INNOVATIVE PEDAGOGICAL STRATEGIES FOR TEACHING ENVIRONMENTAL LITERACY IN AFRICAN CLASSROOMS

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Abstract

Environmental degradation, climate change, deforestation, flooding, desertification, and pollution have become pressing challenges across Africa. These realities necessitate the promotion of environmental literacy among learners at all levels of education. However, conventional teacher-centered instructional approaches have proven inadequate in equipping students with the critical thinking, problem-solving, and participatory skills needed for sustainable environmental action. This paper examines innovative pedagogical strategies for teaching environmental literacy in African classrooms. The paper adopts a qualitative review approach, drawing from recent literature on environmental education, eco-pedagogy, indigenous knowledge systems, inquiry-based learning, technology-enhanced instruction, and participatory teaching approaches. The study highlights strategies such as experiential learning, place-based education, storytelling, project-based learning, inquiry-based learning, collaborative learning, eco-pedagogy, and technology integration as effective approaches for enhancing environmental literacy. The paper further discusses the relevance of indigenous African knowledge systems in environmental education and identifies challenges hindering effective implementation, including inadequate teacher preparation, poor infrastructure, insufficient instructional resources, and curriculum limitations. Recommendations are made for curriculum reform, teacher professional development, community engagement, and increased government support for environmental education initiatives. The paper concludes that innovative and culturally responsive pedagogical strategies are essential for developing environmentally literate citizens capable of promoting sustainable development in Africa.

Keywords: Environmental literacy, pedagogy, innovative teaching strategies, eco-pedagogy, sustainability, African classrooms.

Introduction

Environmental issues such as climate change, erosion, biodiversity loss, desertification, pollution, and deforestation are increasingly threatening sustainable development across African nations. These environmental crises have direct implications for health,

agriculture, education, and socio-economic development. Consequently, education systems are expected to equip learners with the knowledge, attitudes, skills, and values required to respond effectively to environmental challenges. Environmental literacy refers to the capacity of individuals to understand environmental systems, identify environmental problems, and participate responsibly in actions that promote environmental sustainability. Environmental literacy encompasses environmental knowledge, critical thinking, problem-solving skills, attitudes, values, and responsible environmental behavior (Eheazu, 2017). Despite the importance of environmental literacy, many African classrooms still rely heavily on traditional lecture methods characterized by rote memorization and passive learning. Such approaches often fail to connect environmental concepts to learners' everyday realities and local ecological contexts. Recent educational studies emphasize the need for innovative, participatory, and context-sensitive pedagogical strategies that can foster active learner engagement and sustainable environmental action (Lestari, Rahmawati, Ali, Sopandi, & Wulan, 2019).

This paper explores innovative pedagogical strategies suitable for teaching environmental literacy in African classrooms and discusses how these approaches can enhance learners' environmental awareness, critical thinking, and sustainable practices.

Conceptual Clarifications -- Environmental Literacy
Environmental Literacy has to do with the possession of relevant enlightenment and capabilities that enable an individual to take necessary steps, including becoming guides, for environmental replenishment and saving from further degeneration. Eheazu (2017) posits that Environmental literacy is a process which covers people's awareness of their environment and their acquisition of the knowledge, values, skills, experiences and determination which enables them to act either individually or collectively in harmony with forces and elements which surround them, in their daily activities. Environmental literacy covers an individual's understanding of environmental concepts and issues, combined with the ability and willingness to take informed actions toward environmental sustainability. It includes cognitive, affective, and behavioral dimensions that empower learners to make environmentally responsible decisions.

In these days of current environmental challenges confronting nations of the world – tsunami, flooding, deforestation, desertification, heatwaves, wild fires, oil spillage and the like - the need for environmentally literate persons to inform, to educate and to guide in the taking of the right steps, cannot be over-emphasized

Pedagogy --- It has to do with the activities of educating, teaching or instructing. It is especially understood to mean the strategies or methods of instruction and their development. According to Eheazu (2017), the term refers to the methods, approaches, and practices used in teaching and learning in formal regular levels of education. Eheazu (2017) added that pedagogy principally involved the teaching of children. On

the whole pedagogy involves the understanding, development and use of the methods of instruction concerning any educational level.

The state of affairs in Nigeria in this season is such that there is unprecedented need for more effective ways of confronting the myriad of challenges facing the society all over the land, Education as a major tool for achieving national goals and objectives, and is highly apt for confronting environmental challenges. Innovative pedagogy involves learner-centered, participatory, and transformative instructional approaches designed to improve engagement, creativity, critical thinking, and practical problem-solving. According to Haruna, Mohammed, Abdulsalam, et al. (2025) and Masonto, & Ntshoe, (2026)) innovative pedagogy is a great asset in the achievement of educational objectives.

Theoretical Framework -- This paper is anchored on Constructivist Learning and Transformative Learning Theories. Constructivist theory propounded by Piaget in the 1953s posits that learners actively construct knowledge through interaction with their environment and experiences. Environmental literacy education becomes effective when learners engage in inquiry, observation, experimentation, and community participation (Piaget, 1970).

Transformative leadership theory which was developed by James MacGregor Burns in the year 1978 and was later expanded upon by Bernard Bass emphasizes critical reflection, inspiration, motivation and behavioral change. The theory's relevance here is on the point that environmental education should not only transmit knowledge but also transform learners' attitudes and actions toward environmental sustainability (Smith, 2018). Making the learners to understand the implications of environmental changes and the appropriate response to ensure that sustainability is maintained

Innovative Pedagogical Strategies for Teaching Environmental *Literacy*

The following are the major innovative pedagogical strategies identified for teaching environmental literacy:

1. Inquiry-Based or Problem-Based Learning -- Inquiry-based learning encourages learners to investigate real environmental problems through questioning, observation, research, and experimentation. Students actively participate in identifying environmental problems and then discovering the environmental solutions rather than passively receiving information. This makes the learners to build knowledge as well as decision-making skills (Musah, & Wangila, 2024); Dillon, 2002). Research shows that inquiry-based or problem-based approaches improve environmental problem-solving skills and critical thinking among learners (Dillon, 2002). In African classrooms, inquiry-based learning can involve the activities like investigating causes of local flooding, conducting soil and water testing, studying waste disposal practices in communities and examining the effects of deforestation. This strategy enhances learners' scientific reasoning and environmental awareness.

2. Place-Based Education ---- Place-based education connects learning to learners' local environments and community realities be they cultural, historical or natural physical environment. This strategy makes environmental education more relevant and meaningful by focusing on the learners' local ecological issues. Studies emphasize that teaching environmental concepts using community-based climate data and local environmental experiences increases student engagement and retention (Sobel, 2004). Examples of place-based activities would include studying erosion sites in nearby communities, visiting farms, rivers, forests, and waste disposal areas, investigating local environmental problems and organizing community sanitation projects. Place-based learning as revealed by (Sobel, 2004) strengthens learners' emotional connection with their environment, and thus the desire for its sustainable maintenance.

3. Experiential Learning -- Experiential learning or outdoor learning involves "learning by doing." Learners participate in practical environmental activities that promote hands-on understanding of ecological concepts. The direct interaction with the natural environment significantly build the learners' environmental awareness, skills and emotional connection through first-hand experience (Ernst & Monroe, 2004)
Examples of experiential learning activities would include tree planting exercises, school gardening projects, recycling activities, environmental conservation campaigns, nature walks and field trips. A core strength of experiential learning includes the fact that it promotes active learner participation, environmental stewardship, and long-term behavioral change.

4. Project-Based Learning ---- Project-based learning engages students in solving real-life environmental problems through collaborative projects. The idea of this learning technique traced to John Dewey concerns real life activities that learners should individually carry out. It involves students being guided to freely determine the topic they like to work on, including the process of data gathering, analysis and drawing generalization. It is learner-centered, and leaves the teacher as guide and resource person for their projects which may be practical or theoretical (Chauhan, 1981). The teacher anchors this technique on solving real –life environmental problems. Projects such as designing waste management systems, developing climate awareness campaigns, constructing simple recycling models, and creating school environmental clubs – could be used.
Major strength of this teaching strategy include promoting creativity, collaboration, communication, and critical thinking skills.

5. Indigenous Knowledge Integration ----- African indigenous knowledge systems contain rich environmental wisdom developed through generations of interaction of the people with nature. The inter-connectedness of African people with their culture, and environment make them take actions that foster sustainability. The indigenous knowledge is already environment or place - based, societal values-driven, and action

–oriented. Integrating this indigenous knowledge into classroom instruction enhances cultural relevance and promotes decolonized environmental education (Rheaume, 2024)).

As posited by Eheazu (2017) indigenous knowledge would foster ecological literacy in several ways:

a) Making learning culturally relevant and place-based It draws on local practices, e.g. Yoruba sacred grooves, Hausa "fadama" farming, Igbo "Mmiri" shrines for streams and rivers.
b) Developing environmental stewardship and values. African indigenous systems already teach respect for land, trees, water through proverbs, rituals and community laws. These would develop in the learner sense of responsibility for the planet and the stewardship which eco-pedagogy seeks to achieve
c) Building critical thinking and intercultural dialogue. Eco-pedagogy works with dialogue and reflection on human - environment connections. For instance, traditional soil fertility methods versus fertilizer use – it is easy for students to critique both of these and as well proffer solutions to them.
d) Low-cost practical activities. This method makes available ready –made experiential activities such as eco-based storytelling, community mapping of medicinal plants, participation in communal tree planting, and the like.
e) Strengthening Community - school link. Community elders and other members could become co-teachers teaching aspects of the indigenous knowledge which would cover for insufficiency of teachers and as well promote learning as an act that continues beyond the classroom

Other examples of innovative ways of teaching eco-pedagogy include teaching environmental conservation through local proverbs, using folktales to explain ecological balance, learning traditional farming and water conservation methods, andngaging community elders in environmental discussions. Storytelling and oral traditions help learners connect environmental values with their cultural identities.

6. Collaborative and Participatory Learning --- Learning hear moves beyond awareness creation to action. Under the guidance of the teacher the students are made to plan and implement environmental projects in groups. Collaborative learning promotes teamwork, dialogue, and shared responsibility in environmental problem-solving. Among the many activities that could be used to conduct this study are going on Recycling drives, tree planting, advocacy campaigns, group discussions, environmental debates, community action projects, peer teaching and environmental clubs. This action –oriented participatory pedagogies foster democratic engagement and encourage learners to become active environmental citizens (Jansen & Schnack, 1997).

7. Systems Thinking Approach --- This techniques of teaching environmental

literacy teaches students to view environmental issues as interconnected systems and not as isolated problem. As posited by UNESCO (2017), this technique uses some tools such as concept maps, causal loops and models to understand feedback, interdependence and unintended consequences. Examples of activities that could be used in systems thinking techniques include identifying clogged gutters and figuring out what gut it clogged and where it came from, identifying worn paths in lawns and figuring out why the path got won and why it is maintained, removing a patch. in the vegetation and tracing the possible consequences to the flora and fauna; and diverting water flows from its natural course and noting the consequences. System thinking approach according to Jansen & Schnack (2017) foster deeper understanding of the consequences of environmental activities.

8. Eco-Pedagogy ---- Eco-pedagogy is one of the major innovative teaching methods. It sees humans (and animals) and the environment as interconnected, and rejects the separation of humans and nature as well as social issues and environmental issues. The method builds on Paulo Freire's critical pedagogy and according to Rheaume (2024) its purpose is to get the students from the level of Awareness to Reflection and then to Action for social and environmental justice and planetary sustainability. It thus emphasizes environmental justice, sustainability, and critical consciousness. It encourages learners to question environmental exploitation and advocate for ecological sustainability. Eco-pedagogical approaches connect environmental issues with social, economic, and political realities affecting African communities. Eco-pedagogy encourages several group activities such critical reflection, environmental activism, community engagement and sustainable living practices. Examples of learning activities for teaching eco-pedagogy are collaborative local projects such as mapping drainage blockage, effective thinking for instance asking students to write about water flow in their environment or their connection to nature, environmental outdoor learning and digital story-telling on eco-practices using video or short stories.

9. Technology-Enhanced Learning --- This is an instructional technique that intentionally uses technological tools to support, enrich and extend teaching and learning. It improves access to and engagement in teaching learning and the outcomes (UNESCO, 2021). Digital technologies can significantly improve environmental literacy instruction through interactive and multimedia learning experience. As an innovative teaching strategy. Technology - enhanced learning involves digital delivery of content – via use of videos, simulations, e-bools, animations and Learning Management Systems like Google Classroom to present lessons, interactive and collaborative tools – Quizzes on Kahoot, discussion forum, WhatsApp /Telegraph groups. Immediate feedback could be given by students who would work in group in and outside the class, personalized and self-paced learning – Lessons can be replayed, adaptive quizzes can be taken, and apps can be used at the learner's pace. data for assessment and feedback – learner participation, quiz scores, and time –on-task can be tracked through digital platforms for targeted support, and blended approach – face-to-

face teaching can be combined with on-line resources (UNESCO, 2021).

Technology-based approaches to teaching environmental literacy would include climate simulation software, educational videos, mobile learning applications, online environmental campaigns, and Geographic Information Systems (GIS). Technology integration enhances learner engagement and access to global environmental information.

Challenges Facing Environmental Literacy Education in African Classrooms

Despite the benefits of innovative pedagogical approaches, several challenges could hinder effective implementation of the approaches. The following major ones need to be noted:

Inadequate Teacher Preparation. Some teachers have not acquired the training they need to undergo in order to become effective school teachers. Many teachers lack specialized training in environmental education and innovative instructional methods. Such teachers do not have what it takes to effectively teach ecological literacy

Poor Infrastructure and Resources. That is there is significant non-availability of the required buildings, laboratory equipment, studios, tools and other materials needed for effective teaching and learning of ecological literacy. Limited access to laboratories, instructional materials, internet connectivity, and digital tools constrains effective environmental teaching.

Overcrowded Classrooms. This make learning interaction difficult as almost all materials used for the teaching and learning are insufficient for the learners because of the over -crowding. Difficulty to see the board, to move in the class, to be heard, to manage class, and the like abound.

Large class sizes make participatory and experiential learning difficult. There would be too may groups to be guided by the teachers, there would be too few seats, and insufficient space for the students

Curriculum Limitations. Environmental education is often infused into other subjects rather than taught as a distinct subject area, resulting in fragmented implementation.

Financial Constraints Field trips, environmental projects, and technology integration require funding that many schools lack.

Recommendations

In order to promote environmental literacy in African classrooms, and enjoy the benefits therefrom, the following recommendations are proposed, drawing from Zhou, (2025): Governments should integrate environmental literacy as a core component of school curricula. Teacher education institutions should provide training on innovative

environmental pedagogies. Schools should promote experiential and community-based environmental projects. Indigenous environmental knowledge should be incorporated into instructional practices. Educational institutions should invest in digital technologies for environmental learning. Partnerships should be established among schools, communities, NGOs, and environmental agencies. Environmental clubs and sustainability initiatives should be encouraged in schools.

Conclusion

Environmental literacy is essential for addressing Africa's growing environmental challenges and achieving sustainable development. Traditional teacher-centered methods are insufficient for promoting deep environmental understanding and responsible action among learners. Innovative pedagogical strategies such as inquiry-based learning, experiential learning, place-based education, eco-pedagogy, collaborative learning, indigenous knowledge integration, and technology-enhanced instruction provide effective pathways for improving environmental literacy in African classrooms. These learner-centered approaches promote critical thinking, environmental responsibility, and sustainable behavior. Educational policymakers, curriculum developers, and teachers, therefore, must embrace innovative and culturally relevant pedagogies to equip African learners with the competencies needed for environmental sustainability. A reform as this can help develop environmentally responsible citizens capable of contributing to sustainable development goals

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