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AN ASSESSMENT OF CURRICULUM AND MANPOWER DEVELOPMENT IN NIGERIA: THE KADUNA POLYTECHNIC EXPERIENCE, 2011-2024

Author(s)

Sani Abdullahi (PhD); Prof. Muhammadu Mustapha Gwadabe
Affiliation:
Nigerian Defence Academy, Kaduna; Ahmadu Bello University, Zaria
Email: walinkakuri2010@gmail.com; mmgkano@gmail.com

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Abstract

Curriculum development and manpower training are foundational to the role of tertiary institutions in national development. Kaduna Polytechnic, one of Nigeria's foremost polytechnics, has played a significant role in advancing technical and vocational education through structured curriculum innovation that feature contemporary global trends in technological advancement. Despite this, youth in Kaduna state and Nigeria in general, continues to battle with unemployment and lack of advanced skills to fit in national and internal industries. This paper therefore, examines the contributions of Kaduna Polytechnic to curriculum development and manpower capacity-building in Nigeria between 2011 and 2024. Utilizing documentary analysis, stakeholder interviews, and policy reviews, the study investigates how Kaduna Polytechnic has aligned its academic programmes with evolving industry needs, regulatory standards set by the National Board for Technical Education (NBTE), and the broader goals of national manpower development. The findings reveal that the institution has actively revised curricula, introduced new programmes, and contributed to national curriculum design efforts, particularly in technical and vocational fields. However, limitations persist due to bureaucratic inadequacies, insufficient funding, faculty capacity gaps, and weak linkages with industry stakeholders. Despite these challenges, Kaduna Polytechnic's commitment to curriculum development and its collaboration with the NBTE have driven incremental progress in manpower development in Nigeria.

Keywords: *Technical Education; manpower Development; curriculum; Kaduna Polytechnic.*

Introduction

Education is globally recognized as a powerful instrument of social change and national development.[1] It produces the skills and manpower needed for all national institutions to function properly. However, curriculum stands as the cornerstone of any educational system, shaping the intellectual, professional, and practical capacities of learners while simultaneously influencing the direction of national development.[2] As nations strive to build sustainable economies, develop robust human capital, and remain competitive in an increasingly globalized world, curriculum development becomes a critical tool that set nations on the radar of achieving desired goals. Curriculum development set the standard that enhances knowledge, skills, attitudes, and productivity of a nation's labor force to meet specific economic and developmental needs.[3]In Nigeria, where education is widely recognized as a strategic instrument for social and economic transformation, curriculum design and implementation have remained dynamic processes, shaped by technological innovations, global trends, and shifting developmental priorities. Within this context, technical and vocational education holds particular significance, especially in addressing the country's need for a skilled and employable workforce.[4]

Polytechnics, as a subset of Nigeria's tertiary education system, are mandated to address the need for middle-level technical manpower professionals that are vital to the functioning of industries, government services, and entrepreneurial sectors. Consequently, the Polytechnic education model is structured to combine theoretical knowledge and practical application, with a curriculum that is expected to be flexible, industry-driven, and competency-based.[5]In recognition of this, The National Board for Technical Education (NBTE), established as the regulatory body for Technical and Vocational Education and Training (TVET) in Nigeria, has provided a standardized framework for minimum curricular requirements in polytechnics while also encouraging institutions to innovate and contextualize their programmes.[6]

The Kaduna Polytechnic, one of Nigeria's premier technical institution established in 1956, has been instrumental in contributing to manpower development, producing graduates in diverse fields such as engineering, environmental studies, applied sciences, business, and technical education. Central to this contribution is the institution's continued focus on curriculum development and reform aligning its academic programmes with national priorities, labor market expectations, and global trends in education and technology.[7] Between 2011 and 2024, the Polytechnic has embarked on several strategic initiatives aimed at strengthening its curriculum and enhancing its role in manpower capacity building. These efforts were guided by a recognition that the existing models of education were no longer sufficient to meet the complexities of current economic and technological advancement. This study, therefore, seeks to critically assess the depth and effectiveness of Kaduna Polytechnic's curriculum development efforts, their impact on manpower training, and the broader implications for national development.

Conceptual Clarifications

Curriculum

The term curriculum has not yet lent itself to any universally accepted definition as experts have not yet fully agreed on its exact meaning. Definitions have however changed with time and have to a large extent, reflected varying conceptions. Curriculum is an instrument that dictates the affairs of every educational system in the school.[8] It is the vehicle through which knowledge and other learning activities are disseminated to the learners.[9]The common wealth of learning define curriculum as a composite whole including the learner, the teacher, teaching and learning, methodologies, anticipated and unanticipated experiences outcomes possible within a learning institution.[10] Onwuka defines Curriculum as "the entire body of courses offered by a school including the selection, organization and refinement of knowledge, understanding, attitudes, skills, values and behavior to be transmitted to the students.[11] From the definitions, it is pertinent to note that for a curriculum to be meaningful, it must take into cognizance, the learners and the environment.

The structures of the curriculum currently in use in the Polytechnic for all programmes consist of four semesters at the National Diploma and another four semesters at the Higher National Diploma Level.[12] This includes classrooms contacts, laboratories, and workshops activities in the institutions. At the National Diploma Level, there is the 3-4 months Supervised Industrial Work Experience Scheme (SIWES) which takes place at the second semester of the first year (few departments are exempted), also there is the mandatory one year industrial work experience scheme after the National Diploma programme, preceding the Higher National Diploma programme.[13] The curriculum presently use to achieve the aim of the Polytechnic education for both the ND and HND programmes are designed and handed over to the Polytechnics for implementation by NBTE.[14] It should be pointed out that while the courses so design to be implemented for the programmes, cannot be deleted by those implementing for any reason, the various programme managers are allowed through the local content committee to add to the courses after Academic Board of the polytechnic(s) have approved such addition.[15]

Curriculum Development

Curriculum development is a key educational process for educational developers of schools and higher education as it allows an educational course to be designed to meet defined needs. Curriculum development therefore refers to the organized and systematic planning, design, implementation, and evaluation of instructional content and learning experiences.[16] It involves harmonizing knowledge, skills, values, and attitudes that are required for national relevance and global competitiveness.[17] The term is also used to refer to improvement, change or modification on already existing educational programmes, as curriculum is never static.[18] However, in the context of this study, the term is used to refer to both implementation

process, review, improvement, modification, integration of new courses, as well as designing curricular for newly introduced programmes.

Overview of Kaduna Polytechnic

Kaduna Polytechnic is one of the premier institutions for technical and vocational education in Nigeria that offers a broad spectrum of accredited courses across engineering, science, technology, business, social sciences, and humanities.[19] It is located in Tudun Wada, Kaduna South Local Government Area, Kaduna State. The polytechnic emphasizes practical, hands-on training and research, supported by adequate facilities and governance structures, making it a key contributor to Nigeria's national development in technical education.[20] The institution was established with the objective of providing diverse instruction, training and research in technology, the sciences, commerce, the humanities and programmes of in-service instruction for members of the public service in Nigeria.[21]

The establishment of Kaduna Polytechnic was routed to the idea to start a Technical Institution in Northern Nigeria as far back as 1951. This desire resulted to the establishment of Kaduna Technical Institute in 1956.[22] The establishment of Technical Institute, Kaduna was as a result of the acceptance by the British Government on the recommendation of the Higher Education Commission, which suggested the upgrading of Yaba Higher College to Technical Institute and proposed Technical Institutes in Kaduna and Enugu.[23] The Northern Nigeria Executive Council at its meeting of 17th August, 1962, re-designated the Kaduna Technical Institute to Polytechnic. However, it became Kaduna Polytechnic through the Federal Government Decree No. 20 of 1968, which was revised in 1979 by Decree No. 79.[24] With the aid of the 1968 Decree, it amalgamated two training centres, namely; the College of Science and Technology and Staff Development Centre, with Survey Unit joining later. These formed the nucleus of its four- college structure then and in 1991, the institution was taken over by the Federal Government under Decree No. 40 of the same year.[25]

The Polytechnic is been considered as the largest technical institution in Africa.[26] It is a large institution in physical size and numerical strength of students and staff population and in the number of programmes it runs. Apart from its main campus located in Tudun Wada that hosted the College of Engineering (COE) and the College of Science and Technology (CST), the institution has three other satellite campuses that include Barnawa campus for the College of Environmental Studies (CES), Ungwa Rimi for the College of Business & Management Studies (CBMS), and an additional location in Sabon Tasha for College of Administrative Studies and Social Sciences (CASSS).[27] The Polytechnic is highly cosmopolitan with students from all over Nigeria and other countries. From a modest figure of 158 students in 1961, the polytechnic currently has over 25,000 students undertaking more than 138 programmes in 44 Academic Departments with a staff strength of about 4,963 (Academic and Non- Academic).[28]

Beyond its role in manpower development, the institution has been actively involved in shaping technical education through curriculum review, introduction of new academic programs, staff involvement in national curriculum committees, and strategic engagement with industry stakeholders. Between 2011 and 2024, the Polytechnic intensified its efforts in curriculum development, responding to emerging labor market needs, national education policies, and NBTE directives.[29]

NBTE Role and Core Subjects for National Diploma and Higher National Diploma

Established in 1977, the National Board for Technical Education (NBTE) is a parastatal under the Federal Ministry of Education, responsible for overseeing Technical and Vocational Education and Training (TVET) in the country. Its core mandate includes ensuring quality, relevance, and uniformity in the curricula and standards of National Diploma (ND) and Higher National Diploma (HND) programs in Nigeria's polytechnics, monotechnics, and technical colleges.[30]The board therefore plays a pivotal role in the design, regulation, and continuous development of the curriculum used in Nigeria's polytechnic system.

One of the most critical functions of NBTE is the responsibility of designing, approving, supervising the polytechnic to ensure proper implementation of standard curricula and periodic review of the National Minimum Standards (NMS) for all ND and HND programs.[31] Each polytechnic receives its programme curriculum from NBTE, with strict guidelines for implementation.[32] The board also design the structure of all programmes for the polytechnics. The structure of ND and HND programs includes general studies, professional courses, and practical training. While subjects may vary across disciplines (e.g., Engineering, Business Studies, ICT, or Environmental Sciences), certain core subjects are mandatory across most programs to ensure a well-rounded education.[33]

National Diploma (ND) Core Subjects

The ND forms the first stage of polytechnic education and is typically two years in duration (4 semesters, 2 academic session). It aims to equip students with practical and theoretical knowledge necessary for lower and middle-level employment or progression to the HND level.[34] Structure and Content of the ND core subject includes General Studies (GNS) that comprises, English language, communication skills, mathematics, citizenship education, and entrepreneurship; Core/Professional Courses that are discipline specific; Practical/Laboratory work that Emphasizes on hands-on training and Industrial Training (SIWES), which is a 3-4 months of supervised industrial attachment after the first year.[35]

Higher National Diploma (HND) Core Subjects

The HND curriculum is the second stage and a continuation of the ND programme, with a more specialized and advanced approach to the discipline. Like ND, the HND programme is also structured to be completed within two years which is spread across two academic session with four semesters.[36] The programme core subject breakdown include Advanced Core Courses (In-depth, specialized knowledge within the discipline), Entrepreneurship Development to enhance focus on self-employment, Independent research project, Seminars/Presentations to enhance communication and analytical skills, as well as Industrial Training in some cases, especially in science and technology.[37]This structure ensures that the curriculum remains nationally standardized while retaining institutional adaptability.

Process of Curriculum Development

Curriculum development is a complex way of building and expanding a course taught in an institution. The process of curriculum development in the Nigerian polytechnic system, particularly for improving existing curriculum, is a structured and collaborative effort aimed at aligning educational programs with national goals, industry needs, and global standards.[38] It involves multiple stakeholders including the National Board for Technical Education (NBTE), polytechnic institutions, industry partners, and academic staff.[39] The framework for curriculum expansion is broad and includes various stages of namely, needs assessment and analysis, content selection and review, curriculum redesigning and development, pilot testing, implementation and evaluation.

Needs Assessment and Analysis

The needs assessment and analysis serves as the foundational stage in curriculum development, which identifies the educational, occupational, and societal needs that the curriculum must address. It is a systematic process of identifying and evaluating gaps, outdated content, and areas for improvement in the existing curriculum to ensure it meets current educational, industrial, and societal demands.[40] The process is being conducted by NBTE's Academic Planning department through the Research and Statistics unit in liaison with educators and industry stakeholders, to gather data on manpower demands. This constitutes examining the skills, knowledge, and attitudes required in the workforce and comparing them with the existing capabilities of students and graduates.[41] It also includes the interpretation and prioritization of the data gathered as well as determining the extent and urgency of identified needs, which guides the curriculum's structure, content, and delivery methods.

Content Selection and Review

As the second stage in curriculum development, content selection and review refer to the systematic process of choosing, evaluating, and refining the identified skills, and values to be

included in the curriculum to ensure it meets educational goals, learner needs, and societal expectations. In this process, experts including members of the needs assessment, educators and curriculum officers use the report of the needs assessment exercise to revise existing course content, select relevant topics and materials from the new set goal ensuring the curriculum is competency-based, learner-centered, and reflects current industry practices.[42]

Curriculum Redesigning and Development

Following the report of the Needs Assessment and Content Selection Committees, the Curriculum Review Committee performs its duties by critically analyzing the identified skill gaps, industry demands, and recommended course content to determine the necessary updates or redesigns required for the existing curriculum. The committee synthesizes these inputs to ensure alignment with national occupational standards, technological advancements, and labor market expectations. It then drafts a revised curriculum structure, ensuring the integration of relevant theoretical knowledge, practical competencies, and contemporary teaching methodologies.[43] After initial drafting, NBTE organizes national workshops where academics, COREN (particularly for engineering), industry professionals and regulatory bodies are engaged to validate the curriculum's relevance and quality before producing the final draft for approval and subsequent implementation across polytechnic institutions.[44]

Pilot Testing

Pilot testing is conducted after the curriculum review and approval processes to evaluate the practicality, effectiveness, and relevance of the newly developed curriculum in real educational settings. It involves implementing the curriculum on a small scale in selected polytechnics or departments, where feedbacks are collected from lecturers, students, and industry partners regarding content delivery, resource adequacy, teaching methods, and assessment strategies.[45] This is being carried out to identify strengths, gaps, and unforeseen challenges in implementation. The results of the pilot test are analyzed by the curriculum review committee to make final adjustments or improvements, ensuring the curriculum is fully functional, responsive to industry needs, and suitable for wider adoption across all relevant institutions.

Implementation

With successful pilot testing and final approval of the revised curriculum, NBTE make preparation for immediate implementation, marking the transition from planning to actual practice. This stage involves the dissemination of the finalized curriculum to all relevant departments, training of academic staff on new content areas and pedagogical approaches, and the provision of necessary instructional materials and infrastructure.[46] Institutions align their academic calendars, course outlines, and assessment plans with the

new curriculum, while monitoring mechanisms are established to track progress and address emerging challenges. Effective implementation ensures that the intended learning outcomes are achieved and that students acquire the competencies required for industry relevance and national development.

Although NBTE is in charge of curriculum development and do not permit any removal or alteration of core courses, it's important to note that the board recognizes the importance of local and industry-specific needs, hence, it allows for limited curricular flexibility through a mechanism called the Local Content Committee. This provision empowers programme managers within institutions to propose and introduce additional courses relevant to their local or institutional context provided these additions are vetted and approved by the Academic Board of the respective polytechnic.[47] This is done in collaboration with industry stakeholders, professional bodies, and academic experts to ensure that the curricula remain relevant and responsive to changing technological and labor market demands.[48] These standards form the backbone of the polytechnic curriculum and are revised every five years to reflect advancements in technology, evolving industry expectations, and national manpower needs.[49] Through this review process, NBTE ensures that the curriculum remains responsive to both local and global labor market changes.[50] It also fosters innovation at the grassroots level, encouraging departments to respond to new trends or emerging sectors within their regions.

Contributions of Kaduna Polytechnic to Curriculum and Manpower Development

Kaduna Polytechnic has been recognised as one of the frontline technical institutions in Nigeria that have been participating in curriculum development processes aimed at aligning its programmes with global best practices, evolving technological and industrial needs and national development goals.[51] As established earlier, curriculum development in Nigerian polytechnics is under the purview of the National Board for Technical Education (NBTE). As a designated pilot institution that operates within this framework, Kaduna Polytechnic implemented reforms aimed at transitioning the polytechnic curriculum from a rigid content-based system to a flexible, outcomes-based and industry-relevant structure. Since 2011, the institution has emerged as a powerhouse in Nigeria's curriculum development landscape through its strategic involvement in NBTE's effort to overhaul the existing curriculum in line with global standards.[52] This strategic participation has guided the institution to achieve curriculum development through the following:

Integration of New Innovations: Kaduna Polytechnic was involved in NBTE's effort of integrating the National Vocational Qualifications Framework (NVQF) and the Competency-Based Training (CBT) system. The Polytechnic was among five institutions selected to test-run the revised CBT curriculum in engineering, science and business fields, starting from 2012. This pilot phase formed the basis for NBTE's broader adoption of competency-based approaches

across the national polytechnic system by 2015.[53] NBTE reported in 2014 that Kaduna Polytechnic demonstrated high curriculum adaptability and institutional readiness for CBT implementation, outperforming some of its peers in both assessment and student performance metrics.[54] The Polytechnic's curriculum also incorporates entrepreneurship education, which empirical studies have shown to significantly influence students' subjective norms and entrepreneurial intentions. This integration fosters a mind-set of self-reliance and job creation among students, directly impacting curriculum content and pedagogical approaches.

Internal Curriculum Review Processes: The polytechnic integrates research findings and innovations into curriculum design, ensuring that academic programmes remain relevant and cutting-edge. Its research, innovation, intellectual property, and technology transfer policy explicitly states that research activities inform and enhance curriculum delivery, which helps maintain high academic standards and technological relevance.[55] Although NBTE is solely responsible for providing curriculum for all programmes in the polytechnics, efforts were made by Kaduna Polytechnic that led to the adjustment, domestication and improvement of the curriculum to contemporary global development and on the mandate of the institution and society without violating the NBTE rules. Each academic department regularly reviewed its programmes in line with NBTE's revised minimum standards. The Department of Agricultural Engineering, for instance, redesigned its ND and HND curricula to incorporate local technologies such as solar irrigation, post-harvest processing, and climate-resilient farming tools, earning national recognition from NBTE in 2022.[56] Similarly, the department of engineering has summarized the theoretical aspect of its curriculum and expanded the practical aspect, making it a 50-50 approach instead of the 70-30 provided by NBTE, which will make students to be technically more grounded in all aspects.[57] Rufai further states that:

> There have been continuous efforts by the polytechnic to equip students with emerging real life skills. Some of these initiatives are locally implemented before they later become incorporated by NBTE if found worthy. For instance, Kaduna Polytechnic was the first technical institution to introduce technical report writing, and it was through its recommendation that NBTE adopted it as part of the minimum requirement for all polytechnics. The report writing was initiated to equip students with academic writing skills, otherwise known as research methodology. Moreover, the first book written to guide technical report writing for polytechnics was drafted by Engr Yusuf from Kaduna Polytechnic.[58]

In another instance, the polytechnic was reported to have introduced a new course known as Solar Energy Technology (SET) to students of electrical engineering, particularly those at HND level. The course was introduced to educate students and equip them with solar energy technology in line with the global development of renewable energy science and technology. Unlike other courses initiated, SET remain a locally designed course as NBTE has not incorporated in its curriculum yet.[59]

Initiating new programmes: The Polytechnic has remained at the forefront of introducing new academic programmes in response to evolving industry demands. Notably, it became the first institution in Nigeria to offer the National Diploma in Railway Engineering Technology, following approval by the National Board for Technical Education (NBTE) in 2020. As the institution that initiated the idea of Railway Engineering Technology, Kaduna Polytechnic was granted permission by the NBTE to develop the programme's academic structure, which subsequently served as the basis for designing its curriculum.[60] Engr Malami states that:

> Kaduna Polytechnic played a central role in the development of the curriculum for Railway Engineering Technology. As the programme's initiator, the institution designed its academic structure and participated in the design, assessment and development of a standardised curriculum. Following strategic negotiations with the Nigerian Railway Corporation (NRC), Kaduna Polytechnic secured permission from the National Board for Technical Education (NBTE) to commence the programme and obtained accreditation. The negotiations also enabled the Polytechnic to secure access to the NRC Research Centre in Zaria for use as a practical workshop, thereby providing the facilities required for the effective delivery of the programme.[61]

Additionally, the polytechnic pioneered Gas Engineering courses in Northern Nigeria, aligning its offerings with national infrastructural and energy needs. It further introduced new National Diploma (ND) and Higher National Diploma (HND) programmes in renewable energy, automation, and mechatronics engineering.[62]

Industry-Curriculum Integration: Between 2016 and 2020, Kaduna Polytechnic initiated a series of curriculum-industry interface programs under its Centre for Technology Innovation and Curriculum Development (CTICD). These efforts ensured direct industry participation in course design, including: Partnership with Kaduna Refining and Petrochemical Company (KRPC) and Peugeot Automobile Nigeria (PAN) to review mechanical and automotive modules; introduction of short-term modular skill courses on welding, mechatronics, and CNC machining, which were absorbed into the broader HND curriculum after 2018.[63]

Contribution to National Curriculum Committees: Staff from Kaduna Polytechnic, notably from the Schools of Engineering and Environmental Studies, played leading roles in NBTE's national curriculum review exercises. Between 2015 and 2022, over 20 Kaduna Polytechnic lecturers were appointed as NBTE curriculum resource persons for the revision of: Civil Engineering (2017), Building Technology (2018), Entrepreneurship Education (2019), Quantity Surveying (2021) and Automotive Engineering Technology (2021).[64] These reviews introduced practical project-based learning components and updated software integration into the curricula. Malami claims that:

> Automotive Engineering Technology was initially suspended by the National Board for Technical Education (NBTE) because the programme did not meet the required standards. Following sustained efforts by Kaduna Polytechnic, the NBTE agreed to lift the suspension subject to a curriculum review. Two lecturers from the Department of Mechanical Engineering, including the respondent, were selected to serve on the curriculum review committee. Following the completion of the review process and the implementation of the recommended revisions, Kaduna Polytechnic promptly resumed the programme.[65]

Bridging Theory and Practice through Industrial Attachment: A key feature of Kaduna Polytechnic's curriculum is the incorporation of the Supervised Industrial Work Experience Scheme (SIWES), which provides students with hands-on experience in real industrial settings. This practical component is critical in curriculum development as it informs continuous curriculum adjustment to meet actual workplace demands. Feedback from SIWES placements is used to refine course content, ensuring that technical education remains responsive to technological advancements and industry needs.[66]

Challenges of Curriculum Development in Kaduna Polytechnic

Curriculum development in Kaduna Polytechnic, as in many Nigerian polytechnics, faces numerous challenges that impede the effective delivery of technical and vocational education. These challenges span institutional bureaucracy and limited autonomy, funding constraints, infrastructural deficit, and systemic policy instability.

Institutional Bureaucracy and Limited Autonomy

One of the major challenges confronting curriculum development at Kaduna Polytechnic is institutional bureaucracy. Although the National Board for Technical Education (NBTE) guidelines recommend periodic curriculum reviews, ideally every five years, to ensure responsiveness to technological and industrial developments, such reviews at Kaduna Polytechnic and other Nigerian polytechnics have often been irregular, with some extending beyond a decade. This has contributed to curricular gaps and reduced responsiveness to changing industry requirements. While the NBTE permits polytechnics to undertake internal adjustments to existing curricula, substantial modifications require formal approval from the Board. The hierarchical and often protracted approval process can therefore constrain timely curricular adaptation to emerging technologies and evolving labour-market needs. Furthermore, although Kaduna Polytechnic maintains relationships with relevant industries, the institutional mechanisms for translating industry feedback into timely curriculum revisions remain limited. Weak feedback loops between the Polytechnic and industry consequently constrain the institution's capacity to align curriculum content with technological innovation and changing workforce requirements.[67]

Funding Constraints

The development of effective curricula requires significant financial resources for research, stakeholder engagement, training, and pilot testing. Kaduna Polytechnic, like many Nigerian public tertiary institutions, suffers from chronic underfunding. Financial limitations affect the ability to conduct needs assessments, involve consultants or industry experts, and train faculty in emerging areas like Artificial Intelligence, mechatronics, and renewable energy.[68] For instance, the polytechnic and its counterpart in Nigeria received an average of ₦1.17 billion each, which is less than allocations to universities and colleges of education.[69] This disparity has affected infrastructure development, staff welfare, and overall institutional growth. Malami states that:

> Funding constitutes one of the major challenges confronting Kaduna Polytechnic and has, in several instances, contributed to delays in securing full accreditation for academic programmes. Inadequate funding limits the institution's capacity to provide the facilities, equipment and infrastructure required to satisfy accreditation standards. The experience of the Railway Engineering Technology programme provides a clear illustration of this challenge. Owing to financial constraints, the Polytechnic was unable to procure the machinery, tools and other equipment required to establish the laboratory and workshop facilities necessary for the programme. Consequently, students admitted into the programme were reportedly compelled to wait for almost two years before they could continue their studies. The experience demonstrates how inadequate funding can impede the timely development of essential infrastructure, delay programme implementation and ultimately disrupt students' academic progression.[70]

Infrastructural Challenges

Kaduna Polytechnic's institutional environment presents significant barriers to curriculum development, particularly in terms of facilities and equipment. The fast pace of technological advancement creates a persistent lag in curriculum relevance. Kaduna Polytechnic struggles to integrate new technologies into its syllabi due to a lack of up-to-date equipment and qualified personnel. For instance, while 3D printing, automation, and data analytics are revolutionizing global industries, many programmes in the polytechnic remain focused on outdated technologies and techniques.[71]

Moreover, the tools and equipment available are insufficient to cater to the large student population, resulting in limited access and reduced hands-on experience per student. The lack of adequate workstations means students cannot perform individual practical tasks effectively, diminishing the curriculum's practical component. In addition, there is a notable

absence of proper maintenance culture within the polytechnic, leading to rapid deterioration of existing equipment and facilities. This neglect further compounds the problem of outdated resources and disrupts the continuity of practical instruction.[72]

Political and Policy Instability

Frequent changes in national education policies and political interference have hindered consistent curriculum development. Changes in government often result in new directives, funding reallocations, or shifts in national priorities without continuity. The recent effort by the government to transform polytechnics into city universities or integrate them into university systems is a clear example of policy instability that has created uncertainty and adjustment challenges. These reforms affect curriculum development processes, staff morale, and institutional focus.[73]

Conclusion

From the foregoing, it can be deduced that Kaduna Polytechnic has solidified its position as a dynamic institution dedicated to advancing technical and vocational education in alignment with national development goals. Through regular curriculum reviews that integrate emerging technologies, industry requirements, and entrepreneurial skills, the polytechnic ensures its programs remain globally relevant and responsive to evolving economic demands. Furthermore, Kaduna Polytechnic has prioritized manpower building by fostering a skilled workforce through strategic initiatives like the Supervised Industrial Work Experience Scheme (SIWES), which bridges the gap between theoretical knowledge and practical application, significantly enhancing graduates' employability and industry readiness. Empirical evidence from the study highlights that these curriculum development efforts, coupled with robust entrepreneurship education, empower students with the competencies needed for self-reliance and job creation. Despite challenges such as funding constraints and infrastructural limitations, the polytechnic's proactive governance, participatory curriculum committees, and collaboration with national bodies like the NBTE have sustained its leadership in technical education and manpower development, positioning it as a cornerstone for producing skilled professionals who contribute to national and regional growth.

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