
IMPACT OF SUPERVISORY PRACTICES, INSTRUCTIONAL MATERIALS, AND EQUIPMENT AVAILABILITY ON THE DELIVERY OF THE NCE METALWORK TECHNOLOGY CURRICULUM IN NORTH-WESTERN NIGERIAN POLYTECHNICS

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Abstract:

The study examines how supervisory practices, availability of instructional materials, and equipment influence effective delivery of the NCE Metalwork Technology curriculum in polytechnics across North-Western Nigeria. Employing a descriptive survey design, data were gathered from 140 respondents (lecturers, technologists, administrators) in selected federal and state polytechnics using a structured Likert-scale questionnaire (Cronbach's $\alpha = 0.87$). Results indicate moderate supervisory practices ($M = 3.12$, $SD = 0.78$), low instructional materials availability ($M = 2.38$, $SD = 0.92$), and critically low equipment functionality ($M = 2.21$, $SD = 0.85$), correlating with fairly low curriculum delivery effectiveness ($M = 2.65$, $SD = 0.81$). Pearson correlations and t-tests revealed significant positive relationships ($p < 0.05$) between the independent variables and delivery outcomes, with federal institutions performing marginally better than state institutions. Respondent quotes highlight themes of irregular supervision, obsolete machinery, and consumable shortages hindering practical training. The findings align with broader Nigerian TVET challenges, including funding deficits and infrastructural decay. Recommendations focus on enhanced supervisory training, targeted resource allocation, public-private partnerships, and policy reforms to align with national industrialization and SDG 4 objectives. This research contributes to evidence-based interventions for revitalizing metalwork technology education in underserved northern regions.

Introduction

Technical and Vocational Education and Training (TVET) is vital for Nigeria's economic diversification away from oil dependence, youth employment, and technological progress. By providing practical, industry-aligned skills in sectors like manufacturing, construction, agriculture mechanization, and metal

fabrication, TVET promotes self-employment, reduces high youth unemployment (over 60% of the population is young), and builds a competent workforce. It supports key national frameworks, including the National Policy on Education, the Economic Recovery and Growth Plan (ERGP), and Sustainable Development

Goals 4 (quality education) and 8 (decent work and economic growth), while closing the widening gap between education outputs and industrial needs to boost productivity, innovation, and competitiveness.

The Nigeria Certificate in Education (NCE) Metalwork Technology programme, regulated by the National Commission for Colleges of Education (NCCE), plays a targeted role in producing qualified technical teachers for junior secondary Basic Technology and technical colleges. Graduates deliver hands-on training in welding and fabrication, machining, sheet metalwork, forging, foundry practices, and tool maintenance, combining pedagogical skills with trade competencies to ensure safe, proficient metalworking instruction and sustain Nigeria's supply of skilled artisans and educators. NCCE minimum standards (2020 revised and updates) require fully equipped workshops with hand tools (files, hammers, callipers), power machines (lathes, milling machines, grinders), arc/gas welding sets, benches with vices, safety gear, and regular consumables (electrodes, cutting fluids, abrasives, steel stock) to achieve psychomotor and safety objectives.

However, polytechnics in North-Western Nigeria (Kano, Kaduna, Katsina, Sokoto, Kebbi, Jigawa, Zamfara) face severe barriers: chronic underfunding restricts equipment purchase and maintenance; many workshops use

outdated, broken machinery due to neglect and spare-part shortages; security issues (banditry, kidnapping, conflicts) disrupt supply chains and deter upgrades; and resource allocation favours southern/central zones via TETFund, World Bank projects (IDEAS, STEP-B), and private partnerships, leaving the North-West underserved despite its population and industrial potential (Kano hub).

The 2025 NBTE-led nationwide TVET evaluation confirmed persistent infrastructure deficits, outdated curricula in places, weak industry links, and graduate skill gaps particularly limited exposure to modern practices like CNC and advanced welding resulting in low employability and poor trade-test performance. These challenges undermine TVET's potential in the North-West, perpetuating youth unemployment, slow industrialization, and regional inequality. Urgent solutions include equitable funding, targeted interventions, improved security for educational facilities, and stronger public-private partnerships to revitalize NCE Metalwork Technology delivery and advance Nigeria's development goals.

Statement of the Problem

Despite well-established policy frameworks from the National Commission for Colleges of Education (NCCE) and the National Board for Technical Education (NBTE), which

outline clear minimum standards for workshop facilities, instructional resources, and supervisory oversight, the delivery of the Nigeria Certificate in Education (NCE) Metalwork Technology curriculum in many North-Western Nigerian polytechnics remains markedly ineffective, (Aina, and Adebayo, (2021).) However, if this is taken into cognizance via improvement, the situation would have look better than the present status. These guidelines mandate regular internal and external supervision, adequate provision of instructional materials (textbooks, diagrams, consumables), and functional equipment to support practical, competency-based training in core areas such as metal fabrication, arc and gas welding, machining (lathe and milling operations), sheet metalwork, forging, and foundry practices.

In practice, however, supervisory inconsistencies severely undermine implementation. Monitoring is often irregular, with departmental heads and external NBTE/NCCE inspectors conducting infrequent visits due to logistical constraints, inadequate funding for travel, and overburdened supervisory staff. When supervision does occur, feedback is typically limited, superficial, or delayed, offering little actionable guidance to improve teaching strategies or resource utilization. This lack of consistent oversight allows deviations from the intended, practical-oriented approach to persist unchecked.

Compounding these issues are the chronic scarcity of instructional materials and the widespread non-functionality of essential equipment. Many workshops suffer from shortages of consumables (welding electrodes, cutting fluids, abrasives, mild steel stock), outdated or broken machines (lathes with seized spindles, non-operational welders, missing grinding wheels), and poor maintenance culture due to insufficient budgetary allocations. As a direct consequence, instructors resort to over-reliance on theoretical lectures and chalk-and-talk methods, drastically reducing hands-on practice time.

The outcomes are profound and multifaceted. Students experience poor psychomotor skill acquisition, leaving them unable to confidently perform critical tasks such as precision measurement, safe welding, or accurate machining. This deficiency translates into low graduate employability, as industries in fabrication, welding, and machining demand verifiable practical competence rather than theoretical knowledge alone. Ultimately, the programme fails to meet contemporary industrial demands, perpetuating a skills mismatch that hinders Nigeria's manufacturing sector growth, youth empowerment, and regional economic development in the North-West. Addressing these interconnected challenges, such as supervisory lapses, resource shortages, and equipment dysfunction, is essential to restoring the

curriculum's intended practical focus and producing competent, industry-ready technical educators and practitioners.

Objectives of the Study

1. To determine the extent to which supervisory practices influence the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria.
2. To examine the impact of the availability of instructional materials on the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria.
3. To assess the influence of equipment availability on the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria.

Research Questions

1. To what extent do supervisory practices influence the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria?
2. To what extent does the availability of instructional materials affect the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria?
3. To what extent does the availability of equipment influence the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria?

Hypotheses

- H₀₁** There is no significant influence of supervisory practices on the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria.
- H₀₂** There is no significant impact of the availability of instructional materials on the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria.
- H₀₃** There is no significant influence of equipment availability on the effective delivery of the NCE Metalwork Technology curriculum in polytechnics in North-Western Nigeria.

Review of Related Literature

Relevant literature was objectively reviewed, as can be seen in the sub-topics below.

Supervisory Practices in TVET

Supervision plays a critical role in ensuring instructional quality, curriculum compliance, and continuous professional development of teachers in Technical and Vocational Education and Training (TVET) institutions. Effective supervision involves regular classroom and workshop observations, constructive feedback, performance evaluation, and guidance on pedagogical strategies, all of which help maintain fidelity to the intended practical-oriented delivery of programmes such as NCE Metalwork Technology.

Okwelle (2022) highlights significant managerial challenges in the supervision of 21st-century TVET programmes in Nigeria, including inadequate training for supervisors, limited logistical support (transportation and monitoring tools), insufficient time allocation due to heavy administrative loads, and lack of standardized supervisory instruments. These constraints frequently result in irregular and superficial oversight, where visits are sporadic, feedback is minimal or absent, and follow-up actions are rarely implemented.

In the Nigerian context, particularly within polytechnics and colleges of education, poor supervision contributes directly to deviations from the practical-oriented approach mandated by NCCE standards. Without consistent monitoring, instructors often default to lecture-based methods, neglecting hands-on activities in metal machining, welding, and fabrication due to resource or time pressures. This undermines psychomotor skill development, reduces student engagement with workshop tasks, and compromises the production of competent technical teachers. Strengthening supervisory capacity through targeted training, clear protocols, and adequate resources is therefore essential to bridge the gap between policy intent and actual curriculum delivery.

Okwelle's findings highlight that effective supervisory practices, coupled with adequate availability of instructional materials and equipment, are essential for

overcoming implementation barriers and ensuring the successful delivery of the NCE Metalwork Technology curriculum in North-Western Nigerian polytechnics, where deficiencies in these areas directly hinder practical skill acquisition and overall curriculum effectiveness.

Instructional Materials and Equipment Availability

Instructional materials such as charts, textbooks, diagrams, and consumables (welding electrodes, cutting fluids, abrasives, mild steel stock) along with functional equipment (lathes, milling machines, arc welders, grinders, hand tools, benches with vices) form the backbone of the psychomotor domain in metalwork technology. These resources enable students to develop essential hands-on skills, including precision machining, safe welding techniques, material manipulation, and tool handling, which are central to achieving NCCE-specified competencies in fabrication, forging, foundry, and sheet metalwork.

Raheef (2024) emphasizes that shortages of such facilities critically hinder effective teaching and learning processes in technical education, often leading to reduced student engagement and superficial skill acquisition. Ogunbote (2024) specifically highlights outdated equipment, chronic funding shortages, and poor maintenance practices as persistent barriers in Nigerian tertiary metalwork workplaces, resulting in graduates who lack industry-ready

proficiency. Raheef's (2024) emphasis on the inadequacy of instructional materials and equipment, which severely limits hands-on skill acquisition and innovative teaching approaches in metalwork programs, synergizes with Ogunbote's (2024) findings on the critical need for suitable, well-equipped workplaces and modern resources in tertiary institutions. Together, these reinforce that deficiencies in equipment availability and instructional support not only hinder effective supervisory practices but also compromise the overall delivery of the NCE Metalwork Technology curriculum in North-Western Nigerian polytechnics, ultimately undermining students' practical competencies, employability, and the curriculum's goal of producing skilled technical educators and practitioners. Addressing these interconnected challenges through targeted provision of resources and enhanced supervision could significantly improve implementation outcomes.

In an analogous northern context, Bwala (2020) assessed facilities in North-Eastern colleges of education and reported grossly inadequate modern tools and machines, directly correlating with low student performance in practical assessments. Complementing these findings, a 2025 study on automobile and metalwork skill development established strong positive correlations between the adequacy of workshop resources and students' demonstrated proficiency in key

practical tasks, reinforcing that resource availability is a decisive factor in bridging the gap between curriculum intent and actual skill outcomes in TVET programmes.

Curriculum Delivery in NCE Metalwork Technology

Curriculum delivery in the Nigeria Certificate in Education (NCE) Metalwork Technology programme is fundamentally hands-on and practical-oriented, designed to equip pre-service technical teachers with essential psychomotor skills for teaching junior secondary school basic technology and related trades. According to the National Commission for Colleges of Education (NCCE) minimum standards (revised editions, including 2012 and 2020 updates), the programme emphasizes competencies in key areas such as metal machining, sheet metalwork, forging, welding, foundry practices, metal fabrication, and basic tool handling. These practical components are intended to dominate instruction, with students engaging in workshop-based activities to develop trade-related skills like problem-solving, precision measurement, material selection, and safe equipment operation. The goal is to produce graduates who can competently teach and practice metalwork, fostering self-reliance, employability, and alignment with industrial needs in Nigeria's evolving manufacturing sector.

However, delivery often suffers when resources are limited, resulting in a pronounced theory bias that undermines the programme's core objectives. In many North-Western Nigerian polytechnics and colleges of education, inadequate funding, outdated or non-functional equipment (lathes, milling machines, arc welders), and shortages of consumables (welding rods, cutting fluids, abrasives) force instructors to prioritize lectures and theoretical explanations over practical demonstrations and student-led projects. This shift diminishes hands-on experience, leading to superficial skill acquisition, reduced student confidence in performing real-world tasks, and poor retention of psychomotor competencies. Studies highlight that such constraints contribute to graduates' skill gaps, low pass rates in practical examinations, and challenges in meeting industry demands for competent fabricators and technical educators.

Recent curriculum revisions have compounded these issues while attempting modernization. Sabo (2021) notes that the NCCE minimum standards (2020 revised edition) reduced overall graduation credit units from 118 (in the 2012 version) to 94 for the entire NCE (Technical) programme, including general and pedagogical courses. Specifically for Metalwork Technology, trade-specific credits dropped from 64 to 48, a 21% reduction without proportional adjustments to content delivery

mechanisms. While the revision aimed to streamline the curriculum, promote trade specialization, entrepreneurship, and relevance to basic education, it has inadvertently intensified pressure on already strained resources. With fewer credits allocated to practical modules like foundry and machining, instructors face difficulties covering essential psychomotor outcomes effectively, especially in under-equipped workshops. This reduction creates a mismatch between expected practical depth and available instructional time and facilities, further entrenching theory-dominated approaches. The credit reduction in the revised NCE (Technical) minimum standards (from 64 to 48 credit units for metalwork technology, a 21% cut in trade-specific content) has significant implications for curriculum delivery. It creates substantial gaps in coverage of essential practical topics, limiting depth in hands-on training and potentially weakening graduates' competence in trade-related skills like machining, forging, and foundry work.

Sabo (2021) suggests this reduction exacerbates challenges in achieving intended practical skill outcomes, as the condensed content widens the mismatch between traditional lecture-based methods and required hands-on proficiency, contributing to poorer student performance and retention in subjects like metal foundry.

While Sabo (2021) primarily offers intrinsic analysis highlighting the need for trade specialization, entrepreneurship alignment, and relevance to basic education without explicit solutions in cited references, subsequent studies (Adamu et al., 2024) build on this by recommending innovative pedagogies like problem-based learning to mitigate gaps and enhance practical skill retention despite reduced credits.

Addressing these challenges requires targeted interventions, such as increased budgetary support for workshop upgrades, integration of modern technologies (basic CNC or simulation tools where feasible), and enhanced instructor training in adaptive teaching strategies. Without such measures, curriculum delivery will continue to fall short of producing fully competent metalwork technology graduates capable of contributing to Nigeria's industrialization goals.

Theoretical Framework

The Input-Process-Output (IPO) Systems Theory, derived from general systems theory, views educational programmes as dynamic systems where inputs (resources like supervisory practices, instructional materials, and equipment) interact through processes (teaching, monitoring, and practical activities) to produce outputs (effective curriculum delivery, skill acquisition, and graduate competence). In TVET contexts,

inadequate inputs disrupt practical processes, yielding suboptimal outputs such as theory-biased instruction and skill gaps.

This study directly relates to the IPO model: supervisory practices, instructional materials, and equipment availability serve as critical inputs influencing the process of NCE Metalwork Technology curriculum delivery in North-Western Nigerian polytechnics. Deficiencies in these inputs (irregular supervision, scarce consumables, non-functional machines) hinder hands-on processes, resulting in low delivery effectiveness, reduced psychomotor skills, and misalignment with industrial demands consistent with empirical findings of moderate supervision and low resource levels leading to fairly low programme outcomes.

Methodology

Design and Population

Descriptive survey; population: 210 staff in NCE Metalwork departments (federal/state polytechnics).

A multi-stage sampling technique was used for the study. At the first stage, a purposive sampling technique (PST) was used to justify the polytechnics that offer the NCE Metalwork Technology programme as Federal Polytechnic Kaduna, Nuhu Bamalli Polytechnic Zaria, Kano State Polytechnic Kano, Hassan

Usman Katsina Polytechnic, Katsina State, and Waziri Umaru Federal Polytechnic Birnin Kebbi State. However, other sample sizes were portrayed in Table 1 below. This selection was purposely carried out based

on the federal and state polytechnics offering the programme only. So, the selection was based on the purpose of the study.

Table 1: Population and Sample Size which was proportionally carried out

Category	Population	Sample Size	Percentage	Sampling Technique
Federal Polytechnics	120	80	67%	Stratified random
State Polytechnics	90	60	67%	Stratified random
Lecturers	150	100	-	-
Technologists/Administrators	60	40	-	-
Total	210	140	67%	-

Sample via Taro Yamane (95% confidence)

Instrument and Reliability

5-point Likert questionnaire was used for the study; sections on variables; Cronbach's $\alpha = 0.87$.

Data Collection and Analysis

Administered 2025; analyzed with means, SD, Pearson r, t-test (SPSS).

Results and Discussion

Demographic Profile

Respondents: 65% lecturers, 29% technologists, 6% administrators; 70% male; experience 5–15 years.

Table 2: Mean Ratings of Variables (N = 140)

Variable	Mean	SD	Decision/Remark
Supervisory Practices (frequency, feedback)	3.12	0.78	Moderate
Instructional Materials Availability	2.38	0.92	Low
Equipment Availability and Functionality	2.21	0.85	Low
Curriculum Delivery Effectiveness (practical emphasis, skill acquisition)	2.65	0.81	Fairly Low

Detailed Analysis with Respondent

Supervision: Moderate due to "irregular NBTE visits and departmental heads overburdened" (Lecturer, Kano Polytechnic). Materials: Low "Consumables like electrodes often out of

stock for months" (Technologist, Katsina). Equipment: Low "Only 40% of lathes functional; no modern CNC". Delivery: Hindered "We teach theory mostly; students lack hands-on confidence" (Lecturer, Kaduna).

Hypothesis Testing

Table 3: Pearson Correlation Results

Hypothesis	R	p-value	Decision
H01: Supervision & Delivery	0.58	0.000	Reject H01
H02: Materials/Equipment & Delivery	0.64	0.000	Reject H02

Significant positive relationships ($p < 0.05$).

Independent t-test: Federal vs. State institutions ($t = 3.41, p = 0.001$), federal slightly higher means.

Discussion of Findings

The findings of this study reveal moderate supervisory practices ($M = 3.12, SD = 0.78$), low availability of instructional materials ($M = 2.38, SD = 0.92$), and critically low equipment availability and functionality ($M = 2.21, SD = 0.85$) in North-Western Nigerian polytechnics offering the NCE Metalwork Technology programme. These factors collectively contribute to fairly low curriculum delivery effectiveness ($M = 2.65, SD = 0.81$), characterized by limited practical training, reduced student psychomotor skill acquisition, and over-reliance on theoretical instruction. The positive and significant correlations (supervision $r = 0.58, p < 0.001$; materials/equipment $r =$

$0.64, p < 0.001$) underscore that improvements in these areas directly enhance hands-on delivery and overall programme outcomes.

These results align closely with recent scholarship on resource-skill linkages in Nigerian TVET. Ogunbote (2024), in examining metalwork technology workplaces in tertiary institutions, identified outdated equipment, poor funding, and inadequate maintenance as major barriers to effective training, leading to skill deficiencies among graduates. Similarly, the 2025 study by Ogunbote et al. on adequate workshop tools in South-West universities of education demonstrated that resource scarcity negatively impacts skill development in automobile and

metalwork technology, with students in under-equipped settings showing lower proficiency in machining, welding, and fabrication, mirroring the low equipment ratings in the present North-West context. Raheef (2024) emphasized that the availability of facilities is essential for supporting teaching and learning processes in technical education, concluding that shortages hinder effective delivery and provoke negative public perceptions of TVET programmes. These studies collectively reinforce the input-process-output dynamics: insufficient resources (inputs) disrupt practical-oriented processes, yielding suboptimal skill outputs. While this study (focused on North-Western Nigerian polytechnics) finds supervisory practices moderately supportive but often inconsistent due to regional resource constraints, Ogunbote (2024) emphasizes challenges in implementing suitable metalwork workplaces in tertiary institutions nationwide, highlighting infrastructure deficits more broadly. Raheef (2024) underscores severe inadequacies in facilities and equipment availability impacting TVET teaching/learning, with stronger public skepticism toward technical education's value.

Nuances: This study's regional emphasis reveals supervisory practices as a partial mitigator of material shortages, whereas Ogunbote prioritizes workplace suitability/equipment modernization, and Raheef stresses broader facility gaps and

negative perceptions suggesting integrated supervision could bridge equipment deficiencies more effectively in North-West contexts than in general Nigerian settings.

Regional funding disparities exacerbate these challenges in the North-West compared to national averages. While federal interventions (TETFund allocations and recent World Bank-supported initiatives like IDEAS) have improved some southern and central zones, North-Western polytechnics often receive disproportionately lower shares due to historical inequities, security concerns disrupting supply chains, and competing priorities in education budgets. National TVET assessments indicate that northern zones, including the North-West, consistently lag in infrastructure investment, with many workshops relying on obsolete or non-functional lathes, welders, and grinders contrasting with better-resourced institutions elsewhere. This geographic imbalance perpetuates a cycle of theory-biased instruction, lower graduate employability, and misalignment with industrial demands in metal fabrication and related sectors.

Furthermore, respondent quotes from the study illuminate these realities: one lecturer noted, "Irregular supervision and lack of consumables force us to skip practical sessions," while a technologist added, "Many machines have been down for years due to no maintenance funds." These qualitative insights complement

the quantitative data, highlighting how supervisory lapses compound resource shortages, leading to inconsistent monitoring and feedback that could otherwise optimize limited facilities.

In broader terms, the findings contribute to ongoing discourse on TVET revitalization in Nigeria, aligning with calls for equitable resource distribution to achieve SDG 4 targets on quality education and skills. Without addressing these regional disparities through targeted funding, supervisory capacity building, and public-private partnerships, NCE Metalwork Technology programmes in the North-West risk continued underperformance, hindering national industrialization goals.

Summary of findings

There was a strong positive and significant correlation between supervisory practices and curriculum delivery effectiveness ($r = 0.58$, $p < 0.001$).

A strong positive and significant correlation existed between the combined availability of instructional materials and equipment and curriculum delivery effectiveness ($r = 0.64$, $p < 0.001$).

Improvements in supervisory practices, instructional materials, and equipment availability were found to significantly enhance hands-on curriculum delivery and overall programme outcomes.

Conclusion

Supervisory inconsistencies, material/equipment deficits severely impair NCE Metalwork curriculum delivery, perpetuating skill gaps and TVET underperformance in North-Western Nigeria.

Recommendations

Strengthen Supervisory Capacity and Frequency by the Curriculum Development Agency: The National Commission for Colleges of Education (NCCE), in collaboration with polytechnic managements, should implement mandatory, structured supervisory training programmes for departmental heads, workshop coordinators, and external monitors. This should include quarterly on-site monitoring schedules, standardized observation checklists, and timely, actionable feedback mechanisms. Such measures would directly address the moderate supervisory rating and capitalize on the $r = 0.58$ correlation to improve instructional quality and practical delivery.

Increase Targeted Funding and Resource Allocation for Instructional Materials and Equipment: Given the stronger correlation ($r = 0.64$) between materials/equipment availability and curriculum effectiveness, federal and state governments, through TETFund and special intervention funds, should prioritize ring-fenced grants for North-Western polytechnics. These should focus on procuring modern lathes, milling machines,

functional welding sets, safety gear, and regular replenishment of consumables (electrodes, cutting fluids, abrasives). Performance-based funding tied to improvements in workshop functionality and practical session hours is recommended to ensure accountability.

Establish Regular Maintenance and Inventory Systems: Polytechnics should institute dedicated workshop maintenance units with annual budgets and trained technical staff. Routine preventive maintenance schedules, spare parts stocking, and digital inventory tracking would prevent prolonged equipment downtime and sustain the positive impact of resource improvements on hands-on training outcomes.

Promote Public-Private Partnerships and Industry Linkages: Collaborate with local metal fabrication, welding, and manufacturing firms in Kano, Kaduna, and other industrial hubs to sponsor equipment donations, consumable supplies, and co-funded workshop upgrades. Industry experts could also serve as adjunct supervisors or guest instructors, reinforcing practical relevance and extending the benefits of enhanced supervision and resources.

Integrate Monitoring and Evaluation Mechanisms: NCCE/NBTE should develop a national TVET dashboard to track key indicators (supervisory visit frequency, equipment functionality rate, practical session coverage) across zones. Annual regional equity audits and

corrective interventions would help close the North-West gap and sustain long-term gains in curriculum delivery effectiveness.

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