

# Industrial Education in Nigeria: Trends, Challenges, and Prospects for National Development

**Benjamin Kolawole Awoniyi**

Department of Adult and Continuing Education  
Faculty of Education, University of Ilesa, Ilesa, Osun State

**Adedolapo Oluwadamilola Awoniyi**

University of Ibadan

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**Abstract:** *Industrial education in Nigeria represents a vital framework for equipping individuals with the knowledge, technical skills, and practical competencies necessary to drive industrialisation and national development. It combines vocational training with broader socio-economic objectives, bridging the gap between theoretical learning and workplace demands. This review synthesises literature on the historical evolution, current state, challenges, and prospects of industrial education in Nigeria. Historically rooted in indigenous apprenticeship systems, industrial education expanded under colonial rule and was later formalised through post-independence policies such as the National Policy on Education. Despite these efforts, the sector continues to grapple with significant challenges, including outdated curricula, poor funding, weak institutional linkages with industry, and negative societal perceptions that diminish its appeal. These barriers have contributed to skill mismatches and persistent unemployment among graduates. However, opportunities abound in curriculum reform, integration of digital skills, public-private partnerships, and the adaptation of international best practices, as demonstrated in models from Germany, South Korea, and Japan. Strengthening collaborations between schools and industries and ensuring policy consistency supported by sustainable funding are essential to reposition industrial education as a driver of economic growth. If effectively reformed, industrial education has the potential to reduce unemployment, foster entrepreneurship, enhance technological innovation, and contribute significantly to achieving the Sustainable Development Goals. The review concludes that industrial education, when properly aligned with industry needs, is indispensable for Nigeria's socio-economic transformation and global competitiveness.*

**Keywords:** industrial education, vocational training, curriculum reform, workforce development, public-private partnership

## INTRODUCTION

Industrial education refers to the systematic instruction and training provided to individuals to equip them with the knowledge, technical skills, and practical competencies required for participation in industrial activities and technological advancement. It is rooted in the idea that education must not only provide theoretical knowledge but also empower learners with practical expertise that can be applied in the world of work. Industrial education combines aspects of vocational and technical education with broader economic and social goals, ensuring that individuals are prepared to meet the demands of the industrial sector. In essence, it encompasses training in trades, crafts, applied sciences, engineering, and technology-driven skills, all of which are vital for sustainable national growth and productivity (Olaitan, 2016). This makes industrial education a central pillar in human capital development, since it bridges the gap between schooling and the workplace.

The relevance of industrial education to socio-economic development cannot be overstated, particularly in countries grappling with unemployment, poverty, and technological underdevelopment. A workforce trained through industrial education contributes significantly to reducing youth unemployment, which remains a pressing issue in Nigeria. Moreover, industrial education supports entrepreneurship by equipping individuals with hands-on skills that can be used to establish small and medium-scale enterprises, thereby contributing to poverty reduction and economic diversification. The multiplier effect of this form of education lies in its potential to improve livelihoods, reduce dependence on foreign expertise, and drive industrialisation processes that are necessary for economic stability and global competitiveness (Ayonmike, Okwelle & Okeke, 2015).

Globally, industrial education has evolved as a strategic response to the challenges of industrialisation and technological advancement. Developed nations such as Germany, Japan, and South Korea have successfully harnessed industrial education to achieve rapid economic growth. For instance, Germany's dual system of vocational education integrates classroom learning with practical industry training, producing a workforce that meets industry standards and demands. In South Korea, industrial education has been aligned with national industrial policies, resulting in a skilled workforce that propelled the country from a low-income nation to one of the world's leading economies within a few decades. These global contexts demonstrate that industrial education, when properly integrated into development policies, is a catalyst for industrial competitiveness, technological innovation, and socio-economic transformation (World Bank, 2020).

In the Nigerian context, however, industrial education faces numerous challenges that limit its effectiveness in driving development. Although policies such as the National Policy on Education emphasise the importance of vocational and technical training, poor implementation, inadequate funding, and societal perceptions that undervalue technical education hinder its success. Many Nigerians still consider industrial and

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vocational education inferior to traditional academic pathways, resulting in low enrolment and limited prestige for technical institutions. Furthermore, the gap between school curricula and industry needs continues to widen, producing graduates who often lack the practical skills required in the labour market. This disconnect has fuelled unemployment and underemployment, even as industries lament the shortage of skilled labour. Nonetheless, Nigeria holds significant potential to reform its industrial education system by learning from global models and adapting them to its local context. If prioritised, industrial education could play a transformative role in fostering sustainable economic development and positioning Nigeria on a path toward industrialisation (Uwaifo, 2020).

### **Historical Evolution of Industrial Education in Nigeria**

The historical evolution of industrial education in Nigeria reflects a complex trajectory shaped by traditional practices, colonial policies, and post-independence reforms that sought to align education with the country's industrial and economic development needs. In the pre-colonial era, industrial education was largely informal and community-based, primarily carried out through apprenticeship systems. Young people were trained in crafts, trades, and occupations such as blacksmithing, carpentry, weaving, pottery, and leatherwork. These apprenticeships were organised under master craftsmen who provided both technical skills and moral guidance, ensuring that learners developed competence and character necessary for societal integration. Industrial training during this period was practical and skill-oriented, with knowledge transmitted orally and experientially. Scholars have noted that apprenticeship systems were effective in sustaining local industries and equipping young people with the skills to be self-reliant within their communities (Okafor, 2018). This form of industrial education was deeply rooted in culture and sustained intergenerational knowledge transfer.

The advent of colonialism in Nigeria introduced a new dimension to industrial education. The British colonial administration recognised the economic benefits of vocational training, especially in preparing manpower to serve colonial interests. Consequently, vocational and trade schools were established, primarily to train artisans, technicians, and clerks who could work in colonial industries, railways, and public service. However, the focus of these schools was narrow and often subordinated to the needs of the colonial economy rather than the holistic development of indigenous industries. For instance, trade schools in Yaba and Enugu provided training in carpentry, masonry, and mechanical works, but their graduates were often channelled into low-level administrative or technical roles within colonial enterprises (Uwaifo, 2020). Moreover, colonial education policies tended to elevate literary and clerical education over vocational and industrial training, thereby creating a perception that technical education was inferior. This legacy of undervaluing industrial education has remained a challenge in Nigeria's educational system.

After Nigeria's independence in 1960, efforts were made to reform industrial education to align with national development aspirations. The government recognised the importance of technical and vocational training in driving industrialisation and reducing unemployment. A significant milestone was the introduction of the National Policy on

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Education (NPE) in 1977, revised in subsequent years, which gave prominence to vocational and technical education. The NPE emphasised the need to produce self-reliant graduates and to integrate practical skills into the school curriculum. Technical colleges, polytechnics, and universities of technology were established to promote industrial education and to bridge the gap between theoretical knowledge and practical application (Federal Republic of Nigeria, 2014). Despite these initiatives, challenges such as inadequate funding, insufficient infrastructure, and limited industry linkages have hindered the effectiveness of industrial education.

Nevertheless, post-independence reforms laid the groundwork for recognising industrial education as a crucial driver of economic development. Scholars argue that aligning technical education with labour market demands and fostering collaboration between industries and schools are vital for maximising the potential of industrial education (Ayonmike, Okwelle & Okeke, 2015). The historical progression from indigenous apprenticeship systems to formalised vocational and technical institutions highlights both the resilience and challenges of industrial education in Nigeria. While colonial policies left a legacy of imbalance, post-independence reforms represent ongoing efforts to revitalise industrial education as a foundation for national development

### **Current State of Industrial Education in Nigeria**

The current state of industrial education in Nigeria reflects both progress and persistent challenges in efforts to prepare a skilled workforce for national development. Industrial education encompasses technical colleges, polytechnics, and universities of technology, all of which are strategically positioned to bridge the gap between theoretical knowledge and practical skills. Technical colleges, which are designed to provide mid-level manpower for industries, have been established across different states, offering training in fields such as mechanical engineering, electrical installation, building technology, and automobile engineering. However, many of these institutions face infrastructural decay, inadequate equipment, and limited exposure to emerging technologies, which undermines their ability to deliver on their mandate. Despite these challenges, technical colleges remain relevant in producing artisans and technicians needed for industrial growth (Okwelle & Ogbuanya, 2018).

Polytechnics occupy a central position in Nigeria's industrial education framework by focusing on the production of higher-level technical manpower. They offer National Diplomas (ND) and Higher National Diplomas (HND) in applied sciences, engineering, and management studies. Polytechnics are meant to be practice-oriented, emphasising skill acquisition and applied research, yet they often grapple with societal perceptions that place them beneath universities in terms of prestige. This perception has contributed to declining enrolment rates in some polytechnics. Nonetheless, polytechnics continue to play a vital role in equipping students with employable skills, especially in technical fields that support industrialisation and entrepreneurship (Ayonmike, Okwelle, & Okeke, 2015).

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Universities of technology, on the other hand, represent the apex of industrial education in Nigeria by integrating research, innovation, and advanced technical training. Institutions such as the Federal University of Technology in Akure and Minna have been at the forefront of promoting science, engineering, and technology-driven disciplines. They not only provide advanced education but also serve as hubs for research and development in industrial processes. However, limited funding, inadequate laboratories, and weak linkages with industries hinder their full potential. The lack of strong university-industry partnerships reduces the opportunities for students to gain practical exposure to real industrial challenges, thereby limiting the relevance of the training to labour market demands (Uwaifo, 2020).

Government policies have been critical in shaping the landscape of industrial education. The establishment of the National Board for Technical Education (NBTE) has been central to standardising curricula, accrediting programmes, and maintaining quality assurance across technical and vocational institutions. The NBTE ensures that institutions align with national development goals by producing skilled graduates to meet the labour market's needs. However, policy inconsistency and inadequate implementation have weakened the effectiveness of these interventions. Moreover, while NBTE has provided guidelines for curriculum updates, many institutions still struggle to adopt them due to resource limitations. This creates a gap between the skills taught in classrooms and the competencies required by industries (Federal Republic of Nigeria, 2014).

The Industrial Training Fund (ITF) plays a complementary role in strengthening industrial education by facilitating industry-based learning opportunities. Established in 1971, ITF is responsible for promoting and encouraging the acquisition of skills in industry and commerce. Through initiatives such as the Students Industrial Work Experience Scheme (SIWES), ITF provides students with hands-on training in industrial environments, thereby enhancing their employability. Despite funding and organisational challenges, the ITF has remained a key player in connecting education with industry practice and bridging the gap between theoretical knowledge and workplace demands (Okolie, Nwajiuba, & Igwe, 2020).

In summary, while technical colleges, polytechnics, and universities of technology, supported by NBTE and ITF, constitute the backbone of industrial education in Nigeria, their impact is constrained by infrastructural limitations, poor funding, and weak industry linkages. Strengthening these institutions through consistent policy reforms, improved funding, and stronger public-private partnerships will be vital for ensuring industrial education contributes effectively to Nigeria's sustainable development.

### **Challenges of Industrial Education in Nigeria**

One of the recurring challenges facing industrial education in Nigeria, as widely noted in the literature, is the problem of poor funding and infrastructural decay. Industrial education requires substantial investment in workshops, laboratories, technical equipment, and consumables to ensure effective teaching and learning. However, technical and vocational institutions in Nigeria often lack the necessary financial



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resources to provide modern and functional facilities. The result is that many institutions operate with outdated equipment that no longer aligns with industry standards, thereby limiting the practical exposure of students. A study by Okoye and Okwelle (2014) emphasises that chronic underfunding has left technical institutions ill-equipped, creating a gap between theoretical knowledge and practical skills acquisition. This funding crisis is compounded by irregular budgetary allocations and policy inconsistencies, making the sustainability of industrial education precarious.

Another major issue lies in the mismatch between the skills of graduates and the actual needs of industries in Nigeria. Employers often lament that graduates of technical and vocational programmes lack the hands-on competence required to excel in modern workplaces. This disconnect results in high unemployment rates, even among those trained in vocational fields, because their training does not reflect current technological trends. A report by the World Bank (2020) highlights that the Nigerian education system, including industrial education, is producing graduates who are not sufficiently prepared for the labour market due to outdated curricula and weak linkages with industries. The lack of periodic curriculum review and insufficient engagement with industry stakeholders means that graduates are trained in obsolete techniques while industries demand modern technical expertise.

In addition to structural and curricular challenges, societal perception of vocational and industrial education significantly undermines its relevance. In Nigeria, industrial education is often seen as inferior to traditional academic pathways, such as university degrees in professional fields. Parents and students alike tend to regard vocational education as a last resort for those who are unable to gain admission into conventional higher education institutions. This stigma discourages many young people from pursuing industrial education, leading to under-enrolment in technical institutions. Ayonmike, Okwelle, and Okeke (2015) argue that this negative perception has persisted due to a lack of awareness of the potential of industrial education to foster self-reliance, reduce unemployment, and promote economic development. Unless this societal bias is addressed through advocacy, sensitisation, and policy reorientation, industrial education will continue to struggle with low patronage and poor recognition.

Finally, the limited collaboration between the private sector and technical education providers remains a critical challenge. Industrial education thrives best where there are strong partnerships between schools and industries, enabling students to gain practical experience through internships, apprenticeships, and work-based training. However, in Nigeria, such partnerships are weak and often poorly coordinated. Industries are reluctant to invest in technical training, while educational institutions frequently fail to engage meaningfully with employers to understand workforce demands. According to Uwaifo (2020), the absence of structured collaboration between industries and educational providers widens the gap between knowledge acquired in schools and the competencies required in the workplace. Strengthening these partnerships would not only enhance curriculum relevance but also promote innovation, employability, and industrial growth.

In sum, the challenges of poor funding, skill mismatch, negative societal perception, and limited private sector collaboration are interrelated barriers that have stifled the development of industrial education in Nigeria.

### **Prospects of Industrial Education in National Development**

The prospects and opportunities for industrial education in Nigeria are numerous and highly significant for the country's socio-economic development. One of the most pressing opportunities lies in curriculum reform and the integration of digital skills. The current industrial education curriculum in Nigeria, though functional in its traditional approach, often fails to keep pace with global technological advancements and the evolving needs of industries. This mismatch creates a gap between the skills students acquire and the expectations of employers in a fast-changing economy. Incorporating digital literacy, coding, data analysis, robotics, and artificial intelligence into the industrial education curriculum can bridge this gap and prepare learners for the modern workplace. This reform would not only enhance employability but also foster innovation and creativity among graduates, equipping them with competencies necessary to thrive in the Fourth Industrial Revolution (Obioma & Okoh, 2020).

Another critical prospect is the strengthening of public-private partnerships in industrial education. Governments alone cannot meet the resource needs required to improve technical and industrial education, particularly given the infrastructural deficits and funding limitations within Nigeria's educational sector. Collaborations between educational institutions and private industries provide avenues for resource mobilisation, training support, and curriculum enhancement. Such partnerships could include internships, apprenticeships, industrial attachments, and joint research initiatives that ensure industrial education remains relevant and responsive to the demands of the labour market. For example, partnerships with multinational companies in the oil, construction, and technology sectors could expose students to cutting-edge practices while industries benefit from a pipeline of skilled graduates. Ayonmike and Okoye (2016) emphasised that effective public-private collaborations enhance skill acquisition and ensure that graduates are not only theoretically prepared but also practically equipped for industry challenges.

Equally significant is the opportunity to adapt international models of industrial education that have proven effective in other contexts. Countries such as Germany and South Korea have successfully leveraged vocational and industrial education systems to power their industrialisation and economic growth. The German dual system, for instance, combines classroom instruction with practical training in industries, producing a skilled workforce aligned with employer needs. Similarly, South Korea's model emphasises investment in technical education, innovation, and technology transfer, which contributed immensely to its transformation into an industrial hub. Nigeria stands to gain by adapting these models to its local context, ensuring that students benefit from structured and consistent exposure to practical skills. According to Ogbuanya and Owodunni (2015), aligning Nigeria's industrial education with global best practices would not only improve competitiveness but also attract foreign investment, as industries often seek countries with skilled human capital.

Furthermore, industrial education has a central role in advancing Nigeria's progress toward achieving the Sustainable Development Goals (SDGs), particularly those related to employment, innovation, and economic growth. Industrial education directly contributes to SDG 4, which advocates for inclusive and equitable quality education, by offering learners practical skills for self-reliance and lifelong learning. It also plays a significant role in achieving SDG 8, which focuses on promoting sustained, inclusive economic growth and decent work for all. By equipping young people with employable skills, industrial education reduces youth unemployment and fosters entrepreneurship. In addition, SDG 9, which promotes industry, innovation, and infrastructure, can be advanced through an education system that trains graduates to contribute to technological innovation, sustainable industries, and infrastructural development. UNESCO (2019) underscored that vocational and industrial education is a driver of innovation and a cornerstone for building sustainable economies in developing nations. Thus, Nigeria's industrial education system, if strategically reformed and resourced, can be a powerful mechanism for realising multiple SDGs simultaneously, thereby positioning the nation for sustainable and inclusive development.

In summary, the prospects and opportunities of industrial education in Nigeria are deeply rooted in reforms and collaborations that align with both global and local needs. Curriculum reforms, particularly through the integration of digital skills, present a chance to modernise education and prepare learners for the digital economy. Strengthened public-private partnerships promise a more practical and industry-oriented training experience. Adapting international models ensures alignment with proven global practices, while the contribution of industrial education to the SDGs highlights its relevance for national and global development agendas. Harnessing these opportunities requires political will, consistent investment, and an unwavering commitment to repositioning industrial education as a cornerstone of Nigeria's economic growth and sustainable development.

## CONCLUSION

The role of industrial education in Nigeria cannot be overemphasised, as it serves as a fundamental driver of technological progress, skill acquisition, and national development. Despite its relevance, the sector continues to face critical challenges that limit its effectiveness, such as outdated curricula, weak linkages between schools and industries, and inconsistent government policies. A thorough reflection on these issues indicates that meaningful reform is essential if industrial education is to align with the pressing needs of the modern labour market and contribute substantially to the country's economic transformation. The industrial sector is increasingly dynamic, shaped by globalisation, rapid technological changes, and the demand for multi-skilled workers. Without a proactive and adaptive industrial education framework, Nigeria risks producing graduates who are ill-prepared for the realities of today's workplaces. Thus, the recommendations put forward are both timely and necessary for charting a new course for industrial education.



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A primary recommendation is the revamping of curricula to meet industry demand. Many of the current programmes still reflect outdated content and training models that fail to prepare learners for emerging sectors such as information technology, renewable energy, automation, and advanced manufacturing. The revision of curricula should be guided by active collaboration with industry stakeholders to ensure that the knowledge and competencies imparted are directly relevant to contemporary labour market needs.

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