into educational policies and school plans aligns with the Sustainable Development Goals, ensuring the ongoing incorporation of environmental practices into education.

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