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## **METHODS OF TEACHING ENVIRONMENTAL EDUCATION FOR SUSTAINABILITY**

**Comfort Nkongho AGBOR, Michael Obun ETAN**

Department of Environmental Education

University of Calabar, Nigeria

[commyspaco@yahoo.com](mailto:commyspaco@yahoo.com), [mickkyetan1@gmail.com](mailto:mickkyetan1@gmail.com)

<https://orcid.org/0000-0003-3298-1053>

**Raphael Terungwa AKUJI, Comfort Omeri OGBOR**

Department of Environmental Education

University of Calabar, Nigeria

[akujiiraphael22@gmail.com](mailto:akujiiraphael22@gmail.com), [comfortogboromeri@gmail.com](mailto:comfortogboromeri@gmail.com)

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### **ABSTRACT**

Environmental education (EE) is essential in the promotion of sustainable awareness and ecological responsibility among learners. However, its effective implementation is often hindered by challenges such as inadequate teacher training, limited instructional resources, lack of policy enforcement, and minimal stakeholder collaboration. This paper explored the challenges and opportunities in implementing effective teaching methods in environmental education, emphasizing the role of technology integration, multi-stakeholder collaboration, and experiential learning in enhancing pedagogical effectiveness. The paper also outlined key strategies for improving EE, including curriculum reform, professional development for educators, interdisciplinary instructional approaches, and the utilization of digital learning tools. Furthermore, future directions on EE teaching methods highlights the need for localized curriculum frameworks, increased funding for environmental education programs, and the adoption of innovative instructional techniques to improve learning outcomes. The insights provided in this paper contribute to scholarship by offering practical recommendations for improving EE pedagogy within the Nigerian educational context while aligning with global best practices. The paper concluded by reaffirming the importance of effective EE pedagogy in addressing contemporary environmental challenges and proposes actionable suggestions for policymakers, educators, school administrators, community stakeholders, and researchers to enhance EE implementation. The paper suggested that strengthening teaching methodologies, promoting stakeholder engagement, and advancing research, environmental education can be positioned as a transformative tool for sustainable development.

**Keywords:** Environmental Education, Teaching Methods, Sustainability, Curriculum Development, Stakeholder Collaboration, Digital Learning Tools.

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## INTRODUCTION

Environmental Education (EE) has become an essential component of contemporary education, promoting knowledge, attitudes, and behaviors that promote environmental sustainability. As global environmental challenges such as climate change, deforestation, biodiversity loss, and pollution continue to threaten ecosystems and human livelihoods, the role of education in equipping learners with the skills and competencies to address these issues has gained prominence. EE aims to instill environmental awareness, critical thinking, and problem-solving skills necessary for sustainable living and resource management. According to UNESCO (2021), EE is not only about imparting knowledge but also about encouraging proactive engagement in environmental conservation efforts. The integration of EE into school curricula worldwide reflects its significance in preparing future generations to become responsible stewards of the environment. However, the effectiveness of EE largely depends on the teaching methods adopted in delivering its content, as conventional didactic approaches often fail to inspire active participation and behavioral change among learners.

Globally, there is a growing recognition of the importance of EE in promoting a sustainable future. International organizations such as the United Nations Environment Programme (UNEP) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) have developed policies and frameworks to enhance EE in formal and informal education settings. The Sustainable Development Goals (SDGs), particularly Goal 4 on quality education and Goal 13 on climate action, emphasize the need for educational institutions to integrate sustainability principles into their teaching methodologies (UNESCO, 2022). In Nigeria, EE is embedded within the National Policy on Education, which advocates for environmental awareness at all levels of education (Federal Ministry of Education, 2017). The Nigerian Conservation Foundation (NCF) and other environmental advocacy organizations have also played significant roles in promoting EE through school-based environmental clubs, community awareness programs, and policy recommendations. Despite these efforts, the implementation of EE in Nigerian educational institutions faces challenges such as inadequate funding, a lack of trained educators, and the persistence of teacher-centered instructional approaches that limit student engagement.

The choice of teaching methods in EE is critical in ensuring that learners not only acquire theoretical knowledge but also develop practical skills and a deep appreciation for environmental stewardship. Traditional lecture-based methods, which dominate Nigerian classrooms, often fail to inspire students to take action on environmental issues. In contrast, experiential and participatory teaching methods, such as fieldwork, problem-solving exercises, and project-based learning, have been shown to enhance student engagement and knowledge retention (Adebayo & Okonkwo, 2019). Digital technologies, including virtual reality (VR) and gamification, are also emerging as innovative tools for delivering EE content in a more interactive and immersive manner. Empirical findings of Ananyi and Owosu (2024) revealed utilization of artificial intelligence determinant for enhancing the economic aspects of public universities in Nigeria. Therefore, adopting a combination of traditional and contemporary teaching strategies, educators can create an effective learning environment that fosters environmental consciousness, critical thinking, and problem-solving skills among students.

This paper seeks to examine various teaching methods employed in EE, evaluating their effectiveness, challenges, and best practices in the Nigerian educational context. It explores the theoretical foundations of EE teaching methodologies, assesses the impact of traditional and

innovative instructional approaches, and highlights the role of indigenous knowledge and community participation in environmental learning. Additionally, the paper discusses barriers to the effective implementation of EE teaching methods and proposes evidence-based strategies for improving EE pedagogy. This paper aims to contribute to the discourse on enhancing EE delivery in Nigeria, ultimately equipping learners with the knowledge and skills necessary for environmental conservation and sustainable development by critically analyzing these aspects.

## **Problem Statement**

Despite the growing recognition of Environmental Education (EE) as a crucial tool for promoting sustainability and environmental responsibility, its implementation in Nigeria remains inadequate due to ineffective teaching methods that limit student engagement and practical application. Traditional lecture-based approaches, which dominate Nigerian classrooms, often fail to instill critical thinking, problem-solving skills, and proactive environmental stewardship among learners. While global educational frameworks, such as those advocated by UNESCO and UNEP, emphasize experiential, participatory, and technology-driven teaching strategies, many Nigerian institutions continue to struggle with outdated pedagogical methods, insufficient teacher training, and a lack of instructional resources tailored to EE. The disconnect between policy recommendations and classroom practices raises concerns about the ability of Nigerian educational institutions to equip students with the necessary knowledge and skills for addressing pressing environmental challenges. This study, therefore, seeks to critically examine the teaching methods employed in EE, assess their effectiveness, identify the challenges hindering their implementation, and propose best practices for improving EE pedagogy in Nigeria.

## **Theoretical Foundation**

The theoretical framework of this paper is anchored on constructivism theory which posits that learners do not passively absorb knowledge but rather actively construct their understanding through experiences, interactions, and reflection (Piaget, 1950; Vygotsky, 1978; in Kpee, 2019). This theory provides a robust framework for examining teaching methods in Environmental Education (EE) by emphasizing student-centered, inquiry-driven, and participatory approaches that promote deep learning and environmental consciousness. Given the nature of EE, which requires learners to engage with complex environmental challenges, constructivist principles guide educators in designing instructional strategies that promote experiential, interactive, and problem-solving-oriented learning experiences. The application of Cognitive Constructivism theory to this exploration highlights the importance of active learning, critical thinking, and real-world application in the teaching and learning process.

Jean Piaget's Cognitive Constructivism (1950) highlighted that learners develop knowledge by actively engaging with their environment. In the context of EE, this perspective supports experiential teaching methods, such as fieldwork, environmental simulations, and project-based learning, which enable students to explore environmental concepts in real-world settings. Piaget's theory emphasizes that knowledge is constructed through experience, making hands-on environmental education activities, outdoor learning, and inquiry-based instruction highly effective in promoting students' understanding of ecological systems, sustainability, and conservation. As noted by Ogunleye and Nwankwo (2021), the application of traditional

teaching methods, which rely heavily on direct instruction, align less with cognitive constructivism, as they limit students' ability to engage with and apply knowledge in meaningful dimension.

Lev Vygotsky's Social Constructivism (1978) further extends this framework by emphasizing the social and collaborative dimensions of learning. Vygotsky argued that knowledge is constructed through social interactions, cultural context, and guided participation, making peer learning, group discussions, and community-based environmental projects effective strategies in EE. The concept of the Zone of Proximal Development (ZPD) highlights the importance of scaffolding—where learners progress from basic understanding to complex environmental problem-solving through guidance from teachers, peers, or environmental experts (Adebayo & Eze, 2018). This principle is particularly relevant in collaborative learning settings, such as school-based environmental clubs, partnerships with conservation organizations, and interdisciplinary environmental studies, where students engage with local and global environmental issues under expert mentorship.

In addition to Constructivism, Experiential Learning Theory (ELT) by David Kolb (1984) further strengthens the theoretical framework of this paper. Kolb proposed that learning occurs through a cyclical process of concrete experiences, reflective observation, abstract conceptualization, and active experimentation. In EE, this model supports learning through action, such as participating in ecological restoration projects, conducting environmental research, or engaging in sustainability initiatives. ELT aligns with the hands-on and inquiry-driven nature of environmental education, reinforcing the effectiveness of problem-based learning, case studies, and outdoor exploration in enhancing students' critical thinking and environmental stewardship (Okafor & Adeyemi, 2020).

The application of Constructivism and Experiential Learning in EE teaching methods suggests a shift from teacher-centered to learner-centered instruction, where students actively engage in environmental problem-solving, policy analysis, and sustainability practices. However, challenges such as limited resources, lack of trained educators, and curricular constraints hinder the full implementation of constructivist-aligned methods in Nigerian schools. Overcoming these barriers requires policy adjustments, capacity building, and investments in infrastructure to support experiential and technology-driven environmental education (Ogunleye & Nwankwo, 2021).

Anchoring this paper in Constructivism Theory and Experiential Learning Theory provides the study a sound theoretically perspective on effective teaching methods in EE. These frameworks emphasize active, inquiry-based, and collaborative learning experiences, which are essential for promoting environmental consciousness, problem-solving skills, and sustainability-oriented mindsets among students. The integration of traditional, experiential, and innovative teaching methods within a constructivist paradigm enhances the effectiveness of EE by ensuring that learners not only acquire environmental knowledge but also develop the skills and attitudes necessary for responsible environmental stewardship.

## **LITERATURE REVIEW**

### **Meaning of Environmental Education**

Environmental Education (EE) is a multidisciplinary field that integrates principles from ecology, social sciences, and education to equip individuals with the knowledge, skills, and

attitudes necessary for understanding and addressing environmental challenges. Scholars have defined EE as an educational process aimed at promoting awareness, knowledge, concern, and participation in solving environmental problems through critical thinking and informed decision-making (Nwosu & Okeke, 2019). It is designed to provide learners with a holistic understanding of environmental systems, human-environment interactions, and the socio-economic implications of ecological degradation. According to Ukpong and Eze (2020), EE is not just about transferring information but also about inspiring behavioral changes that promote sustainable living and responsible environmental stewardship.

Globally, EE is recognized as an essential tool in addressing climate change, biodiversity loss, and pollution by encouraging active citizen participation in environmental conservation efforts (Adebayo, 2021). The United Nations Educational, Scientific and Cultural Organization (UNESCO) (2020) emphasizes that EE should be integrated across educational levels, from primary to tertiary institutions, to ensure that learners develop a lifelong commitment to sustainability. In Nigeria, EE is embedded within the National Policy on Education (NPE), which mandates environmental awareness and conservation education as part of the school curriculum (Federal Ministry of Education, 2019). However, despite its policy recognition, the implementation of EE remains inconsistent due to inadequate resources, teacher training deficiencies, and infrastructural constraints (Ogunleye & Nwankwo, 2021).

In defining EE, scholars have also emphasized the interdisciplinary nature of the subject. It draws on diverse fields such as geography, biology, chemistry, economics, and sociology to provide a comprehensive approach to environmental problem-solving (Okafor & Adeyemi, 2020). This integration is necessary to ensure that learners not only understand the theoretical dimensions of environmental sustainability but also develop practical skills for engaging in conservation activities, environmental advocacy, and green innovations. In essence, EE serves as an educational framework that nurtures environmental literacy, which is essential for promoting sustainable development (Eneh, 2018).

Conceptually, EE is built on the premise that environmental challenges are complex and require a systematic and participatory educational approach to develop solutions (Akinyemi & Bello, 2017). It is not limited to formal education settings but extends to non-formal and informal learning environments, including community-based education, media campaigns, and corporate sustainability training programs (Ikechukwu & Adewale, 2021). EE is structured around five core objectives, as outlined by the Tbilisi Declaration (1977), which include awareness, knowledge, attitudes, skills, and participation. These objectives provide a framework for structuring EE curricula to ensure that learners not only gain theoretical knowledge but also develop a sense of responsibility toward environmental conservation. Environmental Education is often classified into three key domains, which influence its pedagogical design and implementation. (1) This involves acquiring factual knowledge about ecological processes, environmental issues, and sustainability concepts (Ukpong & Eze, 2020), (2) the approach emphasizes experiential learning, where students engage in outdoor activities, field studies, and nature-based exploration to develop a deeper connection with the environment (Nwosu & Okeke, 2019), and (3) the dimension focuses on promoting attitudes and behaviors that promote conservation, advocacy, and proactive environmental problem-solving (Ogunleye & Nwankwo, 2021).

These three domains collectively shape the methodologies used in EE, ranging from traditional classroom-based instruction to interactive, technology-driven, and community-centered approaches (Adebayo, 2021). Scholars have also conceptualized EE as a transformative

educational process, one that moves beyond cognitive learning to incorporate affective and psychomotor dimensions, ensuring that learners not only understand environmental issues but also develop the skills to take meaningful action (Eneh, 2018). Consequently, modern EE approaches emphasize systems thinking, critical inquiry, and problem-solving, equipping learners with competencies to navigate complex environmental realities. This approach aligns with global sustainability agendas, such as the United Nations Sustainable Development Goal 4 (Quality Education) and Goal 13 (Climate Action), which stress the importance of education in driving environmental consciousness and sustainable development (UNESCO, 2020).

### **Importance of Environmental Education**

The importance of EE extends beyond classroom instruction to encompass broader societal, economic, and ecological benefits. It serves as a catalyst for environmental awareness, behavioral change, and policy advocacy, ensuring that individuals and communities adopt sustainable practices (Ukpong & Eze, 2020). One of the primary benefits of EE is enhancing environmental literacy, enabling individuals to critically analyze environmental issues and make informed decisions regarding resource use, waste management, and climate adaptation strategies (Adebayo, 2021). Moreover, EE plays a crucial role in climate change mitigation and adaptation by equipping learners with scientific knowledge and practical skills to engage in climate-resilient practices (Ogunleye & Nwankwo, 2021).

In countries like Nigeria, where environmental issues such as deforestation, desertification, and urban pollution pose significant threats, EE provides scientific and policy-based insights to address these challenges. For example, educational programs on renewable energy, afforestation, and eco-friendly agricultural practices have been identified as key strategies for reducing environmental degradation and promoting sustainable economic development (Ikechukwu & Adewale, 2021). EE also fosters citizen participation in environmental governance, ensuring that individuals understand their role in shaping policies that affect ecological sustainability (Okafor & Adeyemi, 2020). Through initiatives such as school-based environmental clubs, community clean-up campaigns, and corporate sustainability programs, EE encourages active engagement in conservation efforts. Studies have shown that individuals who receive environmental education are more likely to support and participate in sustainable practices, policy advocacy, and community-driven conservation initiatives (Eneh, 2018). In addition, EE contributes to economic development by promoting green skills and sustainable entrepreneurship.

The transition toward green economies requires a workforce equipped with knowledge in renewable energy, environmental engineering, sustainable agriculture, and waste management (Akinyemi & Bello, 2017). The application of vocational and technical training in EE curricula, students can develop competencies that enhance their employability in emerging environmental sectors. This aligns with Nigeria's Economic Recovery and Growth Plan (ERGP), which emphasizes the role of sustainable industries in national development (Federal Ministry of Education, 2019). EE plays a vital role in public health by raising awareness about pollution control, water sanitation, and sustainable food systems. It informs communities about the health risks associated with environmental degradation, such as airborne diseases, water contamination, and chemical pollution, thereby promoting preventive measures. Nwosu and Okeke (2019) noted that environmental education campaigns on proper waste disposal, climate-resilient housing, and

disaster preparedness have proven effective in enhancing community resilience and health outcomes.

The literature highlights that EE is an indispensable tool towards the promotion sustainability, climate action, and socio-economic development makes this multidisciplinary nature, combined with its focus on experiential and problem-solving approaches. These approaches provides powerful educational model for addressing contemporary environmental challenges. However, despite its significance, the full integration of EE into educational systems remains a challenge, particularly in developing nations like Nigeria, where issues such as policy gaps, inadequate funding, and insufficient teacher training hinder effective implementation. Addressing these barriers requires a collaborative effort between policymakers, educators, environmental organizations, and community stakeholders to ensure that EE is effectively leveraged as a driver of environmental and socio-economic transformation.

## **Methods of Teaching Environmental Education in Nigerian Schools**

The adoption of appropriate teaching methods in EE is crucial for enhancing students' understanding of environmental issues and promoting sustainable practices. Scholars such as Nwosu and Okeke (2019) have emphasized that effective teaching methods in EE should facilitate active learning, critical thinking, and behavioral transformation rather than mere knowledge transfer. In Nigeria, EE is primarily integrated into subjects such as Geography, Biology, Agricultural Science, and Social Studies, making it essential for educators to employ diverse instructional strategies that align with the interdisciplinary nature of the field. Ogunleye and Nwankwo (2021) argue that the success of EE largely depends on how well teaching methods are adapted to contextual realities, including class sizes, available resources, and students' engagement levels. The National Policy on Education, as documented by the Federal Ministry of Education (2019), also advocates for participatory and learner-centered approaches to EE.

### ***1. Traditional Teaching Methods in Environmental Education***

Lecture-based instruction has remained the dominant method of teaching in Nigerian schools, particularly in EE. According to Eneh (2018), the lecture method is widely used due to its efficiency in covering large volumes of content within limited timeframes, especially in schools with overcrowded classrooms. Rote memorization, another common traditional approach, requires students to recall environmental concepts verbatim, often at the expense of deep understanding. Although it enhances knowledge retention, Bosah (2013) noted that it does little to promote analytical thinking or real-world application of environmental principles. Discussions led by teachers serve as an alternative to direct instruction, allowing for some degree of interaction, yet these discussions often remain structured in ways that restrict students from fully engaging in critical inquiry about environmental challenges. Nonetheless, challenges such as limited teacher training, infrastructural deficits, and curriculum rigidity continue to impede progress.

The choice of teaching methods in EE significantly influences students' understanding, engagement, and commitment to environmental stewardship. Traditional lecture-based methods remain prevalent, experiential, innovative, and participatory approaches have demonstrated greater effectiveness in promoting environmental awareness and problem-solving skills.

### **a) Lecture-Based Teaching**

Lecture-based teaching is one of the most widely used traditional methods in EE, particularly in Nigerian schools. This approach involves the teacher delivering content through direct instruction while students passively receive information. Lessons are often structured around predefined topics, with teachers explaining environmental concepts such as pollution, conservation, and climate change without interactive engagement. According to Nwosu and Okeke (2019), lecture-based instruction is dominant in public secondary schools due to its efficiency in covering extensive syllabi within a limited timeframe. Teachers rely on oral presentations and board demonstrations, often supplemented with printed handouts or guided note-taking exercises. This method is particularly prevalent in large classrooms where managing student participation is challenging (Ogunleye & Nwankwo, 2021).

### **b) Rote Memorization**

Rote memorization is another common traditional approach in EE, requiring students to commit environmental facts, definitions, and terminologies to memory. In many Nigerian schools, students are expected to recall key environmental principles, such as the components of the ecosystem, types of waste, and effects of deforestation for assessments. Eneh (2018) highlighted that rote learning is deeply ingrained in Nigeria's educational system due to the emphasis on standardized examinations, where success is often measured by the ability to reproduce textbook content verbatim. While this method ensures knowledge retention, it limits students' ability to apply environmental concepts to real-world situations.

### **c) Textbook-Centered Instruction**

Textbook-centered instruction is a method where teachers rely heavily on government-approved textbooks as the primary source of content delivery. In EE, lessons are structured around textbook materials, with limited reference to contemporary environmental challenges outside the curriculum. Okafor and Adeyemi (2020) noted that in many Nigerian schools, environmental science textbooks do not adequately address localized issues such as oil spillage in the Niger Delta or desertification in Northern Nigeria, making the learning experience less relevant to students' immediate surroundings. Furthermore, since many schools lack laboratory and fieldwork facilities, textbooks become the main instructional tool for both teachers and students.

### ***Implications of Traditional Teaching Methods in EE***

The continued reliance on traditional teaching methods has significant implications for environmental consciousness in Nigeria. As Ogunleye and Nwankwo (2021) argued, failing to integrate participatory learning and problem-solving approaches into EE results in low environmental awareness among students. Without exposure to practical environmental challenges, students may struggle to develop the necessary critical thinking skills to address issues such as deforestation, waste management, and climate change adaptation. The lack of interactive teaching methods limits students' ability to develop pro-environmental behaviors. While rote memorization may enable students to recall environmental laws and policies, it does



not instill a sense of environmental responsibility or practical engagement in sustainability initiatives (Okafor & Adeyemi, 2020). This contributes to a gap between theoretical environmental knowledge and real-world application, hindering Nigeria's progress toward achieving sustainable development goals (SDGs). Moving forward, education policymakers, curriculum developers, and teacher training institutions must prioritize pedagogical reforms in EE. Strategies such as teacher capacity building, resource investment, and policy adjustments are essential for transitioning from traditional, passive learning approaches to experiential, student-centered EE (Federal Ministry of Education, 2019). Without such reforms, environmental education in Nigeria will continue to be theoretical rather than practical, limiting its effectiveness in promoting environmental consciousness and sustainability practices.

## ***II. Experiential Method of Teaching Environmental Education***

Experiential learning approaches in EE promotes active participation, real-world engagement, and practical application of knowledge to ensure that learners develop a deep and lasting understanding of environmental concepts. Unlike traditional teaching methods that rely heavily on rote memorization and passive reception of information, experiential learning emphasizes firsthand experiences that allow students to interact directly with their environment. This aligns with Kolb's Experiential Learning Theory, which posits that learning is most effective when individuals engage in a continuous cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 2015). In the context of EE, this means that students do not simply read about pollution, deforestation, or climate change but actively explore these issues through field observations, hands-on projects, and investigative inquiries that connect theoretical knowledge to practical environmental challenges. Within Nigeria and other African nations, the adoption of experiential learning remains limited due to infrastructural constraints, rigid curricula, and inadequate teacher training, yet its potential to enhance environmental consciousness, foster problem-solving skills, and encourage sustainable practices cannot be overemphasized (Adebayo & Okechukwu, 2021). The following subsection of the review provide an in-depth exploration of the three fundamental experiential teaching and learning approaches which includes field-based learning, project-based learning, and inquiry-based learning, examining their applications, benefits, challenges, and contextual implications for EE in Nigeria.

### **a) Field-Based Learning**

Field-based learning represents one of the most effective experiential learning strategies in EE, as it immerses students in real-world environments where they can observe, investigate, and interact with ecological systems. Unlike classroom-based instruction, which relies on textbooks and lectures, field-based learning allows learners to connect theoretical knowledge with actual environmental phenomena, promoting deeper comprehension and long-term retention. This method involves activities such as environmental excursions, ecological surveys, biodiversity assessments, and site visits to conservation areas, industrial waste facilities, and sustainable agricultural farms. One practical example of field-based learning in Nigerian secondary schools is students visiting a deforested site to analyze the impact of logging on biodiversity, soil erosion, and climate regulation. Students can develop a more profound sense of environmental responsibility and ecological empathy through witnessing firsthand the degradation of forests

and interacting with affected communities. Similarly, students who visit waste management plants gain practical insights into recycling processes, landfill management, and the implications of improper waste disposal.

Such experiences are crucial in developing environmentally responsible behaviors and instilling a conservation mindset among young learners (Ogunleye & Adebajo, 2019). However, despite its effectiveness, the implementation of field-based learning in Nigerian schools is often constrained by inadequate funding, lack of proper planning, and limited government support for outdoor learning initiatives. Many schools, particularly in urban areas, face difficulties in accessing safe and environmentally diverse locations for field-based education, while rural schools often struggle with logistical and transportation barriers that hinder student excursions (Adebayo & Okechukwu, 2021). Addressing these challenges requires strong policy interventions, increased funding for educational field trips, and collaborative efforts between schools, environmental agencies, and community-based organizations to enhance the practical implementation of field-based EE in Nigeria.

### **b) Project-Based Learning**

Project-based learning (PBL) serves as a dynamic and interactive pedagogical approach that enables students to engage in long-term, inquiry-driven projects designed to solve real-world environmental challenges. Unlike passive learning methods that emphasize theoretical knowledge without practical application, PBL encourages students to take an active role in their learning process, working collaboratively to research, design, and implement environmental projects that address pressing sustainability issues in their communities. This method not only enhances problem-solving and critical thinking skills but also fosters teamwork, leadership, and civic engagement, as students work together to develop and implement environmental solutions. In the Nigerian context, PBL has been increasingly recognized as an effective strategy for promoting EE, particularly in schools that integrate eco-friendly initiatives such as waste recycling programs, tree planting projects, and climate action campaigns (Olawale & Eze, 2020).

One notable example of PBL in Nigerian schools is the “Eco-School Initiative,” a program designed to engage students in environmental sustainability efforts by encouraging them to develop green infrastructure, implement waste management systems, and advocate for environmental conservation within their communities. Through such projects, students learn about the principles of sustainability, the importance of environmental stewardship, and the role of policy-making in promoting ecological balance. In addition to structured school-based projects, students may also undertake independent environmental research projects, such as studying the effects of oil spills in the Niger Delta or analyzing the impact of urbanization on biodiversity loss. These projects not only deepen students’ understanding of environmental issues but also prepare them for careers in environmental science, policy-making, and sustainability advocacy (Chukwu & Adamu, 2019). However, the effective implementation of PBL in Nigerian schools faces several challenges, including curriculum rigidity, lack of adequate teacher training, and insufficient funding for project materials. Many teachers lack the expertise to facilitate project-based learning, and schools often prioritize exam-focused curricula that leave little room for interactive learning experiences. To overcome these barriers, educational policymakers must revise curricula to integrate PBL as a core instructional strategy, provide professional development opportunities for teachers, and allocate funding for project-based environmental initiatives in schools.

### **c) Inquiry-Based Learning**

Inquiry-based learning (IBL) represents a highly interactive and investigative approach to EE that encourages students to formulate questions, conduct research, and analyze data to draw evidence-based conclusions. This method differs from conventional rote-learning techniques by promoting scientific curiosity, problem-solving abilities, and independent thinking. In an IBL framework, students do not simply receive information about environmental issues but instead engage in guided or independent investigations to explore complex environmental phenomena. This approach aligns closely with STEM education trends, as it incorporates data collection, field experiments, and critical analysis, thereby equipping students with the skills needed to address real-world sustainability challenges (Ogunleye & Adebajo, 2019). In Nigeria, IBL has been employed in various environmental education programs, such as air pollution monitoring projects, soil quality assessments, and climate change impact studies. For instance, students investigating air pollution levels in Lagos may collect samples of airborne particulates from different locations, analyze pollutant concentrations, and examine the health implications of poor air quality.

Similarly, students in agricultural science classes may conduct comparative studies on soil fertility across different farming zones to assess the impact of chemical fertilizers on soil degradation (Chukwu & Adamu, 2019). Through such hands-on research experiences, students develop a deeper understanding of environmental challenges and gain the analytical skills necessary for making data-driven decisions on sustainability issues. However, despite its pedagogical benefits, IBL faces significant implementation barriers in Nigeria, including limited access to laboratory equipment, inadequate teacher training in research methodologies, and time constraints within the school curriculum. Many educators lack the expertise to design and facilitate investigative learning experiences, and schools often lack the necessary resources to support laboratory-based environmental inquiries. To address these challenges, investment in laboratory infrastructure, teacher capacity-building programs, and curriculum adjustments is essential to enhance the adoption of IBL in Nigerian schools.

Experiential learning approaches such as field-based learning, project-based learning, and inquiry-based learning provide effective, interactive, and practical alternatives to traditional teaching methods in EE. These strategies empower students with real-world problem-solving skills, critical thinking abilities, and active environmental consciousness, thereby promoting a generation of environmentally responsible citizens. However, poor funding, inadequate teacher training, and rigid educational policies continue to hinder the widespread implementation of these approaches in Nigeria.

### ***III. Innovative and Technology-Driven Methods of Teaching***

The evolution of teaching methodologies in environmental education has increasingly embraced innovation and technology-driven approaches to enhance students' understanding of sustainability, ecological conservation, and environmental management. These methods integrate modern digital tools, interactive platforms, and student-centered pedagogical frameworks that facilitate engagement and knowledge retention. Unlike traditional methods that primarily emphasize teacher-centered instruction, innovative and technology-driven approaches prioritize experiential and participatory learning, allowing students to explore environmental concepts in immersive and practical ways. The incorporation of digital tools, gamification, and virtual

simulations has significantly redefined instructional strategies, providing learners with real-time environmental scenarios that promote critical thinking and problem-solving skills. This shift aligns with global and national educational policies advocating for technology integration in education to improve learning outcomes. The following structured review offer key innovative approaches in environmental education.

#### **a) Digital Tools in Environmental Education**

Digital tools have become indispensable in contemporary environmental education, offering dynamic ways to engage students in environmental learning. These tools include mobile applications, interactive websites, Geographic Information System (GIS) mapping, and online databases that provide real-time environmental data. Digital learning platforms enable students to access diverse resources on climate change, biodiversity, and pollution control, thereby enhancing their understanding of global and local environmental issues. One notable advantage of digital tools is their ability to provide immediate access to vast information sources, allowing students to conduct independent research and develop analytical skills. GIS technology, for example, enables learners to analyze geographical and environmental data, helping them visualize spatial changes in ecosystems and climate patterns. Furthermore, mobile applications designed for environmental education provide interactive experiences, such as tree-planting simulations and carbon footprint calculators, encouraging students to engage in sustainability initiatives. However, while digital tools offer numerous benefits, challenges such as the digital divide, inadequate infrastructure, and limited access to reliable internet services in some Nigerian schools hinder their effective implementation. Many public schools in Nigeria still struggle with insufficient technological resources, making it difficult for educators to fully integrate digital learning into environmental education. Addressing these challenges requires significant investment in ICT infrastructure and teacher training to ensure that digital tools are effectively utilized to enhance environmental literacy.

#### **b) Gamification in Environmental Education**

Gamification involves incorporating game-based elements, such as rewards, competition, and interactive storytelling, into the learning process to enhance student engagement. In environmental education, gamification has emerged as an effective method for promoting interest in ecological conservation and sustainability practices. Educational games designed with environmental themes allow students to explore complex ecological issues in a simulated, interactive format. Students who engage in environmental-themed games develop problem-solving skills as they navigate real-world environmental challenges, such as pollution control, wildlife conservation, and waste management. Additionally, gamification fosters collaboration and teamwork, as many environmental games require students to work together to achieve sustainability goals. Despite its advantages, the implementation of gamification in Nigerian schools faces constraints such as limited access to educational technology, high costs of developing localized environmental games, and resistance from educators who are accustomed to conventional teaching methods. To maximize the potential of gamification, educational policymakers must integrate game-based learning into the national curriculum and provide teachers with professional development programs on utilizing gamification effectively in environmental education.

### **c) Virtual Simulations for Environmental Learning**

Virtual simulations have revolutionized environmental education by providing immersive experiences that allow students to explore environmental processes in a controlled digital environment. These simulations use augmented reality (AR) and virtual reality (VR) technologies to create realistic environmental scenarios, enabling learners to observe and interact with ecological systems without physical limitations. A major advantage of virtual simulations is their ability to bridge the gap between theoretical knowledge and practical experience. For example, students can engage in virtual field trips to rainforests, coral reefs, and industrial sites, observing the impact of human activities on ecosystems without leaving the classroom. Climate change simulations allow students to model the effects of rising global temperatures, deforestation, and carbon emissions, promoting a deeper understanding of environmental sustainability. However, the adoption of virtual simulations in Nigerian schools remains limited due to high costs, inadequate access to VR equipment, and a lack of trained educators capable of integrating these technologies into their teaching practices. To enhance the use of virtual simulations in environmental education, stakeholders must invest in digital infrastructure and provide educators with the necessary skills to incorporate simulation-based learning into their instructional strategies.

## ***IV. Participatory and Community-Based Methods of Teaching***

Participatory and community-based methods of teaching environmental education focus on active student engagement, direct interaction with the environment, and collaborative efforts with local communities. These methods depart from passive instructional techniques and instead promote experiential learning, empowering students to develop critical thinking skills, environmental consciousness, and a sense of responsibility for sustainability. Given the environmental challenges facing Nigeria, such as deforestation, flooding, and pollution, participatory and community-based approaches are crucial in equipping students with practical knowledge and problem-solving skills. While these methods offer numerous benefits, challenges such as resource constraints, inadequate institutional support, and policy gaps must be addressed to ensure their successful implementation in Nigerian schools. Strengthening participatory and community-based environmental education requires multi-sectoral collaboration, curriculum innovation, and increased investment in environmental literacy programs to equip students with the knowledge and skills necessary for sustainable development. The following sections examine key participatory and community-based teaching methods in environmental education.

### **a) Project-Based Learning in Environmental Education**

Project-based learning (PBL) is an instructional approach where students explore environmental issues through structured projects, engaging in research, solution development, and practical implementation. This method requires students to identify environmental problems, propose sustainable solutions, and collaborate with peers, educators, and community stakeholders to execute their findings. These projects create avenues for interdisciplinary learning by integrating concepts from geography, biology, and social sciences into environmental education. Furthermore, PBL allows students to take ownership of their learning process, enhancing motivation and retention of knowledge. The implementation of project-based learning in

Nigerian schools is often hindered by a lack of resources, inadequate teacher training, and limited institutional support. Many schools struggle to provide the necessary funding for long-term environmental projects, restricting the scope and impact of student-led initiatives. Moreover, the success of PBL depends on well-trained educators who can guide students in conducting research, formulating hypotheses, and implementing solutions. To overcome these challenges, education policymakers must prioritize teacher capacity-building programs, establish partnerships with environmental organizations, and integrate PBL into national curricula to ensure sustainability in environmental education.

### **b) Service-Learning in Environmental Education**

Service-learning is a pedagogical approach that combines community service with academic instruction, allowing students to apply classroom knowledge to real-world environmental challenges. This method emphasizes civic engagement, experiential learning, and social responsibility, as students collaborate with local communities to address pressing environmental concerns such as deforestation, pollution, and climate adaptation. By actively participating in community-based projects, students gain firsthand experience in environmental conservation while contributing to sustainable development. One of the primary advantages of service-learning is its ability to bridge the gap between theoretical knowledge and practical application. For instance, students involved in environmental sanitation campaigns, afforestation programs, and sustainable agriculture projects acquire hands-on skills that reinforce their understanding of environmental concepts. Additionally, service-learning fosters community partnerships, strengthening relationships between schools, local organizations, and governmental agencies in promoting environmental advocacy. To enhance the effectiveness of service-learning in environmental education, it is essential to integrate community engagement initiatives into the national curriculum, encourage multi-sectoral collaboration, and allocate resources for sustained environmental outreach programs.

### **c) Indigenous Knowledge Integration in Environmental Education**

The incorporation of indigenous knowledge into environmental education enhances students' understanding of traditional ecological practices, conservation strategies, and sustainable resource management. Indigenous knowledge systems, which have been passed down through generations, provide valuable insights into biodiversity conservation, climate resilience, and ecosystem management. In Nigeria, various ethnic communities possess rich environmental wisdom, including traditional farming techniques, water conservation practices, and herbal medicine preservation, all of which contribute to sustainable resource utilization. However, the marginalization of indigenous knowledge in formal education presents a significant challenge. Many Nigerian schools prioritize Western scientific models of environmental education, often overlooking the valuable contributions of indigenous ecological practices. Additionally, the absence of documented resources on traditional environmental knowledge makes it difficult for educators to incorporate indigenous perspectives into their curricula. To address this gap, educational institutions should engage community elders, document indigenous environmental practices, and develop culturally inclusive curricula that recognize and integrate traditional ecological wisdom.

#### **d) Community-Based Environmental Education Initiatives**

Community-based environmental education initiatives involve collaborative efforts between schools, local organizations, and governmental agencies to promote environmental sustainability through public awareness campaigns, conservation programs, and participatory workshops. These initiatives provide students with opportunities to engage directly with environmental experts, policymakers, and community stakeholders, promoting an understanding of real-world environmental issues and solutions. A key strength of community-based education is its ability to cultivate collective action. By participating in initiatives such as climate change awareness programs, community clean-up drives, and biodiversity conservation projects, students develop leadership skills and a sense of environmental responsibility.

These programs also promote intergenerational learning by facilitating knowledge exchange between students, parents, and local environmental advocates, thereby reinforcing environmental consciousness across different age groups. Many schools and communities lack the institutional frameworks necessary to sustain long-term environmental initiatives, leading to fragmented or short-lived interventions (Ogunleye et al., 2019). Strengthening this approach requires increased collaboration between government agencies, private organizations, and non-governmental organizations (NGOs) to provide funding, policy support, and technical expertise. By establishing structured community-based environmental programs, Nigeria can enhance environmental literacy and promote active participation in conservation efforts at the grassroots level.

### **CHALLENGES AND OPPORTUNITIES IN IMPLEMENTING EFFECTIVE TEACHING METHODS IN ENVIRONMENTAL EDUCATION**

The implementation of effective teaching methods in environmental education presents both challenges and opportunities that influence the quality of learning experiences and the overall impact of environmental awareness programs. Teaching environmental education requires innovative and participatory approaches that foster critical thinking, problem-solving, and behavioral change among students. However, the successful adoption of such methods is often hindered by institutional constraints, inadequate teacher training, limited resources, and socio-cultural factors. Despite these obstacles, emerging technological advancements, policy reforms, and stakeholder collaborations provide opportunities to enhance the effectiveness of environmental education. Mitigating the challenges while leveraging available opportunities can improve the delivery of environmental education and promote long-term ecological sustainability.

The adoption of effective teaching methods in environmental education faces significant hurdles, including inadequate teacher training, resource limitations, curriculum gaps, and socio-cultural barriers. These challenges restrict the ability of educators to integrate interactive and hands-on learning strategies, thereby limiting students' engagement and understanding of critical environmental issues.

#### **Inadequate Teacher Training and Pedagogical Preparedness**

One of the most significant challenges in implementing effective teaching methods in environmental education is the lack of adequate teacher training and pedagogical preparedness.

Many educators lack the necessary knowledge and skills to incorporate interactive and experiential learning approaches into their teaching (Eze & Nduka, 2019). Traditional teacher training programs often emphasize subject-specific knowledge without adequately preparing educators for interdisciplinary and practical-based environmental education. As a result, many teachers rely on conventional lecture methods, which do not actively engage students in hands-on environmental learning experiences. To overcome this challenge, there is a need for targeted professional development programs that equip teachers with participatory teaching strategies, inquiry-based learning techniques, and problem-solving approaches relevant to environmental education (Obi, 2020).

### **Resource Limitations and Financial Constraints**

The implementation of effective environmental education methods is often constrained by a lack of financial resources and inadequate infrastructural support. Interactive learning approaches such as field trips, ecological surveys, and outdoor classroom activities require financial investment in transportation, equipment, and materials, which many schools cannot afford (Okonkwo & Eke, 2020). Additionally, schools in underfunded regions may lack essential teaching aids such as environmental models, laboratory equipment, and multimedia tools that enhance students' understanding of ecological concepts. Limited funding also affects the ability of schools to provide continuous teacher training and integrate environmental education into the broader curriculum. To address this issue, educational institutions must explore alternative funding sources such as partnerships with non-governmental organizations (NGOs), corporate sponsorships, and government grants to support sustainable environmental education programs (Adebayo & Ibekwe, 2019).

### **Curriculum Gaps and Weak Policy Integration**

Another major challenge in implementing effective teaching methods in environmental education is the lack of a well-structured curriculum and weak policy integration. In many educational systems, environmental education is treated as a supplementary subject rather than a core component of the curriculum, leading to inconsistencies in its implementation (Opara & Okorie, 2021). Without a clear policy framework, schools struggle to allocate sufficient instructional time, design relevant course content, and assess students' learning outcomes in environmental education. Additionally, the absence of standardized guidelines makes it difficult for teachers to develop structured lesson plans that incorporate participatory and inquiry-based learning methods. Strengthening policy integration by incorporating environmental education as a mandatory subject within national curricula can enhance its visibility and ensure consistency in teaching practices across schools (Uche & Amadi, 2020).

### **Socio-Cultural and Community Engagement Barriers**

The successful implementation of effective environmental education methods is also influenced by socio-cultural factors and community engagement challenges. In some communities, traditional beliefs, economic priorities, and social norms conflict with environmental sustainability practices, making it difficult to gain public support for environmental education initiatives (Obi, 2018). For instance, in areas where deforestation, mining, or other



environmentally harmful practices are key sources of livelihood, community members may resist educational efforts that promote conservation and sustainable resource management. Additionally, low levels of environmental awareness among parents and community leaders can limit their willingness to participate in school-based environmental programs. Overcoming these barriers requires culturally sensitive educational approaches that align with local values and demonstrate the economic and social benefits of environmental conservation (Nduka, 2017).

## **MAJOR OPPORTUNITIES**

Despite the challenges, several key opportunities exist to enhance the implementation of effective teaching methods in environmental education. These include technology integration, strengthening multi-stakeholder collaboration, enhancing experiential and place-based learning, curriculum reforms, and alternative funding strategies. By leveraging these opportunities, educators can improve teaching effectiveness, foster student engagement, and promote long-term commitment to environmental sustainability.

### **Technology Integration**

Despite the challenges, advancements in technology present significant opportunities for improving the effectiveness of environmental education. Digital learning tools, virtual reality simulations, and online platforms enable interactive and immersive learning experiences that enhance students' understanding of environmental concepts (Okonkwo & Eke, 2020). For example, Geographic Information Systems (GIS) and remote sensing applications allow students to analyze real-world environmental data, conduct virtual field studies, and engage in problem-solving activities related to climate change and biodiversity conservation. Additionally, the use of social media and digital storytelling can foster greater student engagement and facilitate knowledge-sharing among schools and communities. Educators can create dynamic and engaging learning environments that overcome traditional classroom limitations through the integration of technology into environmental education (Opara & Okorie, 2021).

### **Strengthening Multi-Stakeholder Collaboration**

Another opportunity for enhancing the implementation of effective teaching methods in environmental education lies in promoting collaboration between schools, government agencies, NGOs, and private sector organizations. Multi-stakeholder partnerships can provide funding, technical expertise, and community support for environmental education initiatives (Adebayo & Ibekwe, 2019). For instance, corporate organizations with corporate social responsibility (CSR) programs can sponsor school-based environmental projects, while NGOs can offer teacher training and curriculum development support. Additionally, government policies that promote environmental education integration at all levels of schooling can create an enabling environment for sustainable educational practices. Strengthening these collaborations can improve resource availability, enhance teacher capacity, and increase student participation in environmental conservation activities.

## **Enhancing Experiential and Place-Based Learning**

The adoption of experiential and place-based learning approaches offers another opportunity to improve the teaching of environmental education. These methods encourage students to learn through direct interaction with their local environment, promoting a deeper connection to ecological systems and sustainability issues (Eze & Nduka, 2019). Community gardens, school-based recycling programs, and environmental restoration projects provide students with practical experiences that reinforce theoretical knowledge. Furthermore, partnerships with local environmental organizations can facilitate mentorship programs, internships, and real-world problem-solving activities that prepare students for future careers in environmental science and advocacy. Schools can cultivate a generation of environmentally conscious citizens equipped with the skills to address global sustainability challenges by incorporating experiential learning into environmental education (Uche & Amadi, 2020).

## **Curriculum Reforms for Sustainable Integration**

Reforming the environmental education curriculum presents a vital opportunity to enhance the effectiveness of teaching methods. Many educational systems currently treat environmental education as a supplementary subject, limiting its integration into core academic programs (Opara & Okorie, 2021). If environmental education is incorporated into national curricula and aligned with real-world sustainability challenges, schools can guarantee that students receive structured and comprehensive instruction. Furthermore, curriculum reforms that emphasize interdisciplinary approaches by integrating environmental topics into science, geography, and social studies can improve student engagement and create a more holistic learning experience. Ensuring that environmental education policies are well-implemented and regularly updated will further enhance their effectiveness and long-term impact on students (Uche & Amadi, 2020).

## **Alternative Funding Strategies**

The implementation of effective environmental education methods requires financial investment, making alternative funding strategies an essential opportunity for improvement. Many schools struggle with inadequate resources to support outdoor learning activities, field trips, and hands-on projects (Okonkwo & Eke, 2020). Seeking funding from government grants, private-sector sponsorships, and international environmental organizations can provide the necessary financial support to enhance environmental education programs. In addition, schools can establish community-driven fundraising initiatives, such as green enterprise projects or eco-friendly product sales, to generate funds for sustainability-related educational activities. By exploring diverse funding sources, educational institutions can overcome financial constraints and ensure the long-term viability of environmental education programs (Adebayo & Ibekwe, 2019).

## **STRATEGIES FOR IMPROVING ENVIRONMENTAL EDUCATION TEACHING METHODS**

Improving environmental education teaching methods requires a combination of innovative pedagogical approaches, policy support, and stakeholder involvement to ensure effective knowledge dissemination and student engagement. Given the growing need for environmental

awareness and sustainability, educators must adopt strategies that enhance learning experiences, foster critical thinking, and promote real-world problem-solving skills. These strategies include technology-enhanced learning, interdisciplinary curriculum integration, experiential and outdoor education, teacher capacity development, community and stakeholder involvement, and policy-driven educational reforms. Implementing these strategies can strengthen the impact of environmental education, equipping students with the necessary skills and knowledge to address environmental challenges effectively.

### **Technology-Enhanced Learning**

Incorporating technology into environmental education enhances interactivity and accessibility, making complex ecological concepts easier to understand. Digital learning tools such as virtual simulations, Geographic Information Systems (GIS), and augmented reality applications allow students to engage with real-time environmental data and conduct virtual field explorations, promoting critical analysis and problem-solving skills (Okonkwo & Eke, 2020). Online platforms, webinars, and e-learning modules also provide opportunities for continuous learning beyond the classroom, while social media channels facilitate global knowledge-sharing and environmental advocacy. Therefore, educators can create more dynamic, engaging, and inclusive environmental education experiences that transcend traditional classroom limitations by leveraging technological innovations (Opara & Okorie, 2021).

### **Interdisciplinary Curriculum Integration**

Environmental education is most effective when integrated across multiple subjects rather than being treated as a standalone course. By embedding environmental topics into science, geography, economics, and social studies curricula, students can develop a holistic understanding of sustainability issues and their interconnectedness with economic and societal structures (Adebayo & Ibekwe, 2019). For example, incorporating environmental case studies into economics lessons can illustrate the impact of climate change on resource management, while integrating environmental ethics into social studies promotes civic responsibility. A well-structured interdisciplinary curriculum not only enhances student engagement but also fosters critical thinking and practical application of environmental concepts in diverse fields.

### **Experiential and Outdoor Learning**

Hands-on experiences and real-world exposure significantly improve students' comprehension and retention of environmental concepts. Outdoor learning activities such as field trips, school gardens, and environmental restoration projects allow students to interact directly with nature, reinforcing theoretical knowledge with practical applications (Eze & Nduka, 2019). Community-based environmental programs, internships, and service-learning opportunities further enable students to apply classroom knowledge to address local sustainability challenges. By promoting experiential learning, educators can cultivate a generation of environmentally conscious individuals equipped with the skills to advocate for and implement sustainable solutions.

## **Teacher Capacity Development**

Effective environmental education relies heavily on the expertise and preparedness of teachers, necessitating continuous professional development programs. Training workshops, certification courses, and peer-learning networks help educators acquire up-to-date knowledge on environmental issues and innovative teaching methodologies (Uche & Amadi, 2020). Providing teachers with access to modern teaching resources, including instructional materials, research publications, and digital tools, further enhances their ability to deliver high-quality environmental education. Strengthening teacher capacity ensures that educators can effectively engage students, implement innovative pedagogical techniques, and instill a deep understanding of environmental sustainability.

## **Community and Stakeholder Involvement**

Engaging local communities, non-governmental organizations (NGOs), and private-sector partners can significantly enhance the effectiveness of environmental education. Collaborative initiatives such as mentorship programs, sponsorship of school-based environmental projects, and community-led conservation efforts provide students with diverse learning opportunities beyond the classroom (Okonkwo & Eke, 2020). Schools can establish partnerships with environmental organizations to access additional resources, technical expertise, and funding support. Through the integration of community involvement into environmental education, students gain practical exposure to real-world environmental challenges while promoting a culture of collective responsibility for sustainability.

## **Policy-Driven Educational Reforms**

Government policies and institutional frameworks play a critical role in shaping the success of environmental education programs. Policies that mandate the integration of environmental education into national curricula, provide funding for sustainability-focused initiatives, and support research on effective teaching methodologies contribute to the long-term advancement of the field (Opara & Okorie, 2021). Additionally, establishing evaluation frameworks and monitoring mechanisms ensures accountability and continuous improvement in teaching practices. A strong policy foundation creates an enabling environment for educators, institutions, and stakeholders to work collaboratively toward strengthening environmental education at all levels.

## **FUTURE DIRECTIONS FOR TEACHING METHODS IN ENVIRONMENTAL EDUCATION**

The future of teaching methods in environmental education will be shaped by advancements in technology, interdisciplinary curriculum integration, and increased stakeholder engagement to foster holistic learning experiences. Emerging trends such as artificial intelligence, virtual reality, and interactive simulations will enable students to engage in real-world environmental problem-solving scenarios, enhancing their critical thinking and decision-making skills. Additionally, incorporating indigenous knowledge systems and culturally relevant teaching approaches will make environmental education more inclusive and community-driven. Greater emphasis on

experiential learning through outdoor education, ecological restoration projects, and sustainability-focused service-learning will reinforce theoretical knowledge with practical applications. Strengthening collaborations between educational institutions, governmental agencies, and non-governmental organizations will also provide enhanced resources, policy support, and professional development opportunities for educators. Embracing the future directions, environmental education can evolve into a dynamic and impactful discipline that equips learners with the skills and awareness needed to address pressing environmental challenges.

## **CONCLUSION**

Effective teaching methods in environmental education play a critical role in promoting environmental awareness, sustainability consciousness, and problem-solving skills among learners. This review has highlighted key challenges such as inadequate teacher training, resource constraints, weak curriculum integration, and socio-cultural barriers while also emphasizing major opportunities in technology integration, stakeholder collaboration, and experiential learning. The role of educators, policymakers, and community stakeholders is essential in advancing environmental education by ensuring structured policies, continuous professional development, and community-driven approaches that align with local environmental realities. Future research should focus on localizing teaching methods to reflect Nigerian cultural and ecological contexts, exploring how indigenous knowledge, community-based practices, and technological innovations can be effectively integrated into environmental education pedagogy. Environmental education can be strengthened as a transformative tool for sustainability and long-term ecological stewardship by bridging the gaps and leveraging available opportunities,.

## **Suggestions**

Based on the reviewed literature and its contributions to scholarship, the following five suggestions provide practical steps for advancing environmental education pedagogy:\

- Teacher training institutions should integrate comprehensive environmental education courses into pre-service training programs while also providing continuous professional development for in-service teachers.
- Policymakers should formulate and enforce clear policy guidelines that outline structured learning objectives, instructional methodologies, and assessment criteria to ensure consistency in implementation of environmental education as a core subject within national curricula.
- School administrators should prioritize investments in teaching aids, laboratory equipment, and outdoor learning facilities such as field trips, school gardens, and digital learning tools that provide students with hands-on experiences to enhance practical environmental education.
- Community leaders, parents, and local organizations should actively participate in promoting environmental education that reflects indigenous knowledge and cultural perspectives on sustainability.

- Academic researchers should conduct further studies on the impact of various teaching methodologies, including technology-driven approaches, place-based learning, and interdisciplinary strategies in environmental education.

The implementation of these actionable suggestions, stakeholders can contribute to the development of a more effective, structured, and engaging environmental education system that fosters sustainability and ecological responsibility among learners.

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