

ADVANCING SUSTAINABILITY EDUCATION IN NIGERIA THROUGH MULTIDISCIPLINARY CURRICULUM DESIGN

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ABSTRACT: Sustainability education has become an essential element of modern curriculum development as societies increasingly confront environmental degradation, climate change, and socio-economic inequality. In Nigeria, integrating sustainability education into school curricula is critical for preparing learners with the knowledge, skills, and values required to address complex global and local challenges. This paper examined how multidisciplinary curriculum design can advance sustainability education in Nigerian educational institutions. The paper assessed the concept of sustainability education and its relevance to holistic learner development, emphasizing the interconnectedness of environmental, social, and economic dimensions. It highlights the importance of adopting a multidisciplinary approach that draws from science, social studies, economics, geography, and civic education to create meaningful and context-relevant learning experiences. Such integration enables learners to develop critical thinking, problem-solving abilities, and responsible citizenship. The paper also discussed key challenges affecting the implementation of sustainability education in Nigeria, including rigid curriculum structures, limited teacher capacity, inadequate instructional resources, and insufficient policy support. It further identified opportunities for improvement through curriculum reform, teacher professional development, and collaborative stakeholder engagement. Existing literature and global best practices constituted the source of information; the study emphasized the need for flexible and adaptive curriculum frameworks that support interdisciplinary teaching and learning. The findings suggest that embedding sustainability education through multidisciplinary curriculum design can significantly enhance learner awareness and engagement while promoting long-term environmental and societal well-being. The paper concluded that a well-structured multidisciplinary approach is vital for advancing sustainability education and achieving sustainable development goals in Nigeria's education system.

Keywords: Sustainability Education, Curriculum Innovation, Multidisciplinary Approach, Nigeria, Educational Development.

Reference to this paper should be made as follows:

Enyinwa, G., & Alaukwu, J. C. (2026). Advancing sustainability education in Nigeria through multidisciplinary curriculum design. *International Journal of Leadership, Quality Education and African Development*, 3(2), 202-219.
<https://doi.org/10.5281/zenodo.21228216>

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INTRODUCTION

Sustainability education equips learners with knowledge and skills to address environmental and socio-economic challenges, and integrating it into curriculum design through a multidisciplinary approach that is essential in the promotion of critical thinking, responsible citizenship, and long-term sustainable development outcomes across educational levels.

The increasing complexity of Global challenges due to multiple factors including but not limited to global warming, climate change, biodiversity loss, economic inequality, and social instability have positioned education as a focal point for sustainable development. Education is no longer seen as just knowledge transmission, but as a means of transforming an individual's ability to develop the competences necessary to address current and future challenges facing society (UNESCO, 2020).

There are many sustainability-related issues in Nigeria such as the environmental degradation in the Niger Delta, desertification in the North, the issue of youth unemployment, and the widening gap between the rich and the poor. However, despite the many challenges, the Nigerian educational system has failed to integrate principles of sustainability into its curriculum in a systematic way (Ogunyemi, 2018).

The current structure of the curriculum is still very much fragmented and discipline-based, with an emphasis on rote-learning and performance on exams, rather than critical thinking and problem solving. This type of approach is not well suited to addressing the interconnected nature of sustainability-related issues. There is a pressing need for innovative curricular development that encourages interdisciplinary and multidisciplinary learning.

A multidisciplinary approach to curriculum development allows for knowledge to be used in conjunction with other areas of learning creating an overall curriculum that helps learners develop a comprehensive understanding of Sustainability Issues. This paper argued for the need for this type of approach to promote sustainable development in Nigeria, and discusses what sustainability education means, the theoretical frameworks pertinent to sustainability education, and recommendations regarding implementing multidisciplinary curriculum development in Nigeria.

CONCEPTUALIZATION

Concept of Sustainability Education

Education for Sustainable Development (ESD), otherwise known as sustainable development education, promotes a holistic, transformational approach to education that prepares students to be active participants in the processes of sustainable development through understanding, experience, application and infusion of essential elements such as knowledge, skills, values and attitudes necessary to foster positive change in the world. The fundamental concept of ESD is that it empowers individuals with information, knowledge, and skills for making informed decisions and taking responsible actions regarding environmental protection, economic stability, and an equitable society for today and for future generations (UNESCO, 2020).

Practices of sustainability education encompass educational approaches and methodologies designed to develop a student's ability to comprehend, investigate, and respond to the interrelated environmental, economic, and social issues affecting their community/local area as well as the world as a whole, and this is achieved within the framework of education for sustainable development (UNESCO, 2020). Practices based on ESD principles focus on the development of critical thinking, problem-solving, participatory learning and transformational action.

In many instances, scholars have defined sustainability education as a way of thinking and acting that transcends merely providing a body of knowledge about the environment and incorporates the basic elements of social/economic responsibility into education- for example,

critical thinking, systems thinking, participatory learning and ethical reasoning (Tilbury, 2011). Sustainability Education is also viewed as both content-based (what you are providing students with) as well as process-oriented (how you are preparing students).

Sustainability Education is cross-disciplinary: sustainability education is inherently interdisciplinary, presenting multiple opportunities to learn from different disciplines (for example, environmental science, economic science, sociology and political science). Integrated learning approaches are used to teach students about sustainability; these approaches aim to help students develop their ability to understand and address complex problems (examples include climate change, poverty, economic inequality, resource depletion, deforestation, improper waste disposal, food insecurity and dependence on fossil fuels). Through sustainability education, students of all ages learn the importance of using sustainability practices as responsible citizens, protecting our environment and developing sustainable economic growth. Effective sustainability education enables individuals and communities to be empowered to make meaningful contributions toward federal goals such as poverty alleviation, environmental preservation, and inclusionary economic growth (Ololube & Wome, 2025).

Scope of Sustainability Education

There are many areas associated with sustainable education. Sustainability in education has been divided into three areas: environmental dimension, social and economic/financial. All three areas impact one another when addressing sustainability.

Environmental Dimension: The environmental dimension of sustainability focuses on protecting our Earth's ecological environment and being responsible and effective stewards of our environment. Topics typically covered in this dimension include:

- Climate Change and Global Warming
- Biodiversity Conservation
- Management of Pollution
- Waste Management
- Renewable Energy and Sustainable Resources

Learners will learn about the effects and consequences of man's activities; they will also learn about the importance of adopting sustainable practices. For instance, many currently know about the various forms of pollution occurring in Nigeria. In addition to that, we see from the news that Nigeria experiences many oil spills and its land is being overtaken by desertification. These current examples of environmental issues within Nigeria clearly demonstrate the importance of increasing environmental literacy within the population of Nigeria.

Economic Perspective

The Economic Perspective focuses on using sustainable economic practices to create growth while considering the Environmental and Social Dimensions of Sustainable Development. Topics included under this area include:

- Sustainable Production and Consumption;
- Green Economy Circular Economy Models;
- Entrepreneurship and Innovation;
- Resource Efficiency and Financial Sustainability.

Nigeria and other developing economies, must align their economic growth strategies with their sustainable development goals.

Social Perspective

The Social Perspective examines issues related to the nature of equity, justice and Inclusion. Social Perspectives address the following topics:

- Human Rights and Social Justice;
- Gender Equity;
- Cultural Diversity;
- Community Development/Social Cohesion.

Sustainability education promotes values of tolerance, fairness and collective responsibility.

Cross-Cutting/Integrative Theme:

In addition to the four pillars of Sustainability Education, there are also numerous Cross-Cutting/Integrative Thematic Areas such as:

- Global Citizenship Education;
- Peace and Conflict Resolution;
- Ethical Leadership/Governance;
- Health and Well-Being.

Because of the Nature of Sustainability, a comprehensive approach to the development of Sustainability Curriculum is necessary.

Objectives of Sustainability Education

Sustainability education objectives are often aligned with the global development frameworks and the Sustainable Development Goals (SDGs). The following are key objectives:

- Develop critical thinking skills and systems perspectives: Students learn how to identify and assess complex, multifaceted problems; the interconnections among the different variables affecting those problems; and how to evaluate the longer-term implications of their decisions regarding these problems (Sterling, 2010).

- Promote responsible citizen engagement and citizenship: Sustainability education encourages active participation in local communities and society, through civic engagement and developing ethical decision-making skills.
- Enhance students creativity and problem-solving abilities: Students will be provided with opportunities to create and test innovative solutions to the various problems they encounter in their lives; this is accomplished by utilizing inquiry-based methods and hands-on, experiential learning.
- Encouragement of behavior change and values reorientation: The primary objective of sustainability education is to help learners change their knowledge, attitudes and behaviors toward adopting more sustainable lifestyles, including the practice of responsible consumption and environmental stewardship.
- Enable learners to gain the skills needed to obtain sustainable livelihoods in the future: Sustainability education will prepare learners to pursue jobs in the emerging areas of green business and renewable energy, sustainable agriculture and green jobs, as well as jobs in the related fields of green entrepreneurship and environmental management.
- Develop skills that allow learners to be lifelong learners and to adapt to changes in the world: Sustainability education encourages learners to continually learn and adapt to the ever-evolving global landscape.

Sustainability Education in the Nigerian Context

Current Status

In Nigeria, sustainability education is still in a developmental stage. While elements of environmental education are embedded in subjects such as geography, biology, and civic education, these are often taught in isolation and lack a holistic sustainability perspective (Ogunyemi, 2018).

The National Policy on Education (Federal Republic of Nigeria, 2014) acknowledges the importance of education in national development but does not explicitly provide a comprehensive framework for sustainability education.

Key Issues

- Disorganized Curriculum: Sustainability subjects are spread out throughout other subjects and not connected, leading to limited impact of sustainability education.
- Insufficient Capacity of Teachers: Several teachers lack the knowledge, skills, and pedagogical strategies necessary to effectively teach sustainability content so that it will lead to student action (Salami, 2021). Many teachers have not received training or professional development in the area of sustainability. When time and/or curricular requirements prevent teachers from completing sustainability units, many sustainability units and lessons are treated as peripheral content or omitted entirely.
- Limitations on Resources: Schools frequently do not have sufficient instructional resources, laboratories, technologies, and the infrastructure necessary to provide students with hands-on learning opportunities and examples of sustainable living practices like recycling, using renewable energy sources, and conserving water.

- Gaps between Policy and Implementation: Even with policy development, weak monitoring practices and lack of political support have limited successful implementation.
- Socio-Economic Limitations: Because of poverty, unemployment, and poor infrastructure, most people in the country cannot afford to place high priority on sustainability education (Okpin, 2025).

Emerging Opportunities

While these issues continue to exist in Nigeria, there are many emerging opportunities for increasing sustainability education in Nigeria:

- The public is becoming more aware of climate change and the environment.
- The Sustainable Development Goals (SDGs) have been incorporated into Nigeria's national development plans.
- Digital Learning Platforms are expanding.
- Non-Governmental Organizations (NGOs) and International Organizations are increasingly participating in Nigeria.

Importance of Sustainability Education for National Development

Education for Sustainable Development is an essential element driving economic development and progress in Nigeria, where many social, economic, and ecological issues exist:

- The development of human capital through sustainability education provides individuals with the knowledge, skills, and competencies necessary for the 21st-century workforce, resulting in improved productivity and increased economic development.
- Citizens with education on sustainability will be more likely to engage in sustainable practices, decreasing the amount of environmentally harmful activities and increasing the amount of conservation and preservation of the environment.
- Sustainability education provides entrepreneurship and innovation opportunities, creating green industries and sustainable economic systems.
- Sustainability education supports social justice, inclusivity, and peace to maintain a cohesive and unified society, which is critical to maintaining national stability.
- Sustainability education is the foundation for achieving the 2030 sustainable development goals, including quality education, action on climate change, and building sustainable communities.
- Sustainability education develops leaders and creates a culture of informed and responsible decision-making that balances economic, ecological, and social factors.
- Sustainability education strengthens the country's ability to adapt and recover from future environmental and socioeconomic issues, building long-term resilience in Nigeria. Researchers and studies support the premise that sustainability education promotes entrepreneurial activity and environmental awareness which contribute to the overall development of Nigeria (Ololube & Wome, 2025).

THEORETICAL FRAMEWORK

The integration of sustainability education into curriculum design requires a strong theoretical foundation that explains how learners acquire knowledge, how complex systems are understood, and how meaningful behavioral change occurs. This study is anchored on three complementary theories: Constructivist Learning Theory, Systems Theory, and Transformative Learning Theory. Together, these frameworks provide a robust basis for designing multidisciplinary and sustainability-oriented educational programs.

Theory of Constructivism

Constructivist learning theory states that learners do not receive knowledge passively; instead, they actively create knowledge while learning by interacting with their environment. Constructivism, which derives from the initial work of Piaget (1972) and was expanded on by Bruner (1996), emphasises that learners learn through exploration, investigation and comprehension. According to this theory, every learner comes into the learning experience with previous knowledge and experiences. The student will use this knowledge and previous experience as a foundation to interpret the new information being presented. Therefore, the process of learning becomes an active engagement, rather than a passive process. The core concepts are:

- **Active Learning:** Learning is an active process; therefore, students must actively engage in constructing their knowledge.
- **Previous Knowledge:** Each student possesses an existing cognitive structure; therefore, this structure will shape how they learn.
- **Social Interaction:** Students' ability to learn will be improved through collaboration and interaction with other learners.
- **Contextual Learning:** Students learn best when they acquire new knowledge through real-life situations or authentic experiences.

Constructivism is relevant to Sustainability Education because of the complexity of sustainability issues. Sustainability issues are contextually based and therefore require a critical analysis and understanding of the problems. Sustainability education supports:

- Experiential learning (e.g., projects and field trips dealing with environmental issues)
- Problem-based learning (Working with real solutions to sustainability issues)
- Collaborative learning (Group discussions regarding sustainability issues)

For example, students could work on a project that focuses on improving waste management within their local community or awareness of climate changes through a public service campaign, which would allow students to develop knowledge through actual experience.

Implications for Multidisciplinary Curriculum Design

Constructivist theory encourages:

- Integration of subjects through real-world problems
- Student-centered teaching approaches

- Use of inquiry-based and project-based learning

In the Nigerian context, this implies moving away from rote memorization toward interactive and participatory teaching methods.

Despite its strengths, constructivism has been criticized for:

- Overemphasizing learner autonomy at the expense of structured guidance
- Being difficult to implement in large classrooms
- Requiring well-trained teachers and adequate resources

These limitations are particularly relevant in Nigeria, where class sizes are large and resources are limited.

Systems Theory

Systems theory, as articulated by Capra (1996) and Bertalanffy (1968), views the world as a set of interconnected and interdependent systems. It emphasizes that elements within a system cannot be fully understood in isolation but must be examined in relation to the whole. In the context of sustainability, systems theory is crucial because environmental, economic, and social issues are deeply interconnected. The key principles of Systems Theory are:

- Holism: The whole is greater than the sum of its parts
- Interdependence: Components of a system influence one another
- Complexity: Systems are dynamic and non-linear
- Feedback Mechanisms: Systems respond to internal and external changes
- Relevance to Sustainability Education

Sustainability challenges such as climate change, poverty, and resource depletion are systemic in nature. Systems theory enables learners to:

- Understand the interconnections between environmental, social, and economic factors
- Analyze cause-and-effect relationships
- Recognize unintended consequences of actions

For example, deforestation in Nigeria is not only an environmental issue but also linked to economic activities, population growth, and policy failures. Implications for Multidisciplinary Curriculum Design

Systems theory supports:

- Integration of knowledge across disciplines
- Teaching of complex, real-world problems
- Development of systems thinking skills

In practice, this means designing curricula that encourage students to explore how different sectors (e.g., agriculture, industry, governance) interact within sustainability contexts.

Criticisms of Systems Theory

- It can be abstract and difficult for learners to grasp
- Requires high-level analytical skills
- Implementation may be challenging in rigid curriculum structures

However, its benefits in understanding sustainability outweigh these limitations.

Transformative Learning Theory

Transformative learning theory, developed by Mezirow (1997), focuses on the process by which individuals critically examine their beliefs, assumptions, and values, leading to profound changes in perspective. Unlike traditional learning theories that emphasize knowledge acquisition, transformative learning emphasizes personal and social change.

Key Components of Transformative Learning

- Critical Reflection: Questioning existing beliefs and assumptions
- Dialogue: Engaging in discussions to explore new perspectives
- Experience: Learning through real-life situations
- Perspective Transformation: Changing one's worldview

Sustainability education requires not only knowledge but also a shift in attitudes and behaviors. Transformative learning supports:

- Development of environmental ethics
- Adoption of sustainable lifestyles
- Promotion of social responsibility

For example, learners may shift from unsustainable consumption habits to environmentally responsible behaviors.

Implications for Multidisciplinary Curriculum Design

Transformative learning encourages:

- Inclusion of reflective activities (e.g., journals, discussions)
- Engagement with real-world sustainability issues
- Emphasis on values and ethics in education

In Nigeria, this could involve integrating community service and civic engagement into the curriculum.

Criticisms of Transformative Learning Theory

- Difficult to measure learning outcomes
- Requires supportive learning environments

- May be challenging to implement in traditional educational systems

Despite these challenges, it remains essential for achieving behavioral change in sustainability education.

Synthesis of Theoretical Framework

The three theories complement each other in supporting sustainability education:
Contribution to Sustainability Education

- The Constructivism theory Promotes active, experiential, and learner-centered approaches
- The Systems Theory encourages holistic understanding of complex sustainability issues
- The Transformative Learning theory Facilitates behavioral and attitudinal change

Together, they provide a comprehensive framework for:

- Designing multidisciplinary curricula
- Promoting critical and systems thinking
- Encouraging sustainable behaviors

Application to the Nigerian Educational Context

In Nigeria, applying this integrated theoretical framework requires:

- Curriculum reform to support interdisciplinary learning
- Teacher training in innovative pedagogies
- Investment in educational resources and infrastructure
- Policy support for sustainability education

By leveraging these theories, Nigerian education can transition from traditional, exam-oriented systems to dynamic, sustainability-focused learning environments (Adeola et al., 2023).

Multidisciplinary Curriculum Design

Concept of Multidisciplinary Curriculum

A multidisciplinary curriculum is an approach to teaching and learning that integrates knowledge, concepts, and skills from multiple disciplines to address complex, real-world issues. Unlike traditional subject-based curricula, which treat disciplines as isolated entities, a multidisciplinary curriculum encourages connections across subject areas while still maintaining the identity of each discipline (Jacobs, 1989).

In the context of sustainability education, a multidisciplinary curriculum is particularly relevant because sustainability challenges such as climate change, poverty, and environmental degradation are inherently complex and cannot be adequately addressed through a single

disciplinary lens. Therefore, integrating perspectives from science, social sciences, economics, and humanities enables learners to develop a more holistic understanding of these issues.

Key Principles of Multidisciplinary Curriculum Design

- **Integration of Knowledge:** This principle summarizes the connections between various concepts across different fields and disciplines. For instance, climate change could be studied through scientific, economic and social lenses, whereas it might involve investigating scientific techniques.
- **Real- World Relevance:** Learning is about addressing the problems that we face today, rather than learning abstractly, this makes it more relevant and applicable in our lives. By addressing real-world situations such as local water shortages or waste in urban areas, students learn about issues that impact their communities and society as a whole.
- **The Learner-Centered Curriculum:** The curriculum is structured to support active participation, inquiry, and critical thinking. A curriculum focuses on the way that learners create their understanding; therefore, it is learner-centred.
- **The Collaborative Teamwork Approach:** Both teachers and learners work together to share knowledge and collectively solve problems, creating opportunities for multidisciplinary collaboration.
- **Flexible and Adaptable:** Multi-disciplinary curricula are flexible in the way content is delivered; educators are free to adapt to new issues and local contexts.
- **Holistic Development:** Holistic education supports learners in developing their cognitive, social, emotional and ethical capacities, aligning with the sustainability education goals of creating an educated and engaged global community. Understanding that the actions taken in one system (e.g. reducing carbon emissions) can have a direct impact on others (e.g. Global Poverty and Global Health).
- **The Value-Based Education Approach;** The value of the approach is that it weaves ethics and social justice into the discussion of scientific and economic topics.
- **The Future-Oriented Perspective:** The Future-oriented Perspective Approach allows students to examine and model the long-term effects of current behaviours (Sterling, 2021).

Models of Multidisciplinary Curriculum Integration

Thematic Integration Model

This model organizes curriculum content around a central theme, such as sustainability, health, or technology. Each subject contributes its unique perspective to the theme.

In this model, a single theme (e.g., "Clean Water") is taught across different classes at the same time.

Example 1:

In Chemistry, students test local water pH levels; in Social Studies, they study the legislation governing water rights; in English, they write persuasive letters to local officials about water conservation.

Example 2:

Theme: Sustainable Agriculture

Biology: Soil fertility and crop science

Economics: Agricultural markets and pricing

Geography: Land use patterns

Civic Education: Community farming practices

Project-Based Learning Model

In this model, students work on projects that require the application of knowledge from multiple disciplines. This model uses a central "Driving Question" that requires inputs from multiple fields to solve. It emphasizes inquiry, collaboration, and problem-solving.

Example:

A. Students design a community waste management system involving:

- Science (waste decomposition)
- Mathematics (data analysis)
- Social studies (community behavior)

B. Driving Question: "How can our school reduce its carbon footprint by 20%?"

Example Application: Students must conduct an Energy Audit (Math/Physics), write a Policy Proposal to the school board (English/Civics), and plant a Carbon-Sink Garden (Agricultural Science/Biology).

Problem-Based Learning Model

Learning is driven by real-world problems that do not have a single correct answer. Students must draw from various disciplines to propose solutions.

Example:

Problem: Urban flooding in Lagos

Geography: Causes of flooding

Engineering concepts: Drainage systems

Economics: Cost implications

Inquiry-Based Integration Model

This model encourages students to ask questions, investigate issues, construct knowledge through exploration and develop solutions to real-world problems. This method not only improves cognitive skills but also prepares students to address complex societal issues.

Collaborative Teaching Model

Teachers from different subject areas co-plan and co-teach lessons, ensuring integration across disciplines. It involves two or more teachers plan their units together to overlap similar concepts.

Example: A Mathematics teacher and a Biology teacher coordinate a unit on population growth. The math class focuses on exponential functions, while the biology class applies those functions to track the depletion of local natural resources.

The Webbed Model

A broad concept is "webbed" to various departments through a central organizing theme.

Example: Using "Sustainable Cities" as a web.

Physics: Renewable energy sources.

Economics: The cost-benefit analysis of green building materials.

Art: Designing urban green spaces for mental well-being.

Application in Nigerian Education

Students are taught in distinct subject areas rather than integrating multiple disciplines, as would better serve their ability to understand and help solve world issues, which are inherently complex and require knowledge from many different disciplines to understand the problem and arrive at the best solution possible (that is, sustainability requires knowledge from environmental science, engineering, economics, social sciences, and humanities, etc.). This integrated approach (i.e., multidisciplinary) to education is therefore vital in developing a complete understanding of sustainability (George, 2023).

Even though some elements of multidisciplinary education exist in Nigerian schools, they are not systematically put into practice. Teachers tend to still teach subjects in isolation and collaboration among teachers remains limited (Federal Republic of Nigeria, 2014). The Federal Ministry of Education and the Nigerian Educational Research and Development Council (NERDC) have begun to integrate environmental education into the National Curriculum; however, often the application of environmental education is "infusional," not truly multidisciplinary.

Multidisciplinary education provides a means for students to effectively break down barriers between disciplines, allowing for the emergence of a more connected and comprehensive view of the world. This view is essential for sustainability, which requires a level of consideration of often multiple, competing interests and perspectives. For example, addressing climate change will require engineers and scientists to advance technical solutions and for economists, politicians and ethicists to contribute insights. Through the combination of these various viewpoints and approaches, multidisciplinary education will prepare students to face the diverse challenges related to sustainability with the creativity and resourcefulness necessary to create innovative solutions (Tariq, 2024).

Practical Applications in Nigeria

- Science and Agricultural Economics: Students will be able to learn about sustainable agricultural practices (i.e. crop rotation) in conjunction with exploring the socioeconomic factors of food security in Rural Nigeria.
- Civic Education & Geography: Students will have the opportunity to learn about Nigeria's various ecosystems and the responsibilities of citizens to safeguard the environment (i.e. Niger Delta protection and desertification issues in Northern Nigeria).
- Technical Education: Technical/Vocational Schools will have the opportunity to incorporate "Green Skills" such as Solar Panel Installation and Sustainable Masonry into their core curriculum (Ogunyemi, 2018)

Other Examples of Real World Applications include:

- Projects focusing on Environmental Sanitation practices in Schools
- Integration of Agricultural Education with Science and Business

- Integration of Entrepreneurship Education with Economic, Technology and Innovation

Ways to Incorporate into Practice

The Design of Multidisciplinary Curriculum can be accomplished using:

- Integration of Sustainability Themes into existing courses
- Development of Interdisciplinary courses at the Tertiary Level
- Project-Based Learning in the Classroom
- Community-Based Learning Experiences

Role of Stakeholders

- Governments: Create Policies and Provide Funding
- Teachers: Implement Curriculum and Encourage Innovation
- Educational Institutions: Provide Resources and Physical Infrastructure
- Community Members: Participate in Real-World Learning Opportunities

Benefits of Multidisciplinary Curriculum

- Critical Thinking Development: The learner will be able to evaluate problems from several points of view and compile the different arguments presented. The learner can synthesize the opposing views of industrial development and environmental sustainability into one solution or process.
- Problem Solving: Multidisciplinary curricula prepare learners to address the complexities that exist in real-world situations by providing learners with the capacity to analyze multiple components of a problem and develop solutions.
- Increased Learner Engagement: Multidisciplinary curricula make learning relevant to learners. When learners are able to apply the knowledge gained in school to the world around them and find solutions to real-world problems (E.g. waste disposal in the cities of Lagos or Kano) they become more engaged in the subject matter.
- Transferable Skills Development: Learners develop transferable skills, such as problem-solving, teamwork, communication skills, and creativity.
- Capabilities Alignment with the SDGs: Multidisciplinary curricula support the development of competencies necessary to achieve the Sustainable Development Goals.
- Integrated Learning Experience: Multidisciplinary curricula provide an integrated learning experience that connects cognitive, emotional and social learning. Many green jobs require a combination of technical, social and economic knowledge.

Challenges of Implementation

- Lack of flexibility in the Nigerian curriculum: The present-day Nigerian curriculum has a rigid structure that is set up around what is tested in high-stakes testing such as WAEC or NECO, which promotes single-subject memorization rather than integrated project work across multiple disciplines; therefore, rigid curriculum structures are a challenge for many tertiary institutions when trying to develop aligned, common objectives and a

cohesive flow of knowledge across multiple disciplines. For example, if an individual was studying ecology or sustainability they would require input from all three disciplines including Environmental Science, Economics and Sociology but at present, the rigid departmental boundaries create difficulties for developing a multidisciplinary approach. Academic departments have different levels of priority on a daily basis, allocating different resources between the departments affects the ability to implement multidisciplinary courses (Naujokaitienė et al., 2020).

- **Teacher preparedness:** Even though most educators are well qualified in their discipline, many do not have the training or knowledge to teach sustainability concepts across disciplines; in other words, most teachers have not received the necessary training in interdisciplinary teaching methods (Salami, 2021). Therefore, continuing Professional Development (PD) and support for teachers will ultimately be required to help teachers establish new teaching methods and use the technology as intended.
- **Lack of Resources:** Educators often find themselves short on teaching materials, technology and facilities. In addition, there are very few up-to-date textbooks, and digital resources designed specifically for integrated sustainability education (Adeyemi & Ogundele, 2020).
- **Assessment Approaches:** Traditional assessment approaches do not provide educators with adequate measures of multidiscipline learning outcomes.
- **Institutional Resistance:** The resistance to change created by continued practices and bureaucratic structures (Okeke, 2019) creates a barrier for teachers that limit their ability to develop new integrated courses and/or ways of teaching sustainability concepts across disciplines.
- **Large Class Sizes:** Large Class Sizes create challenges in developing an interactive and collaborative learning environment (Okeke, 2019).
- **Subject Silos:** The traditional school systems in Nigeria are highly compartmentalized which create barriers for teachers from different departments to collaborate and develop multidisciplinary courses.

Strategies for successfully implementing a curriculum change:

Curriculum Redesign

- Review and redesign curriculum; As a result, the overall goal of this reform is to create a curriculum that incorporates an integrated, multidisciplinary approach.
- Ensure the curriculum aligns with sustainability goals.

Teacher Professional Development

- Receive continual training regarding methods of innovative teaching. At the present time, teacher training should also incorporate sustainability education within a multidisciplinary context through workshop sessions.

Integration of Technology

- Utilize technology and other related digital tools to enhance collaboration and facilitate research.
- Join with e-learning platforms as a means of providing education remotely.

Assessment Methodologies

- Develop and implement project-based and performance-based assessments to motivate students to find relationships in their learning experiences across multiple disciplines.
- Use both peer and self-assessment as part of the assessment process.

Policy Support and Leadership

- Development of strong leadership commitment at both institutional and national levels towards the establishment of this reform.
- Clearly define the processes and procedures needed to implement this change.

Stakeholder Involvement

- Collaborate with non-governmental organisations (NGOs), industry, and community stakeholders to help support the implementation of this change.
- Foster public-private partnerships to enhance support for implementation.

Infrastructure Development

- Create an environment that is conducive to learning through investment in facilities and information and communication technology (ICT) infrastructure.
- Provide adequate amounts of educational resources to support curriculum and instructional delivery.

CONCLUSION

Sustainable development education has emerged as an innovative shift in how education philosophically and practically operates. The multidisciplinary, broad scope of Sustainable Development & Sustainability Education is required to prepare new thinkers for today's pressing International, National and Local issues/challenges due to the complexity and interdisciplinary nature of most of society's challenges. As such, we must continue to build on progress to ensure that Sustainable Development Education becomes fully integrated into our educational systems and curriculum in Nigeria. Building the future of Sustainable Development Education will require competent leadership, a commitment to implementing effective policies, and the investment of human and material resources to achieve these goals.

The development of a sustainable education system in Nigeria will require a new approach to curriculum design referred to as a Multi-disciplinary Curriculum Design that supports Nigeria's Sustainable Development and National Development Goals. In Nigeria, developing a Multi-disciplinary Curriculum Design will enable students to acquire the skill sets and competencies that they need to approach and solve the multiple complex issues that society presents to us today. While there remain several challenges to successfully implementing a multi-disciplinary curriculum, including the rigidity of the current curriculum design, lack of qualified teachers, and limited resources available to deliver a quality educational system, these barriers can be overcome through the use of Strategic Reform, Collaboration of Stakeholders and Long-term Funding Commitment to Education. Ultimately, A Multi-disciplinary Curriculum will allow for the holistic growth of students, foster innovative thought, and develop the next generation of leaders in Sustainable Development.

Recommendations

The following are recommendations for the future of sustainability education in Nigeria:

- The Federal Ministry of Education (FME) should partner with appropriate agencies, such as the Nigerian Educational Research and Development Council (NERDC), to regularly review and strengthen the current national curriculum to reflect a thorough, age-appropriate understanding of all aspects of sustainability across all subjects and levels of education.
- Government and educational institutions should provide schools with the resources needed to create an environment in which teachers have sufficient and ongoing support to develop their knowledge, skills and abilities to effectively deliver sustainability-based material and to teach multidisciplinary instruction.
- In order to overcome the financial limitations on the development of sustainability education in schools, schools should seek to secure external funding sources (e.g., grants from industries, governmental and non-governmental organizations) that will support sustainability initiatives in schools.
- Schools should form partnerships with local communities, non-governmental organizations, and local and national environmental organizations to develop community-driven sustainability campaigns and outreach programs to provide students with hands-on (real world) experiences in sustainable practices.

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