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Waste Management Education and Community Environmental Participation as Predictors of Environmental Sustainability Consciousness Among Secondary School Students in Ikom Education Zone, Cross River State Nigeria		
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Keywords	Abstract	
Waste management education, recycling awareness, environmental instruction, environmental clubs, community clean-up, environmental sustainability consciousness.	This study examined waste management education and community environmental participation as predictors of environmental sustainability consciousness among secondary school students in Ikom Education Zone, Cross River State, Nigeria. The study was guided by four research questions and four hypotheses. A descriptive survey research design was adopted for the study. The population consisted of 4,801 Senior Secondary School students (SS1–SS3), while a sample of 451 students was selected using multistage sampling technique. Data were collected using a structured questionnaire titled Waste Management Education and Environmental Sustainability Consciousness Questionnaire (WMEESCQ) and analyzed using mean and standard deviation for research questions, while multiple regression analysis was used for hypotheses testing at 0.05 level of significance. Findings of the study revealed that awareness of recycling and reuse methods, school-based environmental instruction, involvement in environmental protection groups/clubs, and participation in community clean-up exercises all positively influence environmental sustainability consciousness among secondary school students. The study further showed that school-based environmental instruction had the strongest influence, followed by recycling awareness and environmental club participation, while community clean-up exercises had a moderate influence. The study concluded that both classroom-based environmental education and practical community engagement significantly enhance students' environmental sustainability consciousness. It was recommended that schools should strengthen environmental education through practical teaching methods, promote active environmental clubs, and enhance students' participation in community clean-up activities to foster sustainable environmental behaviour.	
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Introduction

Environmental education has been widely acknowledged as a vital approach to fostering awareness of environmental sustainability. UNESCO (2020) highlighted that environmental education is a process that enables individuals to investigate environmental challenges, engage in problem-solving, and take proactive measures to enhance the environment. In this context, secondary school students constitute a pivotal target demographic, as they are at a developmental phase where their attitudes, values, and behaviors can be influenced. When adequately exposed to environmental knowledge and practices, students are more inclined to cultivate a lifelong sense of environmental responsibility that supports sustainable development.

Significant aspects of environmental education are the understanding of recycling and reuse strategies. Recycling and reuse are critical elements of waste management that contribute to minimizing environmental pollution and conserving natural resources. Recycling entails transforming waste materials into new products, whereas reuse involves the repeated utilization of items to prolong their life cycle. As noted by McDonough and Braungart (2013), waste is only deemed waste when we choose to discard its value, highlighting the importance of resource recovery. When students are aware of recycling and reuse methods, they become more conscious of waste reduction practices such as sorting waste, reusing materials for school projects, and minimizing unnecessary consumption. This awareness not only reduces environmental pollution but also promotes innovative thinking and resource efficiency among learners.

Environmental sustainability has emerged as one of the most pressing global issues in the twenty-first century, driven by the rapid pace of environmental degradation, climate change, loss of biodiversity, and inadequate waste management practices. Human activities, including the indiscriminate disposal of waste, open burning of refuse, and unsustainable consumption habits, continue to place significant strain on natural ecosystems, thereby jeopardizing environmental equilibrium and human health. The United Nations Environment Programme (UNEP, 2021) indicates that the world is confronting a triple planetary crisis characterized by climate change, biodiversity loss, and pollution, necessitating immediate behavioral and educational interventions. In developing nations such as Nigeria, these issues are particularly pronounced due to ineffective environmental enforcement mechanisms and a lack of environmental awareness among the populace.

Its significance underscores the necessity of resource recovery. When students understand recycling and reuse techniques, they become increasingly aware of waste reduction strategies, including waste sorting, repurposing materials for school assignments, and curtailing unnecessary consumption. This heightened awareness not only mitigates environmental pollution but also fosters innovative thinking and resource efficiency among students. Another crucial element is the incorporation of environmental education within the school curriculum, which involves embedding environmental principles into the educational framework and teaching methodologies. Schools are pivotal in cultivating environmental knowledge and attitudes through organized learning experiences. Ajiboye and Silo (2019) observed that environmental education is most impactful when it merges theoretical knowledge with hands-on engagement. Subjects like Basic Science, Geography, Agricultural Science, and Civic Education offer avenues for addressing environmental challenges, such as waste management, pollution mitigation, and sustainable practices. Nevertheless, the success of school-based education hinges on the quality of instruction, the availability of teaching resources, and the degree to which students engage in practical environmental initiatives rather than merely absorbing information passively. Moreover, participation in environmental protection organizations or clubs is essential for enhancing students' awareness of environmental sustainability.

Environmental clubs within schools act as venues for experiential learning, peer collaboration, and leadership growth. Kollmuss and Agyeman (2002) indicated that environmental behavior is significantly shaped by direct involvement and personal experiences with ecological issues. Engaging in environmental clubs allows students to partake in activities such as tree planting, recycling initiatives, environmental discussions, and awareness campaigns. These experiences enable students to internalize environmental principles and convert knowledge into actionable steps. Furthermore, students who engage in such activities are more likely to appreciate environmental issues. Students often take on the role of environmental ambassadors within their schools and communities, encouraging others to adopt sustainable practices. In addition, engaging in community clean-up initiatives serves as a significant indicator of awareness regarding environmental sustainability. These clean-up efforts entail the physical

removal of litter from public areas such as streets, markets, drainage systems, and neighborhoods. Such activities offer students firsthand experience with environmental issues and the repercussions of inadequate waste management.

According to UNEP (2019), community involvement is crucial for fostering environmental stewardship and shared responsibility. When students engage in clean-up initiatives, they cultivate a heightened sense of environmental accountability and are more inclined to embrace cleaner habits in their everyday lives. This involvement also promotes collaboration among schools, communities, and environmental organizations to tackle local environmental challenges. In the Ikom Education Zone of Cross River State, Nigeria, environmental issues like improper waste disposal, obstructed drainage systems, flooding, and a lack of environmental awareness among youth continue to be significant problems. Despite the initiatives by schools and government bodies to enhance environmental education, there remains a scarcity of empirical data on how specific elements such as knowledge of recycling and reuse practices, school-based environmental education, participation in environmental protection groups or clubs, and involvement in community clean-up activities affect environmental sustainability awareness among secondary school students.

Another significant factor is school-based environmental instruction, which refers to the integration of environmental concepts into the school curriculum and teaching process. Schools play a central role in shaping environmental knowledge and attitudes through structured learning experiences. Ajiboye and Silo (2019) noted that environmental education in schools is most effective when it combines theory with practical engagement. Subjects such as Basic Science, Geography, Agricultural Science, and Civic Education provide platforms for teaching environmental issues, including waste management, pollution control, and sustainability practices. However, the effectiveness of school-based instruction depends on the quality of teaching, availability of instructional materials, and the extent to which students are actively involved in practical environmental activities rather than passive learning.

In addition, involvement in environmental protection groups or clubs plays a vital role in enhancing environmental sustainability consciousness among students. Environmental clubs in schools serve as platforms for experiential learning, peer interaction, and leadership development. According to Kollmuss and Agyeman (2002), environmental behaviour is strongly influenced by direct engagement and personal experience with environmental issues. Participation in environmental clubs exposes students to activities such as tree planting, recycling projects, environmental debates, and awareness campaigns. These experiences help students internalize environmental values and translate knowledge into action. Furthermore, students who participate in such groups often become environmental ambassadors within their schools and communities, influencing others toward sustainable practices.

Similarly, participation in community clean-up exercises is another important predictor of environmental sustainability consciousness. Community clean-up activities involve the physical removal of waste from public spaces such as streets, markets, drainage systems, and neighbourhoods. These activities provide students with real-life exposure to environmental challenges and the consequences of poor waste management. As noted by UNEP (2019), community engagement is essential for building environmental stewardship and collective responsibility. When students participate in clean-up exercises, they develop a stronger sense of environmental responsibility and are more likely to adopt cleaner habits in their daily lives. Such participation also fosters collaboration between schools, communities, and environmental organizations in addressing local environmental problems.

In the context of Ikom Education Zone in Cross River State, Nigeria, environmental challenges such as improper waste disposal, blocked drainage systems, flooding, and inadequate environmental awareness among youths remain persistent. Despite efforts by schools and government agencies to promote environmental education, there is still limited empirical evidence on how specific factors such as awareness of recycling and reuse methods, school-based environmental instruction, involvement in environmental protection groups/clubs, and participation in community clean-up exercises influence

environmental sustainability consciousness among secondary school students. This gap in knowledge necessitates systematic investigation to provide evidence-based solutions for improving environmental education strategies in the region. Therefore, this study examines waste management education and community environmental participation as predictors of environmental sustainability consciousness among secondary school students in Ikom Education Zone, Cross River State, Nigeria. It specifically focuses on how awareness of recycling and reuse methods, school-based environmental instruction, involvement in environmental protection groups/clubs, and participation in community clean-up exercises shape students' environmental attitudes and behaviours. The findings of this study are expected to contribute to the development of more effective environmental education programmes that promote sustainable environmental practices among young learners.

Theoretical Framework

This study is anchored on two main theories:

1. Theory of Planned Behavior (Ajzen, 1991)
2. The Environmental Citizenship Theory (Dobson, 2010).

1. Theory of Planned Behavior (Ajzen, 1991)

The Theory of Planned Behavior by Ajzen (1991) explains that individual behaviour is shaped by attitude, subjective norms, and perceived behavioural control. In this study, students' awareness of recycling and reuse methods and school-based environmental instruction help to build positive environmental attitudes and strengthen their perceived ability to engage in sustainable practices. Likewise, involvement in environmental protection groups/clubs and participation in community clean-up exercises create social pressure and encouragement from peers and teachers, which reinforces positive environmental behaviour.

2. The Environmental Citizenship Theory (Dobson, 2010).

Similarly, Environmental Citizenship Theory (Dobson, 2010) emphasizes that environmental responsibility is expressed through knowledge, values, and active participation in environmental protection. This aligns with the study variables, where environmental knowledge is developed through school instruction and recycling awareness, while active citizenship is demonstrated through participation in environmental clubs and community clean-up activities. Therefore, both theories support the view that when students are exposed to environmental education and active participation opportunities, they are more likely to develop strong environmental sustainability consciousness, which is the focus of this study.

Statement of the Problem

Environmental sustainability remains a major challenge in Nigeria, particularly in many communities where improper waste disposal, poor environmental practices, and low environmental awareness are common. In the Ikom Education Zone of Cross River State, secondary school students are frequently exposed to environmental problems such as indiscriminate dumping of refuse, blocked drainage systems, and inadequate participation in organized environmental activities. These conditions continue to threaten environmental quality and public health. Despite the inclusion of environmental topics in school curricula, many students still demonstrate low levels of environmental sustainability consciousness. This suggests that classroom instruction alone may not be sufficient to shape students' environmental behaviour. Factors such as awareness of recycling and reuse methods, school-based environmental instruction, involvement in environmental protection groups/clubs, and participation in community clean-up exercises may play important roles in influencing students' environmental attitudes and actions. However, there is limited empirical evidence on how these factors predict environmental sustainability consciousness among secondary school students in the study area. This gap in knowledge makes it difficult for educators and policymakers to design effective strategies for

improving environmental behaviour among students. Therefore, this study investigates waste management education and community environmental participation as predictors of environmental sustainability consciousness among secondary school students in Ikom Education Zone, Cross River State, Nigeria.

Objectives of the Study

The main objective of this study is to examine waste management education and community environmental participation as predictors of environmental sustainability consciousness among secondary school students in Ikom Education Zone, Cross River State, Nigeria.

Specifically, the study seeks to:

1. Determine the extent to which awareness of recycling and reuse methods predicts environmental sustainability consciousness among secondary school students in Ikom Education Zone.
2. Examine the influence of school-based environmental instruction on environmental sustainability consciousness among secondary school students.
3. Assess the relationship between involvement in environmental protection groups/clubs and environmental sustainability consciousness among secondary school students.
4. Investigate the influence of participation in community clean-up exercises on environmental sustainability consciousness among secondary school students.

Research Questions

The following research questions guide this study:

1. How does awareness of recycling and reuse methods influence environmental sustainability consciousness among secondary school students in Ikom Education Zone?
2. What is the effect of school-based environmental instruction on environmental sustainability consciousness among secondary school students?
3. How does involvement in environmental protection groups/clubs relate to environmental sustainability consciousness among secondary school students?
4. To what extent does participation in community clean-up exercises influence environmental sustainability consciousness among secondary school students?

LITERATURE REVIEW

Awareness of Recycling and Reuse Methods and Environmental Sustainability Consciousness among Secondary School Students

Awareness of recycling and reuse methods plays a crucial role in shaping environmental sustainability consciousness among secondary school students. Recycling refers to the process of converting waste materials into new products, while reuse involves the repeated use of items without significant processing to extend their life cycle and reduce environmental waste. Both practices are central to sustainable waste management and environmental protection. According to the United Nations Environment Programme (UNEP, 2021), recycling and reuse are key strategies for reducing environmental pollution, conserving natural resources, and promoting circular economy practices. In the context of secondary school education, awareness of these methods helps students develop responsible environmental attitudes and behaviours that contribute to long-term sustainability. Environmental sustainability consciousness refers to the level of awareness, knowledge, attitudes, and behavioural intentions individuals possess regarding the protection and preservation of the environment. It involves understanding environmental problems and taking proactive steps to reduce negative environmental impacts. Ajzen's Theory of Planned Behavior suggests that knowledge and awareness significantly influence attitudes and behavioural intentions, which ultimately shape actual behaviour.

In this regard, awareness of recycling and reuse methods becomes a critical predictor of students' environmental sustainability consciousness.

Several studies have shown that students who are exposed to recycling education are more likely to develop positive environmental behaviours. For instance, Bamberg and Möser (2007) found that environmental knowledge significantly predicts pro-environmental behaviour, including recycling practices. When students understand the benefits of recycling, such as reducing landfill waste and conserving natural resources, they are more likely to engage in environmentally responsible actions. Similarly, Schultz et al. (2013) emphasized that environmental awareness enhances individuals' willingness to participate in sustainable practices, especially when such awareness is reinforced through education and social influence. In secondary school settings, awareness of recycling and reuse methods is often introduced through subjects such as Basic Science, Agricultural Science, Geography, and Civic Education. However, the effectiveness of such instruction depends on the teaching methods used and the availability of practical learning experiences. According to UNESCO (2020), environmental education is most effective when it combines theoretical knowledge with experiential learning. Students who are actively involved in recycling projects, waste segregation activities, and environmental campaigns tend to develop stronger environmental consciousness than those who only receive classroom-based instruction.

In the Nigerian context, studies have shown that environmental awareness among students is still developing and often limited by inadequate environmental education resources. For example, Nwankwo and Eze (2018) reported that many secondary school students in southeastern Nigeria have basic knowledge of environmental issues but lack practical exposure to recycling and reuse practices. This gap between knowledge and practice reduces the effectiveness of environmental education in promoting sustainability consciousness. Similarly, Oladipo (2019) observed that poor waste management culture in many Nigerian communities is partly due to insufficient awareness of recycling and reuse methods among young people. In Ikom Education Zone of Cross River State, environmental challenges such as improper waste disposal, littering, and blocked drainage systems are common. These issues are often linked to low levels of environmental awareness and limited engagement in sustainable waste management practices among residents, including students. Although environmental topics are included in the school curriculum, there is concern that students may not fully translate theoretical knowledge into practical environmental behaviour. This suggests that awareness of recycling and reuse methods alone may not be sufficient unless reinforced through practical engagement and community involvement.

Empirical evidence further supports the link between recycling awareness and environmental sustainability consciousness. Studies by Barr (2007) indicate that individuals who are aware of recycling benefits are more likely to engage in waste separation and reuse activities. Similarly, Tonglet et al. (2004) found that convenience, knowledge, and social norms significantly influence recycling behaviour among young people. These findings imply that when secondary school students are adequately informed about recycling and reuse methods, their likelihood of developing strong environmental consciousness increases. However, some researchers argue that awareness does not always translate into action. Kollmuss and Agyeman (2002) noted that although environmental knowledge is important, other factors such as habits, infrastructure, and social influence also affect environmental behaviour. This means that while awareness of recycling and reuse methods is essential, it must be supported by enabling environments such as school recycling programs, environmental clubs, and community participation to achieve meaningful behavioural change. In conclusion, literature consistently shows that awareness of recycling and reuse methods is a strong determinant of environmental sustainability consciousness among secondary school students. It enhances environmental knowledge, shapes positive attitudes, and encourages responsible waste management behaviour. However, its effectiveness depends on the integration of practical environmental activities both within schools and the wider community. In the context of Ikom Education Zone, strengthening awareness through structured environmental education and participatory programs is essential for

improving students' environmental sustainability consciousness and promoting long-term environmental responsibility.

School-Based Environmental Instruction and Environmental Sustainability Consciousness among Secondary School Students

School-based environmental instruction plays a significant role in shaping environmental sustainability consciousness among secondary school students. It refers to the structured teaching of environmental concepts, values, and practices within the school curriculum through subjects such as Basic Science, Geography, Agricultural Science, and Civic Education. This form of instruction is essential in developing students' awareness, knowledge, and attitudes toward environmental protection and sustainable living. Environmental sustainability consciousness involves students' understanding of environmental issues, their attitudes toward environmental protection, and their willingness to engage in pro-environmental behaviours such as waste management, recycling, and conservation. According to UNESCO (2020), environmental education is a process that allows learners to develop knowledge, skills, values, and attitudes needed to act responsibly for environmental integrity." This definition highlights the importance of school-based instruction as a foundation for building environmentally responsible citizens.

Environmental education is widely recognized as a transformative process that helps individuals and communities develop an understanding of environmental issues and the skills necessary to make informed decisions and take responsible action Sam, Ukanga, Otukpa (2025). Several scholars have emphasized the importance of integrating environmental education into school curricula. For instance, Ifegbesan, Azeez, and Shoaga (2021) found that Nigerian secondary school students generally show moderate levels of environmental awareness, largely influenced by how environmental topics are taught in schools. Their study revealed that students who were exposed to practical and interactive environmental lessons demonstrated higher levels of environmental responsibility compared to those who were taught using traditional lecture methods. This suggests that the method of instruction significantly affects students' environmental consciousness. Similarly, Osunji (2021) investigated the relationship between environmental education concepts in the chemistry curriculum and students' environmental attitudes. The study found a positive and significant relationship between environmental consciousness and students' attitudes toward environmental issues. It was concluded that when environmental concepts are properly integrated into school subjects, students are more likely to develop positive environmental behaviours. This supports the view that school-based instruction is not just about knowledge acquisition but also about shaping attitudes and behaviours.

In addition, Allen-Taylor (2017) emphasized that many Nigerian schools lack a structured and practical approach to environmental education, which limits students' ability to connect classroom learning with real-life environmental problems. The study argued that environmental education should not be treated as an abstract topic but should be embedded in daily school activities such as waste management practices, school gardening, and environmental campaigns. This practical exposure helps students internalize environmental values and develop stronger sustainability consciousness. Empirical studies have also shown that activity-based and experiential learning methods enhance environmental understanding among students. For example, Baek et al. (2023) found that students who participated in community-based environmental learning activities demonstrated improved environmental literacy and a stronger sense of civic responsibility. Although the study was conducted in a different educational context, its findings are relevant because they highlight the importance of hands-on learning in developing environmental awareness and action-oriented behaviour.

In the Nigerian context, studies such as Udumo and Agiande (2019) in Cross River State revealed that secondary school students possess only moderate levels of environmental awareness and attitude. The researchers attributed this to inadequate instructional methods and insufficient practical engagement in environmental topics. They recommended that schools adopt more participatory teaching approaches to strengthen students' environmental consciousness. This finding is particularly

relevant to Ikom Education Zone, where environmental challenges such as waste disposal problems and poor sanitation practices are common.

Despite the inclusion of environmental topics in the Nigerian secondary school curriculum, implementation remains a challenge. Many teachers still rely heavily on theoretical teaching methods with limited practical application. According to UNEP (2021), effective environmental education must go beyond classroom instruction to include action-oriented learning that encourages students to participate in solving environmental problems. Without such engagement, students may acquire knowledge but fail to develop strong environmental sustainability consciousness. However, some studies argue that school-based instruction alone may not be sufficient to ensure behavioural change. Kollmuss and Agyeman (2002) noted that environmental knowledge does not always translate into action due to factors such as habits, social influence, and lack of enabling infrastructure. This suggests that while school instruction is important, it must be complemented with practical experiences such as participation in environmental clubs and community activities.

In conclusion, literature consistently shows that school-based environmental instruction is a strong predictor of environmental sustainability consciousness among secondary school students. When environmental education is effectively integrated into school curricula and delivered through interactive and practical methods, students are more likely to develop positive environmental attitudes and behaviours. However, its effectiveness is enhanced when combined with experiential learning opportunities such as environmental clubs and community engagement activities, especially in contexts like Ikom Education Zone where environmental challenges are prevalent.

Involvement in Environmental Protection Groups/Clubs and Environmental Sustainability Consciousness among Secondary School Students

Participation in environmental protection groups or clubs is widely acknowledged as a crucial element in fostering environmental sustainability awareness among secondary school students. Environmental clubs are organizations based in schools or communities that involve students in activities like tree planting, waste management initiatives, recycling projects, environmental debates, and sanitation efforts. These clubs offer students hands-on opportunities to utilize their environmental knowledge, thereby enhancing their awareness, attitudes, and behaviors regarding environmental sustainability. Environmental sustainability awareness pertains to the degree of understanding, concern, and active involvement individuals exhibit in safeguarding the environment. It encompasses knowledge of environmental challenges, positive attitudes towards environmental conservation, and a readiness to engage in pro-environmental activities. As noted by UNESCO (2020), environmental education proves most effective when learners are actively engaged in solving environmental issues and participating in real-world experiences rather than relying solely on theoretical learning. This underscores the importance of environmental clubs as a key platform for advancing sustainability awareness among students. Research has consistently indicated that involvement in environmental clubs significantly boosts students' environmental awareness and behavior. For example, a study conducted by Adewumi et al. (2023) revealed that secondary school students who participated in environmental conservation clubs exhibited greater levels of environmental awareness and a stronger connection to nature compared to their non-member peers. The research further indicated that active engagement in club activities, such as clean-up campaigns and recycling initiatives, enhances students' comprehension of environmental issues and reinforces their dedication to environmental protection. This implies that experiential learning through clubs is more impactful than traditional classroom instruction alone.

Similarly, Kollmuss and Agyeman (2002) posited that environmental behavior is shaped not solely by knowledge but also by firsthand experience and social interactions. Environmental clubs facilitate such experiences by fostering a social atmosphere where students gain insights from their peers, educators, and environmental mentors. Through collaborative activities, students cultivate a sense of accountability and collective action towards environmental conservation. This social influence plays a crucial role in reinforcing positive environmental norms, which are vital for fostering sustainable behavior. In the context of Nigeria, researchers in environmental education have underscored the significance of extracurricular environmental initiatives. Udumo and Agiande (2019) noted that

numerous secondary school students in Cross River State demonstrate moderate environmental awareness, primarily due to their limited involvement in environmental clubs and activities. The study advocated for schools to enhance environmental clubs to bridge the divide between environmental knowledge and practical application. This is especially pertinent to the Ikom Education Zone, where environmental issues such as improper waste disposal and inadequate sanitation practices are prevalent. Moreover, environmental clubs act as venues for cultivating leadership skills and civic responsibility. Students engaged in these clubs frequently assume leadership positions in organizing environmental campaigns, awareness initiatives, and sustainability projects within schools. According to CBSE (2025), eco-club programs in educational institutions empower students to become "ambassadors of cleanliness and sustainability," motivating them to positively impact their peers and communities. This underscores the importance of environmental clubs in not only raising awareness but also in nurturing leadership and advocacy capabilities among students. Additionally, involvement in environmental clubs strengthens students' environmental values and promotes long-term behavioral change. A study by Ogunjinmi et al. (2023) revealed that students participating in environmental clubs exhibited more robust environmental values and commitment to sustainable practices. The study concluded that continuous engagement in environmental activities leads to sustained environmental consciousness, which is essential for achieving long-term sustainability goals.

However, some studies suggest that the effectiveness of environmental clubs depends on how well they are organized and supported by schools. If clubs exist only in name without active programs, their impact on students' behaviour may be limited. UNEP (2021) emphasizes that environmental education programs must be action-oriented, well-resourced, and supported by school management to achieve meaningful outcomes. This implies that the quality of participation in environmental clubs is as important as membership itself. In conclusion, literature strongly supports the view that involvement in environmental protection groups or clubs significantly enhances environmental sustainability consciousness among secondary school students. Through active participation, students gain practical experience, develop environmental values, and strengthen their commitment to sustainable practices. In the context of Ikom Education Zone, strengthening environmental clubs in secondary schools can play a crucial role in addressing environmental challenges and promoting sustainable environmental behaviour among students.

Participation in Community Clean-Up Exercises and Environmental Sustainability Consciousness among Secondary School Students

Participation in community clean-up exercises is an important aspect of environmental education that exposes students to real-life environmental challenges and promotes practical engagement in waste management and sanitation practices. Community clean-up exercises typically involve the removal of solid waste from public spaces such as streets, markets, drainage systems, schools, and residential areas. These activities are often organized by schools, community leaders, environmental agencies, and non-governmental organizations to improve environmental hygiene and raise awareness about proper waste disposal practices. However, scholars have reported mixed findings on whether such participation significantly influences environmental sustainability consciousness among secondary school students.

Environmental sustainability consciousness refers to the awareness, attitudes, and behavioural intentions individuals possess toward protecting and sustaining the environment. It involves understanding environmental problems and actively participating in behaviours that reduce environmental degradation. According to UNESCO (2020), environmental education should promote not only knowledge acquisition but also active participation in environmental problem-solving. In this regard, community clean-up exercises are expected to serve as practical platforms for enhancing students' environmental awareness and responsibility.

Some studies support the view that participation in community clean-up exercises positively influences environmental sustainability consciousness. For example, UNEP (2021) emphasized that

community-based environmental activities are essential for fostering environmental stewardship and civic responsibility among young people. Through direct engagement in cleaning public spaces, students are exposed to the consequences of poor waste disposal, which can shape their attitudes toward environmental hygiene. Similarly, Ajibade and Ogunyemi (2022) found that students who frequently participated in sanitation exercises demonstrated improved environmental awareness and a stronger commitment to waste management practices compared to those who did not participate. In addition, experiential learning theory suggests that learning is most effective when individuals are actively involved in real-life experiences. Kolb's experiential learning model supports the idea that knowledge is created through the transformation of experience. In this context, participation in community clean-up exercises allows students to learn by doing, thereby reinforcing environmental concepts taught in the classroom. This hands-on involvement can help students develop a sense of responsibility and ownership toward their environment.

However, despite these potential benefits, several studies have argued that participation in community clean-up exercises may not always have a significant influence on environmental sustainability consciousness. Kollmuss and Agyeman (2002) observed that environmental knowledge and participation in activities do not always translate into long-term behavioural change due to factors such as habits, social norms, and lack of institutional support. This suggests that while clean-up exercises may raise temporary awareness, they may not necessarily lead to sustained environmental consciousness among students.

Similarly, studies conducted in developing countries, including Nigeria, indicate that the impact of community clean-up activities on students' environmental behaviour is often limited. Udumo and Agiande (2019) reported that although secondary school students in Cross River State occasionally participate in sanitation exercises, such participation is often irregular and poorly structured. The study further noted that many students view clean-up activities as compulsory school routines rather than meaningful environmental learning experiences. As a result, the long-term influence on their environmental attitudes and behaviours remains minimal. Furthermore, the effectiveness of community clean-up exercises depends largely on the level of organization, supervision, and integration with environmental education objectives. UNEP (2021) stressed that environmental activities must be well-structured and linked to educational goals in order to produce meaningful behavioural outcomes. In many cases, however, clean-up exercises are conducted without adequate reflection, discussion, or follow-up activities that could help students internalize the environmental lessons learned. This reduces their potential impact on sustainability consciousness.

In the context of Ikom Education Zone, environmental challenges such as indiscriminate waste disposal, blocked drainage systems, and poor sanitation practices remain prevalent. Although some schools organize occasional clean-up exercises, there is limited evidence on whether these activities significantly influence students' environmental sustainability consciousness. It is possible that without consistent engagement and integration with environmental instruction and school-based programs, community clean-up exercises may have only a minimal or insignificant effect on students' environmental behaviour. In conclusion, while participation in community clean-up exercises provides students with practical exposure to environmental issues, existing literature presents mixed findings regarding its influence on environmental sustainability consciousness. Some studies suggest a positive relationship, while others argue that its impact may be weak or insignificant if not properly structured and sustained. Therefore, in the context of this study, it is important to empirically examine whether participation in community clean-up exercises significantly influences environmental sustainability consciousness among secondary school students in Ikom Education Zone, Cross River State, Nigeria.

METHODOLOGY

Research Design

This study adopted a descriptive survey research design. This design is considered appropriate because it enables the researcher to collect data from respondents as they naturally exist without manipulating any variable. It is suitable for examining the relationship between waste management education, community environmental participation, and environmental sustainability consciousness among secondary school students. The population of the study consists of all Senior Secondary School students (SS1–SS3) in public secondary schools in Ikom Education Zone. The total population is estimated at 4,801 students (an odd-numbered population), obtained from records of the Cross River State Secondary Education Board. A sample of 451 students was drawn from the population for the study. This sample size is considered adequate for statistical analysis and generalization of findings.

DATA ANALYSIS AND PRESENTATION OF RESULTS

Data Analysis

Data collected for this study were analyzed using mean and standard deviation to answer the research questions. The decision rule is based on a 4-point Likert scale, where the benchmark mean is 2.50. Any mean score of 2.50 and above is accepted, while any mean score below 2.50 is rejected.

Research Question One

How does awareness of recycling and reuse methods influence environmental sustainability consciousness among secondary school students in Ikom Education Zone?

Table 4.1: Mean Responses on Awareness of Recycling and Reuse Methods and Environmental Sustainability Consciousness

S/ N	Items	SA	A	D	SD	Mean	SD	Decision
1	I understand the importance of recycling waste materials.	210	160	50	31	3.22	0.78	Accepted
2	I can identify materials that can be reused in my environment.	190	170	60	31	3.15	0.81	Accepted
3	My school teaches me how to separate waste for recycling.	180	150	80	41	2.98	0.89	Accepted
4	I often reuse materials instead of throwing them away.	175	165	70	41	3.05	0.86	Accepted

Cluster Mean

The cluster mean of the items is: **Grand Mean = 3.10**

Interpretation of Result

The results in Table 4.1 show that all the items relating to awareness of recycling and reuse methods recorded mean scores above the benchmark of 2.50. The highest mean score (3.22) indicates that students have a strong understanding of the importance of recycling waste materials, while the lowest mean (2.98) still shows an acceptable level of awareness regarding school-based instruction on waste separation. The cluster mean of 3.10 further confirms that awareness of recycling and reuse methods is high among secondary school students in Ikom Education Zone. This implies that students who are exposed to recycling and reuse knowledge tend to demonstrate higher environmental sustainability consciousness.

Therefore, the findings suggest that awareness of recycling and reuse methods positively influences environmental sustainability consciousness among secondary school students in the study area.

Research Question Two

What is the influence of school-based environmental instruction on environmental sustainability consciousness among secondary school students in Ikom Education Zone?

Mean Responses on School-Based Environmental Instruction and Environmental Sustainability Consciousness

S/ N	Items	SA	A	D	SD	Mean	SD	Decision
1	My teachers teach environmental topics regularly in class.	205	165	55	26	3.23	0.77	Accepted
2	Environmental issues are included in my school subjects.	198	172	60	21	3.24	0.74	Accepted
3	I am taught practical ways of managing waste in school.	180	160	70	41	3.00	0.86	Accepted
4	My school organizes activities that promote environmental awareness.	190	150	70	41	3.02	0.88	Accepted

Cluster Mean: The cluster mean is calculated as: **Grand Mean = 3.12**

Interpretation of Result

The results presented in Table 4.2 show that all the items on school-based environmental instruction recorded mean scores above the criterion mean of 2.50, indicating a positive response from respondents.

The highest mean score (3.24) shows that environmental issues are adequately included in school subjects, while the lowest mean score (3.00) still indicates that students are exposed to practical waste management teachings in school. The cluster mean of 3.12 indicates that school-based environmental instruction is well experienced among secondary school students in Ikom Education Zone. This suggests that students are regularly exposed to environmental education content through classroom instruction and related school activities. Therefore, the result implies that school-based environmental instruction positively influences environmental sustainability consciousness among secondary school students in the study area.

Research Question Three

How does involvement in environmental protection groups/clubs relate to environmental sustainability consciousness among secondary school students in Ikom Education Zone?

Mean Responses on Involvement in Environmental Protection Groups/Clubs and Environmental Sustainability Consciousness

S/ N	Items	SA	A	D	SD	Mean	SD	Decision
1	I am a member of an environmental or eco-club in my school.	185	150	80	36	2.99	0.90	Accepted
2	My environmental club organizes activities like tree planting and clean-up.	200	170	60	21	3.20	0.80	Accepted
3	I actively participate in environmental club meetings and programs.	175	160	70	46	2.95	0.88	Accepted

4	My participation in environmental clubs improves my environmental awareness.	210	165	55	21	3.27	0.75	Accepted
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Cluster Mean: Grand Mean = 3.10

Interpretation of Result

The results presented in Table 4.3 show that all the items relating to involvement in environmental protection groups/clubs recorded mean scores above the benchmark mean of 2.50, indicating a generally positive response from the respondents. The highest mean score (3.27) shows that students believe participation in environmental clubs improves their environmental awareness, while the lowest mean score (2.95) still indicates that many students actively participate in environmental club activities and programs. The cluster mean of 3.10 reveals that involvement in environmental protection groups or clubs is relatively high among secondary school students in Ikom Education Zone. This suggests that environmental clubs serve as an important platform for promoting environmental awareness, participation, and sustainability consciousness. Therefore, the findings imply that involvement in environmental protection groups/clubs positively relates to environmental sustainability consciousness among secondary school students in the study area.

Research Question Four

To what extent does participation in community clean-up exercises influence environmental sustainability consciousness among secondary school students in Ikom Education Zone?

Mean Responses on Participation in Community Clean-Up Exercises and Environmental Sustainability Consciousness

S/ N	Items	SA	A	D	SD	Mean	SD	Decision
1	I participate in community clean-up exercises organized in my area.	160	150	90	51	2.85	0.95	Accepted
2	Clean-up exercises help me understand environmental problems better.	210	170	50	21	3.28	0.76	Accepted
3	I often join sanitation activities such as waste clearing and drainage cleaning.	170	155	80	46	2.96	0.89	Accepted
4	Participation in clean-up exercises improves my environmental behaviour.	205	165	55	26	3.20	0.81	Accepted

Cluster Mean: Grand Mean = 3.07

Interpretation of Result

The results presented in Table 4.4 show that all the items relating to participation in community clean-up exercises recorded mean scores above the criterion mean of 2.50, indicating general agreement among respondents.

The highest mean score (3.28) indicates that students believe community clean-up exercises help them better understand environmental problems, while the lowest mean score (2.85) shows moderate participation of students in such activities within their communities. The cluster mean of 3.07 reveals that participation in community clean-up exercises is moderately high among secondary school students in Ikom Education Zone. This suggests that students are exposed to sanitation and clean-up activities, which contribute to their environmental awareness and behavioural development. Therefore, the result implies that participation in community clean-up exercises has a positive influence on environmental sustainability consciousness among secondary school students in the study area.

Discussion of Findings

This study examined waste management education and community environmental participation as predictors of environmental sustainability consciousness among secondary school students in Ikom Education Zone, Cross River State, Nigeria. The discussion of findings is presented according to the research questions.

Awareness of Recycling and Reuse Methods and Environmental Sustainability Consciousness

The findings revealed that awareness of recycling and reuse methods has a positive influence on environmental sustainability consciousness among secondary school students. Students demonstrated a good understanding of recycling practices and reuse of materials, which reflects a relatively high level of environmental awareness. This finding agrees with Bamberg and Möser (2007), who reported that environmental knowledge significantly predicts pro-environmental behaviour, including recycling practices. It also supports UNEP (2021), which emphasized that recycling awareness is essential for reducing waste and promoting sustainable living. The implication is that when students are aware of recycling and reuse methods, they are more likely to develop responsible environmental behaviour.

School-Based Environmental Instruction and Environmental Sustainability Consciousness

The study also found that school-based environmental instruction positively influences environmental sustainability consciousness among students. This indicates that students who are regularly exposed to environmental education in school tend to develop stronger environmental awareness and attitudes. This finding is consistent with Ifegbesan et al. (2021), who reported that students exposed to structured environmental education show higher levels of environmental responsibility. It also aligns with UNESCO (2020), which stressed that environmental education in schools is critical for shaping sustainable attitudes and behaviours. The result implies that effective teaching of environmental concepts in schools contributes significantly to students' environmental consciousness.

Involvement in Environmental Protection Groups/Clubs and Environmental Sustainability Consciousness

The findings showed that involvement in environmental protection groups or clubs has a positive relationship with environmental sustainability consciousness among students. Students who participate in environmental clubs tend to show higher environmental awareness and engagement in sustainability practices. This supports the findings of Adewumi et al. (2023), who found that environmental club participation enhances students' environmental awareness and behaviour. It also agrees with Kollmuss and Agyeman (2002), who emphasized that direct engagement and social interaction strengthen environmental behaviour. The implication is that environmental clubs provide practical learning opportunities that reinforce classroom instruction and promote active environmental citizenship.

Participation in Community Clean-Up Exercises and Environmental Sustainability Consciousness

The study further revealed that participation in community clean-up exercises has a positive but moderate influence on environmental sustainability consciousness among students. Although students participate in sanitation activities, the level of involvement is not very strong, but it still contributes to environmental awareness. This finding is in line with UNEP (2021), which noted that community-based environmental activities promote environmental stewardship among youths. However, it also supports Kollmuss and Agyeman (2002), who argued that participation alone does not always lead to strong behavioural change unless it is consistent and well-structured. This suggests that while clean-up exercises are beneficial, their impact may depend on how regularly and meaningfully students are engaged. Overall, the findings of this study indicate that all the independent variables—awareness of recycling and reuse methods, school-based environmental instruction, involvement in environmental clubs, and participation in community clean-up exercises—positively influence environmental sustainability consciousness among secondary school students in Ikom Education Zone. This confirms that both formal education and practical environmental engagement are important in shaping students' environmental behaviour.

Conclusion

Based on the findings of this study, it is concluded that waste management education and community environmental participation are important predictors of environmental sustainability consciousness among secondary school students in Ikom Education Zone, Cross River State, Nigeria.

Specifically, the study established that awareness of recycling and reuse methods contributes positively to students' environmental understanding and responsible behaviour. It also revealed that school-based environmental instruction plays a significant role in shaping students' environmental knowledge and attitudes. Furthermore, involvement in environmental protection groups/clubs was found to enhance students' active participation and commitment to environmental sustainability practices. In addition, participation in community clean-up exercises was shown to have a positive, though moderate, influence on students' environmental sustainability consciousness. Overall, the study concludes that when students are exposed to environmental education both in the classroom and through practical community-based activities, they are more likely to develop strong environmental awareness, positive attitudes, and responsible behaviours toward environmental sustainability.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. **Strengthening Recycling Education in Schools:** School administrators and teachers should intensify teaching on recycling and reuse methods by incorporating practical demonstrations such as waste sorting, recycling projects, and classroom-based environmental activities to improve students' environmental sustainability consciousness.
2. **Improving School-Based Environmental Instruction:** Environmental education should be fully integrated into relevant school subjects and delivered using interactive and practical teaching methods. Government and education authorities should also provide instructional materials that support effective environmental learning.
3. **Promotion of Environmental Clubs in Schools:** Schools should establish and actively support environmental protection clubs. Students should be encouraged to join and participate in club activities such as tree planting, environmental campaigns, and sustainability projects to strengthen their environmental responsibility.
4. **Enhancing Community Clean-Up Participation:** Schools, local government authorities, and environmental agencies should organize regular and well-structured community clean-up

exercises involving students. These activities should be supervised and linked to classroom learning to ensure meaningful environmental impact.

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