

INTEGRATING CLIMATE ADAPTATION AND RESILIENCE INTO EDUCATIONAL CURRICULA: A FRAMEWORK FOR ENHANCING SUSTAINABLE DEVELOPMENT IN SECONDARY SCHOOLS

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Abstract: In the face of escalating climate change impacts, equipping future generations with the knowledge and skills necessary for adaptation and resilience has become a global imperative. This study explores the integration of climate adaptation and resilience into secondary school curricula as a strategic approach to fostering sustainable development. Utilizing a mixed-methods research design, the study examines best practices in climate education, identifies gaps in existing curricula, and proposes a comprehensive framework for embedding climate-related content into educational systems. Through an analysis of case studies from South East, Nigeria, the research highlights the critical role of education in enhancing students' environmental literacy and adaptive capacities. The proposed framework incorporates climate science, local environmental challenges, and practical solutions, aiming to cultivate a generation of informed and proactive individuals. The study concludes with actionable recommendations for policymakers and educators, emphasizing the need for a systemic transformation in educational practices to support global sustainability goals. This research not only contributes to academic discourse but also serves as a practical guide for implementing climate education that prepares students to navigate and mitigate the complexities of a changing climate.

Keywords: *Integrating, Climate Adaptation, Resilience, Educational Curricula, Sustainable Development*

Introduction

Climate change poses a significant threat to global sustainability, with rising temperatures, extreme weather events, and environmental degradation adversely affecting communities worldwide (IPCC, 2023). As the impacts of climate change become more severe, the need for adaptation and resilience-building has gained critical importance. Education is a powerful tool for equipping young generations

with the knowledge, skills, and attitudes necessary to address these challenges effectively. Integrating climate adaptation and resilience into secondary school curricula provides an opportunity to prepare students for a future where climate-related disruptions will be increasingly prevalent (UNESCO, 2022).

The integration of climate education into school curricula aligns with the United Nations Sustainable

Development Goals (SDGs), particularly Goal 13 (Climate Action) and Goal 4 (Quality Education). According to UNESCO (2023), embedding climate change education into formal learning systems fosters environmental stewardship, enhances community resilience, and supports the transition towards sustainable development. However, despite global recognition of the importance of climate education, many school curricula lack a structured approach to teaching climate adaptation and resilience (Global Partnership for Education, 2024).

Several frameworks have been proposed to facilitate this integration, emphasizing interdisciplinary approaches that combine environmental science, social studies, and practical skills development. The Institute for Development Impact (2023) highlights that climate-resilient education should focus on experiential learning, critical thinking, and problem-solving skills to empower students in climate adaptation strategies. Furthermore, climate resilience education can strengthen students' capacity to analyze risks, advocate for sustainable policies, and engage in climate-smart practices at both local and global levels (OECD, 2024).

This paper explores the integration of climate adaptation and resilience into secondary school curricula, outlining key strategies and frameworks for effective implementation. By examining best practices, policy recommendations, and case studies from various educational systems, this study aims to provide a comprehensive model for enhancing sustainable development through education. The goal is to equip students with the necessary knowledge and skills to become proactive agents of change, fostering long-term resilience and adaptation within their communities. This introduction sets the stage for a deeper analysis of how climate adaptation and resilience can be systematically integrated into

educational curricula to support sustainable development in secondary schools. Climate change presents multifaceted challenges that impact various aspects of our environment, society, and economy. Key challenges include:

1. Extreme Weather Events: The increasing frequency and severity of extreme weather events, such as heat waves, floods, and storms, are direct consequences of climate change. For instance, in 2022, Nigeria experienced its worst flooding in over a decade, displacing over two million people and heightening the risk of diseases like malaria and cholera (Adebowale-Tambe, 2024)

2. Public Health Risks: Climate change exacerbates health issues, including respiratory disorders, heat-related illnesses, and the spread of vector-borne diseases. The Nigerian government has recognized these threats and is taking proactive steps to protect public health amid climate challenges (Adebowale-Tambe, 2024)

3. Impact on Children: Children are particularly vulnerable to the effects of climate change. In Nigeria, over 110 million children are at risk, facing challenges such as rising temperatures, flooding, drought, and severe storms. These conditions threaten their health, education, and overall well-being (Edema, 2023)

4. Economic and Infrastructural Strain: The economic implications of climate change are significant, affecting agriculture, energy demand, and infrastructure. For example, the International Energy Agency projects a nearly 4% annual growth in global electricity demand until 2027, driven by factors like the rise of electric vehicles and data centers. This surge poses challenges for maintaining a secure and sustainable electricity supply (Ambrose, 2025).

5. Environmental Degradation: Climate change leads to environmental degradation, including

desertification, deforestation, and loss of biodiversity. In northern Nigeria, drought and desertification are reducing arable land, worsening food insecurity, and impacting livelihoods. (Adebowale-Tambe, 2024)

Addressing these challenges requires comprehensive strategies, including policy reforms, public awareness campaigns, international cooperation and integrating climate adaptation and resilience into educational curricula, to mitigate the adverse effects of climate change and build resilience in vulnerable communities. Education plays a pivotal role in enhancing climate resilience and adaptation by equipping individuals and communities with the knowledge and skills necessary to address climate challenges effectively. Integrating climate change education into curricula fosters informed decision-making and proactive engagement in mitigation and adaptation efforts. The United Nations Development Programme (UNDP) (2023) emphasizes that education serves as a consistent pathway out of poverty and vulnerability, particularly in the context of climate change. By understanding climate impacts, communities can develop resilience strategies tailored to their specific needs. In accordance with above, UNESCO (2024) advocates for climate change education as a crucial component of sustainable development. Such education empowers learners with the knowledge, skills, values, and attitudes needed to act as agents of change, promoting climate action at various societal levels. <https://www.unesco.org/en/climate-change/education>.

Recent studies highlight the importance of incorporating climate change topics early in educational systems. Early exposure to climate education fosters a generation that is more aware and prepared to implement effective adaptation and mitigation strategies (Badin, Pierre

and Lydie (2022)). In the same way, Crow (2024) maintains that in practice, educational institutions are taking significant steps to embed sustainability into their programs. For instance, Arizona State University has mandated a sustainability course for all incoming students starting in 2024, aiming to cultivate a comprehensive understanding of climate issues across disciplines. Moreover, the Organisation for Economic Co-operation and Development (OECD) has introduced initiatives to assess and enhance students' preparedness to tackle climate challenges. By focusing on actionable knowledge and dispelling misinformation, these programs aim to empower students to contribute effectively to climate resilience (Anya and Glenn (2024)). In summary, integrating climate change education into formal and informal learning environments is essential for fostering climate resilience and adaptation. Such educational initiatives not only inform but also empower individuals and communities to engage in meaningful climate action.

Review

In a study carried out by Martha, Richard, Annie, Alison and Willandia (2017) on identifying effective climate change education strategies: a systematic review of the research. Increased interest in climate change education and the growing recognition of the challenges inherent to addressing this issue create an opportunity to conduct a systematic review to understand what research can contribute to our ideas about effective climate change education. An academic database, EBSCOhost, was used to identify 959 unique citation records addressing climate change education. Of these, 49 sources met the criteria of focusing on assessment of climate change education interventions. Analysis of these sources examined the intervention purpose, assessment methodology,

and identified strategies that might result in effective interventions. Two themes were identified that are common to most environmental education: (1) focusing on personally relevant and meaningful information and (2) using active and engaging teaching methods. Four themes specific to issues such as climate change were also generated: (1) engaging in deliberative discussions, (2) interacting with scientists, (3) addressing misconceptions, and (4) implementing school or community projects. Suggestions for addressing controversial topics like climate change are offered.

A similar study by Alan (2019), *Climate change education and research: possibilities and potentials versus problems and perils?* This article introduces key features to the background, themes and implications of three collections available in *Environmental Education Research* that focus on climate change education and research. The problems and perils of scholarship and inquiry in this area are highlighted by contrasting these with some of the possibilities and potentials from a broad range of studies published in this and related fields of study, for example, in understanding who is doing the teaching and learning in climate change education, and in identifying the conceptual, policy and economic drivers and barriers related to its uptake. Key points for debate and action are identified, including for so-called ‘pyro-pedagogies’ and ‘practice architectures’, and the various philosophical, political and phenomenal aspects of climate change education that are likely to affect its prospects, at this moment and into the immediate future.

Be that as it may, World Bank Report (2024) on Education for Climate Action, A report published five months ago emphasizes that education is crucial for climate action, as it reshapes behaviors, develops skills, and spurs innovation necessary to combat

climate change. In the same vain, UNESCO's Climate Change Education for Sustainable Development Programme: Established in 2010, this program aims to help individuals understand and address the impacts of climate change by integrating it into national curricula and promoting participatory teaching methods. Climate adaptation and resilience education is essential for equipping individuals and communities with the knowledge and skills needed to respond to climate change. Globally, best practices in this field involve a combination of policy initiatives, curriculum integration, community engagement, and experiential learning. Best practices in climate adaptation and resilience education involve a holistic approach that integrates formal and informal learning, technology, community engagement, and policy support. Countries and organizations worldwide are leveraging these strategies to prepare current and future generations for climate-related challenges

Also,

Diquito (2021) This study aimed to know the trends and issues of climate change integration in science teaching, specifically in GE 5 (Science Technology and Society). The qualitative method was utilized in this study through the in-depth interview of fourteen (14) participants, as well as document analysis. Results revealed that teachers used experiential learning as the current trend in climate change integration; while the major issue was about the insufficient preparation to integrate climate change in the subject. Conclusively, teachers used innovative strategies and faced various concerns in integrating climate change to Science, Technology, and Society course. It is then recommended that a training proposal are needed to enhance teacher’s integration level, and further study to the identified

issues to effectively teach the topics and avoid problems in integrating climate change.

Key Components of a Climate Adaptation and Resilience Curriculum includes

Climate adaptation and resilience education are critical for preparing individuals and communities to effectively respond to the challenges posed by climate change. In recent global best practices, according to Qing and Chibuike (2025) in this field emphasize integrating climate education into curricula, fostering experiential learning, leveraging technology, and promoting inclusive approaches. A climate adaptation and resilience curriculum prepares learners to understand, respond to, and mitigate the impacts of climate change. It integrates scientific, social, economic, and technological aspects of climate adaptation while fostering critical thinking, problem-solving, and community engagement (Deborah, Rabella & Lauterbach, 2024). These components provide a scientific and contextual understanding of climate change and resilience strategies. Key Components of a Climate Adaptation and Resilience Curriculum includes:

- **Foundational Knowledge and Climate Science:-** Covers climate change concepts, adaptation strategies, risk assessment, and the socio-economic and environmental impacts of climate change. This emphasizes systems thinking, climate justice, and policy frameworks.
- **Practical Skills and Community Engagement:-** Focuses on resilience-building strategies, sustainable resource management, disaster preparedness, and technology-driven solutions. It includes experiential learning through case studies, participatory planning, and collaboration with local communities.

Climate adaptation and resilience curriculum should be interdisciplinary, solution-focused, and action-

oriented. It must equip learners with the knowledge, skills, and tools to build sustainable, climate-resilient communities.

Curriculum Development

Developing a comprehensive climate adaptation and resilience curriculum involves several key components:

1 Understanding Climate Risks: Educate learners on the causes and consequences of climate change, emphasizing the importance of a granular understanding of evolving physical risks under different future climate scenarios. This knowledge is crucial for informed decision-making and effective adaptation planning.

2 Vulnerability and Risk Assessment: Teach methods to assess vulnerabilities and risks associated with climate impacts. This includes evaluating exposure to hazards and identifying factors that contribute to susceptibility, enabling the development of targeted adaptation strategies.

3 Adaptation Strategies and Planning: Provide training on developing and implementing adaptation plans that enhance resilience. This encompasses exploring technological and behavioral adaptation levers, economic and societal adjustments, and governance frameworks to support climate resilience.

4 Capacity Building and Public Awareness: Emphasize the role of education, training, and public awareness in empowering individuals and communities to participate actively in climate action. This includes fostering public participation and ensuring access to information, as outlined in the Action for Climate Empowerment framework.

5 Monitoring and Evaluation: Instruct on the development of key performance indicators (KPIs) to monitor and evaluate the effectiveness of adaptation and resilience efforts. This ensures that

strategies are evidence-based and can be adjusted as needed to achieve desired outcomes. Integrating these components into a climate adaptation and resilience curriculum equips learners with the knowledge and skills necessary to address the multifaceted challenges posed by climate change. Integrating climate science with local environmental issues and practical skills empowers communities to effectively address climate change. This approach combines scientific research with local knowledge, fostering relevant solutions. For instance, citizen science initiatives engage residents in environmental monitoring, enhancing data collection and community involvement. Additionally, educational programs that link STEM subjects to real-world applications inspire students to pursue sustainable practices (link.springer.com, arxiv.org & ctinsider.com)

Pedagogical Strategies for Effective Climate Education:

Experiential Learning – Engage students in hands-on activities like fieldwork, climate simulations, and citizen science projects to deepen understanding (UNESCO, 2023).

Interdisciplinary Approach – Integrate climate topics across subjects such as science, geography, and economics to provide a holistic perspective (UNEP, 2023).

Problem-Based Learning – Encourage students to analyze real-world climate challenges and develop solutions, fostering critical thinking and innovation (IPCC, 2023).

Community Engagement – Involve students in local sustainability projects and advocacy efforts to promote active participation and social responsibility (UNFCCC, 2023).

Strategies for Implementing the Curriculum in Schools

Teacher Training and Capacity Building – Provide professional development programs to equip educators with the necessary skills to deliver the curriculum effectively (UNESCO, 2023).

Student-Centered Learning – Use interactive and inquiry-based teaching methods to engage students in critical thinking and problem-solving (UNICEF, 2023).

Integration Across Subjects – Embed curriculum content into various disciplines to ensure a multidisciplinary approach to learning (OECD, 2023).

Community and Stakeholder Involvement – Collaborate with parents, local organizations, and policymakers to support curriculum implementation and real-world applications (World Bank, 2023).

Monitoring and Evaluation Frameworks to Assess Impact on Students' Knowledge and Behavior

Pre- and Post-Assessments – Conduct baseline and follow-up evaluations to measure changes in students' climate knowledge, attitudes, and behaviors (UNESCO, 2023).

Performance-Based Assessments – Use projects, presentations, and real-world problem-solving tasks to gauge students' application of climate concepts (OECD, 2023).

Behavioral Surveys and Observations – Track students' eco-friendly actions, such as waste reduction and energy conservation, to assess behavioral shifts (UNEP, 2023).

Stakeholder Feedback and Continuous Improvement – Collect input from students, teachers, and the community to refine and enhance the curriculum's effectiveness (World Bank, 2023).

Theoretical Framework

Theoretical framework refers to the theory of learning on which the study is built upon. Theories of learning try to explain the mechanism of behavior

involved in the learning process. Thus two are considered to be in tandem with the present study.

Sustainable Development Theory

Sustainable development theory is a multidisciplinary framework that seeks to balance economic growth, social equity, and environmental protection to ensure the well-being of present and future generations. It emerged as a response to concerns about environmental degradation, social inequalities, and the long-term viability of economic progress. The most widely accepted definition comes from the Brundtland Report (1987): "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition highlights two key concepts: Needs (particularly those of the world's poor, which should be prioritized) and Limitations (imposed by technology and social organization on the environment's ability to meet present and future needs). Sustainable development is generally understood through three interdependent pillars: 1) Economic Sustainability:- Promotes inclusive economic growth and efficient resource use, Encourages long-term investment in infrastructure, education, and innovation and Focuses on reducing poverty and creating sustainable livelihoods. 2) Social Sustainability:- Ensures social inclusion, equity, and justice, Supports access to education, healthcare, and decent work and Encourages participation in decision-making and respects human rights. 3) Environmental Sustainability:- Protects ecosystems, biodiversity, and natural resources. Reduces pollution and mitigates climate change.. This theory is very important to the study because it supports and promotes renewable energy and sustainable consumption patterns.

Resilience Theory in Education

Resilience Theory in education focuses on how students, teachers, and educational systems adapt to challenges, overcome adversity, and thrive despite difficulties. It examines the protective factors that enable learners to succeed even in stressful or disadvantaged circumstances. Resilience is the capacity to recover from difficulties, adapt to change, and thrive in challenging situations. In education, this theory explores how students develop psychological, social, and academic strength in response to adversities such as poverty, trauma, learning disabilities, or systemic inequalities. The theory is rooted in developmental psychology and positive psychology, emphasizing strengths rather than deficits. It suggests that while some students naturally exhibit resilience, schools and educators can cultivate it through supportive relationships, effective teaching strategies, and an inclusive learning environment. Resilience in education is influenced by protective factors that promote positive development and help students manage stress and setbacks. The theory is add-rem to the present study because it brings out the necessity of resilience nature of students and teacher to learning priority.

Research Methodology

This study employs a sequential explanatory mixed-methods research design to investigate the integration of climate adaptation and resilience into secondary school curricula. The sequential design begins with a quantitative phase which was augmented with qualitative data (Gogo & Musonda, 2022). This approach was employed to understand how effectively climate adaptation and resilience content are currently integrated into secondary school curricula, the pedagogical approaches that are most effective for teaching climate adaptation and resilience, the barriers and enablers influencing the implementation of climate adaptation curricula in

secondary schools, and how climate education affects students' knowledge, attitudes, and behaviours related to climate resilience.

Quantitative Phase

A combination of purposive, convenient and stratified random sampling technique was employed to select 33 secondary schools from three States in the South East geographical zone of Nigeria. The States are Anambra, Ebonyi and Enugu. The sample includes senior secondary school students and teachers from equal representations of public, private and missionary schools in the urban areas. A structured content analysis instrument was developed to evaluate the presence, depth, and quality of climate adaptation and resilience content in curriculum documents. The 5-point Likert scale (1=absent to 5=comprehensive) instrument was used to assess seven dimensions: climate science foundations, local climate impacts, adaptation strategies, disaster risk reduction, social dimensions of climate change, sustainable development linkages, and action orientation. The instrument demonstrated high internal consistency (Cronbach's $\alpha = 0.88$) in pilot testing.

A 22-item questionnaire was administered to teachers to assess implementation practices, teaching methods, perceived self-efficacy, and institutional support for climate education. The instrument includes both closed and open-ended items and was validated by a panel of 7 experts in climate education. Additionally, the students were administered a 15-item instrument that measures climate change knowledge (5 items), attitudes toward climate action (5 items), and self-reported climate-resilient behaviours (5 items). The instrument demonstrated acceptable reliability coefficients for each subscale (Cronbach's $\alpha = 0.83$, 0.79, and 0.81 respectively).

Independent samples t-tests were conducted to compare public/private/missionary school differences. One-way ANOVA was used to assess regional variations with post-hoc Tukey tests, while multiple linear regression was utilized to determine factors predicting implementation quality using the model (Equation I):

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \varepsilon_i \quad (I)$$

Where Y_i represents the implementation quality score, $X_{1i} \dots X_{ki}$ represent predictor variables (such as, teacher training, resource availability, administrative support), and ε_i is the error term. Structural Equation Modelling (SEM) was employed to test the theoretical model linking curriculum content, teaching practices, institutional factors, and student outcomes. Model fit was assessed using conventional indices (CFI > 0.95, RMSEA < 0.06, SRMR < 0.08).

Qualitative Phase

For the qualitative phase, purposive sampling was used to select 9 schools (3 from each State) for in-depth case studies, informed by selection criteria based on integrated climate education programs. A structured observation tool was used to document teaching strategies, student engagement, and classroom interactions during climate education lessons. 48 classroom observations were conducted during climate-related lessons, with each observation lasting one full class period. A systematic framework was developed and used in analysing school policies, lesson plans, student assignments, and educational resources related to climate adaptation, to identify patterns, similarities, and differences in implementation experiences. Additionally, relevant documents were collected from each case study school for systematic analysis. Sixteen curriculum developers and twelve climate education experts

were recruited using snowball sampling techniques to aid the document analysis.

Informed consent was obtained from all adult participants, while both parental consent and student assent were obtained for student participants. Pseudonyms were used to maintain confidentiality, and participants were informed of their right to withdraw from the study at any time without consequences. Following Fetters et al.'s (2013) integration framework, quantitative and qualitative findings were integrated through using the quantitative results to purposefully sample for the qualitative phase, developing qualitative protocols based on quantitative results, merging quantitative and qualitative findings, creating visual representations that juxtapose quantitative and qualitative findings.

The study was limited by its use of self-reported data, which may be subject to social desirability bias,

although this was partially mitigated through triangulation with observational data. While the sample cuts across three States, it may not be fully representative of all educational contexts globally, particularly in resource-limited settings.

Results

The study analysed curricula from 33 secondary schools in South East Nigeria. The results are presented as follows:

1. Effectiveness of Current Integration of Climate Adaptation and Resilience Content in Secondary School Curricula

To evaluate how well climate adaptation and resilience content are integrated into secondary school curricula, a content analysis was conducted across 33 schools. Mean scores and standard deviations from results on the seven key dimensions are summarized in Figure 1.

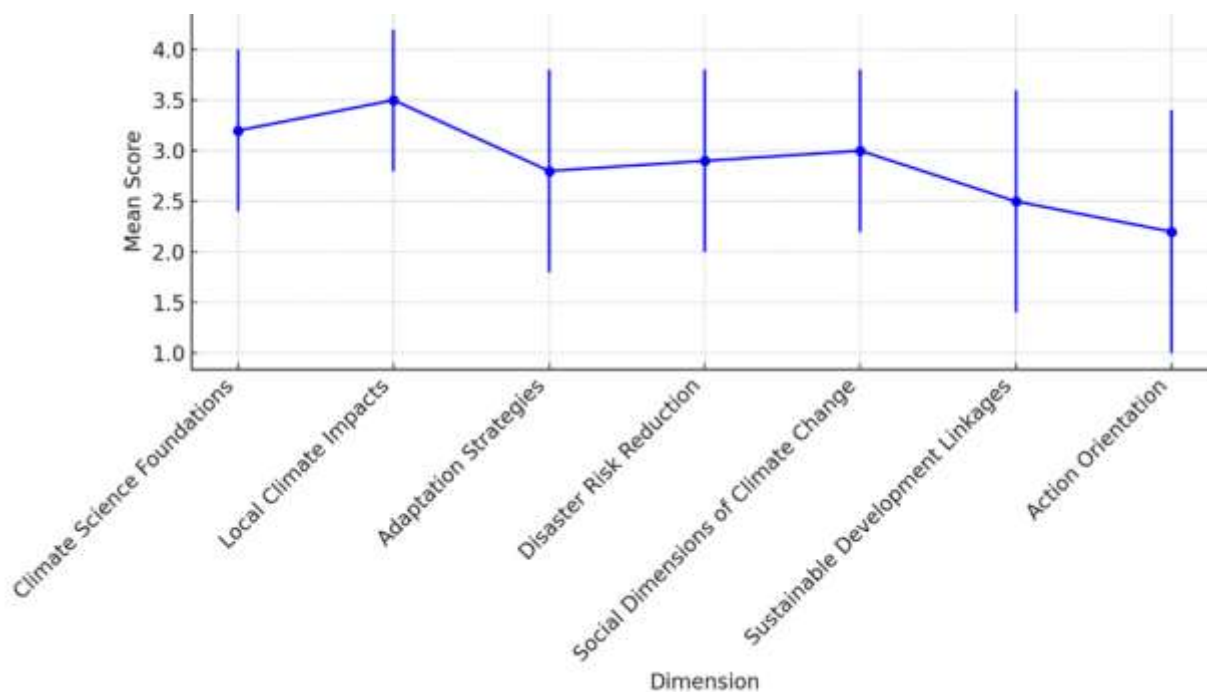


Figure 1: Results across the Seven Dimensions

The results in Figure 1 show moderate integration overall, with local climate impacts and climate

science foundations being the strongest areas. Conversely, action orientation and sustainable development linkages are notably weaker, and this may be attributed to gaps in practical and sustainability-focused content. Regional differences were significant ($p < 0.05$), with Enugu schools showing higher integration ($M = 3.8$) compared to Anambra ($M = 3.2$) and Ebonyi ($M = 3.0$). Qualitative data from curriculum reviews and interviews with developers revealed that Enugu's curricula included detailed, region-specific content, such as flooding impacts.

2. Pedagogical Approaches for Teaching Climate Adaptation and Resilience

The study identified effective teaching methods through teacher surveys and classroom observations. Key findings suggest that lectures were the most used method (89% of teachers), followed by group discussions (56% of teachers) and hands-on activities (37%). Interestingly, 72% of teachers rated hands-on activities and experiential learning as the most effective for student engagement, despite their limited use. Moreover, in 48 observed classrooms across nine schools, it was observed that students preferred experiential learning such as field trips and gardening as the most significant driver of higher student engagement and understanding.

3. Barriers and Enablers Influencing the Implementation of Climate Adaptation Curricula

The study explored factors affecting implementation through surveys and interviews. The identified barriers include insufficient teacher training with 58% of teachers reporting unpreparedness due to limited professional development. 63% of teachers cited inadequate materials and infrastructure, with a male participant lamenting about the lack of technology for simulations. 46% noted a lack of prioritization or time allocation for climate action activities by school leadership. Enablers identified

by the study were that schools, especially in Enugu, where teachers have experienced targeted training like UNESCO workshops showed better awareness and motivation to implement climate action activities. Partnerships with local stakeholders like NGOs enhanced relevance and success, as seen in an Anambra school's sustainable agriculture project. Likewise, interactive approaches in the form of project-based learning increased student interest and engagement. Quantitative analysis supported the results with a 29% variance confirming that teacher training ($p < 0.01$) and administrative support ($p < 0.05$) significantly predicted motivation and implementation success.

4. Impact of Climate Education on Students' Knowledge, Attitudes, and Behaviours

Results from the student survey demonstrate that 78% of students had heard of climate change, with a mean knowledge test score of 61% ($SD = 17%$). In schools with climate programs, teachers reported that knowledge scores rose by 22% and willingness to act by 11% after six months, particularly in Enugu and Anambra. Particularly, action-oriented learning like gardening increased climate-resilient behaviours, unlike lecture-based approaches, where changes were minimal. A strong relationship between curriculum content, teaching methods, and student outcomes was confirmed ($CFI > 0.95$), thus emphasizing the necessity of practical education.

Conclusion

The results of this study indicate that while the curricula moderately incorporate foundational climate science and local climate impacts, significant deficiencies exist in action-oriented content and connections to sustainable development. These gaps, which derive from inadequate administrative, resource, training and financial support, expand teacher awareness-motivation-implementation gaps and further hinder students' ability to translate

knowledge into practical, climate-resilient behaviors. Moreover, regional disparities further complicate implementation, with Enugu outperforming Anambra and Ebonyi due to stronger administrative support and resource availability.

The study identifies experiential learning and community engagement as the most effective pedagogical approaches for teaching climate adaptation and resilience. This is as a result of their high potential to drive greater student engagement and interest. Despite the potential, currently, these methods are underutilized, with traditional lecture-based instruction still dominant. Key barriers to effective implementation include inadequate teacher training, insufficient resources, and weak administrative support, while enablers such as targeted professional development and community partnerships significantly enhance program success.

Recommendations

For policymakers, there is a need to revise secondary school curricula to emphasize action-oriented content, such as practical adaptation strategies and sustainable development principles. These have opportunities for ensuring that students are equipped to address real-world climate challenges. Funding for climate education initiatives should be increased and mainly targeted at the provision of teaching materials, and acquisition and installation of technology for experiential learning. An example of such technology is basic climate modeling tools which are easy for both students and teachers to handle effectively. This should be augmented with an upgrade of existing infrastructure or new infrastructure development to support hands-on and experiential activities. It is crucial to establish frameworks for regional cooperation among schools and stakeholders in Anambra, Ebonyi, and Enugu to

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benchmark and share best practices, resources, and strategies.

It is recommended that educators increase their participation in specialized training programs focused on climate adaptation and resilience education. These programmes are freely available, or at a very low cost, at United Nations offices and NGOs. Educators are further called to engage students in local climate-related projects, such as reforestation efforts or water conservation initiatives, to bridge the gap between theoretical knowledge and practical application. However, it is noted that the will to do this may be frustrated by resource insufficiency. This calls for a cross-disciplinary approach to partnering with other educators and institutions at the tertiary level to evaluate resources can be combined to ensure that the whole surpasses the sum of its parts.

School administrators are recommended to ensure that more time, budget, and logistical support are allocated for curriculum implementation, including teacher training and resource procurement. It is within their purview to forge collaborations with private sector organizations (within the ambit of the enabling industrial and public relations statutes), NGOs, and climate experts to enrich educational programs with real-world expertise and community-based learning opportunities. They may consider inviting climate experts and enthusiasts for lecture and practical delivery sessions, and our engagement with this group suggests that they can do this *pro bono*. It is also recommended that administrators implement regular evaluations to assess the effectiveness of climate education initiatives, using data to refine strategies and ensure continuous improvement.

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