

A CRITICAL APPRAISAL OF EMPIRICAL AUTHENTICITY IN NIGERIAN TECHNOLOGICAL RESEARCH: THE PERSPECTIVE OF A TECHNOLOGY EDUCATOR

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ABSTRACT

RESEARCH ARTICLE

This appraisal critically examines the empirical authenticity of technological research within Nigeria's Technical and Vocational Education and Training (TVET) sector. Despite TVET's role as a catalyst for industrialisation and the Fourth Industrial Revolution (4IR), a significant divergence exists between theoretical research ideals and practical academic output. This paper identifies a prevailing "methodological mono-culture," characterised by an over-reliance on descriptive surveys (exceeding 90% in some faculties) at the expense of experimental designs. This trend is exacerbated by chronic infrastructural decay, erratic power supply, and a profound disconnect between academia and industry. Furthermore, a burgeoning ethical crisis, marked by a 22% admission rate of fabrication, falsification, or plagiarism, undermines the integrity of the nation's empirical research enterprise. Utilising meta-analytic findings and evaluative frameworks like the Kirkpatrick model, the analysis reveals that even when pedagogical interventions succeed, they often fail to translate into economic impact. The study concludes that reclaiming empirical integrity requires a structural realignment toward longitudinal experimentation, ethical fortification, and industry-synched research agendas within the Nigerian context.

KEYWORDS: TVET, Empirical Authenticity, Methodological Mono-culture, Research Misconduct (FFP), Kirkpatrick Model

INTRODUCTION

Technical and Vocational Education and Training (TVET) is globally recognised as a critical driver for sustainable development, industrialisation, and the cultivation of a skilled workforce capable of navigating the complexities of the Fourth Industrial Revolution (UNESCO, 2024). In Nigeria, the strategic importance of TVET is enshrined in national policy as a pathway to economic diversification and technological advancement (Odo et al., 2024). However, the sector's capacity to fulfil this transformative mandate is intrinsically linked to the robustness and applicability of the research that underpins its pedagogical and practical frameworks. The extent to which this research reflects empirical authenticity, therefore, becomes a pivotal determinant of TVET's overall efficacy and societal relevance.

Despite its purported significance, a discernible chasm has emerged between the theoretical ideals espoused in Nigerian TVET scholarship and the practical realities of its academic output. A growing body of evidence suggests that the sector's research enterprise is constrained by a "methodological mono-culture." This phenomenon is characterised by a disproportionate reliance on descriptive survey designs, which, in some faculties, constitute over 90% of all empirical studies (Faculty of Education UNN, 2018). This over-reliance occurs at the expense of more robust experimental, quasi-experimental, and longitudinal designs that are essential for establishing causal inferences and testing the efficacy of technological interventions. Such methodological stagnation limits the generalisability and practical utility of research findings, impeding the development of evidence-based solutions to persistent technical challenges.

The impediments to rigorous empirical inquiry in Nigerian TVET are multifaceted and deeply entrenched. Chronic infrastructural decay, including erratic power supply and inadequate laboratory facilities, creates a prohibitive environment for complex technological research (National Communications Commission, 2024). This systemic deficiency is compounded by a profound disconnect between academic institutions and the industries they are meant to serve. The absence of sustained industry-academia collaboration results in research agendas that are often misaligned with the evolving needs of the labour market, rendering scholarly output largely theoretical and devoid of immediate practical application (Bakare et al., 2025; Stakeholder Partnership Thesis, 2018). Beyond these structural and collaborative deficits, the integrity of the empirical research enterprise itself is under threat from a burgeoning ethical crisis. Recent meta-analyses indicate a concerning prevalence of research misconduct, with admission rates of fabrication, falsification, and plagiarism reaching approximately 22% among some academic cohorts (Global Publication House, 2025). According to Oliha and Osiobaifoa (2024), this erosion of academic integrity, often exacerbated by a "publish or perish" culture and inadequate research ethics training fundamentally undermines the trustworthiness of the nation's scientific output and calls into question the validity of the evidence base informing TVET policy and practice.

This appraisal, therefore, seeks to critically examine the empirical authenticity of technological research within Nigeria's TVET sector. Utilising meta-analytic findings and established evaluative frameworks, such as the Kirkpatrick model (Edidiong et al., 2024), this paper analyses the interplay between methodological choices, infrastructural constraints, and ethical practices. It argues that even when pedagogical interventions demonstrate success at immediate levels of learning, their failure to translate into tangible economic impact or industry-relevant skills signals a profound disconnection between academic research and its purported real-world objectives. The paper concludes by advocating for a structural realignment of the research culture, emphasising the necessity for longitudinal experimentation, rigorous ethical fortification, and the co-creation of research agendas with industry partners to restore empirical integrity and enhance the societal relevance of TVET in Nigeria.

The Epistemological Crisis: Defining Empiricism in a Technical Vacuum

The epistemological foundation of technological research is predicated on a distinct form of empiricism, one that diverges significantly from purely theoretical or philosophical inquiry. Within the domain of Technical and Vocational Education and Training (TVET), the gold standard for empirical rigour is increasingly defined by international frameworks, such as those promulgated by UNESCO-UNEVOC, which advocate for competence-based occupational standards (UNESCO-UNEVOC, 2021). These standards mandate that both training and assessment be objective, demonstrably aligned with defined competency levels, and verified through the observation of authentic performance in-situ (UNESCO-UNEVOC, 2021). Nworgu (2015) and Uwaifo (2006) observed that for research to legitimately claim the mantle of empiricism in this context, it must therefore transcend mere theoretical postulation. This necessitates the rigorous testing of hypotheses through controlled experimentation or the systematic, replicable observation of technical phenomena within real-world or simulated environments

In Nigeria, however, technological research within the TVET sector frequently struggles to sustain this fundamental connection to the material world. This disjuncture represents a profound epistemological crisis, wherein the methods of inquiry have become decoupled from the very nature of the technical reality they seek to investigate. The resultant ‘crisis of relevance,’ a persistent feature of the Nigerian education system since the 1980s, can be attributed, in significant part, to a research culture that fails to bridge the gap between theoretical conjecture and practical outcomes, and between scholarly output and policy formulation (Jega, 2017). The research produced often exists in a vacuum, its findings insufficiently robust or applicable to inform the development of curricula, pedagogical tools, or industrial processes.

This detachment is exacerbated by a prevailing institutional culture that undervalues evidence. Political and bureaucratic leadership in the educational sector has frequently exhibited a marked indifference, or even active resistance, to research-driven evidence, preferring instead an incremental, ‘muddling through’ approach to resolving complex educational challenges (Jega, 2017). This systemic disregard for empirical findings creates a deleterious feedback loop. When researchers perceive that their meticulously gathered data will be systematically ignored by policymakers, the intrinsic motivation for methodological rigour is severely undermined. This dynamic can lead to a proliferation of research that lacks the depth, validity, and practical orientation required to catalyse genuine industrial transformation (Jega, 2017; Ayonmike et al., 2015). The consequence is a body of scholarly work that is not only empirically fragile but also epistemologically misaligned with the practical, problem-solving ethos that should define technological research in a developing economy.

Methodological Mono-culture: The Dominance and Limitation of the Survey Trap

A critical examination of the research designs prevalent within Nigeria's Technical and Vocational Education and Training (TVET) and technology education sectors reveals a pronounced and epistemologically limiting trend. Quantitative inquiry, by its nature, encompasses a diverse array of methodological approaches, each suited to addressing distinct types of research questions. These range from experimental and quasi-experimental designs, which are essential for establishing causal relationships, to causal-comparative and correlational studies, which explore differences and associations between variables (Nworgu, 2015). However, despite this methodological plurality, the landscape of Nigerian educational

research is characterised by an overwhelming and disproportionate reliance on a single approach, which is the descriptive survey research design.

This phenomenon, which may be termed a 'methodological mono-culture,' is starkly illustrated by meta-analytic evidence from Nigerian higher education. Syntheses of completed postgraduate theses and peer-reviewed journal articles indicate that, within some faculties of education and social sciences, the descriptive survey design accounts for in excess of 90% of all empirical studies (Faculty of Education UNN, 2018). While the survey method holds undeniable utility for capturing attitudes, perceptions, and demographic trends at a specific point in time, its dominance to the near-exclusion of other designs signals a profound epistemological imbalance. The implications of this imbalance are particularly acute for a field like TVET, which is fundamentally concerned with the acquisition of measurable skills, the efficacy of pedagogical interventions, and the application of knowledge in practical settings, all of which demand methodologies capable of demonstrating change and verifying competence.

The ascendancy of the descriptive survey can be attributed to a confluence of factors, including its perceived ease of administration, its relatively low cost, and its compatibility with the statistical analysis techniques most familiar to researchers. However, its dominance comes at a significant cost. In relying almost exclusively on self-reported data and cross-sectional snapshots, researchers forfeit the opportunity to observe technical phenomena directly, to manipulate variables in controlled environments, or to track the development of competencies over time (UNESCO-UNEVOC, 2021). Consequently, the field is left with a substantial body of literature describing what stakeholders think or feel about technological education, but a comparative dearth of robust evidence on what actually works in terms of pedagogical practice, skills acquisition, and long-term industrial impact. This methodological inertia not only constrains the theoretical development of the discipline but also severely limits the practical utility of research for informing evidence-based policy and curriculum reform in the Nigerian TVET sector.

Table 1

Comparison of Core Research Methodologies in Technology Education

Research Design	Core Objective	Empirical Mechanism	Practical Limitation in Nigeria
Experimental	Establish cause-effect relationships (Ayonmike et al., 2015)	Manipulation of independent variables under controlled conditions (Nworgu, 2015)	High cost; requires functional workshops and stable power (Ayonmike et al., 2015)
Quasi-Experimental	Test interventions without randomisation (Bakare et al., 2023)	Pre-test/post-test of groups undergoing different treatments (Agbaje et al., 2022)	Difficulty in controlling external school-based variables (Uduafemhe, 2021)
Descriptive Survey	Describe population characteristics or opinions (Nworgu, 2015)	Standardised questionnaires and structured interviews (Faculty	Strictly observational; cannot prove causation or

		of Education UNN, 2018)	technical efficacy (Faculty of Education UNN, 2018)
Case Study	In-depth analysis of a single subject (Faculty of Education UNN, 2018)	Collection of detailed qualitative and quantitative data (Bakare et al., 2023)	Limited generalisability to the broader national context (Faculty of Education UNN, 2018)

The prevalence of the descriptive survey in technological research is fundamentally problematic. Technology, by its very nature, is a field of interventions, processes, and material outcomes (Odo et al., 2024). When research in this field is reduced to documenting the *opinions* of lecturers or students regarding the inadequacy of facilities, rather than *experimenting* with new pedagogical methods or technical processes despite those inadequacies, the research ceases to be truly ‘technological’ and becomes ‘sociological’ (Uduafemhe, 2021). Furthermore, the integrity of these surveys is often compromised by unstatistical methods for determining sample size (Faculty of Education UNN, 2018). Many researchers rely on arbitrary percentage ‘suggestions’ rather than mathematically proven formulas, leading to data that lacks a significant confidence level and possesses a high margin of error (Faculty of Education UNN, 2018). For research to be considered empirical, the data must be statistically dependable and generalisable; the current ‘survey trap’ in Nigerian academia fails this test (Faculty of Education UNN, 2018). According to Ayonmike et al. (2015), this reliance on surveys is frequently a defensive response to the lack of functional laboratories, as researchers find it easier to distribute a questionnaire than to conduct a lab-based experiment in a workshop lacking power or equipment

Infrastructural Decay: The Physical Barrier to Empirical Observation

The foundational claim of any empirical research enterprise is that phenomena exist to be observed and that adequate mechanisms are available for their systematic observation (Nworgu, 2015). Within Nigeria's Technical and Vocational Education and Training (TVET) institutions, however, the physical substrate necessary for such observation, the workshops, laboratories, and equipment that constitute the material basis of technical inquiry, exists in a state of advanced dilapidation (Ayonmike et al., 2015). This infrastructural decay fundamentally undermines the possibility of conducting empirical research that is grounded in the observation of authentic technical practice, rendering the pursuit of rigorous, experimentally verified knowledge profoundly constrained.

The empirical evidence for this decay is both extensive and unequivocal. Technical and vocational institutions across Nigeria are consistently characterised by inadequate infrastructure, obsolete equipment, and workshops that have fallen into disuse or complete non-functionality (Ayonmike et al., 2015). A comprehensive nationwide assessment conducted in 2025 across 320 TVET institutions in all 36 states and the Federal Capital Territory revealed the stark magnitude of this crisis. The UNESCO-led evaluation found that 60 per cent of classrooms and workshops require significant rehabilitation, including window replacement, flooring repairs, and improved lighting (New Telegraph, 2026). Also, less than 25 per cent of institutions have reliable power supply for digital training, while over half report unreliable or no electricity access whatsoever (New Telegraph, 2026). For an empirical tradition that depends on the operation of machinery, the observation of technical processes, and the replication of industrial conditions, such power deficits are existentially crippling.

The implications for empirical observation extend beyond mere infrastructure to the very tools of technical practice. The Executive Secretary of the Tertiary Education Trust Fund (TETFund) has acknowledged that many polytechnics, which should serve as pillars of TVET, contain laboratories and workshops equipped with obsolete machinery that bears no relation to contemporary industrial standards (The Guardian, 2025). This observation echoes earlier documentation of technical colleges where equipment supplied decades ago, in some cases as far back as 1964, remains in use, long past any reasonable lifespan for functional machinery (Daily Trust, 2014). In such environments, the equipment available for student training and, by extension, for research observation, bears at best a passing resemblance to the technologies actually deployed in Nigerian industries. Teachers are consequently compelled to resort to diagrammatic representations on blackboards, substituting symbolic abstraction for direct empirical engagement with operational machinery (Daily Trust, 2014)

Table 2

Strategic Infrastructure Deficits and Research Implications

Infrastructure Component	National Deficit/Status	Impact on Technological Empiricism
Energy/Power Supply	Persistent failures and erratic supply (Stonehill Research, 2024)	Prevents longitudinal experiments; damages sensitive electronic research tools (Opesanwo & Anwana, 2023)
ICT/Internet	Only 54,000 km of fibre backbone; 4G deployment at 45% (NCC, 2024)	Limits access to cloud-based research tools and global databases (Stonehill Research, 2024)
Technical Workshops	Many schools lack functional workshops or modern tools (Ayonmike et al., 2015)	Forces practical subjects to be taught and researched theoretically (Uwaifo, 2006)
General Funding	NIIMP estimates \$3 trillion required over 30 years (NCC, 2024)	Chronic stagnation in facility maintenance and curriculum development (Ayonmike et al., 2015)

The 2013 National Integrated Infrastructure Master Plan (NIIMP) showed a massive deficit across core sectors, including energy and ICT (National Communications Commission [NCC], 2024). For the technological researcher, this translates to a reality where ‘Metal-work Technology’ or ‘Wood-work Technology’ are researched primarily through theoretical scores because the workshops lack the consumables or the machinery for experimental validation (Uwaifo, 2006). Studies have shown that while there is a significant relationship between theoretical and practical performance, the lack of emphasis on the practical aspects in Nigerian universities produces graduates who are knowledgeable in theory but deficient in the practical skills required by the labour market (Uwaifo, 2006).

The ‘empirical’ nature of a study is hollow if the researcher is ‘faking’ the environment or if the ‘technical’ findings are based on machines that have been out of industrial use for decades (UNESCO-UNEVOC, 2021; Ayonmike et al., 2015). Consequently, Nigerian technological research often suffers from a ‘ghost empiricism’, where the data collected relates to a simulated or historical reality rather than the current industrial frontier (Sylvester, 2021; Ayonmike et al., 2015).

The Political Economy of Research: Funding, Motivation, and Brain Drain

Empirical research is an expensive undertaking, requiring consumables, equipment maintenance, and field-work logistics (Ayonmike et al., 2015). In Nigeria, the financial environment for researchers is one of profound scarcity (Global Publication House, 2025). Global Publication House (2025) again noted that the nation currently spends less than 1% of its GDP on research and development. While bodies like the Tertiary Education Trust Fund (TETFund) provide some support, their selection processes are often hampered by inadequate publicity, lack of knowledge about funding agencies, and the exclusion of dedicated research institutes (Global Publication House, 2025). A staggering 42.98% of researchers in Nigeria report a total lack of research funding, leading many to self-fund their studies from their salaries (Global Publication House, 2025). Global Publication House (2025) and Okonta and Rossouw (2014) noted that this creates a ‘poverty-research cycle’ of inadequate funding leading to compromised research designs, which in turn results in low-impact publications that fail to attract international grants or industrial interest

Table 3

Factors Influencing Researcher Productivity in Nigeria

Factor	Statistical Impact on Productivity	Source
Lack of Research Funding	51.1% cited as primary limiting factor	(Global Publication House, 2025)
Brain Drain	Affects 17.11% of the research population	(Global Publication House, 2025)
Lack of Motivation	8.85% of respondents reported low motivation	(Global Publication House, 2025)
Technical Challenges	Reported by 4.68% of researchers	(Global Publication House, 2025)

This financial pressure, combined with high teaching loads and excessive administrative duties, significantly weakens the motivation for rigorous empirical inquiry (Ayonmike et al., 2015). The resulting ‘brain drain’ sees the most capable empirical researchers migrating to environments where their expertise is supported by adequate resources (Global Publication House, 2025). For those who remain, the desire for career progression, which in Nigeria is tied almost exclusively to publication count, often takes precedence over the empirical quality of the research itself (Global Publication House, 2025).

Ethical Crisis: The Shadow of Fabrication, Falsification, and Plagiarism (FFP)

Perhaps the most damaging indictment of the empirical status of technological research in Nigeria is the rising prevalence of Fabrication, Falsification, and Plagiarism (FFP) (Global Publication House, 2025). Driven by the ‘publish or perish’ culture and inadequate ethics training, FFP has emerged as a significant threat to the integrity of the Nigerian academic enterprise (Global Publication House, 2025; Okonta & Rossouw, 2014).

Table 4

Prevalence of Research Misconduct in Nigeria

Misconduct Type	Admission/Prevalence Rate	Predictors and Drivers
Fabrication	14.4% in specific samples	Pressure to publish; knowledge gaps (Agbaje et al., 2013)
Falsification	9.8% in specific samples	Desire for ‘preferred’ results (Agbaje et al., 2013)
Plagiarism	4.5% to 8.92% frequency	Inability to identify plagiarism (Agbaje et al., 2013 ; Oliha & Osiobaifoa, 2024)
Inadequate Records	29.5% (most frequent wrongdoing)	Poor mentoring; lack of oversight (Agbaje et al., 2013)
Salami Slicing	5.3% (redundant publication)	Academic promotion requirements (Agbaje et al., 2013)

In a first-time study of its kind in Africa, approximately 22% of researchers admitted to at least one of fabrication, falsification, or plagiarism (Agbaje et al., 2013). Fabrication involves inventing data, while falsification entails altering research materials or reporting wrong results to support a specific hypothesis (Agbaje et al., 2013). These practices are not merely ethical lapses; they are a direct negation of empiricism (Global Publication House, 2025). If the data is faked, the research is no longer an observation of reality but a manufactured fiction (Agbaje et al., 2013). The consequences of FFP are multifaceted, including the erosion of public confidence in research institutions, the impediment of academic advancement, and the deterioration of Nigeria’s global academic ranking (Global Publication House, 2025; Oliha & Osiobaifoa, 2024). When postgraduate students are not adequately trained in ethics or are aware that plagiarism detection software like Turnitin and many others are rarely used due to subscription costs, the cycle of academic dishonesty is perpetuated (Opesanwo & Anwana, 2023 ; Wittenberg, 2024).

The TVET-Industry Gap: Research in a Vacuum

The ultimate test of empirical technological research is its utility in solving real-world industrial problems (UNESCO, 2024). However, Nigerian TVET institutions suffer from a profound disconnect from the industry (Bakare et al., 2023). This disconnect is manifested in outdated curricula that do not reflect current industry needs and a lack of stakeholder partnerships (Sylvester, 2021; Ayonmike et al., 2015). A survey of 22 technical colleges

across four geopolitical zones revealed extremely low internal efficiency, with only two colleges achieving an efficiency index above 50% (Stakeholder Partnership Thesis, 2018). Furthermore, research indicated a highly disproportionate ratio of technical colleges to general education schools, ranging from 1:70 to 1:138 (Stakeholder Partnership Thesis, 2018). This scarcity of technical institutions is compounded by a lack of collaboration; where only 32% of technical colleges were found to be involved in any form of partnership with outside organisations (Stakeholder Partnership Thesis, 2018). The failure to use good theories to inform policies has led to a ‘crisis of relevance’ where the education acquired does not match the needs of employers, resulting in approximately 11 million unemployed youth (Jega, 2017). In such a climate, research into ‘innovation’ or ‘skill acquisition’ often occurs in a vacuum (Stakeholder Partnership Thesis, 2018). Without the ‘Triple Helix’ interaction between universities, research institutes, and firms, the empirical findings of technological research remain siloed in library repositories, poorly managed and eventually lost (Taraba State University, 2023; Bello & Muhammad, 2021).

Societal Stigma and the Hierarchy of Research

The status of TVET in Nigeria is further undermined by a deep-seated societal perception that vocational education is for the ‘academically weak’ or a ‘last resort’ (Ayonmike et al., 2015; Uduafemhe, 2021). This perception creates a hierarchy of research where university-based studies are viewed as ‘superior’ to those coming from polytechnics, despite polytechnics being the bedrock of technical innovation (Asibeluo, 2015). Studies comparing research behaviour between university and polytechnic lecturers in southeast Nigeria revealed that university lecturers exhibit more positive research behaviour and higher productivity than their polytechnic counterparts (Comparative Research Study, 2021). Polytechnic graduates (HND holders) frequently face discrimination in the workplace, often forced to work under university graduates regardless of practical competence (Asibeluo, 2015). This institutionalised bias discourages polytechnic researchers from pursuing rigorous empirical studies, as the rewards are significantly lower than those in the university system (Comparative Research Study, 2021; HND Discrimination Study, 2020).

Pedagogical Empirical Interventions: A Glimmer of Rigour

Despite the overwhelming systemic barriers, there are instances of rigorous empirical research that offer a roadmap for reform (Bakare et al., 2023 ; Edidiong et al., 2024). These studies often employ experimental or quasi-experimental designs to test psychological or pedagogical interventions in TVET settings (Agbaje et al., 2022). For example, a study on the effectiveness of Rational Emotive Behaviour Therapy (REBT) for improving school engagement among pre-service TVET teachers used a randomised control group design (Agbaje et al., 2022). The findings indicated a significant increase in engagement scores at post-test for the treatment group, demonstrating the potential for evidence-based psychological interventions to address student disengagement (Agbaje et al., 2022). Another significant empirical effort involved the evaluation of TVET programmes using the Kirkpatrick model, which assesses training across four levels: Reaction, Learning, Behaviour, and Outcome (Edidiong et al., 2024).

Table 5*Kirkpatrick Model Evaluation in a Nigerian Polytechnic*

Level of Evaluation	Finding/Result	Statistical Indicator
Reaction	Adequate/Positive	High stakeholder agreement (Edidiong et al., 2024)
Learning	Adequate	High respondent agreement (Edidiong et al., 2024)
Behaviour	Adequate	Students reported habit changes (Edidiong et al., 2024)
Outcome/Impact	No significant influence	Adjusted $R^2=-0.005$, $F=0.363$, $p=0.780$ (Edidiong et al., 2024)

The regression analysis revealed that while reaction, learning, and behaviour were adequate, they did not significantly influence the actual outcome or result of the TVET programme (Edidiong et al., 2024). This is a critical empirical understanding, which suggests that even when ‘education’ happens, it is not translating into ‘economic impact’ or ‘employability’ (Edidiong et al., 2024).

Conclusions

This critical appraisal set out to interrogate a fundamental question: To what extent can technological research within Nigeria's Technical and Vocational Education and Training (TVET) sector be considered genuinely empirical? The evidence synthesized across the preceding sections compels a response that is necessarily qualified and, in many respects, deeply cautionary. While the procedural architecture of Nigerian technological research, its adherence to the formalities of hypothesis formulation, data collection, and statistical analysis, appears to align with the conventions of the empirical tradition, the substantive integrity of that research is systematically compromised by a confluence of structural, methodological, and ethical failures (Faculty of Education UNN, 2018; Global Publication House, 2025; Jega, 2017).

The preceding analysis has demonstrated that the empirical authenticity of Nigerian technological research is undermined at multiple interdependent levels. Epistemologically, the field suffers from a decoupling of inquiry from its material substrate, wherein research methods have become detached from the technical reality they purport to investigate. Methodologically, the dominance of the descriptive survey, exceeding 90 per cent of studies in some faculties, has produced a 'mono-culture' that privileges the documentation of perception over the observation of practice, effectively transforming technological research into a sociological exercise (Faculty of Education UNN, 2018; Uduafemhe, 2021). This methodological inertia is not merely a matter of intellectual preference but is structurally reinforced by infrastructural decay that renders experimental observation impossible (Ayonmike et al., 2015; New Telegraph, 2026), by a political economy of research funding that forces methodological compromise (Global Publication House, 2025), and by an ethical crisis in which approximately one in five researchers admits to fabrication, falsification, or plagiarism (Agbaje et al., 2013; Global Publication House, 2025).

The consequence of these intersecting failures is a research enterprise that produces what may be termed 'simulated empiricism', scholarly outputs that bear the formal hallmarks of empirical inquiry but are, in substance, disconnected from the observable reality of technical practice. Nigerian technological research frequently operates within a 'ghost empiricism,' collecting data that relates to obsolete equipment, simulated environments, or historical realities rather than the contemporary industrial frontier (Ayonmike et al., 2015; Sylvester, 2021). Even where rigorous interventions are attempted, as demonstrated by Kirkpatrick model evaluations, the finding that pedagogical success fails to translate into economic impact underscores a profound disconnection between academic output and industrial outcome (Edidiong et al., 2024).

For technological research in Nigeria to move from this condition of simulated empiricism toward what may be termed 'materialist empiricism', inquiry genuinely grounded in the observation of and intervention in technical reality, a fundamental structural realignment is imperative. This realignment must proceed along several interconnected axes. First, a deliberate methodological shift is required, wherein the academic community de-emphasises the descriptive survey in favour of experimental, quasi-experimental, and longitudinal designs capable of establishing causal relationships and tracking competency development over time (Faculty of Education UNN, 2018). Second, infrastructural rehabilitation must be prioritised, with government fulfilling its commitments under the National Integrated Infrastructure Master Plan (NIIMP) and establishing a dedicated Special Research Trust Fund specifically targeted at equipping technical workshops and laboratories (Global Publication House, 2025; National Communications Commission, 2024). Third, ethical fortification demands mandatory research ethics training at both postgraduate and faculty levels, alongside the provision of institutional subscriptions to plagiarism detection software to ensure the integrity of scholarly output (Agbaje et al., 2013; Okonta & Rossouw, 2014; Opesanwo & Anwana, 2023). Fourth, industry-academia synthesis must become the organising principle of research agenda-setting, ensuring that empirical inquiry is co-designed with industrial partners and that findings are oriented toward practical application and economic impact (Bakare et al., 2023). Finally, strategic adoption of emerging technologies, including artificial intelligence for research management and blockchain for verifiable credentialing and assessment, offers pathways for Nigeria to bypass certain traditional logistical barriers and enhance the transparency and efficiency of its research enterprise (Edidiong et al., 2024; Global Publication House, 2025).

The crisis of relevance that has historically plagued Nigerian technology education is, at its core, a crisis of empiricism. For the technology educator and the technological researcher alike, the imperative is clear: only by grounding inquiry in the rigorous, ethical, and material observation of technical reality can the scholarly enterprise hope to contribute to a national transformation that is not merely theoretical but industrially tangible and economically consequential. The restoration of empirical authenticity in Nigerian technological research is therefore not an abstract academic concern but a fundamental precondition for the sector's capacity to fulfil its mandate as a catalyst for sustainable development, industrialisation, and meaningful participation in the Fourth Industrial Revolution.

Recommendations

Based on the foregoing critical appraisal of empirical authenticity in Nigerian technological research, the following recommendations are proffered:

1. Faculties of education and technology in Nigerian universities and polytechnics should institute policy reforms that discourage the over-reliance on descriptive survey designs. Postgraduate supervision and examination boards ought to prioritise experimental, quasi-experimental, and longitudinal methodologies, particularly for doctoral theses, to ensure that technological research engages directly with the observation of practice and the measurement of competency development over time.
2. The Federal Government, in collaboration with the Tertiary Education Trust Fund (TETFund), should establish a special-purpose intervention fund explicitly allocated to the rehabilitation and equipping of technical workshops and laboratories. This initiative must be aligned with the National Integrated Infrastructure Master Plan (NIIMP) and should prioritise institutions demonstrating capacity for experimental research, thereby providing the material substrate necessary for genuine empirical inquiry.
3. All postgraduate programmes in technology-related disciplines should incorporate mandatory, credit-bearing coursework in research ethics. Furthermore, institutions must provide free, institution-wide access to plagiarism detection software and enforce strict penalties for verified cases of fabrication, falsification, and plagiarism. Regular ethics audits should be conducted by university research offices to monitor compliance and restore confidence in Nigerian academic output.
4. Universities and polytechnics should formalise memoranda of understanding with relevant industries to co-design research agendas, share facilities, and facilitate the joint supervision of student projects focused on solving real-world technical problems. Such partnerships should be incentivised through tax rebates for participating industries and recognition in university accreditation exercises, ensuring that research findings are oriented toward practical application and economic impact.
5. Nigerian TVET institutions should leverage emerging technologies, including artificial intelligence for research design and data analysis, and blockchain for secure, verifiable storage of theses and publications. Investment in reliable internet infrastructure and cloud-based research platforms will enable researchers to access global databases, participate in international collaborations, and bypass certain logistical barriers imposed by physical infrastructural deficits.

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