

MAXIMIZING INFORMATION AND COMMUNICATION TECHNOLOGY TO ADVANCING POLYTECHNIC EDUCATION IN NIGERIA

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ABSTRACT

The Polytechnic education system in Nigeria needs to be broad-based to meet or surpass positively the specified guidelines of 70:30 ratio for technology-based courses and management courses set by the National Board for Technical Education. This paper explores ways by which the Polytechnic system can effectively achieve the challenge by maximising the potential of Information and Communication Technology in advancing the Polytechnic education, making it more relevant to national development and industrially useful, and also provides a guide through curriculum development for the courses proposed. The need for a radical approach for course development and a shift from tradition is canvassed by this paper. The paper ends by suggesting the scrapping of humanities and social science courses within the Polytechnic system.

Keywords: *Information and Communication Technology, Polytechnic Education, National Board for Technical Education,*

INTRODUCTION

The National Board for Technical Education (NBTE), Nigeria's regulatory body for technical education, caused significant disruption in the polytechnic sector in 2006, as several courses, particularly within the School of Management Studies, faced de-accreditation. The main reasons given were carrying capacity, the lop-sided ratio of science and technology-related courses to management courses, and inadequate equipment and tools. This has caused great concern in the sector, leading to some institutions stopping some programmes.

Worldwide, technical education is very expensive, and there is no shortcut to it. Education systems should look into strategies for meeting today's learning requirements with technology. Modes of delivery and the teaching methods must be made flexible (Gulati, 2008). Learning opportunities should be made available throughout the lifespan (Ainscow & Miles, 2008). Modular techniques, whereby the students need to purchase those services in which they are interested or in which their employers require, should be developed. Students view technology as a tool to enrich learning, seeing or experiencing cyber-communications. The pedagogy and techniques in our teaching curriculum need to be revised. The knowledge-based economy requires students who have the capacity to think. Things change very fast, and they should be able to learn and relearn in order to remain competitive. The situation must be approached from a radical approach whereby science and technology form the core of all courses offered at the Polytechnic sector. The system must strive to produce graduates who are relevant to the industries and can contribute meaningfully to the nation's growth (Timperley & Alton-Lee, 2008).

INFORMATION AND COMMUNICATION TECHNOLOGY

Maximizing the potential of Information and Communication Technology (ICT) is crucial for addressing key national challenges, including the enhancement of education, rural development, and poverty alleviation. Research efforts must focus on designing, testing, and refining innovative ICT-driven strategies that can be applied effectively in educational and socio-economic contexts. ICT serves as a fundamental infrastructure for both economic and social development, particularly as information-based economic activities continue to expand. It functions as the central nervous system of modern societies, facilitating the transmission, processing, and coordination of information across different sectors and institutions. By strategically integrating ICT into education and development programs, polytechnics and other tertiary institutions can enhance learning outcomes, support regional development, and contribute significantly to national technological and economic advancement (Ariyo, 1999).

INCREASE USE OF ICT

The integration of Information and Communication Technology (ICT) into polytechnic education is critical for enhancing teaching, learning, research, and institutional management (Kozma, 2005). ICT infrastructure must be strengthened to support modern methodologies such as e-learning, e-governance, and the creation of digital academic communities, ensuring that students and staff can access and share knowledge efficiently (Gulati, 2008). The ratio of computers to students should be significantly improved to provide adequate hands-on experience, while virtual libraries and digital repositories should be developed to facilitate research, information exchange, and continuous learning. By embedding ICT across all aspects of polytechnic operations, institutions can foster a technologically proficient workforce, promote innovative teaching practices, and strengthen their role as engines of national development (Roth and Denisha, 1996).

COMMUNICATION SKILLS

A modern education system must equip students with strong communication skills, ensuring they can articulate ideas clearly, collaborate effectively, and engage confidently in diverse professional settings. Mastery of the English language, along with competence in additional languages, provides students with a competitive advantage in an increasingly interconnected and globalized world. Strong communication skills not only enhance employability but also enable graduates to participate meaningfully in international discourse, negotiations, and collaborations, thereby contributing to both personal and national development. Integrating communication training into polytechnic curricula, alongside technical and practical skills, is therefore essential to produce well-rounded graduates capable of thriving in global industries and knowledge-driven economies.

EMPHASIS ON SCIENCE AND TECHNOLOGY

The rapid economic transformation of the Asian Tigers, including Malaysia, Singapore, and South Korea, has been largely attributed to their strong and sustained investment in science and technology (Wong & Singh, 2008; Wong Ho & Singh, 2007; Daquila, 2002). These countries have deliberately structured their educational and industrial policies to prioritize scientific knowledge, technological innovation, and skills development as the foundation for economic growth. For instance, Malaysia's strategic objective of ensuring that a significant proportion of students in higher education pursue science and technology-related programmes highlights the importance of building a technically competent workforce. In this context, meaningful progress in Nigeria requires a deliberate reorientation of the Polytechnic system toward predominantly science-based education.

Further insight can be drawn from the experience of China, whose remarkable economic rise has been driven by well-articulated policies on science and technology. The "Decision on Accelerating Scientific and Technological Progress" (National Affairs, 1995) outlines key strategic priorities, including the recognition of science and technology as primary productive forces across all sectors, the advancement of technological innovation in agriculture and industry, the development of high-technology industries, and the strengthening of basic research. Additional emphasis is placed on restructuring science and technology management systems, investing in human capital development, increasing funding through diverse channels, promoting international collaboration, and ensuring strong governmental support and coordination.

The outcomes of these policies are evident in China's global industrial presence, where its products compete across virtually all sectors of the world economy. This demonstrates the transformative impact of embedding

science and technology into national development strategies. For Nigeria to achieve similar progress, science and technology must be integrated into all aspects of national life, particularly within the education system.

The realization of an industrialized economy is closely tied to the adoption of information and communication technology-driven education. This requires increased enrolment in science-related subjects at the secondary school level, supported by the availability of qualified and competent teachers (Paten et al. 2004; Desha et al., 2007). Equally important is the early introduction of science education at the primary school level to stimulate interest, curiosity, and long-term engagement in scientific disciplines, as emphasized by Townsend (1998). Through these measures, a strong foundation for technological advancement and sustainable economic development can be established.

POLYTECHNICS' PRODUCTS AND CURRICULUM UPDATE

Over the years, the Polytechnic system in Nigeria has largely mirrored the university system, leading to the widespread perception that Polytechnics are merely adjuncts of universities. Universities are traditionally known for producing graduates who are strong in theoretical knowledge, which may include both practical and abstract concepts, whereas Polytechnic graduates are trained to translate theory into practical applications, such as construction, installation, and operational implementation. This distinction underscores the Polytechnic's unique role in fostering applied skills and technical competence.

For Polytechnics to meet contemporary industrial demands, there is a pressing need to update curricula and reorient course offerings, particularly in management and technology disciplines. Management courses, for example, should integrate science and technology principles, emphasizing innovation, problem-solving, and technical application rather than purely theoretical instruction. Such a shift is necessary to produce graduates who are immediately employable, equipped with the practical skills required to navigate complex industrial environments, and capable of contributing to national development.

The global labour market increasingly favours graduates who combine theoretical knowledge with practical competence, often leading employers to prefer candidates trained abroad. By modernizing curricula, aligning programmes with industry needs, and reinforcing the science and technology foundation of all courses, Polytechnics can bridge this gap. This transformation will ensure that Polytechnic graduates are not only competitive but also capable of addressing local technological challenges, supporting industrial growth, and advancing the nation's technological self-reliance.

CURRICULUM AND EMERGING DEPARTMENTS

The curriculum at all levels of Polytechnic education requires comprehensive revision, with clear benchmarks established to ensure alignment with contemporary industrial and technological demands. It must be designed to equip students with practical, transferable skills, enabling them to apply theoretical knowledge effectively in real-world contexts (Kenneth, 2008). Curriculum development should build upon existing syllabi but undergo thorough review and updating to reflect current trends, innovations, and the rapid pace of technological advancement. This approach ensures that graduates are not only academically competent but also industry-ready, capable of meeting the evolving needs of the workforce and contributing meaningfully to national development.

In line with the drive for technological modernization, Polytechnics should establish a dedicated School of Information and Communication Technology, modelled similarly to General Studies in scope and structure. This proposed school is intended to replace the existing School of Management Studies and would serve as a hub for advancing digital literacy, computational skills, and technology-driven management practices. Properly equipped, this school would support other departments within the Schools of Science and Technology, fostering interdisciplinary collaboration, enhancing research capacity, and facilitating practical training aligned with the needs of modern industries.

The establishment of the School of Information and Communication Technology would position Polytechnics at the forefront of technological education, bridging the gap between academic learning and industry application, while ensuring graduates are highly competent in emerging fields critical to Nigeria's economic and technological growth.

PROPOSED COURSES AND CURRICULUM ENHANCEMENT

To ensure Polytechnic education aligns with the demands of a modern, technology-driven economy, a suite of interdisciplinary courses is proposed that integrates Information and Communication Technology (ICT) with key business and technical disciplines. These courses include Computer Science with Accounting, Business Administration, Marketing, Banking and Finance, Insurance, Electronics, and Statistics, as well as Information Technology with Accounting, Business Administration, Marketing, Banking and Finance, and Insurance. Such combinations are designed to produce graduates who are not only technically proficient but also equipped with practical skills relevant to industry, enhancing employability and entrepreneurial potential.

Beyond ICT-focused programs, courses across other schools should be systematically restructured to increase industry relevance. Proposed technical programs include Electro-Mechanical Engineering, Aeronautics Engineering, and Off-Shore Engineering, reflecting the need for graduates capable of addressing specialized and emerging technological sectors. These programs should emphasize practical training, problem-solving, and the application of scientific principles to real-world challenges, ensuring Polytechnics remain key drivers of national technological development.

The integration of ICT into all areas of study is critical for maximizing the benefits of the Polytechnic system. ICT not only facilitates learning and knowledge dissemination but also reshapes societal interactions and relationships with the environment. As Hargroves and Smith (2005) observe, the environment is shaped by the profound interplay between matter, nature, and society, and ICT introduces innovative ways of living within a more interconnected society, reducing dependency on material resources and transforming human engagement with natural systems. By embedding ICT deeply into curricula, Polytechnics can enhance learning outcomes, foster innovation, and support sustainable technological and industrial growth.

INFRASTRUCTURAL AND MANPOWER DEVELOPMENT

Currently, most federal and state Polytechnics possess a basic level of infrastructure and equipment, which in some cases surpasses that of certain universities actively producing graduates. However, significant investments are still required to upgrade and expand facilities to meet the demands of modern, technology-driven education. Well-equipped laboratories, workshops, ICT centers, and specialized training facilities are essential to ensure that students acquire practical skills that align with industry standards and national development goals.

Equally critical is the development of human capital. The remuneration and working conditions of academic staff must reflect the increasing demands and responsibilities associated with modern Polytechnic education. With the rapid expansion of sectors such as telecommunications through GSM technology and the consolidation of the banking industry, opportunities in business and other high-paying professions are attracting talented individuals away from teaching. This trend threatens the quality of education, as the caliber of students is closely linked to the expertise and commitment of their instructors.

To attract and retain highly qualified teaching staff, competitive salary structures, professional development opportunities, and incentives must be instituted. Ensuring that educators are adequately rewarded and supported will not only enhance teaching quality but also inspire students to engage fully with their studies. In turn, this creates a virtuous cycle, producing skilled graduates capable of driving technological innovation, industrial growth, and sustainable economic development. Strengthening both infrastructure and human resources is therefore indispensable for the Polytechnic system to fulfil its mission as a cornerstone of national technological advancement.

CONCLUSION

The anticipated reforms in the education sector, particularly within Polytechnics, are long overdue. Transforming Polytechnics into fully technology-driven institutions is no longer optional but an imperative for national development. For this transformation to be effective, regulatory bodies must recognize and respond to the dynamic and rapidly evolving global landscape, ensuring that Polytechnics are equipped with modern infrastructure, state-of-the-art laboratories, and well-resourced learning environments. Equally important is the investment in human capital. Adequate funding must be directed toward the recruitment, retention, and continuous professional development of academic staff to meet the demands of a technologically oriented curriculum. By aligning resources, policy, and strategic planning with the needs of industry and emerging technological trends,

Polytechnics can produce graduates who are skilled, innovative, and capable of driving economic growth. Ultimately, the modernization of Polytechnic education will position these institutions as key drivers of technological advancement, industrial development, and sustainable national progress. A deliberate and sustained commitment from government, regulatory bodies, and industry stakeholders is essential to ensure that Polytechnics fulfil their potential as engines of innovation, practical knowledge application, and workforce empowerment in Nigeria and beyond.

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