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Qualitative Study on Digital Transformation in Educational Administration: A Catalyst for Institutional Effectiveness in Nigerian Colleges of Education

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Abstract

Nigerian Colleges of Education continue to administer core institutional functions admissions, records management, staff deployment, resource allocation, and quality assurance through largely manual and fragmented systems, even as national policy instruments increasingly assume a digitally enabled administrative environment. This position paper argues that the digital transformation of educational administration is not a peripheral modernization project but a necessary catalyst for institutional effectiveness in Nigerian Colleges of Education, and that its absence constitutes a structural constraint on the sector's capacity to deliver quality teacher education at scale. Drawing on Technology-Organization-Environment (TOE) theory, Diffusion of Innovation theory, and institutional effectiveness frameworks, the paper critically examines evidence from Nigerian and comparable Sub-Saharan African contexts on administrative digitalization, evaluating its contribution to decision-making quality, accountability, resource efficiency, and stakeholder engagement. The discussion identifies persistent barriers inadequate ICT infrastructure, inconsistent funding, limited digital competence among administrative staff, weak cybersecurity and data governance, and fragmented policy implementation that have constrained transformation to isolated pilot initiatives rather than systemic change. The paper contends that institutional effectiveness in Colleges of Education cannot be sustainably achieved without deliberate investment in digital governance architecture, capacity development, and policy coherence between national ICT frameworks and college-level implementation. It concludes with actionable recommendations for college administrators, the National Commission for Colleges of Education, and policymakers, emphasizing phased infrastructure investment, mandatory digital competency development, harmonized data governance standards, and institutionalized monitoring mechanisms as preconditions for translating digital transformation into measurable gains in institutional effectiveness and, by extension, teacher education quality.

Keywords: digital transformation, educational administration, institutional effectiveness, teacher education

Introduction

The administrative infrastructure of Nigerian Colleges of Education has historically relied on paper-based and manually mediated processes for functions as consequential as student admissions, examination records, staff payroll, and institutional reporting (Adeyemi, 2019; Okonkwo & Eze, 2021). This reliance persists despite two decades of national policy rhetoric committing the education sector to information and communication technology (ICT) integration, beginning with the National Policy on Education's ICT provisions and reinforced by subsequent instruments such as the National Commission for Colleges of Education's (NCCE) Minimum Standards and the National Digital Economy Policy and Strategy (Federal Ministry of Communications and Digital Economy, 2020). The gap between policy ambition and administrative practice is particularly acute in Colleges of Education, a sub-sector that trains the majority of Nigeria's basic and post-basic education teaching workforce and is therefore structurally central to the country's human capital pipeline (National Commission for Colleges of Education [NCCE], 2021). Educational administration, in this context, is understood broadly as the set of institutional processes planning, decision-making, resource management, personnel administration, communication, and quality assurance—through which a College of Education organizes itself to achieve its educational mandate (Peretomode, 2018). Digital transformation of this administrative core refers not merely to the adoption of discrete software tools but to a systemic reconfiguration of institutional processes, governance structures, and organizational culture around digital technologies (Vial, 2019). This distinction matters: much of what has been described as "digitalization" in Nigerian tertiary institutions amounts to the digitization of individual artifacts scanned files, standalone spreadsheets



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without the integrated, process-level transformation that digital transformation properly denotes (Adenuga et al., 2022). The stakes of this administrative gap are heightened by the scale and complexity of the Colleges of Education sub-sector. Nigeria operates over 150 Colleges of Education (federal, state, and private), collectively enrolling hundreds of thousands of students under administrative systems that vary widely in capacity and sophistication (NCCE, 2021). Institutional effectiveness in this sub-sector defined as the degree to which an institution achieves its stated mission through efficient use of resources, sound governance, and demonstrable outcomes (Cameron, 2020) depends heavily on administrative functions that are increasingly difficult to execute reliably at scale without digital systems: verifying credentials, tracking student progression, managing accreditation documentation, and generating the data policymakers require for evidence-based planning. The COVID-19 pandemic exposed this vulnerability starkly. Colleges with limited digital administrative infrastructure struggled not only to sustain instruction but to perform basic continuity functions processing results, maintaining communication with students and staff, and reporting to regulatory bodies (Iwu et al., 2022; Ogunode & Ajape, 2021). This disruption has since catalyzed renewed institutional and policy interest in digital transformation, but interest alone has not translated into systemic change, and the risk is that post-pandemic momentum dissipates into another cycle of underfunded pilot projects. The significance of this problem extends beyond individual institutional efficiency to the broader national teacher supply pipeline, since Colleges of Education are the primary mechanism through which Nigeria's persistent qualified-teacher shortfall is to be closed (NCCE, 2021). Administrative inefficiency that slows admissions processing, delays certification, or compromises records integrity therefore has downstream consequences for teacher supply nationally compounded by a fragmented regulatory architecture that leaves individual colleges to pursue digitalization in isolation rather than as part of a coordinated agenda.

Purpose of the Study

This paper advances a position, grounded in theory and empirical evidence, that digital transformation of educational administration should be treated by Nigerian Colleges of Education and their regulatory bodies as a strategic catalyst for institutional effectiveness rather than a discretionary or purely technical undertaking. It examines the theoretical basis for this claim, critically reviews the empirical evidence on digital administrative transformation in Nigerian and comparable contexts, and derives policy and practical recommendations for accelerating a coherent, sustainable transformation agenda. The paper also argues that the digital transformation of educational administration encompassing governance, records management, decision-support systems, and stakeholder communication is a necessary, though not sufficient, condition for institutional effectiveness in Nigerian Colleges of Education, and that realizing this potential requires deliberate, coordinated investment in infrastructure, human capacity, and digital governance frameworks rather than isolated technology procurement.

Statement of the Problem

Despite two decades of ICT policy pronouncements, the administrative core of most Nigerian Colleges of Education remains substantially undigitalized or only partially digitalized, and where digital tools have been adopted, implementation is frequently fragmented, under-resourced, and disconnected from institutional strategy. The consequence is an administrative environment characterized by data fragmentation, delayed and error-prone reporting, weak evidence for decision-making and administrative inefficiencies that constrain the sub-sector's capacity to deliver on its teacher education mandate. The literature has documented individual barriers to ICT adoption in Nigerian higher education administration extensively, but there remains insufficient scholarly argument connecting digital transformation directly and explicitly to institutional effectiveness as a strategic imperative for Colleges of Education specifically, as distinct from universities or polytechnics, whose governance and funding contexts differ materially.

Conceptual Framework

Digital transformation

Vial (2019) defined digital transformation as a process whereby digital technologies trigger significant changes to organizational properties through the reconfiguration of processes, structures, and value-creating pathways. Applied to educational administration, this means integrating digital technologies into governance, records management, communication, and quality assurance in ways that alter how these functions are performed rather than simply automating their existing paper-based logic.

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Educational administration

Peretomode (2018), encompasses the processes of planning, organizing, directing, coordinating, and controlling institutional resources toward the achievement of educational objectives here, admissions and records administration, staff establishment, budget and procurement, facilities management, and quality assurance.

Institutional effectiveness

Drawing on Cameron (2020) and adapted for Nigerian tertiary contexts by Okebukola (2021), as the extent to which an institution efficiently converts available resources into the achievement of its educational mission, evidenced through accreditation outcomes, graduate quality, resource utilization, stakeholder satisfaction, and organizational responsiveness.

Theoretical Framework

Technology Organization Environment (TOE) Framework

Developed by Tornatzky and Fleischer (1990), the TOE framework posits that an organization's adoption and effective use of technological innovation is shaped by technological context (available technologies and infrastructure), organizational context (structure, resources, culture), and environmental context (regulatory and stakeholder pressures). This suits Colleges of Education well: institutions face similar environmental pressures (NCCE accreditation, national ICT policy) but differ substantially in organizational readiness and infrastructure, producing divergent transformation trajectories across otherwise comparable institutions.

Diffusion of Innovation (DOI) Theory

Rogers's (2003) DOI theory explains how innovations spread within a social system, identifying adopter categories and the innovation attributes relative advantage, compatibility, complexity, trialability, observability that shape adoption decisions. Applied here, DOI theory explains persistent resistance among administrative staff: digital systems are often perceived as high in complexity and low in compatibility with existing bureaucratic routines, slowing diffusion even where relative advantage is, in principle, substantial.

Institutional Effectiveness Theory

Institutional effectiveness scholarship (Cameron, 2020; Astin & Antonio, 2012) treats effectiveness as multidimensional spanning goal attainment, process efficiency, resource acquisition, and stakeholder satisfaction allowing this paper to argue that digital transformation contributes to effectiveness through several distinct pathways simultaneously rather than a single mechanism.

Digital Governance

A fourth, organizing construct digital governance—refers to the policies, standards, and decision rights that determine how an institution manages digital systems and data over their lifecycle (Janssen & van der Voort, 2020), distinguishing transformation as a technical event from transformation as a sustained institutional capability. Much of the disuse pattern documented in the Nigerian literature (Adeyemi, 2019) reflects a governance failure as much as an adoption failure.

Integrated Theoretical Position

Taken together, these frameworks position digital transformation as an organizational-level intervention mediated by organizational readiness (TOE) and adoption dynamics (DOI), sustained through digital governance capacity, and ultimately measured against multidimensional institutional effectiveness criteria. This layered model clarifies why isolated technology procurement the dominant Nigerian pattern so often fails: it addresses only the technological dimension, leaving organizational readiness, diffusion, and governance sustainability unaddressed. The critical discussion below uses this model to distinguish cases that addressed all four dimensions from the more numerous cases that addressed only the first.

Critical Discussion

A growing body of evidence associates digital administrative systems with measurable gains in institutional efficiency and decision quality in higher education contexts. Adenuga et al. (2022), in a study spanning selected Nigerian tertiary institutions, found that institutions with integrated student information systems demonstrated significantly faster results-processing turnaround and fewer record discrepancies than institutions relying on manual or semi-digital systems. Similarly, Okonkwo and Eze (2021) documented that Colleges of Education that had adopted electronic document management for accreditation purposes experienced smoother NCCE resource verification visits, attributing this to the ease of retrieving and cross-referencing institutional records on demand.



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Beyond efficiency, digital administrative systems strengthen the evidentiary basis for institutional decision-making. Ogunode and Ajape (2021) argue that data-driven decision-making, long theorized in the general education administration literature (Mandinach & Gummer, 2016), remains largely aspirational in Nigerian Colleges of Education precisely because administrative data exist in disconnected silos—paper files, unlinked spreadsheets, departmental registers that cannot be aggregated into institution-level dashboards. Where colleges have implemented integrated management information systems, administrators report an improved capacity to identify enrollment trends, staff workload imbalances, and resource bottlenecks before they become acute (Iwu et al., 2022). Digital transformation also plausibly strengthens stakeholder engagement and institutional legitimacy. Communication technologies institutional portals, SMS and email notification systems, mobile applications have been shown in comparable Sub-Saharan African contexts to improve student and parent engagement with administrative processes such as fee payment, registration, and results release (Kigotho & Wanjala, 2020, discussing Kenyan tertiary institutions), a pattern plausibly transferable to the Nigerian context given similar infrastructural and demographic conditions.

Function-by-Function Analysis

A finer-grained look across specific administrative functions clarifies both the potential and the unevenness of digital transformation's impact. In admissions and academic records, Adenuga et al. (2022) found that colleges extending digitalization beyond the centralized JAMB screening interface into internally integrated student records systems reduced duplicate registration errors and shortened transcript turnaround time; where digitalization stopped at initial admission and reverted to manual processing thereafter the more common pattern these gains did not materialize, consistent with the TOE prediction that technological context alone, without organizational follow-through, is insufficient. In financial and resource administration, Ogunode and Ajape (2021) note that electronic payment and budget-tracking systems improved colleges' capacity to reconcile internally generated revenue against expenditure, but that systems introduced without corresponding staff training in financial data interpretation produced records that were technically accurate yet functionally underused for planning administrators possessed the data but lacked the analytic habit to apply it, echoing Mandinach and Gummer's (2016) broader argument that data availability does not automatically produce data-informed practice. Furthermore, quality assurance and accreditation administration shows the clearest catalytic potential, precisely because it is externally incentivized through the NCCE accreditation cycle: colleges maintaining electronic document repositories for accreditation-relevant records experienced measurably smoother resource verification visits and reduced accreditation preparation burden (Okonkwo & Eze, 2021), supporting this paper's later recommendation to formally incorporate digital administrative capacity into accreditation criteria. Furthermore, Communication and stakeholder engagement tools SMS notification, institutional websites, mobile applications have seen more rapid, organic adoption than back-office systems, plausibly reflecting higher relative advantage and lower complexity from the end-user perspective (Rogers, 2003); Kigotho and Wanjala (2020) and, in the Nigerian pandemic context, Iwu et al. (2022) both corroborate measurable engagement gains from such tools. Considered together, this evidence supports a more precise version of the paper's position: digital transformation's catalytic effect concentrates where external accountability pressure, end-user relative advantage, and follow-through investment coincide, and is largely absent where any of these three conditions is missing.

Critical Limitations and Contrary Evidence

The position advanced here is not that digital transformation automatically produces institutional effectiveness; the literature offers substantial caution against such technological determinism. Adeyemi (2019) documents Colleges of Education that acquired hardware and software under donor or government ICT initiatives which subsequently fell into disuse within two to three years, attributing this to the absence of accompanying investment in maintenance, staff training, and process redesign consistent with what Toyama (2015) terms the "amplification" effect, whereby digital tools amplify existing institutional capacity, or dysfunction, rather than substituting for it. A further limitation concerns equity: Okebukola (2021) cautions that digitalization concentrated in urban federal colleges risks widening the effectiveness gap with state and rural colleges lacking comparable infrastructure, potentially converting a technology meant to strengthen the sub-sector into a mechanism of institutional stratification. Cybersecurity and data governance represent a further, frequently underexamined limitation. As colleges digitize sensitive records, they assume risks breaches, unauthorized alteration, downtime for which most currently lack formal governance policies or incident response protocols (Adenuga et al., 2022), and the absence of a tertiary-specific national data governance framework, despite the Nigeria Data Protection Act (2023), leaves individual colleges to develop ad hoc and inconsistent practices. A brief comparative note reinforces



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this reading. South Africa's TVET college sub-sector, despite comparatively better national ICT infrastructure, shows similarly uneven translation of centrally mandated systems into institutional-level use, tied to campus leadership capacity (Adenuga et al., 2022). Kenya's more centrally coordinated rollout of placement and student information systems, by contrast, has produced more consistent digitalization outcomes across institutions (Kigotho & Wanjala, 2020) a difference plausibly attributable to stronger central coordination than Nigeria's more fragmented regulatory landscape affords, though cross-national differences in funding and scale limit direct transferability.

Comparative and Synthesized Assessment

Weighing this evidence, a SWOT-informed synthesis is instructive. The strengths of digital administrative transformation efficiency, improved decision quality, enhanced stakeholder engagement are well supported empirically, though largely from small-scale or institution-specific studies rather than sector-wide longitudinal research, a gap this paper flags as a priority for future inquiry. The weaknesses center on implementation: technology adoption without organizational readiness produces disuse or superficial compliance rather than transformation. Opportunities exist in leveraging existing national digital economy policy momentum, mobile penetration rates, and post-pandemic institutional openness to change. Threats include funding volatility, the inter-institutional digital divide, weak cybersecurity governance, and the risk that digital transformation becomes another unfunded policy mandate layered onto already resource-constrained institutions. This synthesis supports a qualified but firm version of the paper's thesis: digital transformation is a genuine catalyst for institutional effectiveness, but only when technological investment is matched by organizational readiness leadership commitment, staff capacity, and process redesign—and situated within a coherent governance and funding framework. Technology procurement decoupled from these conditions does not merely fail to catalyze effectiveness; it risks entrenching existing inefficiencies under a veneer of modernization.

Policy and Practical Implications

1. For college administrators, the evidence implies that digital transformation initiatives should be conceived as institutional change management projects, not IT procurement exercises. Leadership commitment, staff involvement in system design, and phased implementation with adequate training lead times are preconditions for sustained adoption, consistent with DOI theory's emphasis on compatibility and trialability. Provosts and Registrars should resist treating a system's go-live date as the endpoint of a transformation project; sustained gains depend on a subsequent period of embedded use and workflow adjustment that is frequently under-resourced once procurement targets are met.
2. For the National Commission for Colleges of Education, the implications concern standard-setting and accreditation practice. Incorporating digital administrative capacity demonstrable use of integrated records and reporting systems, not merely hardware presence into minimum standards and accreditation criteria would create a regulatory incentive structure aligned with the transformation agenda, while requiring NCCE to build corresponding capacity to assess such criteria consistently across visits.
3. For government agencies and policymakers, the implications center on funding architecture and policy coherence. Current ICT interventions are frequently project-based and donor-dependent, producing the disuse pattern documented by Adeyemi (2019). A shift toward recurrent budget lines for infrastructure maintenance and staff development, alongside a coordinating mechanism capable of setting interoperable data standards across federal and state colleges, would address the sustainability and fragmentation gaps identified throughout the discussion.
4. For teacher educators and administrative staff, the implications are professional-developmental: digital competence should be a core, mandatory, periodically refreshed administrative competency rather than an informally acquired skill, embedded within continuing professional development structures given that many administrative staff are drawn from the academic ranks.
5. For other stakeholders, including students, parents, and quality assurance bodies, digital transformation implies both improved service delivery and a corresponding expectation of institutional transparency and accountability, which colleges must meet through appropriate data governance safeguards, lest visibility without responsiveness undermine stakeholder confidence in the broader agenda.

Recommendations

1. Institutionalize phased ICT infrastructure investment; Colleges of Education and their funding authorities should adopt multi-year infrastructure investment plans covering connectivity, hardware, and system maintenance financed through recurrent rather than solely capital or donor budget lines, prioritizing the functions shown in Section 3.2 to carry the clearest catalytic potential (academic records, quality assurance documentation) before extending to lower-priority functions.
2. Mandate structured digital competency development for administrative staff: NCCE and college management should establish mandatory, periodically refreshed digital literacy and systems-use training, integrated into staff performance appraisal and delivered in the context of actual institutional workflows rather than generic computer literacy instruction, with peer-support structures pairing early adopters with colleagues.
3. Incorporate digital administrative capacity into NCCE minimum standards and accreditation criteria: This would create regulatory incentives for genuine transformation rather than superficial technology acquisition, backed by standardized rubrics assessing actual system use and data quality rather than hardware presence alone.
4. Develop a sector-specific data governance and cybersecurity framework: The Federal Ministry of Education and NCCE, working with the Nigeria Data Protection Commission, should operationalize the Nigeria Data Protection Act (2023) for student and staff records, including minimum requirements for backup, access control, incident response, and a designated data protection focal officer at each college.
5. Prioritize equity in transformation rollout: Funding and technical support programs should include explicit provisions—weighted funding formulas, phased rollout targets, or shared regional service arrangements among clusters of colleges to prevent state, rural, and less-resourced institutions from being structurally excluded from the transformation agenda.
6. Establish institutional monitoring and evaluation mechanisms: Colleges should track defined indicators records-processing turnaround, system uptime, staff usage rates, accreditation preparation time with NCCE defining a common minimum indicator set to enable cross-institutional comparison and build the sector-wide evidence base current research largely lacks.

Conclusion

Digital transformation of educational administration is a critical catalyst for improving institutional effectiveness in Nigerian Colleges of Education, provided it is implemented within a supportive organizational and policy environment. Evidence suggests that technology enhances administrative efficiency, decision-making, and stakeholder engagement only when accompanied by adequate infrastructure, skilled personnel, sustainable funding, effective governance, and institutional readiness. Consequently, digital transformation should be pursued as a comprehensive institutional reform rather than a standalone technological initiative. The paper also highlights the need for longitudinal, sector-wide studies to establish stronger evidence on the long-term effects of digital transformation on institutional effectiveness. Ultimately, the challenge for Nigerian Colleges of Education is not whether to embrace digital transformation, but how to implement it sustainably, strategically, and equitably to strengthen the future of teacher education.

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