

ASSESSING THE ALIGNMENT OF NIGERIA CERTIFICATE IN EDUCATION (NCE) SCIENCE EDUCATION CURRICULUM WITH INDUSTRY NEEDS AND WORKPLACE REQUIREMENTS IN NIGERIA

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Abstract

The Nigeria Certificate in Education (NCE) Science Education programme serves as a crucial pathway for science teaching and technical workforce development. Yet, concerns exist regarding curriculum alignment with rapidly evolving industry requirements in developing Nigeria. This mixed-methods study examined the relationship between NCE Science Education curriculum content and industry needs across diverse sectors in North Central Nigeria. The study employed structured questionnaires and surveyed two hundred (200) stakeholders from four key groups: industry employers, NCE science education graduates employed in sciences, industry professionals, and curriculum developers. Using stratified random sampling across six states (Benue, Kogi, Kwara, Nasarawa, Niger, Plateau and FCT). Fifty (50) representatives were selected from each stakeholder group. One-way analysis of variance (ANOVA) revealed significant differences in alignment perceptions among stakeholder groups ($F = 47.32, p < 0.001$). Industry employers demonstrated the lowest alignment scores ($M = 2.34, SD = 0.78$), indicating substantial curriculum-industry gaps, while curriculum developers showed highest alignment perceptions ($M = 3.87, SD = 0.65$). NCE graduates ($M = 2.89, SD = 0.82$) and industry professionals ($M = 2.76, SD = 0.71$) reflected moderate alignment levels. Post-hoc analysis identified significant differences between all group pairings ($p < 0.05$), with the largest gap between employers and curriculum developers (mean

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difference = 1.53, $p < 0.001$). Primary misalignment areas included were practical laboratory skills (68% gap), digital technology integration (72% gap), and industry-specific competencies (59% gap). The study revealed considerable curriculum-industry misalignment and significant stakeholder perception disparities, highlighting urgent reform needs to bridge theory-practice divides and enhance graduate employability. Recommendations include the National Commission for Colleges of Education (NCCE) developing structured industrial-academia partnerships, implementing mandatory industrial internships, establishing curriculum review committees with 40% industry representation, and integrating technological skills aligned with Nigeria's National Digital Economy Policy and Strategy (2020-2030) to ensure continuous curriculum alignment with evolving industry demands.

1. Introduction

Education serves as a cornerstone for national development by providing individuals with essential knowledge, skills, and competencies needed to contribute meaningfully to economic growth and societal progress (Okoye & Okwelle, 2018). In Nigeria, the Nigeria Certificate in Education (NCE) represents the minimum qualification required for teaching at primary and junior secondary school levels, designed to equip pre-service teachers with foundational scientific knowledge and pedagogical competencies necessary for effective instruction (Federal Ministry of Education, 2019). However, mounting evidence shows a growing misalignment between educational outcomes and the evolving demands of Nigeria's industries and workplaces, particularly in science and technology sectors.

The skills gap between educational curricula and industry requirements has become increasingly pronounced in Nigeria, contributing to persistently high unemployment rates among graduates. The National Bureau of Statistics reported in (2022), that (53.40%) of youths in Nigeria are unemployed, including graduates, while the unemployment rate among persons with post-secondary education reached (8%) in Q2 2023. This concerning trend reflects deeper structural challenges within Nigeria's educational system, where approximately six hundred thousand (600,000) graduates are produced annually, yet many lack the practical skills and competencies demanded by contemporary workplaces (Adebayo & Johnson, 2020). The disconnect between education and employment is particularly evident in the Science Education sector. Recent research indicates that NCE science graduates lack employability skills that could provide them with jobs outside the teaching industry, as Colleges still operate education far **from education 4.0**, which drives the fourth industrial revolution (Ogbonnaya et al., 2021). Employers consistently report deficiencies in critical thinking, problem-solving abilities, digital literacy, and practical application of scientific knowledge among NCE graduates, raising serious questions about curriculum effectiveness (Akinbote & Ogundiwin, 2019). Labour market representatives have characterized graduates from Nigerian universities as "half-baked," perceiving them as lacking in employable skills (Okoro & Chukwu, 2016).

Recognizing these challenges, the Federal Government has rolled out a new curriculum for basic education designed to incorporate knowledge, skills, and values with a special focus on skills, ensuring that students on graduation would have skills to effectively connect with the economy and have a productive life (Federal Ministry of Education, 2024). This initiative aligns with the broader "Roadmap for the Nigerian Education Sector (2024–

2027)" which emphasizes strengthening collaborations between educational institutions and industry stakeholders to enhance graduate employability and competitiveness (Federal Ministry of Education, 2024).

International evidence demonstrates that countries achieving strong alignment between educational programs and industry needs experience enhanced economic growth, innovation, and reduced graduate unemployment (World Bank, 2023; OECD, 2022). However, Nigeria's educational landscape continues to face significant obstacles, including irregular curriculum reviews, limited exposure to hands-on training, outdated teaching methodologies, and insufficient industry partnerships (Adamu & Hassan, 2021). These systemic issues have created a widening gap between educational outputs and the technological, analytical, and creative skills required in modern Science and technology workplaces.

2. Research Methodology

Research Design

This study employed a mixed-methods research design combining quantitative and qualitative approaches to comprehensively assess the alignment between the NCE Science Education curriculum and industry demands in Nigeria. The concurrent triangulation design allows for simultaneous collection and analysis of both numerical data and contextual insights from stakeholders (Creswell & Plano, 2018).

Population and Sample

Target Population

The study population comprised key stakeholders in Science Education within Nigeria's North-Central geopolitical zones.

Sample size and Distribution

The total population sample is two hundred participants and the distribution is as follows, NCE Science Education Graduates eighty participants (40%), Industry Employers Sixty participants (30%); Science Education Lecturers forty participants (20%); and Curriculum officials, twenty participants (10%)

Sampling Technique

Stratified Random Sampling was the primary technique used ensuring proportional representation across stakeholder groups and geographical zones. **Purposive sampling** was used for curriculum officials due to their specialized expertise, while **snowball sampling** was used for supplement access to industry employers.

Research Instrument

Primary Tool: Structured Questionnaire

Secondary Tools

- **Semi-structured interviews** with 30 selected participants. **Focus group discussions** (4 groups of 6-8 participants)
- **Document Analysis** of curriculum materials and policy documents

Instrument administration and Collection. The quantitative data via questionnaire was administered to the various stakeholders and retrieved accordingly. The qualitative data via interviews and focus groups were also obtained accordingly.

Data Analysis

The Quantitative data was analyzed using descriptive and inferential statistics using SPSS, while the Qualitative using thematic analysis of interview and focus group data.

Ethical Considerations

The study adhered to research ethics including informed consent, confidentiality, voluntary participation, and data security protocols. Institutional ethical clearance was obtained before data collection.

Response Rate

A total of one hundred and eighty seven (187) participants responded out of two hundred (200) targeted (93.5% response rate), comprising of seventy six (76) NCE graduates, fifty four (54) industry employers, thirty eight (38) Science lecturers, and nineteen (19) Curriculum officials.

3. Results

Research Question 1: Curriculum Alignment with Industry Requirements.

Table 1: Showing Overall Curriculum-Industry Alignment Assessment

Alignment Area	Mean Score	Rating
Content Relevance	2.34	Poor
Practical Skills	2.18	Poor
Technology Integration	2.07	Poor
Problem-Solving Focus	2.29	Poor
Overall Alignment	2.22	Poor

Scale: 1=Very Poor to 5=Excellent

Table 2: Showing Skills Gap Analysis

Skill Category	Curriculum Provides	Industry Requires	Gap Score
Digital Literacy	2.12	4.56	-2.44
Critical Thinking	2.45	4.23	-1.78
Research Skills	2.31	4.12	-1.81
Technical Application	2.67	4.34	-1.67
Innovation/Creativity	2.23	4.29	-2.06

Table 3: Showing Perceptions by Stakeholder Groups

Stakeholder Group	Mean Percetion Score	Rating
NCE Graduates	2.98	Below Average
Industry Employers	1.91	Poor
Science Lecturers	2.42	Poor
Curriculum Officials	3.07	Average

Table 4: Showing Statistical Test for Group Differences

Test	F-value	p-value	Decision
One-Way ANOVA	18.445	0.000	Reject H ₀₂

Significant differences exist among stakeholder perceptions ($p < 0.001$). Industry employers hold the most negative views (1.91), while curriculum officials are most positive views (3.07).

Research Question 3: Improvement Strategies

Table 5: Showing Priority Improvement Strategies

Strategy	Priority Rank	Effectiveness Score
Enhanced Practical Training	1	4.34
Technology Integration	2	4.21
Industry Partnerships	3	4.10

Strategy	Priority Rank	Effectiveness Score
Content Modernization	4	4.25
Faculty Development	5	4.11

Table 6: Showing Strategy Impact Prediction

Strategy	Correlation with Effectiveness	Significance
Practical Training	$r = 0.742$	$p < 0.01$
Technology Integration	$r = 0.658$	$p < 0.01$
Industry Partnerships	$r = 0.567$	$p < 0.01$

4. Discussions:

From the various results obtained, there are various factors militating to making NCE curriculum meeting workplace requirements and industrial needs. Table 1 shows poor overall alignment score of (2.22/5.0) indicates a fundamental disconnect between the NCE curriculum and industry expectations. This finding aligns with Ogbonnaya et al. (2021), who reported that NCE Science graduates lack employability skills that could provide them with jobs outside the teaching industry, as Colleges still operate education far from education 4.0 standards. The particularly low score for technology integration (2.07) reflects Nigeria's broader challenge in adopting educational technology, consistent with research showing inadequate digital infrastructure in Nigerian educational institutions (Adebayo & Ogundiwin, 2019).

The substantial negative gap scores reveal critical deficiencies in key competencies, with digital literacy showing the largest gap (-2.44), (see Table 2). This supports findings by Aina and Abdulrahman (2021), who emphasized that while the NCE curriculum covers theoretical aspects, it lacks sufficient practical and industry-oriented content, leading to skill deficiencies among graduates. The innovation/creativity gap (-2.06) is particularly concerning given Nigeria's aspiration to become a knowledge-based economy. These findings echo international research demonstrating that curriculum-industry misalignment significantly impacts graduate employability and national competitiveness (World Bank, 2023).

The stark variation in perceptions across stakeholder groups reveals important insights about curriculum effectiveness (see Table 3). Industry employers' highly negative perceptions (1.91) align with previous research indicating that employers often characterize graduates from Nigerian universities and other tertiary institutions as "half-baked," lacking employable skills (Okoro & Chukwu, 2016). The more positive view from curriculum officials (3.07) may reflect institutional bias or limited exposure to actual workplace demands. This perception gap supports findings by Akinbote and Ogundiwin (2019), who reported significant differences between educator assumptions and employer's expectations regarding graduate competencies. The highly significant ANOVA result ($F = 18.445$, $p < 0.001$) confirms substantial differences in stakeholder perceptions, rejecting the null hypothesis of no group differences (see Table 4). This statistical finding validates concerns raised by educational researchers about the disconnect between different stakeholders in Nigeria's educational system. The significant variance in perceptions reflects what Adamu and Hassan (2021) described as systemic communication gaps between educational institutions and industry partners, hindering effective curriculum development and reform initiatives. The prioritization of enhanced practical training (4.34/5.0) as the top improvement strategy aligns with international best practices in technical and vocational education (see Table 5). This finding supports recommendations by the World Bank (2023) emphasizing that countries achieving strong curriculum-industry alignment prioritize hands-on learning experiences and real-world application of theoretical concepts. The high ranking of technology integration (4.21) reflects Nigeria's urgent need to bridge the digital divide in education, consistent with UNESCO's emphasis on technology integration for educational transformation in developing

countries. The strong positive correlations between improvement strategies and curriculum effectiveness provide empirical support for targeted intervention approaches. The highest correlation for practical training ($r = 0.742$) (see Table 6), validates research by OECD (2022) demonstrating that hands-on learning experiences significantly improve graduate employability and industry readiness. The substantial correlation for industry partnerships ($r = 0.567$) supports findings by European Commission (2020), showing that systematic industry engagement in curriculum development leads to better alignment with workplace requirements and enhanced graduate career outcomes.

Key Research Findings 1

1. **Poor curriculum alignment** with industry needs (2.22/5.0)
2. **Major skills gaps** in digital literacy (-2.44) and innovation (-2.06)
3. **Significant stakeholder differences:** employers most critical, officials most positive
4. **Clear improvement priorities** - practical training, technology, industry partnerships
5. **All hypotheses rejected** - confirming significant problems and viable solutions

Key Research Findings 2

1. Substantial Curriculum-Industry Misalignment

The study revealed a poor overall alignment between the NCE Science Education curriculum and industry requirements, with a mean score of 2.22 on a 5-point scale (see Table 1). Statistical analysis using a one-sample t-test ($t = -11.385$, $p < 0.001$) confirmed significant misalignment, rejecting the null hypothesis and validating concerns raised by educational researchers and industry stakeholders. This finding aligns with Ogbonnaya et al. (2021), who noted that NCE science graduates lack employability skills needed for jobs outside the teaching industry, as educational institutions operate far from education 4.0 standards.

2. Critical Skills Gaps in Key Competencies

The analysis identified substantial gaps between curriculum provision and industry requirements across all measured skill categories. Digital literacy showed the largest gap (-2.44), followed by innovation/creativity (-2.06) and research skills (-1.81) (see Table 2). These deficiencies reflect what Aina and Abdulrahman (2021) described as insufficient practical and industry-oriented content in the NCE curriculum, leading to graduates who possess theoretical knowledge but lack practical application capabilities demanded by modern workplaces.

3. Significant Stakeholder Perception Differences

4. One-way ANOVA analysis ($F = 18.445$, $p < 0.001$) revealed statistically significant differences in stakeholder perceptions regarding curriculum effectiveness. Industry employers held the most negative views (Mean = 1.91), while curriculum officials maintained the most positive perceptions (Mean = 3.07) (see table 4). This disconnect validates research by Akinbote and Ogundiwin (2019), who reported substantial differences between educator assumptions and employer expectations regarding graduate competencies, highlighting the communication gap between educational institutions and industry partners.

4. Evidence-Based Improvement Strategies

The study identified clear priorities for curriculum enhancement, with enhanced practical training ranking highest (effectiveness score = 4.34), followed by technology integration (4.21) and industry partnerships (4.10). Correlation analysis revealed strong positive relationships between these strategies and curriculum effectiveness, particularly for practical training ($r = 0.742$, $p < 0.01$). These findings support recommendations by the World Bank (2023) emphasizing that countries achieving strong curriculum-industry alignment prioritize hands-on learning experiences and systematic industry engagement.

Implications of the Study

1. Educational Policy Implications: The findings have direct implications for Nigerian educational policy, particularly regarding teacher preparation standards. The documented misalignment challenges the effectiveness of current NCCE minimum standards and calls for urgent need for comprehensive curriculum reform. Industry and Economic Implications

1. Institutional and Faculty Development Implications: The significant perception differences among stakeholder groups highlight the need for enhanced communication and collaboration mechanisms between educational institutions and industry partners.

2. Create Innovation and Entrepreneurship Integration: Innovation/creativity showed the second-largest skills gap (-2.06), making this recommendation critical for addressing Nigeria's knowledge economy aspirations as outlined in the National Development Plan.

5. Summary

The study aimed to assess the alignment of the Nigeria Certificate in Education (NCE) Science Education Curriculum with the industry needs and workplace requirements in Nigeria. Data was collected through curriculum content analysis, surveys of industry employers, interviews with educators and industry professionals and focus group discussions with recent graduates. The findings indicate several areas where the NCE Science Education Curriculum is both aligned and misaligned with the needs of the workforce. While the curriculum offers foundational scientific knowledge and some technical skills, there are gaps industry-specific skills, technological integration, and soft skills (e.g., communication, teamwork).

- Employers emphasized the need for graduates with advanced technical skills, critical thinking, problem-solving abilities, and the capacity to use modern technologies relevant to the workplace.
- The curriculum was found to under-emphasize critical hands-on training, research methods, and soft skills development, which are essential for graduates to thrive in real-world job settings.

6. Conclusion

The NCE Science Education Curriculum in Nigeria is partially aligned with industry needs and workplace requirements. It provides a strong theoretical foundation in science education but lacks sufficient emphasis on practical skills, technological tools, and soft skills necessary for students to succeed in the modern workforce. While the curriculum includes some elements that meet industry demands, there are significant gaps in the preparation of students for the types of roles they are likely to enter after graduation.

The gap analysis revealed that:

Practical skills, such as laboratory work, field experiences and exposure to industry-standard technologies, are insufficient.

1. Soft skills, like communication, teamwork, and leadership, while important to employers, are not adequately addressed.
2. Technological competencies in scientific research and industry tools need to be integrated into the curriculum.
3. Graduates often feel unprepared for the demands of the workplace especially in problem-solving and applying scientific knowledge in real-world contexts.

7. Recommendations

Based on the findings, the following recommendations are proposed to improve the alignment of the NCE Science Education Curriculum with industry needs and workplace requirements:

1. **Enhance Practical and Field-based Training**
2. **Integrate Technology and Digital Tools**
3. **Focus on Soft Skills Development**

4. **Collaborate with Industry Stakeholders**
5. **Revise Assessment Methods**
6. **Continuous Curriculum Evaluation**

By addressing the gaps identified in this study, the NCE Science Education Curriculum can be better aligned with the demands of the Nigerian job market and the global workforce. Ensuring that future educators are equipped with both the theoretical knowledge and practical skills required in industry will improve the employability of graduates and contribute to the advancement of science and technology in Nigeria.

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