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**INTERNATIONAL JOURNAL OF CONTEMPORARY ISSUES IN INTEGRATED SCIENCE EDUCATION (IJCIISE)**

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## EDITORIAL

Dear Readers,

We are excited to announce the launch of International Journal of Contemporary Issues in Integrated Science Education (IJCIISE). This Association Integrated Science Educators' Association of Nigeria (ISEAN) play a vital role in promoting scientific advancement, supporting science education, informing science policy, recognizing science excellence and fostering community engagement. The desire to float this journal was borne out of the passion to organize a yearly conference of Integrated Science by the Integrated Science Educators' Association of Nigeria, of which selected scholarly articles will be published after a thorough review. The journal dedicated to advancing knowledge and fostering dialogue within. Our mission is to publish high-quality research, innovative ideas, and critical analyses that contribute to the understanding and development of Integrated Science. At IJCIISE, we believe in the power of interdisciplinary collaboration and inclusivity. We welcome contributions from scholars, practitioners, and thought leaders worldwide, providing a space for diverse perspectives and groundbreaking work. As we embark on this journey, we invite you to submit your research, engage with our content, and join us in creating a vibrant academic community. Together, we can push the boundaries of knowledge and inspire future generations. Thank you for your support as we launch this exciting new endeavour.

This edition moves around issues that border on **"Enhancing Quality Assurance in Integrated Science in Nigeria."** It is believed that diverse contributions from scholars and researchers expressed in this edition will provoke the understanding of issues that could foster education for societal transformations on a global scale
We look forward to your contributions!

For further information on future conference activities, visit **http://ijciise.org/index.php/ijciise**

**Warm regards,**
**Professor O. S. Agboola**
President, Integrated Science Educators' Association of Nigeria (ISEAN)

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# SIGNIFICANCE, IMPLEMENTATION AND CHALLENGES OF IN-SERVICE INTEGRATED SCIENCE TEACHERS' PROGRAMME IN TERTIARY INSTITUTIONS IN NORTHEAST, NIGERIA

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**Abstract**
*Globally, ensuring quality education is a key target of the Sustainable Development Goals (SDGs), particularly for developing countries like Nigeria. The in-service integrated science education program in Nigerian tertiary institutions aims to achieve SDG 4, which focuses on quality education. This study examines the significance, implementation, and challenges of this program in Northeast Nigeria. The paper highlights the robust and updated curricula, which cover essential topics such as security, safety, disease control, and local skills acquisition. However, it also identifies several challenges. To improve implementation, the researchers suggest that both federal and state governments should make concerted efforts to provide the necessary material and human resources. Additionally, they recommend addressing factors that hinder students' participation in technology and science education and ensuring that learners receive practical training through apprenticeships.*
**Keywords:** Significance, implementations, Challenges, Integrated science education Programmes and Northeast Tertiary Institution

## Introduction

Education is crucial for achieving national development goals globally and particularly in Northeast Nigeria. It promotes inclusive and sustainable economic growth locally while addressing global challenges like economic migration. This has drawn the attention of governments, non-governmental organizations, and individuals. Consequently, all educational stakeholders are engaging in efforts that are significant for societal coexistence, collaboration, and development (UNESCO, 2024).The Nigerian government's involvement in education includes establishing tertiary institutions across the country, including the Northeast. These institutions

aim to generate, disseminate, and apply knowledge for sustainable development, targeting both individuals and society. Their programs vary to cater to different interests and capabilities in a dynamic society, focusing on the holistic development of learners (UNESCO, 2023).

Educational reforms have led to curriculum development and changes, including in science education. The significance of science education is immense, contributing to scientific and technological advancements through science literacy and practices, including integrated science. To foster interest in science and technology, the Nigerian government has implemented an admission policy favoring science courses (60%) over arts and social sciences (40%). This policy aims to enhance young people's interest in science.Despite this, many senior secondary school students still prefer arts and social sciences, possibly due to a weak background in elementary science, which integrated science aims to address. A strong foundation in integrated science at the primary and secondary levels is crucial for fostering interest in science at higher education levels. University teacher education programs are designed to produce teachers capable of effectively teaching integrated science in secondary schools and colleges.

**The Concept, Philosophy and Objectives of Integrated Science Teacher Education Curriculum**

Integrated Science Education is a teacher education program designed to produce senior secondary school and college teachers who are well-versed in both the subject matter and teaching methodologies. These teachers are equipped with the necessary skills to excel in their roles. Integrated science combines various concepts from basic sciences such as geography, public health, physics, chemistry, biology, and agricultural science. This integration creates a curriculum that, when taught, enables individuals to teach integrated science effectively as a core subject in universities (N0UN, 2024).

National Commission for Colleges of Education (NCCE, 2012) that oversees national policy formulation for full development of teacher education and training of teachers formulated the philosophy of integrated science in these perspectives based on the National Policy on Education as

(a) Fundamental unity of science
(b) The use of scientific method as a common approach in solving problems of scientific nature
(c) The role and functions of science in everyday life.

The objectives of the integrated science teachers training programme were highlighted by NCCE (2012) thus:

a. Enabling students gain the concepts of the fundamental unity of science.
b. Instilling in student's a commonality of approach to problems of a scientific method.
c. Increasing student's understanding of the role and functions of science in

everyday life and in world which they live.

d. Making the students well informed and scientifically literate.
e. Enabling students acquire and demonstrate the intellectual competence and professional skills necessary - for the teaching of integrated science.
f. Development in teachers the ability to impart and encourage in their students as an inquiry-based subject in the conformity with the national curriculum.
g. Developing the ability and motivation in students to work and think in the independent manner.
h. Enabling students carry out scientific investigations, emphasizing cooperation and development of appropriate scientific process and skills and improving their written and oral communication skills.

The objectives of integrated science education programmes are stated in NUC (2012) and National Commission for Colleges of Education (NCCE, 2012) thus:

1. Enable student to acquire the various concepts, principles, theories, laws and concept schemes, among others of integrated science
2. Enable students to acquire necessary teaching and practical skills and aspects of teaching methodology of integrated science
3. Help students to become effective classroom integrated science teachers
4. Expose students to industrial application of integrated science
5. Acquire the ethics of teaching as a profession
6. Become professional integrated science teacher
7. Disseminate information in integrated science to society
8. Develop positive values and attitudes for efficient discharge of their duties and relevant in the technological advancement as integrated science teachers.

In attempt to achieve the identified philosophy and objectives of integrated science, Bajah (1983) formulated these themes from the objectives as:

I. Life
ii. Energy
iii. Matter
iv. Society

While Dogora (2006) cropped out these themes:

i. Living things and the environment
ii. Non-living things in the environment
iii. Controlling the environment

Recently, NCCE (2016) included ICT, skills acquisition, among others. Based on these philosophy and objectives, and by extension the incorporation of new learning experiences that is coined from global needs, the programmes in the tertiary educational institutions should be relevant to the needs of the ever-dynamic society which we live in. Appraising the teacher education curriculum/programme, it is

relevant to the needs of the society in terms of security, safety, disease control, conflict resolution and skill acquisition for entrepreneurship for self-reliance. University graduates are being employed by private sectors especially industries for services they render at different capacities. Despite the relevance of the curriculum, the programme implementation is confronting with challenges for effectiveness especially in the Northeast, Nigeria. Few of the challenges are:

i. Lack of finance,
ii. low status of teaching profession in the society
iii. the urge to attain the ultimate within a short time
iv. Insecurity and insurgent activities in the region, among others.

Ogundare and Kaneng (2021), Ben (2011) and Adodo and Ogundare 2016 reported that integrated science teachers carry out their teaching with conventional lecture methods which negates active and students-centered learnings. One may now ask why are teachers not performing to the expectations educational makers and curriculum developers?

Are teachers competent adequately in the subject matter; are they proficient in different instructional strategies?

Do the teachers familiar or take their time to study the policy and objectives the course they are to teach? Are teachers adequately motivated to perform their duties?

What are other external variables that inhibit tertiary education teachers from effectiveness?

It is expected that teachers that have passed through integrated science curriculum in teacher education programme should be well proficient in content area as well as instructions/pedagogies. Besides, it might be concluded that that integrated science teachers in tertiary educational institutions are not encouraged through sponsorship to attend local and international conferences for professional development. Other factor such as insecurity and insurgency may also pose threats for integrated science education teacher trainers in the higher institutions. The paper therefore looked at the concept of significance, implementation challenges and possible solutions.

**Concept of Significance**

Merriam-Webster.com Dictionary (2024) defines significance as the quality of being of notable worth or influence. According to the National Policy on Education (2014) by the Federal Republic of Nigeria, significance involves the application of valuable skills and knowledge that are appropriate and useful. The importance of tertiary education in Nigeria lies in developing citizens' minds through cognitive knowledge acquisition, storing knowledge, and applying specialized knowledge to enhance societal culture and ethics. Tertiary education institutions

achieve this through teaching, research, publication, and community service. For instance, universities award degrees to successful graduates to generate, develop, and disseminate knowledge. University education is designed to have academic self-control to function effectively and achieve these goals. To fully attain these goals, polytechnics, colleges of education, and the National Open University of Nigeria (NOUN) perform roles similar to universities. As stated in the National Policy on Education (2014), the roles of university education for national development include:

1. Intensifying and diversifying programs for the development of high-level manpower within the context of national needs.
2. Making professional course content reflect national requirements.
3. Ensuring all students, as part of a general program for overall improvement in university education, take general study courses such as the history of ideas, philosophy of knowledge, and nationalism.

**Significance of Integrated Science Teachers' programme**

The Integrated Science Teachers' Programme is important because it helps raise the standard of science instruction, especially in developing nations. By tying together different scientific fields, integrated science offers a comprehensive method for comprehending scientific ideas and encourages students to think critically and solve problems (Adeyemi & Ogunleye, 2022). Teachers who undergo specialized training in Integrated Science are better equipped to facilitate this interdisciplinary approach, helping students to understand the connections between biology, chemistry, physics, and earth sciences (Ibe, 2021). Additionally, the program addresses the issue of teacher competency, since many science teachers may be proficient in one area but not in others. By providing professional development, Integrated Science Teachers' Programmes guarantee that teachers can deliver content across multiple disciplines, minimising the knowledge fragmentation that students frequently encounter (Okeke & Nnadi, 2020). This improves student achievement and engagement because teachers can use a wider range of teaching methods and provide a more comprehensive context for scientific ideas (Nsofor & Wale, 2021). Furthermore, the importance of these programs is increased due to the rising need for STEM (Science, Technology, Engineering, and Mathematics) education on a global scale. They help students get ready for jobs in these vital disciplines, which are crucial for the development of the country, by promoting a well-rounded scientific education (Ogunyemi & Adamu, 2023).

**Current State of Integrated Science Teachers' Progrmme in the Country and in the Northeast**

The current state of integrated science teacher programs in Nigeria showcases continuous efforts to enhance science education through interdisciplinary methods. These programs are designed to equip teachers with the necessary skills and knowledge to effectively deliver comprehensive science education. A notable

advancement is the focus on curriculum design and implementation (FME, 2020). The National Open University of Nigeria (NOUN) offers a course titled "Integrated Science Curriculum Design and Implementation," which is a key part of their Bachelor of Science in Education (B.Sc. Ed) program. This course aims to provide teachers with a thorough understanding of the principles and techniques required for designing and implementing an integrated science curriculum, specifically tailored to the Nigerian context. Despite these improvements, several challenges remain. A critical review by Winarno et al. (2020) identifies issues such as the inconsistency of teachers' educational backgrounds with integrated science, underdeveloped textbooks, and curriculum problems. The study highlights that while integrated science learning effectively enhances student skills, these challenges need to be addressed to improve the overall effectiveness of the programs.

The Federal Ministry of Education's National Policy on Science and Technology Education (S&TE) is also crucial in shaping integrated science teacher programs. The policy outlines goals and objectives for human resource development, funding, and quality assurance in science education, emphasizing the importance of science and technical education for national development. Research conducted by the University of Jos, (2020) further examines the relevance, implementation, and challenges of integrated science teacher programs in Nigerian universities. This research underscores the need for continuous evaluation and improvement of these programs to ensure they meet the evolving needs of science education. Integrated science teacher programs in Nigeria have made significant progress, ongoing efforts are required to address existing challenges and enhance the quality and effectiveness of these programs. By focusing on curriculum development, teacher training, and policy implementation, Nigeria can improve its science education system and better prepare students for the future.

**Implementation of Tertiary Educational Programmes**

Teachers play a crucial role in curriculum implementation by instructing learners. Their responsibility is to implement the curriculum according to its philosophy and objectives. Teachers use appropriate methods and materials to connect the curriculum content with learners (Kolawole, 2006; Lawal, 2011). The effectiveness of this process depends on the teacher's understanding of curriculum implementation, their training level, and the resources available to them. The strategies used by integrated science teachers and their interaction with students reflect their perspective on the nature of integrated science. However, the researcher observed that the implementation of tertiary educational programmes in northeast Nigeria is unsatisfactory, prompting an investigation into the adequacy of qualified integrated science teachers, their competencies, the use of prescribed methods, the availability of resources, and the adequacy of supervision by government agencies. The National Policy on Education (2013) outlines broad educational objectives aimed at achieving quality education and national development. Given the importance of higher education, special attention has been given to this level,

emphasizing curriculum development. There has been extensive discussion on alternative sources of education funding among federal and state education ministries, universities, and professional associations to ensure the implementation and monitoring of new educational policies.

To make the policy effective in the school system, several elements need to be in place, including the development of appropriate syllabi, instructional resources, teacher training, and the provision of learning materials. Achieving this goal requires careful consideration and monitoring of all these stages and resources. Integrated science teachers trained in tertiary institutions are expected to implement the science curriculum at all educational levels.

**Integrated Science Education Curriculum Implementation in Nigeria**

Teachers are the primary implementers of any curriculum. For effective implementation, it is crucial to focus on teachers' professional development through training and retraining programs, including seminars, workshops, conferences, and symposia, especially when introducing new programs into the educational system. Another critical factor is the availability of physical resources. These include infrastructure such as functional laboratories, libraries and e-libraries, classrooms, textbooks, and reliable internet facilities. These resources must be adequate and appropriate to ensure effective implementation. Tertiary education institutions should be equipped with adequate and functional equipment for curriculum implementation. Outdated and obsolete equipment should be replaced with modern alternatives to enhance teaching and learning activities. Adequate funding is a significant factor in curriculum implementation. The effective implementation of integrated science, in particular, will largely depend on the availability of funds.

**Implementation of Integrated Science teachers' programmes in Northeast, Nigeria**

The implementation of integrated science education programmes in Nigeria has encountered numerous challenges and opportunities in recent years. These programs are essential for developing a skilled workforce and promoting national development. However, several factors have hindered their effective implementation. A major challenge is inadequate funding. Many tertiary institutions in Nigeria face financial constraints, which affect their ability to provide quality education and maintain infrastructure. According to a study by Fasinro, Akinkuotu, and Aina (2024), insufficient funding leads to deteriorating infrastructure, brain drain, and limited access to educational resources. This financial limitation hampers the overall quality of education and the ability to implement comprehensive programs. Another significant issue is the misalignment between intended and implemented curricula. Often, the curriculum does not meet the needs of the job market, resulting in graduates who are not adequately prepared for employment. The same study emphasizes the need for curriculum reforms to ensure that educational programs are relevant and aligned with national development goals.

Educational Resource Centres (ERCs) have been identified as a potential solution to some of these challenges. ERCs can provide multimedia resources, professional development opportunities for integrated science educators, and support services that enhance curriculum implementation. By leveraging ERCs, institutions can alleviate academic loads, compensate for limited facilities, and foster inclusive education (Okoroma, 2020). Additionally, the integration of technology in education, as explored in the EdTech Hub's rapid scan, presents both opportunities and challenges. While technology can enhance learning experiences and provide access to a wealth of information, the digital divide remains a significant barrier. Many students and institutions lack access to necessary technological tools and internet connectivity, limiting the effectiveness of technology-based educational programs. Policy implementation is another critical factor (Dele-Ajayi, & Taddese, 2020). The Federal Ministry of Education's policies, such as the National Policy on ICT in Education, aim to integrate technology into the educational system. However, the success of these policies depends on effective implementation at both federal and state levels. The lack of political will, continuity of programmes, and corruption are major obstacles that hinder policy implementation and, consequently, the effectiveness of integrated science tertiary educational programs. There are significant challenges in the implementation of integrated science tertiary educational programs in Nigeria, there are also opportunities for improvement. Addressing funding issues, aligning curricula with job market needs, leveraging ERCs, and effectively implementing policies can enhance the quality and relevance of the programmes in tertiary education in Northeast, Nigeria

**Challenges of Tertiary Education Institutions in Northeast, Nigeria**

Tertiary education institutions in Northeast Nigeria face numerous challenges that have led to a decline in the quality of manpower supply in the region. These challenges include poor staff remuneration and working conditions, dilapidated facilities, inadequate administration, under funding, over-enrolment of students beyond the capacity of available facilities, cultism, examination malpractice, strike actions, unstable administrative styles, industrial actions by staff unions, apathy towards work and learning, ethnic and religious bigotry, insecurity, insurgency, and banditry. Among these, examination malpractices and conflicts between staff unions and management are particularly problematic (Ajonbadi et al, 2023).

In February 2022, Nigerian universities, including those in the Northeast, were closed for about ten months due to industrial disputes between the Academic Staff Union of Universities (ASUU), other unions, and the federal government (Nduka, 2022). Additionally, some state universities faced internal crises between their respective state governments and school management. These issues have adversely affected the quality of education and, consequently, the quality of graduates, undermining the credibility of degrees awarded by higher education

institutions in Nigeria (Moji, & Adeuga, 2020).

Underfunding is another significant issue affecting the implementation of integrated science programs in the region's tertiary education institutions. ASUU and other staff unions argue that current funding levels are insufficient, especially given the devaluation of the Nigerian currency and inflation rates. Furthermore, there is little focus on the importance of utilizing research for advancement, sponsoring conferences, providing scholarships, publishing research and books, and fostering creativity and innovation. This lack of attention has reduced the impact of universities and other higher institutions on national development and sustainability. Although various committees have been formed to address these issues, the problems persist due to the inadequate implementation of their recommendations. Insecurity also hampers the effective implementation of the integrated science curriculum. Attacks on teachers in affected areas have negatively impacted curriculum implementation and teacher morale. The general insecurity has compromised teachers' ability to perform their duties effectively, and they have not received adequate protection from government authorities, despite the government's duty to protect its citizens from human rights abuses.

**Challenges of Integrated Science teachers' programme in the Northeast**

The implementation of integrated science teacher programs in Northeast Nigeria faces several significant challenges, which impact the effectiveness of science education in the region (Winarno et al. 2020).

1. **Inadequate Funding and Resources**

   A major challenge is the lack of adequate funding, which affects the availability of essential resources and infrastructure. Many schools in Northeast Nigeria are short of laboratory equipment, instructional materials, and well-maintained facilities. This scarcity hinders teachers' ability to deliver practical and engaging science lessons

2. **Lack of Integrated Science Laboratory with appropriate facilities**

   A good number of tertiary education institutions offering integrated science education programme in the Northeast, Nigeria are without modern integrated science laboratory with appropriate and adequate accessories, reagents, among other necessary facilities to carry out practical.

3. **Insufficient Teacher Training**

   Another critical issue is the insufficient training and professional development opportunities for teachers. Many integrated science teachers in the region have limited exposure to modern teaching methods and hands-on techniques necessary for effective science instruction. This gap in training leads to a reliance on traditional, lecture-based teaching methods, which are less effective in promoting student engagement and understanding.

**4. Curriculum Challenges**

The breadth and complexity of the integrated science curriculum also pose challenges. Teachers often struggle to cover the extensive content within the limited time available. Additionally, the curriculum may not always align with the local context and needs, making it less relevant and harder for students to relate to the material.

**5. Insecurity and Instability**

Insecurity and instability in the region further exacerbate these challenges. The ongoing conflict and insurgency in Northeast Nigeria have disrupted educational activities, leading to school closures and the displacement of teachers and students. This instability makes it difficult to maintain consistent and effective educational programs.

**Recommendations for Improvement**

**To address these challenges, several recommendations have been proposed:**

a. Increased Funding: Allocating more resources to education can help improve infrastructure, provide necessary materials, and support teacher training programs.

b. Both federal and state governments and non- governmental agencies should come to rescue this situation by immediately building modern integrated science laboratories with appropriate and adequate modern facilities for the tertiary education institutions running integrated science education programmes in the Northeast, Nigeria.

c. Professional Development: Regular workshops and in-service training programs can equip teachers with modern teaching techniques and practical skills.

d. Curriculum Review: Revising the curriculum to make it more relevant to the local context and manageable within the available time can enhance its effectiveness.

e. Security Measures: Implementing measures to ensure the safety of schools, teachers, and students is crucial for maintaining consistent educational activities.

**Conclusion**

The review revealed that physical facilities are insufficient for effective teaching of integrated science due to underfunding. If the curriculum is adequately and effectively implemented, it will undoubtedly enhance technological development in the region and the country. Introducing integrated science into university and other tertiary education is a worthwhile endeavour. Despite the challenges, to make the program effective and achieve its goals, the government

should provide full support with adequate funding and protection for teachers and students in the region, ensuring the production of high-quality teachers now and in the future.

**Suggestions**

To ensure integrated science achieves its goals in universities and other tertiary education institutions in Nigeria, particularly in the Northeast, several solutions can be implemented:

**a.** **Policy Reform:** The current conservative policies that inhibit the transfer of students' academic records should be relaxed or waived. Adapting and modifying the methods of program articulation and credit transfer, as practiced in other universities worldwide, can facilitate this process.

**b.** **Technological Exposure:** Students should be exposed to all categories of technology, as the university's mission is to create and transfer specialized skills with high-quality manpower.

**c.** **Book Policy:** The federal government should establish a book policy to support the production of integrated science textbooks by subsidizing or covering the costs through copyright agreements. Many integrated science authors lack the capacity to fund their book production. Additionally, a Book Trust Fund should be established to manage science textbooks with copyright agreements.

d. **Enabling Environment:** The government should create an enabling environment to facilitate students' interest and participation in integrated science and science education in general. This includes providing adequate funding, financial allocations, and subventions to higher institutions based on student per capita costs developed by the National University Commission (NUC) and other supervisory bodies.

**e.** **Resource Management:** Federal government supervisory agents should control student admission rates based on the resources available at each higher education institution to ensure that students are not admitted beyond the capacity of available resources.

**f.** **Security:** The government should provide adequate security in the region. Ending attacks on schools, teachers, and students requires actions at all levels, both nationally and internationally. This includes:

i. Stronger monitoring systems.
ii. Targeted preventive measures.
iii. More decisive and timely responses when incidents occur.
iv. Effective justice mechanisms to hold violators accountable and punishable under domestic and international law.

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