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TECHNICAL EDUCATION AND INDUSTRIAL DEVELOPMENT IN AKWA IBOM STATE, NIGERIA

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ABSTRACT

In Akwa Ibom State, technical education is not given the adequate attention it deserves, and this has a negative impact on industrial development. This study examined how technical education affects industrial development in Akwa Ibom State, Nigeria. The research, based on Gary Becker's Human Capital Theory, adopted a qualitative approach. Using an exploratory survey design, in-depth interviews aided the collection of data from 27 technical instructors selected purposively from nine (9) public technical colleges in the state. The data were transcribed and analysed in themes, and findings revealed that several students and graduates of public technical colleges in Akwa Ibom State were not well equipped with the requisite knowledge and technical know-how to work in emerging industries such as oil and gas, power, construction, manufacturing, machine maintenance, automobile, renewable energy, ICT, refrigeration, pipeline maintenance, welding and fabrication, agro-processing, food preservation, mechanised milling and automated packaging systems, owing to outdated curriculum, inadequate instructors and decayed infrastructure. These problems undermine the development of human capital and practical skills, which are essential for innovation, employability, and sustainable economic growth. The study recommended urgent reforms and strategic investments in technical education, particularly by modernising technical curriculum, employing qualified instructors and equipping institutions with industry-compatible infrastructure to cultivate a qualified, entrepreneurial and innovation-orientated workforce.

Keywords: Technical Education, Industrial Development, Curriculum, Technical Instructors, Infrastructure

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1. INTRODUCTION

In an epoch driven by technological advancement and industrial competitiveness, technical education has emerged globally as a foundation for sustainable industrial development. Across developed nations such as the United States, Germany, Japan, China and South Korea, the strong emphasis on technical and vocational education has been instrumental in building skilled human capital, boosting productivity and accelerating industrial growth (Ntegwung, 2016; Ogar & Atanda, 2019). These industrialised countries have demonstrated that a well-structured technical education system can lead to higher employment rates, increased innovation and strong industrial performance (Audu et al., 2013; Ukommi et al., 2013). The synergy between technical training institutions and industrial sectors is key to achieving economic resilience and global competitiveness (United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2015; Jusoh et al., 2024).

In Africa, the discourse on technical education has gained renewed attention in the face of rising youth unemployment, under- industrialisation and dependence on imported technology (Agha et al., 2020; Bassey et al., 2023). Despite its recognised importance, technical education systems in many African countries, particularly Nigeria, remain underfunded, poorly equipped and often disconnected from industrial needs. According to the African Union's Agenda 2063, revitalising technical and vocational education and training (TVET) is essential to building a workforce capable of transforming Africa's economic landscape through manufacturing, agro-processing and technology-driven enterprises (Jusoh et al., 2024; Ubom et al., 2013). In West Africa, countries such as Ghana, Senegal and Côte d'Ivoire have made tremendous efforts to improve TVET systems through policy reforms and donor-funded interventions (Toroka & Kafanabo, 2024). However, challenges persist, including outdated curriculum, lack of infrastructure and a shortage of qualified technical instructors. The region's industrial base remains weak and the gap between technical education outcomes and industrial workforce needs continues to widen (Willie et al., 2022). These issues have hindered the region's ability to harness its human capital for industrial development (Kholifah et al., 2024; Ikegwu et al., 2014).

In Nigeria, technical education is recognised by the National Business and Technical Examinations Board (NABTEB), a Nigerian examination board that is conducting examinations for technical and business innovation colleges in Nigeria and National Policy on Education (NPE) as a critical driver of national development (FGN, 2013; Enang et al., 2025). Institutions such as technical colleges, polytechnics and vocational training centres are expected to provide the practical skills and technical knowledge necessary for economic growth and industrialisation (Anwar et al., 2023; Effiom & Udah, 2014). Nevertheless, the country faces persistent issues, including inadequate funding, poor infrastructure, limited access to modern equipment and a misalignment between training content and industry demands (Agha et al., 2020; Abogoh et al., 2022). Although efforts have been made to establish and support technical institutions through initiatives such as the National Board for Technical Education (NBTE) and state-level programmes, the outcomes have been uneven across regions.

Specifically, in Akwa Ibom State, the government has made efforts to promote technical education as part of its broader economic development agenda. The establishment of technical colleges, partnerships with industry stakeholders and skill acquisition programmes reflect government commitment to equipping its youth with practical and employable skills. However, there remains a significant gap in linking technical education outputs to measurable industrial development outcomes (Willie et al., 2020). Issues such as the uneven distribution of technical institutions, obsolete training equipment, insufficient instructors and outdated curriculum have continued to limit the effectiveness of technical education in contributing to industrial growth in Akwa Ibom State (Cyril, 2018), particularly oil and gas services, electrical installations, construction, manufacturing, machinery maintenance, automobile assembling, renewable energy, ICT hardware assembly and maintenance, industrial refrigeration, pipe-line maintenance, welding and fabrication, agro-processing, food preservation technology, mechanised milling and automated packaging systems. Against this backdrop, this study sought to examine how curriculum, instructors and infrastructure affect industrial development in Akwa Ibom State, Nigeria. The findings aimed to provide evidence-based recommendations for improving technical education and positioning it as a catalyst for industrial transformation in Akwa Ibom State and, by extension, Nigeria.

1.1. Statement of the Problem

In an ideal context, technical education serves as a robust foundation for industrial development by equipping the workforce with the necessary skills, knowledge and competencies required by modern industries. Well-established technical institutions, quality curricula aligned with industry needs, competent instructors and access

to modern tools and infrastructure collectively create a pipeline of skilled labour that drives productivity, innovation and economic growth. This scenario facilitates sustainable industrial expansion, job creation and socio-economic transformation in regions like Akwa Ibom State.

Akwa Ibom State, like many parts of Nigeria, faces significant challenges in leveraging technical education as a catalyst for industrial development. Despite the establishment of several technical colleges, many of these schools suffer from limited accessibility, inadequate funding and poor infrastructural development. The quality of curriculum and training often falls short of industry expectations, with many programmes relying on outdated content and insufficient practical components. Additionally, the shortage of competent and adequately trained technical instructors undermines the effectiveness of skills transfer. Access to modern tools, equipment and learning infrastructure remains inadequate, hindering practical hands-on experience crucial for technical competence (Umoh et al., 2023).

Gaps in technical education leave graduates ill-prepared for industry needs, driving high youth unemployment and underemployment. The inability of the local workforce to meet industrial needs stunts the growth of industries such as oil and gas services, electrical installations, construction, manufacturing, machinery maintenance, automobile assembling, renewable energy, ICT hardware assembly and maintenance, industrial refrigeration, pipe-line maintenance, welding and fabrication, agro-processing, food preservation technology, mechanised milling and automated packaging systems, resulting in slow industrialisation and economic stagnation. This scenario perpetuates poverty, limits socio-economic mobility and increases the vulnerability of communities to social vices (Essoh, Asangausung & Willie, 2025).

Various interventions have been introduced at federal and state levels to address these challenges. The National Business and Technical Examinations Board (NABTEB) has set standards for technical institutions and the government of Akwa Ibom State has invested in skill acquisition programmes and the establishment of technical colleges. Partnerships with private sector entities and development agencies have been initiated to enhance infrastructure and curriculum relevance. Despite these efforts, the persistent gaps in outdated curriculum, lack of instructors and infrastructure deficits suggest that these initiatives are yet to fully resolve the systemic issues affecting technical education and its contribution to industrial development.

Scholars agree that technical education is critical for bridging the skills gap necessary for industrial growth (Ugege et al., 2024; Adeyemi, 2023). The correlation between technical education and industrial productivity was studied by Okoro and Ede (2019). However, researchers also point to persistent challenges of technical education in Africa and Nigeria, such as inadequate infrastructure, poor curriculum alignment and limited instructor capacity, which hinder the full realisation of technical education's potential (Ezeani & Onwuegbuna, 2020; Ezeani, 2022). Some argued that despite policy frameworks, implementation gaps remain a significant obstacle (Nwachukwu, 2020). While previous studies provide insights into the broad challenges of technical education in Nigeria, there is a paucity of empirical research on how curriculum, instructors and infrastructure affect industrial development in Akwa Ibom State. This gap limits the ability of policymakers and educators to tailor interventions effectively. This study filled the gap by providing a comprehensive analysis of how these specific factors of technical education influence industrial growth in Akwa Ibom State, thereby offering targeted recommendations to enhance technical education's role as a driver of industrialisation in the state.

1.2. Objectives of the Study

The main objective of the study was to examine how technical education influences industrial development in Akwa Ibom State, Nigeria. The specific objectives were to:

i. assess how the quality of curriculum and training in technical education influence industrial development in Akwa Ibom State.
ii. evaluate how the availability and competence of technical instructors affect industrial development in Akwa Ibom State.
iii. investigate how access to tools, equipment and infrastructure influence industrial development in Akwa Ibom State.

1.3. Research Questions

The following questions guided the study;

i. How does the quality of curriculum and training in technical education influence industrial development in Akwa Ibom State?
ii. How does the availability and competence of technical instructors affect industrial development in Akwa Ibom State?
iii. How does access to tools, equipment and infrastructure influence industrial development in Akwa Ibom State?

2. LITERATURE REVIEW

2.1. Concept of Technical Education

Particularly for nations striving for industrialisation, technological advancement and independence, technical education is an essential catalyst for national growth. The National Policy on Education (2004) states that it aims to prepare people for jobs requiring technical know-how and hands-on proficiency by providing them with scientific knowledge as well as practical and applied skills. It is intended to promote productivity, innovation and long-term economic growth in addition to job creation. Ojimba (2013) and Agha et al. (2020) are among the scholars who have repeatedly emphasised the transformative potential of technical education. It produces technicians and skilled workers who form the backbone of industrial and technical advancement. Technical education equips people with the skills they need to make significant contributions to the economy and society by encouraging self-reliance and technological literacy. In addition to fostering the development of specialised vocational skills, it increases entrepreneurial potential, lessens reliance on white-collar occupations and offers a means of combating unemployment and poverty through self-employment and the founding of small and medium-sized businesses.

A major move towards training in applied subjects like science, engineering and agriculture necessitated the establishment of the Yaba Higher College in the early 1930s, which is period when technical education in Nigeria first gained traction. In order to build human capital for national transformation, organisations like technical colleges, polytechnics and universities of technology have been crucial ever since (Agha et al., 2020). In the modern world, technical education is especially important for states like Akwa Ibom, where industrial development is essential to economic diversification and achieving the full potential of the state. Technical education supplies the workforce required to sustain industrial growth, lessen reliance on imports and foster domestic innovation by creating a workforce that is technically proficient and competent. As such, it continues to be a powerful instrument for accomplishing Nigeria's long-term industrial and economic objectives.

2.2. Concept of Industrial Development

Industrial development is the process of improving a nation's ability to convert raw materials into completed products for export, consumption, or more manufacturing. It includes not just more manufacturing but also the use of scientific and technological knowledge to boost economic growth, enhance living standards and promote structural change. Industrial growth increases a country's ability to process resources, according to Todaro (1977), but academics like Okafor (2012) highlighted how important it is to manufacturing and technological advancement. Industrialisation is the process of producing capital goods, consumer goods and infrastructure that support larger economic activities using machinery, equipment and human resources. According to Effiom and Udah (2014), it is generally linked to increased productivity, higher per capita income and less reliance on external economies. It is a crucial national development strategy since it also promotes innovation, jobs, poverty alleviation and improved access to healthcare and education.

However, the process is hindered throughout Africa, especially in Nigeria, by a number of factors, such as inadequate funding, inadequate infrastructure, a lack of technical application and an excessive dependence on primary agriculture. According to Ukommi et al. (2013), industrial development necessitates skilled labour in addition to machinery for efficient maintenance and management of the industrial process. These facts demonstrate how important technical education is in supplying the knowledge and people resources required for long-term industrial growth.

The effectiveness of industrial strategies is largely dependent on how successfully countries use organisational capacity, education and technology. Theories of industrialisation are intimately related to economic development. To achieve widespread economic transformation, Nigeria must match technical education with

industrial objectives, such as processing locally available raw materials, creating domestically consumed items and exporting manufactured goods.

2.3. Quality of Curriculum and Training and Industrial Development

A number of systemic problems with the planning and implementation of Nigeria's technical education curriculum were pointed out by Agha et al. (2020). They opined that the curriculum is primarily based on international models, it is not well tailored to the reality of the local industry. The absence of pertinent textbooks and instructional resources, as well as a dearth of certified local teachers with practical technology knowledge, exacerbate this problem. At the expense of practical engineering and technology training, the curriculum itself is excessively academic and disproportionately weighted towards theoretical content in mathematics and pure sciences. Furthermore, rather than using interactive, skills-based education, the majority of instructive approaches are still quite traditional. Similarly, Toroka and Kafanabo (2024) evaluated how well technical education programmes in Tanzania matched the labour market's current needs for industrial skills. Documentary review and interviews with thirty-four purposefully chosen technical graduates were used to gather data. Data analysis was done using thematic analysis. The results showed that several areas of the curriculum continued to rely heavily on out-of-date material that was mostly used in the classrooms. Outdated teaching and learning tools, including machines and equipment, were also found in the study.

The studies by Agha et al. (2020) and Toroka and Kafanabo (2024) offer important insights into the structural flaws and misalignments in technical education curricula in Tanzania and Nigeria, with a focus on the curriculum's foreign orientation, dependence on antiquated teaching techniques, lack of hands-on training and outdated equipment. But instead of providing a localised, comprehensive evaluation of how these curriculum-related concerns significantly impact industrial growth within unique sub-national contexts like Akwa Ibom State, most studies mostly concentrate on national or regional patterns. In order to close this gap, the current study empirically investigates the direct correlation between industrial development rate in Akwa Ibom State and the caliber of technical education training and curricula. In an area that is still understudied in the literature, it seeks to present localised evidence on how the instructional approach, practical training possibilities and curriculum relevance affect the state's industrial workforce preparation and technological development potential.

2.4. Availability and Competence of Technical Instructors and Industrial Development

Kholifah et al. (2024) used a qualitative case study approach to investigate how students and vocational teachers perceived the inclusion of interpersonal skills in the curriculum. Following a survey of 73 vocational students and 42 vocational teachers, 8 teachers and 9 students from different Indonesian provinces participated in semi-structured interviews. Four major themes emerged from the thematic analysis: learning problems, effective instructional methodologies, the necessity of comprehensive support systems and critical interpersonal skills for industry. According to the findings, there is a notable lack of comprehensive interpersonal skills in vocational education, which emphasises how urgent it is to develop and add new abilities. Among the difficulties noted are the need for improved understanding, literacy, preparedness and motivation in both teachers and students.

The ability of vocational education students participating in industrial practice learning programmes was investigated by Anwar et al. (2023). The study adopted a survey design and quantitative methods. Out of 596 students, 230 students enrolled in vocational education participated in this survey. A Likert scale questionnaire (1-4) was used for data collection and a basic probabilistic random sampling technique is used for sampling. The independent sample t-test and one-way analysis of variance (ANOVA) were employed in the data analysis. Findings showed that students who perform work practices in large enterprises scored higher than those in small industries. The value of the capability component varies greatly depending on the industry type utilised to conduct the programme.

Anwar et al. (2023) and Kholifah et al. (2024) offer insightful perspectives on vocational education, especially when it comes to skill integration and industrial practice learning. Kholifah et al. concentrate on how to integrate industry-relevant instructional methodologies with interpersonal skills, whereas Anwar et al. evaluate students' competencies in a variety of industrial settings. Both studies, however, focus mostly on the experience and skill development of the student rather than specifically addressing the availability and proficiency of technical instructors as a factor in industrial development. Furthermore, the studies' institutional and geographic focus is on Indonesia, which leaves a contextual gap in our knowledge of how teacher qualifications and availability affect industrial growth in sub-Saharan Africa, specifically in Akwa Ibom State, Nigeria. By examining the

precise effects of technical teachers' presence and proficiency in nearby technical institutions on the caliber of graduate output and, consequently, industrial development in Akwa Ibom State, the current study closed this gap. The literature that is now available noticeably lacks this instructor-focused and localised perspective.

2.5. Access to Tools, Equipment and Infrastructure and Industrial Development

Using secondary data, Agha et al. (2020) investigated the role of technical education in Nigeria's industrial development. Their research revealed enduring systemic and structural issues that undermine technical education's capacity to propel industrialisation. The report highlighted persistent underfunding, poor facilities and workshops and unstable power supplies as key challenges. It also underlined how these deficiencies, along with the enduring prejudice in society against graduates of polytechnics, monotechnics and universities of technology, continue to undermine technical education's ability to spur industrial development in Nigeria. According to Ojimba (2013), a large number of technical education departments in Nigerian institutions lack operational labs or workshop areas. When such facilities do exist, they are frequently inadequate and out-of-date, usually consisting only of the initial equipment that was supplied when the departments were first formed. This deficiency compromises the quality of technical education delivery and significantly hinders practical training.

The studies by Agha et al. (2020) and Ojimba (2013) provided comprehensive analyses of the structural and systemic problems that Nigerian technical education faces, with a focus on problems like inadequate funding, obsolete or nonexistent workshop facilities and cultural attitude that affect technical education. These studies, however, mostly offer broad national overviews and do not specifically examine how the sufficiency and accessibility of tools, equipment and infrastructure directly affect industrial development in particular subnational contexts. Additionally, they failed to adequately connect these infrastructure shortcomings to quantifiable results in terms of localised industry output or graduation preparation. By focusing just on Akwa Ibom State, the current study fills this knowledge gap by providing a localised, empirical analysis of the ways in which the availability and state of technical training resources affect the industrial growth of the area. Understanding regional inequities and guiding focused policy actions require this context-specific analysis.

2.6. Theoretical Framework

This study examined how technical education affects industrial development in Akwa Ibom State. This is mostly because of inadequate curriculum design, a shortage of qualified instructors and limited access to facilities and equipment. Economic diversification, innovation and sustainable industrial expansion are stalled by these systemic issues, which impede the creation of a trained, industry-ready workforce.

The study was guided by the assumptions of Gary Becker' Human Capital Theory developed in 1964. The theory argued that investments in human capital, that is, education, training, skill development, health and other elements that enhance productivity provide economic benefit to both individuals and societies. Becker (1964) opined that human capital may be created by systematic investment in their abilities, much like physical capital (buildings, machines and tools) and can result in quantifiable economic results like increased productivity, innovation and economic growth. Major tenets of Human Capital Theory relevant to this study include:

i. Education as investment: Training and education are viewed as profitable investments that benefit society and people alike, rather than just being social goods.
ii. Skill development and productivity: The level of education and quality of training directly affect an individual's productivity and, by extension, their contribution to economic development.
iii. Return on investment: Human capital should yield increased productivity, creativity and profits, just like any other type of capital.

When applied to this study, Becker's theory clarifies how low investments in technical education quality, through curriculum reform, teacher training and infrastructure provision; lead to a workforce devoid of the technological competencies and practical skills required to drive industrial growth in Akwa Ibom State. The returns on educational expenditure are greatly reduced when student access to current tools and equipment is restricted, instructors are not well educated or supported and technical education programmes are not in line with industry demands. As a result, the pool of graduates is primarily unemployed or underemployed, making it impossible for them to make a significant contribution to the local economy. People and society as a whole lose out on potential economic value as a result of this inefficiency.

Nevertheless, Human Capital Theory has been criticised in spite of its advantages. One significant criticism is that it frequently ignores education's larger social, cultural and democratic roles in favour of reducing its worth just to its economic utility. Additionally, it makes the assumption that productivity and education have a linear connection, frequently ignoring structural problems like systemic unemployment, labour market saturation and inequality that may keep even highly trained people from reaching their full economic potential. Furthermore, the theory may undervalue the impact of institutional shortcomings that impact the implementation and results of educational programmes, such as corruption, bad governance and insufficient funding-factors that are evidently present in technical education system in Akwa Ibom State.

However, the Human Capital Theory's acceptance in this study is supported by its obvious alignment with technical and vocational education's goals, which are fundamentally utilitarian and focused on building skills for economic production. In addition to offering a compelling framework for assessing the return on investment in technical education, the theory presents a compelling case for greater governmental and private sector commitment to education reform as a way to promote industrial development. In conclusion, Becker's Human Capital Theory provides a pertinent and useful framework for identifying the shortcomings of technical education in Akwa Ibom State and suggesting tactical solutions, notwithstanding its limits. It emphasises how important it is to view education as a fundamental resource for long-term industrialisation and economic expansion.

3. Materials and Methods

In order to examine how technical education influences industrial development in Akwa Ibom State, Nigeria, this study employed an exploratory survey design. It was purely a qualitative research. Data were gathered through in-depth interviews with technical instructors in public technical schools in the state. To maintain accuracy and save the original responses for in-depth examination, a tape recorder was used. The purpose of the open-ended interview questions was to examine the caliber of the infrastructure, training, curriculum, instructor proficiency and industry connections.

A total of 27 technical instructors were purposively selected from nine (9) public technical schools in Akwa Ibom State. Technical instructors who served within the selected public technical schools were the target population. The data were analysed using thematic analysis. Key themes were developed inductively from the transcriptions of the recorded interviews. The responses of the participants were examined for recurrent themes, concepts and narratives. Triangulation and comparison were used to fine tune the themes in order to guarantee their depth and consistency.

The study followed accepted ethical guidelines. Participants gave their informed consent after receiving ethical approval from the appropriate authorities, guaranteeing their anonymity, confidentiality and voluntary participation. Two months were allotted for data collection, which allowed for follow-up interviews and recurrent engagement as needed. Peer debriefing and member verification were used to improve validity and make sure the results appropriately represented the opinions of the participants. Consistent usage of the interview schedule and thorough documenting of procedures helped to sustain reliability. The study's findings and conclusions were given legitimacy and dependability by the meticulous approach. Ethical approval was obtained from the Ethical Committee of the Ethical and Attitudinal Reorientation Commission (EARCOM), Akwa Ibom State.

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3.1. Data Presentation and Analysis

Table 1. Distribution of respondents according to their personal information

Characteristics	Response	Frequency (n=27)	Percentage
Sex	Male	17	62.96%
	Female	10	37.04%
Age (years)	18-23	4	14.81%
	24-29	6	22.22%
	30-35	7	25.93%
	36-41	5	18.52%
	42+	5	18.52%
Level of Education	Polytechnic	11	40.74%
	University	16	59.26%
Religion	Christianity	24	88.89%
	Islam	2	7.41%
	Indigenous Religion	1	3.70%
Years in service	Less than 5 years	6	22.22%
	5-10 years	8	29.63%
	11-15 years	5	18.52%
	16-20 years	4	14.81%
	21 years and above	4	14.81%

Source: Field data (2025)

The data in Table 1 reveals that the majority of respondents (62.96%) are male, indicating a gender imbalance in the sample which may reflect the broader demographics of the technical education or industrial sector in Akwa Ibom State. Most respondents are within the age range of 24 to 41 years, showing a predominantly youthful and mid-career workforce, while the 18-23 and 42 years old and above are equally represented but less dominant. A larger proportion of respondents possess university degrees (59.26%) compared to polytechnic qualifications (40.74%), suggesting a higher academic entry threshold or preference for university-trained professionals in the sector. Christianity is the predominant religion among the respondents, accounting for 88.89%, which is consistent with the religious landscape of Akwa Ibom State, while Islam and Indigenous religions are minimally represented. In terms of work experience, more than half of the respondents have under 10 years of service, with the highest concentration (29.63%) having served between 5-10 years, indicating a relatively young and possibly less experienced workforce. These findings collectively suggest a technically educated but relatively young, male-dominated and religiously homogenous group, with implications for workforce development, gender inclusion and policy planning in technical education and industrial development initiatives within the state.

Table 2. Statistics of Technical Teachers in Public Technical Colleges in Akwa Ibom State

Technical Schools	Technical Teachers	Conventional Teachers	Total
Government Technical College, Ewet	95	163	258
Government Technical College, Abak	64	189	251
Community Technical College, Ikot Akata	38	87	124
Government Technical College, Oron	29	122	151
Government Technical College, Mbioto	18	48	66
Government Technical College, Ikot Udoe	15	39	54
Government Technical College, Efoi	12	43	55
Community Technical College, Ikot Uko	14	56	70
Union Technical College, Ikpa-Eket	22	78	100
Total	307	825	1,132

Source: Database of Public Technical Colleges in Akwa Ibom State as at May, 2025

In public technical colleges throughout Akwa Ibom State, there is a glaring disparity between technical and conventional teachers, as shown in Table 2. Only 307 of the 1,132 teachers are technical educators, compared to 825 who teach conventional subjects. Teachers in non-technical fields predominate in schools intended to

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produce skilled, technically prepared graduates, highlighting a systemic misalignment in staffing goals. Since technical teachers make up fewer than 30% of the teaching staff, students in these institutions are unlikely to obtain enough hands-on training, especially in specialised industry skills. The ramifications are significant. This undercuts technical education's main objective of producing graduates who are practical and prepared for the workforce. The state's excessive dependence on imported technical labour and the wider issue of young unemployment are both exacerbated by it. The scarcity of technical teachers also points to overworked personnel, poorer instruction and less student interaction with contemporary technology.

Table 3. Public Technical Colleges in Akwa Ibom State and Available Workshops

Workshops	**GTC Ewet**	**GTC Abak**	**CTC Ikot Akata**	**CTC Oron**	**GTC Mbioto**	**GTC Ikot Udoe**	**GTC Efoi**	**CTC Ikot Uko**	**CTC Esit Eket**
Mechanical	PF	PF	PF	NA	PF	NA	NA	NA	NA
Carpentry	NA	F	F	F	NA	NA	PF	PF	PF
Automobile	NF	NF	NF	NF	NF	NA	NA	NA	NF
Motor Vehicle	PF	PF	PF	PF	NA	PF	PF	NA	F
Elect/Elect	F	F	F	F	F	NA	PF	PF	PF
Building	NF	PF	PF	PF	NA	NA	NA	NA	F
Plumbing	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tiling	NA	F	NA	NA	NA	NA	NA	NA	NA
Welding/ Fabrication	PF	F	PF	PF	NA	NA	NA	NA	NA
Fridge Repairs	PF	NA	NA	NA	NA	NA	NA	NA	NA

F – Functioning; NF-Not Functioning; PF-Partially Functioning; NA- Not Available; GTC- Government Technical College; CTC-Community Technical College

Source: Database of Public Technical Colleges in Akwa Ibom State as at May, 2025

Table 3 shows that the technical education infrastructure in public technical colleges in Akwa Ibom State is incredibly unequal and underfunded. There are notable disparities in the availability and operation of crucial vocational training institutions, as seen by the distribution and state of workshops. Important crafts including carpentry, electrical/electronics, mechanical and motor vehicle are either entirely absent from some colleges or just partially provided.

There are significant shortages in sectors essential to the development of local industry, as evidenced by the fact that plumbing and automobile workshops are either completely non-existent or non-operational. The majority of existing facilities are either antiquated or only partially operational, which restricts students' access to practical training. The goal of technical education may be undermined by this trend, which indicates that many students are graduating with little exposure to real-world situations. The effects are extensive: industries experience a lack of trained local labour; graduates are less employable and unprepared for entrepreneurial endeavours and the state's goal of sustained industrial growth is jeopardised. Technical colleges will continue to generate undertrained labour if immediate and focused investment is not made in modernising and equipping workshops consistently across institutions. This would block the larger objectives of industrial capacity building and economic diversification in Akwa Ibom.

3.2. Quality of Curriculum and Training in Technical Education and Industrial Development in Akwa Ibom State

Research Question I: How do the quality of curriculum and training in technical education influence industrial development in Akwa Ibom State?

In this study, technical education teachers in Akwa Ibom State strongly agreed that training and curriculum quality have a significant impact on industrial development. The curriculum was criticised as being outdated, too theoretical and not well suited to the real-world needs of contemporary industries. The efficient delivery of technical education was hampered by inadequate training materials, inadequate infrastructure and restricted exposure to modern industry technology. This disparity slows local industry growth and innovation by producing graduates who are unprepared for industrial positions.

The technical instructors also emphasised that a curriculum that combines theory and practice, adapts to changing industry demands and is backed by sufficient finance, state-of-the-art facilities and qualified teachers is necessary for effective industrial growth. The practical relevance of technical education is further diminished by the lack of robust industry-school connections, which restricts internship opportunities, real-world application and feedback loops that are essential for curriculum changes. Selected excerpts from the in-depth interviews were used to analyse the data and the results are shown as follows:

P1. Technical Instructor from GTC, Ewet: *"The curriculum we use is primarily theoretical and out of date. Students are not well prepared for the changing demands of industries in the state. Due to inadequate workshop facilities, there is little opportunity for practical instruction. Because of this, many graduates find it difficult to fulfil industry norms, which hinders the expansion of the local sector"*. This suggests that an antiquated, theory-based curriculum coupled with inadequate hands-on experience degrades student preparedness and directly jeopardises the availability of trained workforce for Akwa Ibom companies, hence impeding the growth of the local economy.

P2. Technical Instructor from GTC, Abak: *"Quality technical education directly affects young people's capacity to help industrial development. Graduates of courses in line with modern industrial technologies and with hands-on experience become qualified technicians and artists who can assist nearby companies and factories. Sadly, we still deal with issues including inadequate resources for training and industry neglect of us"*. This suggests that harmony between training materials and present industry needs determines industrial growth. Schools produce less relevant graduates without modern tools and industry cooperation, so stifling private sector support and employment.

P3. Technical Instructor from CTC, Ikot Akata: *"A well-designed curriculum that integrates both theory and practice is essential. Critical skills for businesses, our technical colleges turn out technicians capable of handling machines, welding and fabrication. Our contribution to industrialisation is limited, though, as we cannot provide the training at the necessary quality due to inadequate infrastructure and lack of funding"*. This implies that poor funding and infrastructure impede the delivery of a curriculum effectively. Lack of support lessens the impact of a well-structured curriculum, hence producing undertrained graduates unable to meet industrial demand.

P4. Technical Instructor from CTC, Oron: *"The foundation of training is its quality. Students can launch their own small businesses and become more employable if they receive training with up-to-date curriculum and contemporary equipment, which promotes local industrial growth. There is a pressing need to update the curriculum to incorporate new technical sectors"*. This suggests that industrial empowerment and entrepreneurship depend heavily on the quality of training. Innovation and the growth of SMEs are hindered by an antiquated curriculum that does not expose pupils to contemporary technology.

P5. Technical Instructor from GTC, Mbioto: *"The quality of training and curriculum determines how much technical education contributes to industrial development. It is essential to possess practical skills like computer-aided design, mechanical maintenance and electrical installation. To upgrade workshops and supply current educational resources, we require government assistance"*. This suggests that access to particular technical skills is necessary for industrialisation. Students lack competencies in fundamental technical areas and are therefore unprepared for the demands of industries if they are not provided with modern content and practical tools.

P6. Technical Instructor from GTC, Ikot Udoe: *"By giving students the necessary skills, our curriculum contributes to industrial growth-but only when the training is of high quality. The issue is poor facilities and insufficient training for teachers, which impacts curriculum delivery and students' readiness for industrial jobs"*. This suggests that even a good curriculum loses some of its impact due to inadequate facilities and teacher training. As a result, students are ill-prepared, which increases the skills gap in the industrial sector.

P7. Technical Instructor from GTC, Efoi: *"The foundation of technical education is the curriculum, which needs to be both applicable and useful. We have observed that students who were taught using antiquated curricula struggle to integrate into contemporary industries, which slows down the state's industrial development"*. This suggests that students are unable to adjust to modern workplaces because of out-of-date curricula. Due to this misalignment, local economic growth is delayed because the industrial labour force lacks modern competencies.

P8. Technical Instructor from CTC, Ikot Uko: *"There is a relationship between curriculum relevance and training quality. How applicable and up-to-date our students' training is will determine how well they can contribute to industrial development. For internships and curriculum feedback, we need to forge closer ties with nearby industries"*. This suggests that students do not acquire pertinent real-world experience in the absence of industry input or training partnerships, which diminishes their ability to contribute to local industry and lowers the overall significance of technical education.

P9. Technical Instructor from CTC, Esit Eket: "*If technical education is given priority with a high-quality curriculum and efficient training, Akwa Ibom's industrial development can be accelerated". Productivity gains and cost reductions are facilitated by skilled graduates. However, the potential impact is limited by issues like inadequate funding and inadequate infrastructure".* This suggests that industries experience low productivity and increased operating costs as a result of a lack of qualified technicians when technical education is not given priority through funding and curriculum reform.

3.3. Availability and Competence of Technical Instructors and Industrial Development in Akwa Ibom State

Research Question II: How do the availability and competence of technical instructors affect industrial development in Akwa Ibom State?

The results of the data analysis showed a significant relationship between industrial development rate in Akwa Ibom State and the availability and proficiency of technical instructors. Instructors at all the technical colleges constantly stressed that producing skilled graduates who can satisfy industry demands requires qualified, well-trained teachers. On the ground, though, there is a severe lack of qualified teachers, which results in big class sizes, overworked staff and subpar hands-on training. There is a knowledge gap between what is taught in classrooms and the practical skills needed in the workplace because many instructors lack current industrial training. Students are less exposed to contemporary technologies as a result of this mismatch, particularly in developing fields like automation, renewable energy and digital fabrication, which impairs their employability and inhibits innovation. The development of a locally competitive and independent industrial workforce is hampered by the lack of specialised instructors in these crucial fields.

The lack of qualified teachers also results in graduates who lack the practical skills necessary to start small businesses or make meaningful contributions to industries. This, in turn, undermines the possibility of domestic industrial growth by fostering a reliance on skilled labour from outside sources. Furthermore, technical education does not keep up with technological advancements in the industrial sector because instructors are not provided with continual professional development opportunities. The data collected through the in-depth interviews were analysed using selected excerpts presented as follows:

P10. Technical Instructor from GTC, Ewet: *"One of the main factors influencing industrial development is the availability of qualified technical instructors. Skilled students are the result of skilled teachers. We are sadly understaffed and many of our instructors have not had any recent industrial training. This restricts the caliber of graduates and the labour pool available to businesses"*. This suggests that a lack of qualified teachers results in undertrained pupils and a smaller pool of talent available for industrial growth. The workforce's lack of contemporary skills lowers the quality of the output.

P11. Technical Instructor from GTC, Abak: *"Students receive practical and pertinent instruction when there are qualified teachers present. However, the majority of schools either lack specialised teachers or have a shortage of staff. This affects the local economy's productivity and innovation by causing a disconnect between training and industry expectations"*. This suggests that low training quality is caused by a lack of staff and a reliance on teachers who are not qualified. Innovation and job readiness are stifled by this misalignment between industry demands and educational requirements.

P12. Technical Instructor from CTC, Ikot Akata: *"Technically sound workers are essential to the industrial sector and only highly qualified educators can produce them. Students who graduate with incomplete knowledge are unable to make significant contributions to industries or launch successful businesses due to inadequate or unqualified instructors"*. This suggests that graduates of underqualified schools have fewer skill sets, which impairs their employability and entrepreneurship potential and impedes the advancement of industry.

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P13. Technical Instructor from CTC, Oron: *"Skilled teachers are essential for encouraging creativity and self-assurance in their pupils. They facilitate the conversion of theory into real-world implementation. Students lose motivation and real-world experience when there are not enough of these instructors, which erodes the supply of qualified technicians that businesses depend on"*. This suggests that students who have fewer qualified teachers are less motivated and learn less in the real world, which lowers the supply of skilled workers entering the industrial sector and reduces the size of the technical workforce.

P14. Technical Instructor from GTC, Mbioto: *"Any technical training institution's engine room is the technical instructor. Industries will gain from a skilled workforce if we have an adequate number of qualified instructors. However, there are frequently insufficient teachers in critical fields like digital fabrication, automation and renewable energy in our schools"*. This suggests that the development of contemporary industry sectors in Akwa Ibom is hampered by a shortage of instructors in vital emerging fields like automation and digital technology, creating gaps that reduce competitiveness.

P15. Technical Instructor from GTC, Ikot Udoe: *"Skilled labour is necessary for industrial development and well-taught students provide skilled labour. Technical education loses its effectiveness if there are not enough qualified teachers. Instructors must also be regularly trained to match technological changes in industries"*. This suggests that technical education becomes antiquated and ineffectual in the absence of consistent instructor training, leading to a workforce that is out of step with technological advancements in business operations.

P16. Technical Instructor for GTC, Efoi: *"The quality of technical education is determined by the caliber of its teachers. Less experiential learning and larger class sizes are the results of instructors' unavailability. Skilled educators guarantee that students can manage practical industrial tasks and launch small businesses"*. This suggests that a lack of teachers results in packed classrooms and low levels of practical participation. This restricts grassroots industrialisation by lowering learning outcomes and delaying the establishment of small businesses.

P17. Technical Instructor from CTC, Ikot Uko: *"Students' value in the industrial sector is determined by what they learn and instructors decide how much they can learn". Both quantity and quality of instructors are required. If not, businesses will keep bringing in highly qualified personnel from outside the state".* This suggests that a decrease in the calibre of graduates is caused by a shortage of instructors who are not adequately qualified. This results in lost chances for local industrial self-reliance and a dependence on outside labour.

P18. Technical Instructor from CTC, Esit Eket: *"When industries have access to skilled technical workers, they expand. However, graduates' quality declines when instructors are inadequate or inept. Due to a lack of staff, some of us teach more than one subject. Qualified technical instructors must be hired, trained and maintained by the government"*. This suggests that training across disciplines is of lower quality when the teaching staff is overworked. Long-term constraints on the supply of industrial labour are caused by the government's failure to hire and train instructors.

3.4. Access to Tools, Equipment and Infrastructure and Industrial Development in Akwa Ibom State

Research Question III: How does access to tools, equipment and infrastructure encourage industrial development in Akwa Ibom State?

The data analysis demonstrated how access to tools, equipment and infrastructure encourage industrial development in Akwa Ibom State. All technical college instructors agree that having access to modern, useful training equipment is essential to providing effective technical education. Students who have access to these resources gain vital real-world experience that transforms their academic knowledge into employable skills that they can use right away in industrial settings. Students who receive this hands-on experience graduate as skilled technicians who can make significant contributions to industries such as manufacturing, electrical work, machining and repair services. Additionally, it increases their capacity for entrepreneurship, especially in the unorganised industrial sector and improves their ability to adapt to real-world jobs. In contrast, students' training is severely limited by the lack of infrastructure and pertinent tools, which lowers their employability and readiness to support local industries and leaves them with insufficient skills.

According to the technical instructors, specialised infrastructure like cutting-edge workshops, ICT labs, welding equipment and safety facilities boost students' self-esteem, promote creativity and help them develop domestic industrial solutions. In addition to creating a skilled labour force, these facilities help students design, build and

maintain systems that are critical to the advancement of industry. Additionally, having access to modern equipment fosters entrepreneurial mindsets in students, enabling them to launch their own companies instead of relying entirely on government jobs. Localised industrialisation and community economic self-reliance are strengthened by this grassroots entrepreneurship. Selected excerpts from the in-depth interviews were used to analyse the data and the results are shown as follows:

P19. Technical Instructor from GTC, Ewet: *"Students can obtain real-world experience when they have access to useful tools and equipment. They become more productive in actual industrial settings as a result of this practical training, which boosts industrial growth by supplying skilled labour to the workforce".* This suggests that practical instruction using the right equipment gives students practical skills, resulting in workers who are prepared for the workforce and can propel the state's industrial development.

P20. Technical Instructor from GTC, Abak: *"Technical education's effectiveness is limited by a lack of contemporary equipment. Our students would graduate prepared to contribute to the state's manufacturing, production and service sectors if they had access to the equipment used in real industries"*. This suggests that students graduate unprepared in the absence of industry-standard tools, weakening the workforce and lessening the effect of technical education on industrial productivity.

P21. Technical Instructor from CTC, Ikot Akata: *"Technical education is built on infrastructure and tools. Their accessibility enhances experiential learning. Without them, we only produce students who know theory. However, they can innovate, build and repair with the correct equipment, promoting industrial growth".* This suggests that having access to tools helps turn theoretical knowledge into useful skills, which in turn promotes production, innovation and repair-all of which are essential components of industrial growth.

P22. Technical Instructor from CTC, Oron: *"Skilled labour is essential to industrial development and practice makes perfect. The gap between learning and doing is filled by tools and equipment. When our workshops are properly furnished, we generate skilled technicians who support regional production and services"*. This suggests that well-equipped workshops generate skilled technicians who directly assist with manufacturing, maintenance and service operations.

P23: Technical Instructor from GTC, Mbioto: *"Future machinists, electricians and welders are under training here. One cannot create professionals without lathes, electrical boards, or welding tools. Improved technical capacity of the state results from more confidence and preparedness brought about by infrastructure access"*. This suggests that training professionals depends on access to specific infrastructure. Technical education without it cannot generate the trained labour needed in sectors depending on it.

P24. Technical Instructor from GTC, Ikot Udoe: *"Students who use contemporary tools for training learn fast to start their own workshops or fit for a career. This boosts the unofficial industrial sector in Akwa Ibom and lowers unemployment. Bad infrastructure slows down this development"*. This suggests that modern tools equip students to be either self-employed or employed, so increasing the informal sector of industry and job creation.

P25. Technical Instructor from GTC, Efoi: *"Infrastructure, such as useful workshops, ICT labs and safety facilities, promotes creativity and efficiency. With the correct tools and training, our students can design, construct and maintain machines or systems. The secret to industrialisation is this"*. This suggests that adequate infrastructure fosters students' capacity for innovation and problem-solving, both of which are essential for regional industrialisation and technologically driven development.

P26. Technical Instructor from CTC, Ikot Uko: *"Students become more productive when resources and infrastructure are easier to access. They start providing technical services to the local economy instead of relying on white-collar jobs. That is how grassroots industrial development begins"*. This suggests that having access to tools promotes entrepreneurship and lessens dependency on government employment, which ignites industrial development from the bottom up.

P27. Technical Instructor from CTC, Esit Eket: *"When technical schools are outfitted like mini-industries, Akwa Ibom can experience industrial growth. Having access to tools increases confidence and competence. Without the right equipment and facilities, we are only creating unskilled workers rather than technicians"*. This suggests that in the absence of proper equipment, technical schools are unable to generate competent technicians, which impedes the state's industrial development and independence.

4. Discussion of Findings

4.1. Quality of Curriculum and Training in Technical Education and Industrial Development in Akwa Ibom State

The results showed that industrial development in Akwa Ibom State is negatively affected due to out-dated curriculum and poor training of students. Technical instructors frequently lament that the current curriculum does not contain innovative discourse. It is excessively theoretical and not sufficiently adapted to the real-world needs of modern industries. This misalignment hinders the state's ability to innovate and grow its industry by producing graduates who are not equipped to handle the changing demands of the regional industrial sector. According to Agha et al. (2020), Nigeria's technical education curriculum is primarily based on foreign systems and is not adequately adapted to local industrial realities. This situation reflects their larger concerns. The experience in Akwa Ibom State was consistent with their analysis, which also highlighted the curriculum's overemphasis on theoretical pure sciences and mathematics at the expense of hands-on engineering and technological training.

When viewed through the lens of the key economic sectors in of Akwa Ibom State, such as oil and gas services, shipbuilding and maritime maintenance, agro-processing and emerging manufacturing—these shortcomings have clear consequences. For example, the oil and gas support industry increasingly requires technicians skilled in precision welding, pipeline maintenance and instrumentation, yet the curriculum remains too general and fails to provide targeted modules for these needs. Similarly, the state's nascent shipbuilding and boat-repair industry demands graduates familiar with marine engineering practices, but without industry-tailored training and modern workshops, this demand remains unmet. In agro-processing, where food preservation, packaging and mechanized farming technologies are gaining ground, the lack of hands-on exposure to processing machinery limits graduates' ability to drive productivity and innovation.

It is clear from placing these results within Gary Becker's (1964) Human Capital Theory that deficiencies in training delivery and curriculum design amount to a significant underinvestment in the human capital needed for industrial development. According to Becker's theory, investing in education and training benefits people and societies in the long run because it increases productivity and efficiency. In this regard, the technical education system in Akwa Ibom State has lost the chance to develop the particular abilities and proficiencies that drive industrial development. Poor infrastructure, a lack of training materials and out-dated equipment made it difficult for students to learn the practical skills necessary for industrial opportunities, which hinders the development of a skilled and creative workforce. This situation is particularly detrimental to industries such as automotive repairs and assembly, electrical installations for housing estates and industrial complexes and renewable energy technologies, all of which require updated tools and continuous training to keep pace with evolving standards.

This result is similar to what Toroka and Kafanabo (2024) observed in Tanzania, where they discovered a comparable dependence on out-of-date material and primarily lecture-based rather than skill-oriented teaching techniques. These teaching methods weaken graduates' practical skills and their ability to make valuable contributions in industrial settings. This gap is further widened by the lack of significant collaborations between the available public technical schools and industries, which limits access to internships, practical experience and vital feedback systems that are necessary to maintain the curriculum's relevance and responsiveness to industry demands. The absence of structured apprenticeship arrangements with shipyards, manufacturing plants and oilfield service companies deprives students of direct exposure to industry processes, thereby reinforcing the disconnect between education and employment readiness.

The need for a curriculum that strikes a balance between theory and practice and is backed by sufficient funding, modern facilities and skilled teachers was also underlined by technical instructors. Even well-designed programmes are unable to generate graduates who can propel industrial advancement in the absence of these components. Lack of industry cooperation causes students to frequently miss out on real-world training applications, which lowers their employability and entrepreneurial potential—two things that are crucial for economic diversification and grassroots industrial development. According to Becker (1964), this is an inefficient use of educational resources because systemic flaws are preventing the anticipated returns on educational investments from being fully realised. As a result, there is a labour shortage in the industrial sector, which can raise operating costs and hinder productivity because skilled graduates enable industries to innovate and optimise processes.

In conclusion, the study showed that promoting industrial development in Akwa Ibom depends critically on the quality of technical education curricula and training. For graduates to be prepared for the workforce, it is imperative that curricula be in line with both existing and emerging industrial technologies, that interactive and skills-based pedagogies be implemented, that infrastructure be improved and that school–industry ties be strengthened. According to the Human Capital Theory, these changes are both necessary for education and wise financial investments. This all-encompassing strategy is essential to turning technical education from a theoretical endeavour into a potent catalyst for regional industrialisation, economic expansion and technological breakthrough—particularly in oil and gas servicing, marine engineering, agro-processing and small-scale manufacturing, where skilled technical labour is the backbone of sustainable growth.

4.2. Availability and Competence of Technical Instructors and Industrial Development in Akwa Ibom State

The results showed that the availability and proficiency of technical instructors affect industrial development in Akwa Ibom State. The foundation for creating skilled graduates who can satisfy the ever-changing demands of industry is competent teachers. This is in line with Kholifah et al. (2024), who highlighted the crucial role that educators play in imparting technical knowledge as well as in incorporating crucial practical and interpersonal skills that are becoming more and more in demand by contemporary industries. The absence of highly qualified and specialised teachers in Akwa Ibom State restricts students' access to modern technologies, including cutting-edge disciplines like automation, renewable energy, and digital fabrication—all of which are essential for a dynamic and competitive industrial sector.

In the oil and gas support industry, for example, the lack of instructors trained in precision welding, pipeline instrumentation, and safety systems means that graduates often require retraining before they can work on offshore platforms or in refinery maintenance. Similarly, the marine engineering and shipbuilding sector, which is gradually expanding in the state, demands instructors who can teach hull fabrication, engine diagnostics, and advanced navigation electronics—competencies that cannot be effectively transferred without specialised teaching staff. In agro-processing industries, instructors with up-to-date knowledge of food preservation technology, mechanised milling, and automated packaging systems are essential to producing technicians who can manage modern processing plants. Emerging sectors such as renewable energy also require instructors skilled in solar PV installation, wind turbine maintenance, and energy storage systems, but current capacity gaps limit the state's ability to build a workforce in these fields.

These results demonstrated the essential link between investments in teacher competency and the financial value produced by human capital development, as seen in Gary Becker's Human Capital Theory. According to Becker's theory, training and education are types of capital that increase people's capacity for production, which eventually generates financial gains for both individuals and society as a whole. In this regard, technical instructors are an important conduit for the development and dissemination of human capital. The caliber of human capital being developed in technical education institutions is directly impacted by their proficiency—or lack thereof. A lack of investment in the fundamental frameworks required for efficient skill development is indicated by the lack of qualified technical instructors or teachers, which leads to overcrowded classrooms and lower-quality practical training. This problem is particularly evident in mechanical workshops, electrical labs, and digital fabrication studios, where insufficient instructor competence often means that students graduate with theoretical understanding but limited ability to operate industry-standard equipment. As a result, the discrepancy between what is taught and what businesses need turns into an economic inefficiency that lowers the region's industrial competitiveness rather than just an educational problem.

A cycle of out-dated curricula and underprepared graduates is further perpetuated by the data, which also showed that instructors cannot keep up with the rapid advancements in technology without on-going professional development. This supports the findings of Kholifah et al. (2024) regarding the difficulties teachers encounter when adjusting to changing industry demands and the necessity of all-encompassing support systems to improve the efficacy of instruction. According to Becker, the stagnation of instructor competence brought on by a lack of professional development and training amounts to a failure to uphold and improve a crucial component of human capital. It lowers the caliber of human capital that teachers are supposed to develop in their students in addition to limiting their own productivity. In highly technical sectors such as electronics assembly, industrial automation, and Computer Numerical Control (CNC) machines, this gap directly reduces the ability of industries to adopt modern production methods. A strong, independent industrial workforce is directly hampered by

technical education institutions' incapacity to recruit, train, and retain qualified teachers. This forces industries to rely on outside skilled labour, which restricts the potential for innovation and local economic growth.

4.3. Access to Tools, Equipment and Infrastructure and Industrial Development in Akwa Ibom State

The results demonstrated that access to tools, equipment, and infrastructure in technical schools can support industrial development in Akwa Ibom State. The availability of operational and contemporary training facilities is fundamental to generating graduates with the practical skills necessary for industrial growth, in line with the findings of Agha et al. (2020). The technical instructors unanimously agreed that students who have access to modern equipment and gain practical experience turn their theoretical knowledge into competence, preparing them for careers in industries like manufacturing, electrical work, and machinery maintenance. In practice, this means that the state's manufacturing plants—whether producing construction materials, consumer goods, or agro-processed products—require graduates who can operate CNC machines, assembly lines, and quality-control devices. Likewise, in the electrical sector, the installation of power distribution systems for residential, industrial, and oilfield facilities depends heavily on technicians who have trained with up-to-date testing tools and electrical safety equipment. For the machinery maintenance sector, industries such as marine engineering, automotive repair, and heavy-duty equipment servicing demand graduates who can use diagnostic tools, hydraulic testing rigs, and precision calibration instruments.

When analysed through the lens of Gary Becker's (1964) Human Capital Theory, these results emphasise the importance of infrastructure investment in creating economically productive people. According to Becker's theory, spending money on education and training increases a person's capacity for production, which eventually results in higher incomes and economic expansion. In this sense, having access to tools and contemporary infrastructure is a type of capital input that greatly improves the quality and efficacy of education by empowering students to gain employable, relevant skills. Based on the analysis, well-equipped workshops and specialised infrastructure help students develop their technical skills while also boosting their self-esteem and creativity—two qualities that are essential for creating valuable human capital that can propel industrial growth. In sectors such as renewable energy, ICT hardware assembly, and industrial refrigeration, these competencies are particularly valuable for enabling industries to adopt advanced technologies without importing all their expertise from outside the state.

This result is consistent with the works of Agha et al. (2020) who focused on the significance of suitable facilities for technical education's applicability and efficacy. Furthermore, the data supports Ojimba's (2013) worry about the effects of antiquated or non-existent workshop facilities, since the lack of contemporary tools significantly reduces practical training and leaves students unprepared to meet industry demands. For instance, the absence of automated milling machines in woodworking programmes limits the supply of skilled workers for furniture and joinery companies, while the lack of modern refrigeration units in food technology labs undermines the agro-processing sector's competitiveness. According to Becker, such infrastructural deficiencies constitute a lost chance to optimise the return on educational investments since the development of high-quality human capital is hampered by the under-utilisation or nonexistence of essential resources. This stifles the economic advancement that could come from a more robust, technically skilled workforce by limiting both individual employability and overall industrial productivity.

Crucially, the results add to the body of literature by showing how technical students' entrepreneurship is encouraged by access to contemporary tools and infrastructure, enabling them to start workshops and unofficial businesses. In Akwa Ibom, this often translates into small-scale fabrication workshops, renewable energy installation services, welding businesses, and ICT repair hubs. This grassroots entrepreneurial activity is a critical driver of localised industrialisation and economic self-reliance, highlighting a dynamic often underexplored in broader studies. Such entrepreneurial results further highlight the long-term financial advantages of focused educational investments from the standpoint of human capital theory. The focus on infrastructure, such as ICT labs and safety facilities, further implies that modern industrial development calls for both the ability to innovate and adapt to changing technologies in addition to traditional technical skills.

Thus, the results showed a cyclical relationship in which skilled labour is fostered by adequate infrastructure, supporting industrial growth, innovation, and economic diversification in Akwa Ibom State. In the oil and gas services sector, for example, this translates into local capacity for rig maintenance and pipeline fabrication; in maritime engineering, it enables ship repair yards to source trained workers locally; in manufacturing, it supports

efficient production lines; and in agro-processing, it improves post-harvest handling and packaging. To fully realise the potential of technical education as a catalyst for industrial development, the state must address the enduring issues mentioned by Agha et al. (2020), such as underfunding and deteriorating infrastructure.

5.1. Conclusion

This study looked at how technical education affects industrial development in Akwa Ibom State, Nigeria, paying special attention to the quality of the training and curriculum, the availability and skill of the technical instructors and the accessibility of tools, equipment and infrastructure. The main findings showed that the current curricula in technical schools in Akwa Ibom State are outdated, overly theoretical and not well suited to the real-world demands of industries. This misalignment has slowed innovation and constrained the expansion of the state's industrial sector by producing graduates who are not sufficiently equipped for industrial employment. Additionally, students are deprived of real-world experience and feedback mechanisms that are essential for preserving curriculum relevance due to a lack of cooperation between schools and industries.

Equally significant is the shortage of qualified and competent technical instructors. The findings underscore that without skilled educators who are regularly updated with industry trends, even a well-designed curriculum loses its effectiveness. Overburdened teaching staff and the absence of continuous professional development further compound this challenge, creating a vicious cycle of underperformance in technical training. Additionally, the study shows that access to modern tools, equipment and specialised infrastructure is foundational to translating theoretical knowledge into practical competence. The absence of such facilities undermines student preparedness, restricts innovation and weakens grassroots entrepreneurship, all of which are necessary for localised industrial development.

The implications of these findings are far-reaching. They contend that technical education in Akwa Ibom State will continue to fall short of its potential as a catalyst for industrialisation unless systemic changes are made, such as updating the curriculum, investing in teacher training and developing the infrastructure. In addition to increasing technical graduates' employability, addressing these problems would boost the expansion of small and medium-sized businesses, lessen reliance on outside labour and increase the state's economic independence.

In terms of contribution to knowledge, this study offers a localised and evidence-based perspective on the factors limiting the effectiveness of technical education in Nigeria, using Akwa Ibom State as a case study. It adds to the literature by highlighting the practical implications of curriculum misalignment, instructor inadequacy and infrastructure deficits on industrial development. Importantly, the study introduces a more nuanced understanding of how these elements interact within the socio-economic and industrial realities of a subnational context.

Further research is recommended to explore specific strategies for fostering industry-school partnerships in Akwa Ibom State, such as models for collaborative curriculum development, industrial mentorship programmes and local apprenticeship schemes. Longitudinal studies that track the employment outcomes of technical education graduates in Akwa Ibom State could also provide valuable insights into the long-term impact of reforms in the sector. Additionally, comparative studies across different Nigerian states or between public and private technical institutions could deepen understanding of best practices and scalable solutions for national industrial advancement.

5.2. Recommendations

Based on the findings of the study, the recommendations were:

i. The findings underscore that a high-quality, well-resourced and industry-aligned technical education system is essential for equipping youths with relevant skills, promoting entrepreneurship and driving sustainable industrial development in Akwa Ibom State. Without urgent reforms in curriculum content, training quality and institutional support, the technical education sector will continue to underperform as a catalyst for local industrial growth.
ii. For industrial development in Akwa Ibom State to thrive, there must be strategic investment in recruiting, training and retaining competent technical instructors. Without strengthening the instructional base of technical education, efforts to grow a skilled industrial workforce and foster local innovation will remain inadequate.

iii. The Government of Akwa Ibom State, in collaboration with relevant stakeholders, should prioritise the comprehensive equipping and modernisation of technical training institutions by providing industry-standard tools, functional infrastructure and digital facilities to ensure hands-on, practice-based learning that aligns with current industrial demands and fosters a skilled, innovation-driven workforce.

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