

# Curriculum Management Relevance in Technology Education and Production of 21<sup>st</sup>-century Skilled Graduates in Federal Colleges of Education (Technical) in Nigeria

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**Abstract:** This study investigated the relationship between curriculum management relevance in technology education and production of 21st-century skilled graduates in Federal Colleges of Education (Technical) in Nigeria. The study was guided by one research question and one null hypothesis. A descriptive correlational research design was adopted. The population comprised 421 technology education lecturers/instructors from eight Federal Colleges of Education (Technical) in Nigeria, while a sample of 205 respondents was determined using the Taro Yamane formula and selected through stratified random sampling techniques. Two researcher-developed instruments titled *Institutional Resource Inventory (IRI)* and *Skills Assessment Scale (SAS)* were used for data collection. The instruments were validated by experts, and reliability coefficients of .898 and .946 were obtained using Cronbach Alpha, indicating high internal consistency. Out of 205 copies of the questionnaire administered, 195 were correctly completed and used for analysis. Mean and standard deviation were used to answer the research question, while Pearson Product Moment Correlation (PPMC) was used to test the hypothesis at .05 level of significance using SPSS version 23. The findings revealed that there is a high extent of relationship between curriculum relevance for skill development and the production of 21st-century skilled graduates, with a grand mean of 2.61. The correlation analysis showed a moderate positive and statistically significant relationship ( $r = .420$ ,  $p < .05$ ), leading to the rejection of the null hypothesis. This indicates that curriculum relevance significantly influences the production of skilled graduates in technology education. The study concluded that curriculum relevance is critical in equipping graduates with the required competencies for the modern workforce. It was recommended that regulatory bodies and curriculum developers should periodically review and update technology education curricula to align with current industry demands, global trends, and emerging technologies, while integrating practical skills, entrepreneurship, and digital competencies to enhance graduate employability and productivity.

**Keywords:** Curriculum Management, Federal College of Education (Technical), Skilled Graduates, Technology education, Nigeria

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## Introduction

Nigeria's technical and vocational education system is undergoing a major overhaul to align with 21st-century workforce demands. In August 2025, the Federal Ministry of Education announced a revised curriculum for technical education, converting Federal Science and Technical Colleges to Federal Technical Colleges and introducing 26 trade areas such as robotics, solar PV installation, AI, and digital media production. The reform aims to reduce curriculum overload, modernize technical education, and build a workforce that is skilled, employable, and globally competitive. However, experts argue that the success of this reform depends on effective curriculum management for relevance, teacher capacity, and infrastructure.

Curriculum management refers to the systematic process of planning, organizing, implementing, monitoring, evaluating, and reviewing educational programmes to achieve predetermined learning outcomes (Ornstein & Hunkins, 2018). It involves coordinating curriculum content, instructional strategies, learning resources, assessment

procedures, and stakeholder participation to ensure effective teaching and learning. Curriculum management plays a vital role in determining the quality of graduates produced by educational institutions. In Federal Colleges of Education (Technical) in Nigeria, effective curriculum management is essential for producing 21st-century skilled graduates who possess the technical competencies, entrepreneurial capabilities, digital literacy, creativity, problem-solving abilities, and adaptability required in contemporary workplaces. As technological advancements continue to reshape occupational demands, curriculum management becomes increasingly important in ensuring that educational programmes remain relevant, responsive, and aligned with national and global labour market expectations.

Technology education is vital in the development of a country since it enables learners to have practical skills, technical knowledge and innovative competencies needed to be productive in contemporary economies. Federal Colleges of Education (Technical) in Nigeria are compelled to produce

skilled graduates to play a significant role in industrial development, growth in technologies and to diversify the economy (FGN, 2013). Nevertheless, the success of these institutions highly relies on how suitable their curriculum can be regarding current skill requirements of the 21<sup>st</sup> century. The National Commission for Colleges of Education [NCCE] is responsible for curriculum development, accreditation, and minimum standards for NCE-awarding institutions. NABTEB is currently reviewing and validating 26 trade syllabuses to ensure they meet industry needs and international best practices. This validation process is critical for ensuring relevance.

In technology education, curriculum management ensures that students acquire practical and employable skills necessary for success in the 21st century. In fact, curriculum management is essential for the alignments between the material, system, and presentation of learning programmes on one hand with contemporary industry requirements, technological development, and expectations on the other hand. Curriculum management is especially importance in technology education as it defines the level of skills that students learn, their employment preparedness, and the capability to suit the changing workplace needs. A competency based and industry-focused curriculum is well structured to give graduates both technical (hard) and employability (soft) skills including communication, teamwork problem-solving as well as production. Production of skilled graduates refers to the output of institutions in terms of graduates who possess the knowledge, skills, and attitudes required for employment and self-reliance. In Nigeria, concerns persist about low quality and skill mismatch among VTE graduates. Ayonmike (2015) notes that TVET should address skills shortage, but outdated curricula and lack of practical training hinder employability.

Over the last few years, the issues of inappropriateness between the skills of graduates of the technical institutions in Nigeria and the needs of the labour suppliers have become a matter of increased concern. This disparity has been significantly blamed on the obsolete curricula which do not accommodate the recent technologies, emerging industries and the best practices in the world. Other research papers like Ogunyemi and Eze (2022) have indicated that graduates with industry-oriented and competency-based curriculum have higher rate of employability than those who are trained on outdated facilities. Similarly, Musa and Adewole (2022) stressed the significance of incorporating the elements of practice training like workshops, internships, and project-oriented learning to recreate the real-life work settings. Literature indicates that curriculum management for relevance is essential for producing 21st-century skilled graduates. Nigeria's 2025 technical education reform provides an opportunity to address skills mismatch, but success depends on effective management, teacher capacity, infrastructure, and industry collaboration which means aligning curriculum planning and delivery with industry needs, integrating ICT and practical training, and

continuously monitoring outcomes. Without these, the reform risks remaining "policy on paper".

Curriculum management refers to the planning, implementation, monitoring, and evaluation of curriculum processes to ensure alignment with societal and industry needs. Ochoma (2019) argues that relevance occurs when curriculum content enables learners to apply knowledge in real-life contexts and adapt to technological advancements. In Nigeria, curriculum relevance has been a persistent issue, with critics describing the system as rote, overloaded, and disconnected from global realities.

The 2025 reform introduces curriculum management components such as industry validation of trade syllabuses, modular specifications for trade areas, and integration of practical components like Supervised Industrial Training/Work Experience. Effective management ensures that these components translate into learning outcomes. Moreover, relevance in curriculum improves competency and technical skill in the students. Technology education must be practical through dealing with tools, machines, and digital systems. Adamu and Salisu (2021) discovered that schools that embraced modern and practice-based curricula experienced greater success rates in professional certification tests, which express their technical competence among graduates. This stresses the need to match the content of curricula with the prevailing industrial activities and technology advances.

21st-century skills include critical thinking, creativity, communication, collaboration, digital literacy, problem-solving, and entrepreneurship. The new technical curriculum explicitly incorporates digital literacy, coding, robotics, AI, and entrepreneurship at the JSS and SSS levels. TETFund's Executive Secretary, Sonny Echono, emphasized that curricula must integrate digital literacy, technical skills, AI, data science, and renewable energy to meet global labor market demands. For technical education, 21st-century skills also include practical, job-ready competencies in trade like solar installation, mechatronics, and smart agriculture. A study in Niger State found that Vocational and Technical Education [VTE] students were only averagely prepared in these skills, indicating gaps in curriculum delivery.

Furthermore, the cooperation between learning institutions and industries has a crucial role to play in the curriculum relevancy. Current response of industries in curriculum formulation makes it easy to integrate new disciplines like robotics, renewable energy, ICT, and specialized manufacturing. According to Adeoye and Salami (2020), good school-industry relations promote internship and job placement, thus facilitating school-to-work transition.

A pertinent curriculum encourages innovation and entrepreneurship other than employability. With the introduction of entrepreneurial education in technology programmes, graduates have the capability to generate jobs and help in the growth of the economy. Odu and Ajibola (2020) noted that those graduates who attended entrepreneurship education had high chances of setting up

businesses, thus decreasing reliance on white-collar employment.

In addition, curriculum relevance leads to high student engagement, retention, and graduation rates. To the extent that the students feel that their learning is meaningful and that it has direction toward their career goal, the students can be more motivated to succeed in their programmes. Afolabi and Olanrewaju (2021) stated that the retention rates were higher in institutions with modernized curricula than those that used outdated material.

Although they have their advantages, there are numerous Federal Colleges of Education (Technical) function in Nigeria whose curriculum is not periodically re-examined to capture the present industry standards and technological developments. According to Ogunleye and Okeke (2021), lack of updating curricula results in a generation of graduates who are unprepared to join the labour market hence complicating the issue of unemployment and underemployment. Adeola and Nwachukwu (2023) also emphasized the fact that fast changes in technology demand adaptive and flexible curricula that would be able to incorporate modern tools and innovations.

As such, relevance in curriculum is critical in delivering globally competitive graduates who would be able to operate efficiently in local and international labour markets. It also contributes to the ability of technology education in stimulating innovation, entrepreneurship and sustainable economic development in Nigeria.

Studies in TVET contexts highlight the link between curriculum relevance and employability. A study in Bayelsa State found that TVET programs had only average curricular relevance and significant challenges in employability due to lack of practical training and outdated curricula. The study recommended greater industry involvement and curriculum modifications to align with labor market demands. Similarly, Saba et al. (2023) found that VTE students in Niger State were averagely prepared in 21st-century skills. They recommended collaboration between the Ministry of Education and institutions to incorporate vocational skills into curricula and ensure they are well taught.

The main aim of technology education in the Federal Colleges of Education (Technical) in Nigeria is to graduate developed graduates that are highly competent, employable, and competent to contribute to the technological and economic growth. Nevertheless, it has been indicated that most graduates of these institutions are poor in terms of practical skills, technical expertise and innovative abilities required in the 21<sup>st</sup> -century labour force.

Among the significant issues that have led to this is the irrelevance of the curriculum to the present-day needs of industry. The technology education curriculum in Nigeria is mostly out-dated, too theoretical, and insufficiently adjusted to contemporary technological achievements and needs in the workplace. This has led to a continuous skills mismatch between what the graduates are knowledgeable in and that which the employers require consequently causing high

unemployment and underemployment rates among the graduates of technical education.

Also, poor coordination of practice training, scant exposure to actual industrial setting and poor institutional-industrial cooperation also add to the issue. Consequently, graduates are not usually exposed to the latest tools, equipment, and technologies, thus becoming less competitive on the local and international labor market. Research including that of Ogundipe and Oluwaseun (2020) has already demonstrated that the graduate rate of institutions with inadequate curriculum is extremely low when compared to those who have undergone training on up-to-date and industry-specific programmes.

Therefore, the lack of the elements of entrepreneurship in certain technology education programs prevents graduates in making jobs and becoming independent. This makes them more reliant on the few job opportunities available and this adds to the unemployment of youths in Nigeria.

In case this trend goes on, Federal Colleges of Education (Technical) could be unable to perform their duty of providing efficient and professional manpower needed in the national development. Thus, there is an urgent necessity to evaluate the level of curriculum relevance in skill development regarding the generation of the 21<sup>st</sup> century skilled graduates in these institutions. Recent studies show mixed progress hence Business Day reports that Nigeria's new curriculum includes compulsory digital literacy, AI, and entrepreneurship, but questions remain about implementation. Nubiachebo (2018) noted that the inclusion of digital literacy and AI is a step toward promoting science and technology.

It is on this backdrop that this research paper examines existing literature on curriculum management, attempts to identify curriculum relevance towards skill development in technology education and its impact on generating skilled graduates in Federal Colleges of Education (Technical) in Nigeria. On management Dimension while curriculum relevance is widely discussed, few studies examine how curriculum management processes, planning, implementation and monitoring influence graduate outcomes in Nigeria and despite the 2025 curriculum reform, there is limited empirical data on how FCETs are managing the transition and its impact on graduate skills. Therefore, Osikoya (2011) warns that implementation may falter without teacher retraining and infrastructure, especially in rural areas.

Additionally, the philosophical underpinning of the developing curriculum should be considered. The pragmatism of technical education reforms, which focuses on experiential learning and 'education for usefulness' to society, has a strong theoretical basis. Pragmatic education is a learning-through-action approach that fosters hands-on learning by engaging learners in solving real-life problems. This philosophical outlook is congruent with the goals of technology education of producing graduates who are able to make a meaningful contribution to the industrialization and economic transformation of the nation.

The fact that revised curricula exist, however, is not alone sufficient for the realization of these aspirations; effective planning, implementation, monitoring, and ongoing development of revised curricula are required. FCETs can deliver technologically competent, entrepreneurial, digitally literate and globally competitive scholars who can lead Nigeria's technological and socio-economic transformation through strategic curriculum management approach, the element of which include relevance, responsiveness, collaboration and innovation.

### Objective of the study

This study aimed to examine the relationship between curriculum management relevance in technology education and production of 21<sup>st</sup> century skilled graduates in federal Colleges of Education (technical) in Nigeria.

### Research question

1. To what extent does curriculum management relevance in technology education relate to production of 21<sup>st</sup>-century skilled graduates in federal colleges of education (Technical) in Nigeria?

### Hypothesis

*Ho:* Curriculum management relevance in technology education has no significant relationship with production of 21<sup>st</sup>-century skilled graduates in Federal Colleges of Education (Technical) in Nigeria.

### Methods and Materials

This study adopted the descriptive correlation research design, carried out in Nigeria, a multinational state in the southeast corner of West Africa, bounded by the Bight of Benin and the Bight of Biafra in the Gulf of Guinea. The population for the study was 421 consisting of teaching staff (lecturers/instructors) of technology education in the eight (8) Federal Colleges of Education (Technical) in Nigeria as follows: Federal Colleges of Education (Technical), Asaba, 39; Gombe, 62; Omoku, 76; Potiskum, 38; Akoka, 65; Bichi, 47; Gusau, 42; and Umunze, 52. The sample size was 205 respondents, which were drawn from the population of teaching staff in each of the eight (8) Federal Colleges of Education (Technical) in Nigeria, as follows: Asaba, 19; Gombe, 30; Omoku, 38 Potiskum, 19; Akoka, 32; Bichi, 22; Gusau, 20; and Umunze, 25. Taro Yamane formula:  $n = \frac{N}{1 + N(e)^2}$ , was utilized in establishing the sample, while stratified random sampling techniques was employed in selecting the representative respondents from the population of each institution under study. Two structured questionnaires titled "Institutional Resource Inventory (IRI)" and "Skills Assessment Scale (SAS)" were developed by the researcher and were the primary instruments for data collection. In order to ensure the content validity of the instruments, one Technology/Technical Education lecturer each, from Ignatius Ajuru University of Education, Port Harcourt and Federal College of Education (Technical), Omoku; one lecturer in Test and Measurement of Faculty of Education, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria were used for the validation of the instruments. The validates

scrutinized, corrected and approved the instruments. Their contributions were compared and considered in the final copies developed and used for the study. This validation process was to ensure that the instruments measure exactly what they are meant to measure. The instrument for data collection was pilot tested on a sample of 30 respondents from Faculty of Vocational and Technology Education, Ignatius Ajuru University of Education, Port Harcourt who were not part of the present study population. The Cronbach alpha correlation coefficient test was used to measure the internal consistency of the instruments. The responses from thirty (30) respondents yielded the overall reliability index of .898 and .946 for Institutional Resource Inventory (IRI)" and "Skills Assessment Scale (SAS) respectively. This were considered sufficient and used for the study because, reliability coefficient of .70 and above is desirable (Nonally 1978, as cited by Okoli, 2012). Cronbach's alpha is the most convenient reliability estimates that can be used for measuring internal consistency of instruments for a non-cognitive or non-achievement-oriented instrument (Nwankwo, 2016). The instruments for data collection, which was the questionnaires, were administered through research assistants in the respective institutions. The researcher through the help of College of Education Academic Staff Union, COEASU Omoku chapter contacted COEASU chapter chairman of the Institutions under study, who then connected the Deans of the school of technology education through which the research assistants were linked. The research established cordial rapport with them; discussed the topic and certain details about the research work and the procedures for data collection. Hence the instruments were mailed to each one of the research assistants in their institutions; haven detailed the research assistants of the procedures; they distributed the instruments to the participants. Two weeks were given to each participating institution for the research assistants to retrieve the completed questionnaire from the respondents personally, and transmitted same to the researcher who vetted and sorted them to ensure that it was only the rightly completed responses that were used for the study. This method of data collection ensured a relatively high return rate. Out of 205 copies of the instruments that were administered to the respondents, 201 completed copies were retrieved representing 98% return rate, 6 copies were found not usable for reasons of not been correctly completing the questionnaires, double ticking, mutilations etc, while 195 were correctly filled and was found usable and considered adequate for the analysis. The descriptive statistic mean was used to answer research questions and the Pearson Product Moment Correlation statistics (PPMC) testing the hypothesis. The SPSS (Statistical Package for the Social Sciences) version 23 was used for data analysis.

### Results

1. **Research question:** To what extent does curriculum management relevance in technology education relate to production of 21<sup>st</sup>-century skilled graduates



in federal colleges of education (Technical) in Nigeria?  
**Table 1:** Mean response on curriculum management relevance in technology education

| s/n               | Item statements                                                                                                                      | N          | Mean        | SD          | Remark             |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------|-------------|-------------|--------------------|
| 1                 | Technology education curriculum aligns with current trends in industry.                                                              | 195        | 3.03        | .532        | High extent        |
| 2                 | The curriculum is updated on a regular basis to incorporate emerging technologies.                                                   | 195        | 2.61        | .702        | High extent        |
| 3                 | Technology education courses are structured to cover essential skills that are effectively taught through hands-on activities.       | 195        | 2.32        | .782        | Low extent         |
| 4                 | The curriculum provides graduates with job skills through hands-on learning paired with competency assessments.                      | 195        | 2.46        | .846        | Low extent         |
| 5                 | The curriculum incorporated entrepreneurial training and interdisciplinary learning contents.                                        | 195        | 2.79        | .422        | High extent        |
| 6                 | Industry professionals contributed to the development of the curriculum which has flexibility with soft and entrepreneurship skills. | 195        | 2.91        | .601        | High extent        |
| 7                 | The curriculum equips students with both technical and soft skills (e.g., communication, teamwork).                                  | 195        | 2.12        | .894        | Low extent         |
| <b>Grand mean</b> |                                                                                                                                      | <b>195</b> | <b>2.61</b> | <b>.395</b> | <b>High extent</b> |

The result on Table 1 showed the relationship between curriculum management relevance in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria. From the results in the table, the respondent scored high extent on items 24, 25, 28, and 29 with mean response scores of 3.03, 2.60, 2.79, and 2.91 respectively. That is, there was a relationship between curriculum relevance for skill development and the training of skilled technology education graduates. While they scored low extent on items 26, 27, and 30 with mean response scores of 2.32, 2.46 and 2.12 respectively, indicating that there was a low relationship between curriculum relevance for skill development in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria.

However, the grand mean response score of 2.61 was higher than the cut off mean of 2.50, indicating that there was high extent of relationship between curriculum relevance for skill development in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria. But, the standard deviation ranges of .422 and .894, was small, and not widely dispersed, but clustered and close to the mean. This revealed that, the relationship between curriculum relevance for skill development in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria had a small variability and therefore homogeneous.

**Ho:** Curriculum management relevance in technology education has no significant influence on production of 21st-century skilled graduates in Federal Colleges of Education (Technical) in Nigeria at 0.05 probability levels.

**Table 2:** Relationship between curriculum management relevance in technology education and production of 21<sup>st</sup>-century skilled graduates

| Variables                                                    | N   | Mean | SD   | Df  | r    | P    | Remark      |
|--------------------------------------------------------------|-----|------|------|-----|------|------|-------------|
| Curriculum Management Relevance in Technology Education (X)  | 195 | 2.61 | .392 | 194 | .420 | .000 | High extent |
| Production of 21 <sup>st</sup> century skilled graduates (Y) | 195 | 2.50 | .34  | 194 | .420 | .000 | High extent |
|                                                              | 195 | 2.12 | .894 | 194 |      |      | Low extent  |
|                                                              | 195 | 2.61 | .395 |     |      |      | High extent |

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 2 showed a correlation coefficient of r-value = .420. This means that there was positive relationship between curriculum relevance for skill development in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria. Furthermore, the p-value of .000 was less than .05 level of significance for a two-tailed test; this indicated that the result was statistically significant. Thus, the null hypothesis was rejected and the alternative upheld. The result therefore, was that there was a significant positive relationship between curriculum relevance for skill development in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria.

### Discussion of findings

The result in Table 1 showed the respondents grand mean response score of 2.61 and SD = .392, which indicated that there was a high extent of relationship between curriculum relevance for skill development in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria. The result was in line with Bassey and Atan (2012) who stressed that technology education curriculum plays an important part in helping people to succeed in a range of technical and vocational disciplines. The PPMC result in Table 2 further revealed that curriculum relevance for skill development scores correlated positively with their respective scores on production of 21<sup>st</sup> century skilled graduates; with the correlation coefficient r-value of .420. This means that there was a moderate relationship between the two correlated variables in the positive direction. This implied that, to a moderate, production of 21<sup>st</sup> century skilled technology

education graduates depend on curriculum relevance for skill development in Federal Colleges of Education (Technical) in Nigeria. Furthermore, the r-value of .420 was found to be statistically significant at .05 probability level. The result, therefore, was that there was a significant moderate positive correlation between curriculum relevance for skill development in technology education and production of 21st century skilled graduates in federal colleges of education (technical) in Nigeria.

The result of the present study was in line with that of Okon and Yusuf (2023) who stated that curriculum relevance and the training of competent technology education graduates have a positive relationship, which was statistically significant. In like manner, Nwachukwu and Chidi (2022) study found a high positive relationship between institutional resources of curriculum resources and the competency levels in graduates ( $r = .70$ ).

### Conclusion

Considering the findings of the study, it was concluded curriculum relevance for skill development is important in equipping technology education graduates with proficient skills in Federal Colleges of Education (Technical) in Nigeria. Curriculum relevance for skill development demonstrated statistically significant positive relationships to the training outcomes of graduates.

### Recommendation

Regulatory bodies (e.g., NCCE) and curriculum developers should update the technology education curriculum periodically to reflect the changing demand in the industry and to align with the recent trends globally. Entrepreneurship, digital literacy and innovation, practical skills, and entrepreneurship should be instilled in the curriculum to enhance graduate relevance and employability.

Curriculum management is key to effective actualization of skill development in COEs therefore government should incorporate management curriculum and skills development.

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