



Research Article

Digital Pedagogy in the Competency-Based Education Transition Era: Bridging Technological Idealism and Institutional Realities in Kenyan Universities

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Published Online: 15 September 2026

@The Author(s) 2026. PAC-JEHSS published by Evangel Publishing House

Abstract

Kenya's Competency-Based Education (CBE) framework mandates digital pedagogy as its primary delivery mechanism, yet systematic evidence reveals a persistent gap between that technological idealism and the institutional realities constraining delivery in public universities. No prior systematic review has simultaneously mapped the antecedents, mediators, and moderators of this implementation quality gap, or synthesised governance-grounded strategies for closing it. This qualitative systematic literature review, conducted following PRISMA 2020 guidelines and organised around an antecedents–mediators–moderators (AMM) governance schema, addressed that gap directly. Searches across Google Scholar, ERIC, AJOL, and JSTOR identified 180 sources; 39 met all inclusion criteria after two-stage screening. The scale of the problem was substantial: only 17.1% of public university campus units maintained consistently adequate digital infrastructure; lecturer TPACK integration averaged 2.59 out of 5; and internet access diverged by 29 percentage points between urban and rural areas. Governance analysis revealed three structural contradictions—funding-mandate misalignment, governance-agility tension, and donor-sovereignty displacement—that compounded these deficits. Kenya's digital CBE quality gap is primarily a governance failure interacting with infrastructure and pedagogical constraints, rather than a problem resolvable through technology acquisition or curriculum reform alone. Four evidence-based strategies are proposed: sequenced infrastructure investment, institutionally sustained TPACK development, mobile-first pedagogical design, and intra-institutional governance reform.

Keywords: Competency-based education, digital pedagogy, Kenya, TPACK, institutional governance

Introduction

Competency-based education (CBE) has fundamentally reshaped how universities organise curricula, structure teaching, and assess graduate readiness. Instead of assuming that students are competent

simply because they have spent a certain amount of time studying and earned a qualification, CBE demands demonstrable, transferable competencies aligned with professional and civic life (Mulder, 2017). In high-income settings, this transition has been supported by sustained infrastructure invest-

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Citation: Sosa, E. (2026). Digital pedagogy in the competency-based education transition era: Bridging technological idealism and institutional realities in Kenyan universities. *Journal of Education, Humanities and Social Sciences (PAC-JEHSS)*, 1(1), 1-15.

ment, faculty development, and governance reform. In sub-Saharan Africa, the same shift occurs under starkly different conditions, with policy instruments routinely underestimating the weight of that difference (Bond et al., 2021; Bozkurt et al., 2020).

Kenya is a particularly instructive case. The Kenya National Qualifications Framework Act (2014) strengthened the alignment of tertiary education with national and workplace competency standards. This alignment is further supported by the Commission for University Education's (CUE) standards and guidelines (CUE, 2014) and its quality-assurance framework, including the Quality Audit and Standards Division (CUE, 2024b). CUE's 2024–2028 Strategic Plan also identifies digital readiness as a core institutional priority (CUE, 2024a), reinforcing the need for universities to develop graduates with competencies relevant to contemporary professional and societal demands. Together, these instruments assume that public universities possess the infrastructure, lecturer competence, student access, and governance capacity to deliver quality digital CBE.

Systematic evidence challenges each assumption directly. Omondi and Kariuki (2022) documented that only 17.1% of campus units maintain reliably adequate digital infrastructure. Waweru (2018) established a pre-COVID baseline finding that the average Technological Pedagogical Content Knowledge (TPACK) score among Kenyan lecturers was 2.59 out of 5—a figure that subsequent evidence suggests has not meaningfully improved (Wanjohi et al., 2025; Gachau, 2026). The 2024 Kenya Housing Survey by the Kenya National Bureau of Statistics (KNBS), recorded internet access at 43% in urban areas versus 14% in rural areas, a 29-percentage-point gap, while Kenya Institute of Public Policy Research and Analysis (KIPPRA, 2024) reported a Digital Divide Index score of 0.45 nationally, ranging from 0.12 in Turkana to 0.86 in Nairobi. Otieno (2021) identified governance rigidity as the structural barrier that translates policy ambition into institutional inertia, a pattern that Tarus et al. (2015) documented as early as 2015. Enabling conditions have systematically lagged behind mandates for over a decade.

Despite a growing body of literature on digital pedagogy and CBE in Africa since 2017, no systematic review has simultaneously mapped the antecedents, mediators, and moderators of the quality implementation gap or synthesised governance-grounded strategies for its resolution in the Kenyan public university context. Prior studies have examined individual variables, including infrastructure, lecturer competence, and governance rigidity, without producing an integrated causal account of how these interact to sustain the

quality gap. This study addressed that lacuna directly based on two objectives: to critically analyse the antecedents, mediators, and moderators of quality digital CBE implementation in Kenyan public universities; and to synthesise contextually grounded, evidence-based strategies for sustainable improvement.

Two research questions guided the inquiry: What structural conditions and institutional dynamics produce and sustain the quality gap? And what evidence-based strategies can bridge the gap between policy mandates and quality implementation outcomes? These were framed as research questions rather than hypotheses, reflecting the interpretive epistemology of the study. The aim was to construct a theoretically grounded explanatory account rather than test a predetermined causal model. Two contributions followed: first, the integration of constructivism, cultural-historical activity theory (CHAT), and critical digital pedagogy as a complementary multi-level analytical lens for digital CBE in sub-Saharan African higher education; and second, the first systematic application of Ang'ana's (2025) antecedents-mediators-moderators (AMM) governance framework to intra-university digital CBE governance, adapted and aligned with broader conclusions in the digital-transformation literature.

Literature Review

Four thematic areas structured this review: digital pedagogy and CBE in African higher education; digital transformation barriers and enablers; lecturer digital competence; and institutional governance. A note on critical engagement is warranted. Some institutions in Kenya and comparable African settings have made meaningful progress in adopting digital CBE, typically through well-resourced pilot projects or atypical governance arrangements (Omondi & Kariuki, 2022; Gachau, 2026). However, these isolated cases do not overturn the central analysis. They describe conditions that are exceptional rather than sector-wide, and they depend on precisely the kind of governance alignment that the majority of institutions lack.

Digital Pedagogy and Competency-Based Education in African Higher Education

Scholarship on digital pedagogy in African higher education has shifted considerably since the mid-2010s. Tarus et al. (2015) and Mutisya and Makokha (2016), whose findings now serve as a historical baseline, treated technology integration primarily as an infrastructural challenge. Beetham and Sharpe (2019) reframed the question: digital technology's educational value lies not in its presence but in its purposeful

deployment within constructivist frameworks that support active knowledge construction, collaboration, and learner engagement. Wanjohi et al. (2025) confirmed that the gap persists in Kenya—virtual learning environments (VLEs) remain basic and fragmented across multiple institutions, with digital literacy gaps, high data costs, and lecturer resistance to adoption prevalent in the mid-2020s. Gachau (2026) corroborated this at seven chartered public universities.

Mulder (2017) defined CBE as restructuring curriculum, instruction, and assessment around demonstrable, transferable competencies, a response to longstanding critiques that conventional graduates lack the adaptability labour markets demand (Allais, 2014). The Kenya National Qualifications Framework Act (KNQF) Act (2014) and Rwanda's curriculum reforms (Nsengimana, 2020) illustrated national-level adoption; at the continental scale, the African Union (2022) Digital Education Strategy and Implementation Plan positions digital CBE as a pan-African priority, yet African Population and Health Research Center (APHRC, 2025) documented that CBC reforms across East Africa remain constrained by capacity shortfalls and institutional inertia. South Africa's experience illustrated the hazards of implementation without systemic capacity-building (Ndofirepi, 2020).

From a constructivist standpoint, the structural link between digital pedagogy and CBE runs through Biggs's (2003) constructive alignment principle: outcomes, teaching activities, and assessment must be mutually aligned, with technology serving that alignment. Mwangi (2021) documented precisely this breakdown in Kenya, especially when curriculum documents are revised while pedagogical practice and assessment design remain unchanged. Ng'ethe et al. (2016) identified this exact pattern across multiple sub-Saharan systems. The conditions required to extend the Zone of Proximal Development through quality digital CBE have been mandated without the corresponding institutional capacity and support systems being established.

Digital Transformation in Higher Education: Barriers and Enablers

Vial (2019), in a foundational review drawing over 3,000 citations, defined digital transformation as requiring simultaneous change across technology, organisational processes, and institutional culture. Upgrading infrastructure without reforming governance produces digital equipping, not transformation. Castro Benavides et al. (2020) identified four co-requisite pillars—technology provision, human capability, organisational processes, and institutional culture—and showed that all four must develop in tandem. Gkrimpizi

et al. (2023) confirmed empirically that addressing any single barrier in isolation yields minimal sustainable improvement. Faculty development, infrastructure, and institutional strategy function as complements, not substitutes (Kraus et al., 2021). In a global review of HEIs, Fernández et al. (2023) found that governance and leadership, not technology or finance, constitute the primary obstacle to sustained institutional change.

Critical scholarship complicates the standard transformation narrative in ways directly relevant to Kenya. Selwyn (2016) showed that technology adoption is more reliably driven by institutional prestige and policy compliance than by pedagogical need. Castañeda and Selwyn (2018) characterised digitalisation as a contested political process shaped by institutional power. Externally designed platforms generate institutional dependency rather than local pedagogical capability when deployed in conditions for which they were not designed, a risk directly applicable to donor-funded Learning Management System (LMS) adoption in Kenyan public universities (Macrine, 2020).

Lecturer Digital Competence: Frameworks, Deficits, and Development Conditions

Mishra and Koehler's (2006) TPACK framework draws a foundational distinction that matters enormously for CBE: effective digital pedagogy requires the integration, not mere coexistence, of technological, pedagogical, and disciplinary knowledge. Educators may know their subject deeply and handle digital tools fluently yet still fail to deploy those tools in pedagogically intentional ways. Falloon (2020) clarified the distinction: digital literacy describes the ability to operate tools; digital competence describes the capacity to deploy them with pedagogical intentionality. Waweru's (2018) pre-COVID baseline survey of 214 lecturers demonstrated this gap precisely. Content knowledge was at 4.12 out of 5, pedagogical knowledge at 3.64, but integrated TPACK at only 2.59, reflecting digital literacy without digital competence.

More recent evidence from Kenyan higher education confirm that this deficit is persistent rather than transitional, with structural barriers to adoption continuing to constrain technology-enhanced teaching even in the mid-2020s (Wanjohi et al., 2025; Gachau, 2026). Hodges et al. (2020) added an important conceptual clarification: this profile is closer to emergency remote teaching than planned digital CBE, making it a floor of achievable quality rather than a ceiling. Rapanta et al. (2020) confirmed internationally that pedagogical design competence, not technology access, is the primary differentiator of quality even where infrastructure is equivalent. TPACK development is ultimately determined by institutional conditions, not individual motivation.

Tondeur et al. (2017) established that institutional support is the primary condition for durable competence development. A meta-analysis of 78 studies established that individual technology acceptance is insufficient without institutional enablement (Scherer et al., 2019). Institution-level factors consistently outweigh individual factors as determinants of professional learning effectiveness (Phillips et al., 2019). Programme-level development produces durable practice change while isolated workshops do not (Instefjord & Munthe, 2017). Bervell and Arkorful (2020) documented the African-specific corollary: ICT provision does not automatically produce pedagogical transformation. These findings converge on a conclusion directly relevant to this review: the institutional conditions for quality digital CBE cannot be purchased through hardware acquisition but must be cultivated through sustained, programme-embedded professional development. Critically, most of this evidence was produced in high-income Organisation for Economic Co-operation and Development (OECD) contexts. Their transferability to Kenyan higher education—where institutional support structures are themselves under-resourced—positions TPACK development not as a precondition to be assumed but as a mediator to be explained.

Institutional Governance and the Policy-Implementation Quality Gap

Governance has emerged as a distinct analytical domain within digital CBE scholarship, separate from both technical infrastructure studies and individual competence research. Ng'ethe et al. (2016), whose comparative sub-Saharan findings serve as an early baseline, documented a systematic tendency toward policy adoption without substantive institutional transformation, driven by accreditation pressures, credential competition, and limited implementation capacity. Otieno (2021) updated this analysis for Kenya specifically, where governance rigidity converts national policy ambition into institutional inertia through hierarchical decision-making, misaligned budget cycles, and centralised procurement. Institutional flexibility, which means the capacity to revise curriculum, assessment, and delivery in response to evidence, is a prerequisite for quality CBE (Darling-Hammond et al., 2019). How educators conceptualise competence also shapes outcomes, with holistic conceptions producing qualitatively superior results (Sturing et al., 2011).

Ang'ana (2025), synthesising 70 governance studies across Africa, identified intra-institutional collaboration and responsible negotiation as critically under-theorised mechanisms for resolving governance contradictions. Governance failures, originate not only

in leadership deficits but in the fragmented internal architecture of institutions themselves. In Kenyan universities, academic senates, financial management units, technology services, and governance bodies routinely operate as independent silos. Fernández et al. (2023) reached a similar conclusion in a global HEI review: governance and leadership, not technology or finance, are the primary obstacles to sustained institutional change. The AMM framework used in this study was adapted from Ang'ana (2025) and aligned with these broader conclusions. Two boundary conditions are acknowledged: the relative autonomy of academic senates means that collegial compliance cannot be assumed in the same way as in government settings; and CUE's role as an external accreditation regulator creates a quality-governance layer with no direct analogue in the original framework. These conditions limit the framework's prescriptive precision but do not invalidate its application. From a CHAT perspective, the governance literature revealed a system-level contradiction: rules components—governance structures calibrated for institutional stability—are in direct tension with the object of quality CBE delivery, which demands governance agility. Neither policy revision nor technology investment, working independently, can dissolve a contradiction of this structural depth.

Theoretical Framework

Three theoretical frameworks ground the study, each capturing a level of the implementation gap that the others cannot reach. The three selected frameworks address micro (constructivism: what quality learning requires), meso (CHAT: what institutional conditions produce it), and macro (critical digital pedagogy: whose interests shape those conditions) analytical levels.

Constructivist learning theory, rooted in the work of Vygotsky (1978) and Piaget (1972), holds that learning is the active construction of understanding through engagement with challenging tasks, social interaction, and environmental response. Vygotsky's Zone of Proximal Development (ZPD)—the productive space between what a learner can accomplish independently and what becomes possible with guided support—is the theoretical foundation for defining quality digital CBE. Digital tools, when intentionally deployed, extend the ZPD; when treated as delivery pipes, they collapse it. Biggs's (2003) constructive alignment operationalises this theory: outcomes, activities, and assessment must be purposefully aligned, with digital tools serving that alignment. Constructivism serves as the analytical benchmark against which Kenyan implementation is assessed and the theoretical basis for defining quality CBE implementation in measurable terms.

Examining the component-pair tensions within this system reveals why implementation consistently stalls despite policy reform and platform procurement. Digital platforms are procured and mandated under governance structures calibrated for institutional stability and annual budget cycles, not for the iterative, responsive redesign that quality digital pedagogy demands: a tools-rules contradiction at the base of the problem. Academic promotion criteria compound this by rewarding research output over pedagogical innovation, meaning the incentive structure that shapes lecturer behaviour actively disincentivises the TPACK development CBE quality requires—a division-of-labour-object tension that no curriculum mandate can dissolve.

Centralised, hierarchical governance further conflicts with the collegial, discipline-autonomous culture of academic faculties, making cross-functional coordination structurally resisted rather than normatively expected. And the platforms themselves, externally designed for high-bandwidth, technically supported environments, are deployed to achieve student competency development in contexts where the infrastructure conditions for their effective use are present in only 17.1% of campus units. In practice, a university can formally adopt CBE, revise curriculum documents, and procure a new LMS, yet deliver outcomes indistinguishable from what preceded the reform. Compliance and quality diverge because the contradictions are systemic. Addressing any one of them in isolation leaves the others intact and the gap undisturbed.

Each framework contributes what the others cannot: Constructivism defines what quality learning structurally requires; CHAT maps the institutional conditions that produce or obstruct it; critical digital pedagogy interrogates whose interests determine the form digital transformation takes. No prior scholarship has brought all three to bear as an integrated analytical lens on the antecedents, mediators, and moderators of quality digital CBE implementation in Kenyan public universities. That integration, and that empirical context, is what this review contributes.

Methodology

An interpretive philosophical paradigm and a qualitative systematic literature review design were used, conducted in accordance with PRISMA 2020 guidelines (Page et al., 2021). An interpretive paradigm was appropriate since the aim was to construct meaning from existing scholarship rather than to test hypotheses against primary data. The AMM schema, adapted from Ang'ana's (2025) governance framework and informed by Baron and Kenny's (1986) mediation

logic, was used to synthesise findings: antecedents are the structural preconditions required for implementation quality; mediators are the human and institutional mechanisms through which antecedents are converted into learning outcomes; and moderators are the contextual conditions that amplify or constrain that conversion. The systematic literature review method enabled the integration of multiple source types—peer-reviewed articles, policy documents, institutional reports, and attributed grey literature—to construct a triangulated evidence base suited to examining policy-implementation gaps in sub-Saharan African higher education, where primary data access is frequently constrained (Bowen, 2009; Prior, 2003).

Search Strategy

The search strategy targeted four electronic databases: Google Scholar (used in lieu of Scopus, to which access was unavailable), ERIC, AJOL, and JSTOR, supplemented by hand-searching recognised policy and research repositories. The complete search string was: ('competency-based education' OR 'CBE') AND ('digital pedagogy' OR 'e-learning' OR 'TPACK') AND ('Kenya' OR 'sub-Saharan Africa' OR 'African higher education') AND ('governance' OR 'institutional' OR 'implementation'). Searches were conducted between January and May 2026, yielding 49 records from ERIC, 38 from AJOL, 27 from JSTOR, and 66 from Google Scholar—180 records before deduplication. Foundational theoretical texts (Vygotsky, 1978; Engeström, 1987; Freire, 1970; Biggs, 2003) and comparative non-African evidence were identified through citation tracking and used exclusively for contextual and theoretical grounding outside the PRISMA synthesis. An article by Wanjohi et al. (2025) was additionally identified through targeted hand-searching of the *Journal of the Kenya National Commission for UNESCO* and cited as supplementary contextual evidence; it was not counted among the 39 PRISMA-included sources. All sources dated 2026, including Gachau (2026) and the author's own prior work informing Figure 1, were confirmed to be formally published or institutionally available within the January–May 2026 search window.

Selection Criteria

Sources were required to be published in English, be accessible in full text, be published between 2014 and 2026, and address CBE, digital pedagogy, TPACK, or institutional governance in African higher education or in transferable comparative contexts. Grey literature was included only where it carried a clear institutional attribution and no peer-reviewed equivalent existed. Sources addressing solely non-African contexts without transferable implications, published before 2014,

or lacking clear methodology were excluded. Of 142 sources screened at the abstract stage, 89 were excluded as off-topic; 53 proceeded to full-text assessment, of which 14 were excluded (8 for non-transferable context, 4 for pre-2014 date, 2 for inaccessible full text), yielding 39 included sources (see Figure 1).

Quality Assessment

The author conducted initial screening; the majority of included sources ($n=36$ of 39; 92.3%) were independently reviewed by a subject-matter colleague, with disagreements resolved through discussion. Single-screener approaches carry a greater risk of confirmation bias (Booth et al., 2016), a limitation acknowledged below. Sources were evaluated against four quality indicators: methodological transparency, contextual relevance to African higher education, evidentiary basis, and recency within the 2014–2026 policy period.

The 39 included sources spanned original research, reviews, chapters, and policy documents. A structured extraction form captured author, year, source type, methodology, geographical focus, thematic domain, key findings, and quantitative statistics with original sample sizes. Thematic synthesis followed Braun and Clarke's (2006) six-phase framework, combining deductive codes from the four a priori domains with inductive codes emerging from cross-source reading. An audit trail of coding decisions was maintained throughout (Thomas & Harden, 2008).

Ethical Considerations

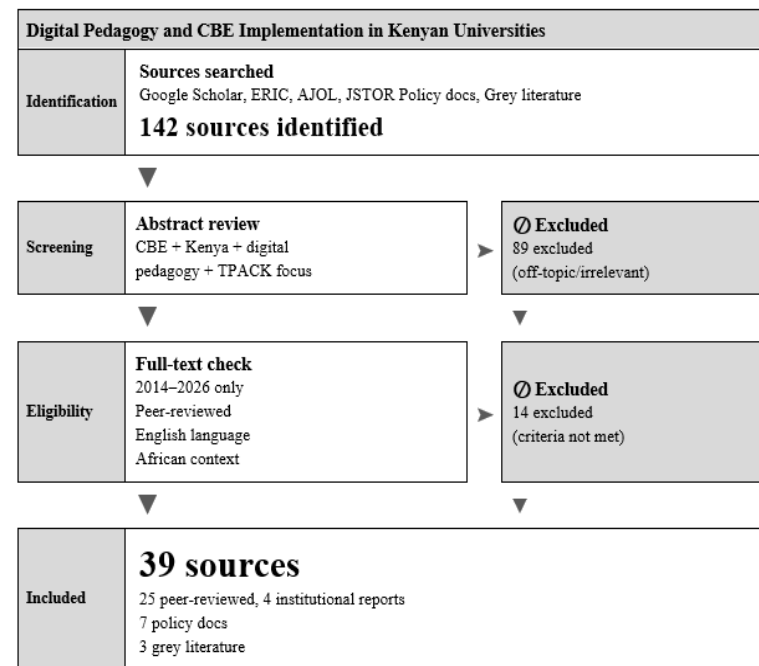
This study involved secondary data exclusively, adhering to ethical guidelines for systematic review research. Transparency and objectivity were upheld throughout to ensure balanced interpretation without over-reliance on any single source (Booth et al., 2016). All sources are properly cited in accordance with APA 7th edition. No primary human participants were involved, and institutional ethical review was not required.

Findings and Discussion

This section presents findings from 39 sources published between 2014 and 2026, interpreted through the three theoretical frameworks and Ang'ana's (2025) AMM governance schema.

Figure 1

Article Search and Selection Process



Note. Adapted from PRISMA 2020 framework (Page et al., 2021). Search keywords: CBE, digital pedagogy, TPACK, Kenya, higher education, governance, sub-Saharan Africa. Methodology: Booth et al. (2016); Denyer & Tranfield (2009).

Descriptive Overview of Reviewed Studies

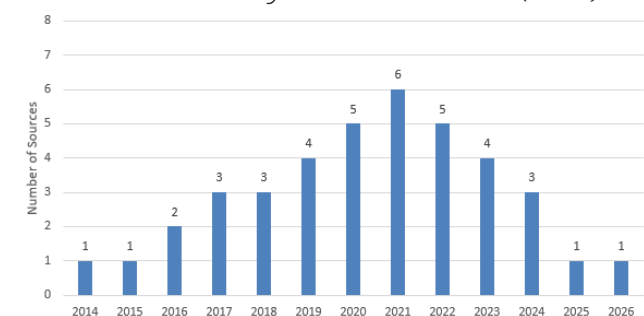
The descriptive characteristics of included sources revealed the scope and disciplinary spread of the evidence base.

Publication Year Distribution

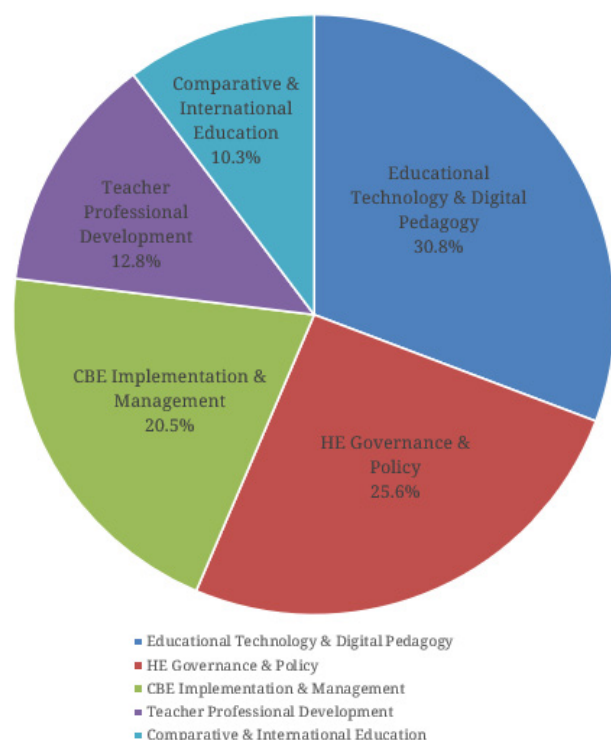
Research on digital CBE governance in African higher education has grown substantially, with 90% of selected sources published from 2017 onward (Figure 2). The 2020–2026 period accounts for 64% of sources, reflecting the catalytic effect of the COVID-19 pandemic on research attention to digital learning infrastructure in sub-Saharan Africa, with the most recent evidence extending into 2026.

Figure 2

Publication Distribution by Year—Selected Sources (N = 39)



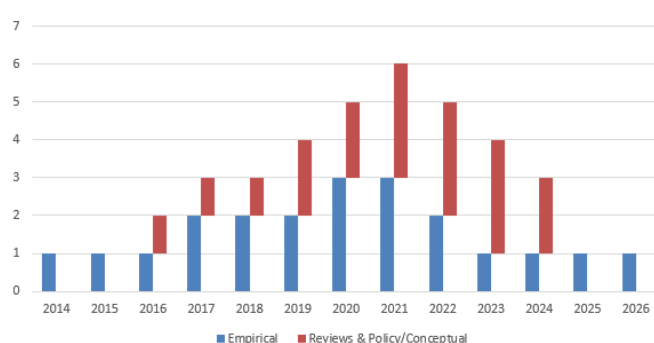
Note. $N = 39$ sources. Distribution reflects publication dates of included sources only. Sources span 2014–2026.

Figure 3*Distribution of Selected Sources by Research Area (N = 39)*

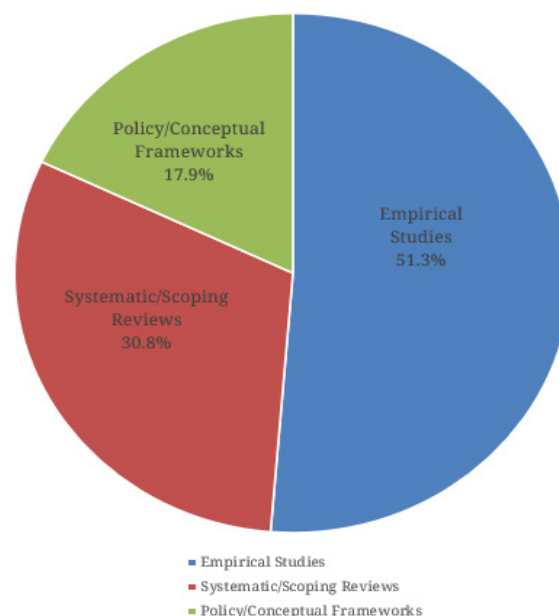
Note. N = 39 sources. Percentages: Educational Technology & Digital Pedagogy 30.8% (n = 12); Higher Education Governance & Policy 25.6% (n = 10); CBE Implementation & Management 20.5% (n = 8); Teacher Professional Development 12.8% (n = 5); Comparative & International Education 10.3% (n = 4).

Research Areas and Source Types

As Figures 3 and 4 show, the largest research category was educational technology and digital pedagogy (30.8%, n = 12), followed by higher education governance and policy (25.6%, n = 10), CBE implementation and management (20.5%, n = 8), teacher professional development (12.8%, n = 5), and comparative education (10.3%, n = 4). Of the 39 sources, 51.3% were empirical studies, 30.8% were systematic or scoping reviews, and 17.9% were policy analyses or conceptual frameworks. Figure 5 shows the distribution by publication year

Figure 5*Research Type Distribution by Year (N = 39)*

Note. Blue = Empirical Studies (n = 20); Red = Systematic Reviews and Policy/Conceptual sources (n = 19).

Figure 4*Distribution of Selected Sources by Research Type (N = 39)*

Note. N = 39 sources. Empirical Studies 51.3% (n = 20); Systematic/Scoping Reviews 30.8% (n = 12); Policy Conceptual Frameworks 17.9% (n = 7).

Antecedents of Quality Digital CBE in Kenya

Antecedents are the foundational structural conditions required before mediating and moderating conditions can operate. Two broad categories emerged: digital infrastructure provision and the national policy context.

Digital infrastructure was the most consistently identified structural prerequisite. Omondi and Kariuki (2022) conducted a rigorous audit, surveying 70 public university campus units: only 17.1% maintained consistently adequate internet connectivity, 34.3% reported partial reliability, and 48.6% had connectivity that was unreliable or absent. Fewer than one in four units (22.9%) had sufficient device infrastructure for collaborative digital activities, and only 31.4% had reliable power supply. Such deficits were not new: Tarus et al. (2015) first identified infrastructure inadequacy and institutional support deficits as the highest-ranked barriers to e-learning implementation, a profile Mutisya and Makokha (2016) corroborated one year later. More recent work established that these constraints persist: the Communications Authority of Kenya (CAK) and KNBS (2025) documented continuing ICT uptake barriers rooted in urban-rural infrastructure inequality, even as Wanjohi et al. (2025) stated that limited access to technology, digital literacy gaps, high data costs, and resistance to adoption remained prevalent across Kenyan higher education institutions in the mid-2020s. Bozkurt et al. (2020) established a global pattern: systems entering the COVID-19 transition with the weakest infrastructure experienced the sharpest decline in quality, with African higher education systems dispropor-

tionately represented. Post-pandemic evidence from Kenya confirmed the deficit still persists. Owidi et al. (2023) documented continuing infrastructure inadequacy at Masinde Muliro University, while Gachau (2026) found that limited ICT resources and bandwidth were critical barriers across seven chartered public universities despite institutional investment.

The national policy context constituted the second antecedent dimension. The CUE issues detailed standards and guidelines governing programme development, quality assurance, and institutional review, and its Quality Audit and Standards Division carries ongoing responsibility for maintaining those standards (CUE, 2014; 2024b). Its 2024–2028 Strategic Plan explicitly positions quality assurance and digital readiness as core priorities (CUE, 2024a), yet the enabling infrastructure to meet those mandates is absent in the majority of institutions. Tarus and Gichoya (2015) outlined the precondition gap for Kenyan higher education directly: reliable power, adequate bandwidth, lecturer readiness, and institutional commitment must exist before digital implementation can succeed. The chronological inversion, mandate preceding enabling condition, is the structural source of the quality gap. In constructivist terms, the conditions for ZPD-extending pedagogy were decreed without being built. In CHAT terms, this surfaces as a systemic contradiction between the rules component (governance mandates) and the tools component (the digital infrastructure through which those mandates must be enacted).

Mediators of Quality Digital CBE in Kenya

Mediators are the institutional mechanisms and human conditions through which antecedent infrastructure is, or is not, converted into quality learning. Lecturer TPACK is the central mediating pathway, conditioned by institutional professional development systems and career incentive structures.

Waweru's (2018) pre-COVID baseline survey of 214 Kenyan university lecturers, interpreted through Angeli and Valanides' (2009) ICT-TPCK assessment schema, contained foundational quantitative evidence. Out of 5, content knowledge (4.12) showed disciplinary preparation was adequate; pedagogical knowledge (3.64) indicated conventional teaching competence; technological knowledge (2.84) reflected basic digital awareness, but the critical deficit was integrated TPACK (2.59)—the capacity to deploy digital tools in pedagogically intentional ways. Falloon (2020) gave this profile a precise conceptual name: the gap between digital literacy (present) and digital competence (absent). Hodges et al. (2020) added interpretive precision: the TPACK score re-

flects conditions closer to emergency remote teaching than to planned digital CBE, making it a floor of achievable performance rather than a ceiling. In an international study, pedagogical design competence, and not technology access, was found to be the primary differentiator of quality even when infrastructure conditions are equivalent (Rapanta et al., 2020).

What determines whether a lecturer develops TPACK is not individual motivation but institutional architecture. Institutional support, embedded professional development, not episodic training, is the primary condition for durable competence growth (Tondeur et al., 2017). In a meta-analysis of 78 studies, Scherer et al. (2019) discovered that positive individual attitudes toward technology are neither necessary nor sufficient for meaningful integration without institutional enablement. At the system level, institution-level variables consistently outweigh individual ones as predictors of professional learning effectiveness (Phillips et al., 2019). Programme-level development produces lasting change in teaching practice where isolated workshops do not (Instefjord & Munthe, 2017). Bervell and Arkorful (2020) documented this corollary directly in the African context: ICT provision without concurrent investment in pedagogical capacity generated minimal educational impact. Post-COVID evidence from Kenya showed the TPACK deficit persisted. Wanjohi et al. (2025) found that fragmented VLE environments, connectivity barriers, and limited pedagogical intentionality among lecturers characterised students' experiences of technology-enhanced learning in Kenyan universities. Owidi et al. (2023) documented ongoing infrastructure inadequacy at Masinde Muliro University, and Gachau (2026) identified limited ICT resources and bandwidth as critical barriers across seven chartered public universities, despite institutional investment—all of which align with Waweru's (2018) pre-COVID baseline as a continuing rather than transitional constraint. Examined through CHAT, this mediator domain disclosed a structural tension between the division of labour component (promotion criteria rewarding research over pedagogical innovation) and the object component (student competency development requiring the very pedagogical sophistication those criteria actively disincentivize).

Moderators of Quality Digital CBE in Kenya

Moderators are the contextual conditions that amplify or constrain the relationship between mediating conditions and quality outcomes. Two moderating domains emerged: student digital access inequality, which determines the equity reach of whatever quality is achieved, and institutional governance contradictions,

which control whether systemic change is possible.

Student Digital Access Inequality

Student access inequality was the first moderating domain. The Kenya Housing Survey documented a 29 percentage-point urban-rural internet access gap (43% urban, 14% rural) and a 13.6 percentage-point computer access disparity (20.9% urban, 7.3% rural) (KNBS, 2024). These figures were corroborated and extended by a joint 2025 survey by the CAK and KNBS, which showed persistent urban-rural disparities in ICT device ownership and internet uptake, and by UNESCO's (2025) assessment of internet development in Kenya, which attributed the structural gap to long-standing infrastructure inequality rather than mere affordability. The national Digital Divide Index score by KIPPRA (2024) was 0.45, with values ranging from 0.86 in Nairobi City to 0.12 in Turkana. Higher education institutions tend to mirror national access patterns, with rural campuses disproportionately excluded from digital participation (Kashorda & Waema, 2014). Access inequality compounds into efficacy inequality, creating a dual disadvantage among students with intermittent access histories (Howard et al., 2016).

student-level consequences include that inadequate devices, poor connectivity, and lack of institutional support inhibit digital learning across Ghanaian and Kenyan universities (Aboagye et al., 2021). Such intensifying access inequalities during COVID-19 were comparable to South African contexts (Czerniewicz, 2020). Low-resource institutions reverted to pre-pandemic patterns once emergency pressure lifted (Selwyn, 2022). What critical digital pedagogy renders visible here is a predictable political economy: the 29 percentage-point access gap (CAK & KNBS, 2025; KNBS, 2024) is the structural consequence of deploying systems designed for urban, high-income contexts in settings where those conditions have never reliably held. Students at rural universities could not engage with online content, digital assessments, or collaborative platforms regardless of lecturer TPACK or campus infrastructure improvements, a structural exclusion no pedagogical redesign alone can address (UNESCO, 2025).

Institutional Governance Contradictions

Three structural governance contradictions emerged consistently. The funding-mandate contradiction concerned the gap between what digital CBE delivery requires and what has been invested to create those conditions (Otieno, 2021). The governance-agility contradiction described the mismatch between university governance mechanisms, including hierarchical decision-making, annual budget cycles, and centralised

procurement, and the iterative, responsive design quality digital pedagogy requires. These were among the primary governance barriers to digital transformation in higher education institutions globally (Fernández et al., 2023). The donor-sovereignty contradiction described the displacement of locally adapted innovation by externally designed platforms, generating institutional dependency rather than local capability (Macrine, 2020; Castañeda & Selwyn, 2018). Ang'ana (2025), in a synthesis of 70 studies on good governance in Africa, provided the most analytically precise diagnosis: governance failures stem not only from leadership deficits but from fragmented internal institutional frameworks. He identified horizontal accountability and responsible negotiation as the enabling mechanisms.

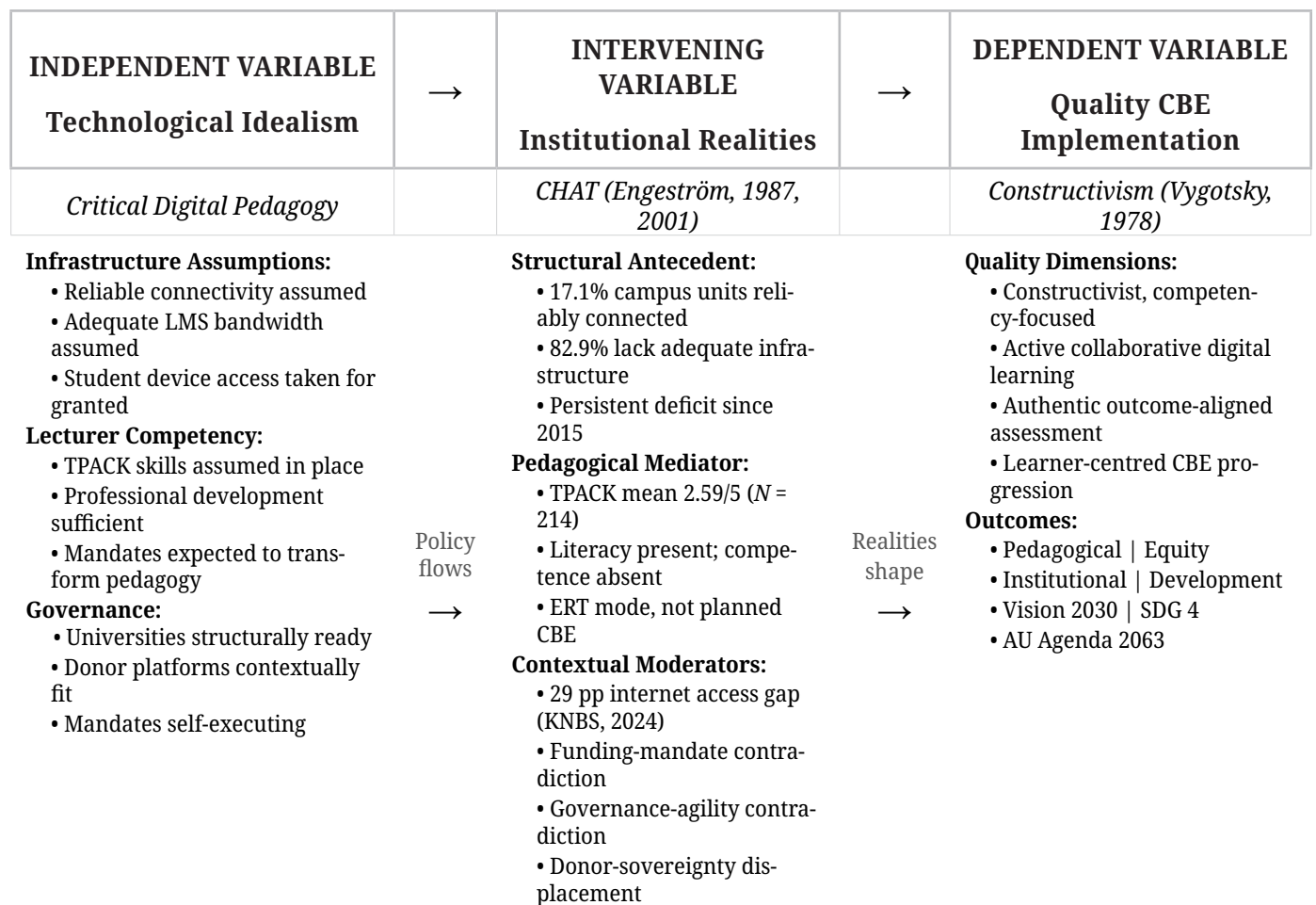
In CHAT terms, the governance moderator surfaced the most structurally intractable contradiction in this review: governance frameworks configured for institutional stability are in direct tension with an object, quality CBE delivery, that demands the capacity to adapt rapidly in response to evidence and changing conditions. The CBE-specific application: institutional flexibility, operationalised as cross-functional decision-making capacity, is a prerequisite for quality CBE (Darling-Hammond et al., 2019).

Outcomes of Quality Digital CBE in Kenya

When antecedent, mediating, and moderating conditions are adequately addressed, quality digital CBE produces four outcome categories. Pedagogical outcomes (active knowledge construction, peer collaboration, authentic assessment, and learner-centred progression) are the most direct. Santoveña-Casal and López (2024) identified collaborative digital activities and inquiry-based assessment as empirical quality markers. Equity outcomes emerge where mobile-first, low-bandwidth design deliberately reaches under-connected students. Concurrent infrastructure investment reduces access-based exclusion (Prinsloo, 2023; Czerniewicz, 2020). Institutional outcomes emerge where CBE quality is treated as a strategic institutional priority, normalising cross-functional coordination and embedding professional development in career structures (Otieno, 2021). Development outcomes connect quality digital CBE to the human capital formation that Kenya's Vision 2030, African Union (AU) Agenda 2063, and Sustainable Development Goals (SDG) 4 require. Allais (2014) cautioned that credential inflation risks displacing genuine preparedness unless CBE is implemented with rigorous, standards-referenced competency assessment, a caution particularly relevant where governance of assessment quality is itself fragmented. Student-per

Figure 6

Schematic Representation of the Antecedents, Mediators, Moderators, and Outcomes Framework for Quality Digital CBE in Kenyan Universities



Note. Adapted from “Re-thinking good governance in Africa: The strategic role of intra-government collaboration and responsible negotiation,” by G. A. Ang’ana, 2025, *International Journal of Research and Innovation in Social Science*, 9(4), 540–561.

Table 1

Intra-Institutional Collaboration and Responsible Negotiation in Quality Digital CBE

Mechanism	Connection	Concepts	Key Authors
Intra-Institutional Collaboration	Acts as a mediator by enabling structured coordination among academic, financial, and technological functions, and as a moderator by sustaining that coordination across governance levels	Infrastructure sequencing: Cross-functional investment preceding pedagogical mandate TPACK embedding: Career structures aligning PD with promotion Curriculum agility: Streamlined revision outside normal senate timelines	Otieno (2021); Ang’ana (2025); Fernández et al. (2023); Darling-Hammond et al. (2019)
Responsible Negotiation	Functions as a mediator by fostering inclusivity in decision-making and as a moderator by addressing governance agility and donor sovereignty contradictions	Horizontal accountability: Structured mutual answerability of academic, financial, and technological functions Access-sensitive design: Platform deployment negotiated against verified student access conditions Governance reform: Transparent priority-setting for CBE investment and timeline decisions	Ang’ana (2025); Ng’ethe et al. (2016); Selwyn (2016); Castañeda & Selwyn (2018)

Note. Adapted from “Re-thinking good governance in Africa: The strategic role of intra-government collaboration and responsible negotiation,” by G. A. Ang’ana, 2025, *International Journal of Research and Innovation in Social Science*, 9(4), 540–561.

spective evidence, currently absent from the Kenyan literature, would further substantiate the equity and pedagogical outcome categories. Figure 6 presents the AMM-outcomes framework schematically.

The Strategic Role of Intra-Institutional Collaboration and Responsible Negotiation

Despite decades of investment in digital infrastructure and individual capacity, the quality gap persists because intra-institutional collaboration and governance-level negotiation have been systematically underaddressed. Ang'ana (2025) identified this absence as the critically missing element in most African governance analyses, and it produced the recurring pattern of technology investment without governance investment. Table 1 maps both mechanisms into the digital CBE quality framework. Preliminary evidence from Kenyan institutions suggested the agenda is achievable: deliberate cross-functional coordination among academic planning, financial management, and technology services has supported infrastructure improvements and LMS adoption at select chartered universities (Omondi & Kariuki, 2022; Gachau, 2026). Further evidence indicates that structured professional development produces meaningful TPACK gains where it is embedded in institutional career structures rather than delivered as episodic workshops (Waweru, 2018). Four specific strategies follow.

Strategy 1: Infrastructure Investment Sequenced Before Pedagogical Mandate

The convergent evidence from Tarus et al. (2015), Tarus and Gichoya (2015), and Omondi and Kariuki (2022) established a clear conclusion: mandating digital CBE delivery before reliable connectivity exists is a structural inversion producing compliance without quality. Required actions include a national infrastructure audit across all 35 accredited public universities; differentiated investment targeting underserved rural campuses; phased implementation timelines tied to verified infrastructure thresholds rather than calendar mandates; and dedicated disbursement earmarked for digital infrastructure, performance-linked to documented implementation progress.

Strategy 2: Institutionally Sustained TPACK Development

The TPACK integration deficit of 2.59 out of 5 cannot be addressed through episodic workshops. Sustained, programme-level professional learning embedded in institutional incentive structures is the minimum intervention required to produce durable competence development (Instefjord & Munthe, 2017; Phillips et al., 2019; Scherer et al., 2019; Tondeur et al., 2017). The

DigCompEdu framework provides the competence map, identifying learner-centred design, collaborative digital facilitation, and authentic digital assessment as the three priority development areas for the Kenyan profile (Redecker, 2017). Peer mentoring structures, protected development time, and explicit TPACK criteria in academic promotion processes constitute the institutional embedding that the evidence supports.

Strategy 3: Mobile-First, Low-Bandwidth Pedagogical Design

With a 29-percentage-point access gap between urban and rural areas (KNBS, 2024), digital CBE must be designed for the access conditions in which most students live, rather than the access conditions assumed by policy instruments. For example, designing modules for offline use in intermittent-connectivity contexts; designing content structures for smartphones; designing asynchronous assessments and feedback to replace reliance on synchronous sessions; and designing audio alternatives to bandwidth-hungry video. In similar African contexts, researchers have found that mobile-first strategies could expand access and maintain quality simultaneously when used in conjunction with pedagogical intentionality (Bervell & Arkorful, 2020; Czerniewicz & Brown, 2014). Open, distance and e-learning academic literature adds to the evidence. Low-bandwidth Open Educational Resources (OER) delivery at the tertiary level in Tanzania could produce equivalent learning outcomes to synchronous delivery when content is converted to offline (Mtebe & Raisamo, 2014). In contrast, the Commonwealth of Learning (2019) quality criteria for open and distance learning in sub-Saharan Africa specify asynchronous, mobile-first design as a condition of equal access rather than an accommodation for resource-constrained contexts.

Strategy 4: Intra-Institutional Governance Reform for Pedagogical Agility

This is the most structurally consequential strategy and the enabling condition for the other three. Ang'ana (2025) specified four governance reform mechanisms: horizontal accountability structures ensuring cross-functional coordination; structured stakeholder negotiation protocols for transparent priority-setting; streamlined curriculum and delivery revision processes not subject to normal approval timelines; and protected innovation budgets outside annual procurement cycles. Governance reform for pedagogical agility does not require dismantling university structures; it requires purposively aligning them with quality digital CBE as a stated institutional priority. As Ang'ana (2025) argued more broadly for African

governance, sustainable reform requires deeper integration of formal collaborative mechanisms into institutional governance structures, addressing both internal leadership dynamics and external dependencies.

Future Research Directions

Five research priorities emerged from this review: longitudinal tracking of infrastructure investment against CBE quality outcomes; nationally representative TPACK surveys across all 35 accredited public universities; qualitative case studies of institutions that have achieved sustained CBE quality; cross-national comparative analysis involving Kenya, Rwanda, Ghana, and South Africa; and student-perspective research into how digital access inequality shapes learning experiences and competency outcomes.

Limitations

Several limitations should inform interpretation. The peer-reviewed literature on Kenyan higher education is skewed toward research-intensive, urban-based institutions; under-resourced rural universities are systematically underrepresented, which may lead to an underestimation of the infrastructure and access constraints facing the majority of the sector. Primary quantitative evidence rests on a small number of studies (KNBS, 2024; Omondi & Kariuki, 2022; Waweru, 2018), none of which are nationally representative. Evidence was uneven across the four thematic domains: TPACK deficits were supported by multiple independent empirical studies, while governance barriers relied more substantially on qualitative and policy analyses. The review was restricted to English-language sources, potentially excluding scholarship in Swahili or French-language regional journals. The use of Google Scholar rather than Scopus or Web of Science introduced reproducibility limitations. While 92.3% of included sources ($n = 36$ of 39) underwent independent quality verification, the abstract-stage exclusion of 89 sources and full-text exclusion of 14 sources were single-screener decisions not subject to the same independent check; since these exclusion decisions account for the bulk of the overall screening activity, the residual confirmation bias risk they carry (Booth et al., 2016) is not fully addressed by the verification protocol applied to included sources. The author's position as a faculty member within Kenyan higher education warrants acknowledgment: institutional familiarity enhances contextual sensitivity but may introduce confirmation bias toward explanations of governance failure, a risk partially mitigated by the systematic search protocol, comparative non-African evidence, and peer debriefing during thematic synthesis.

Conclusion

This systematic review of 39 scholarly sources traced the structural, pedagogical, and governance conditions producing and sustaining the digital CBE quality gap in Kenyan public universities. The picture that emerges is layered and interdependent. Infrastructure deficits and policy precondition gaps were never resolved before delivery mandates were imposed, denying lecturers and students the foundational conditions quality CBE requires. The TPACK deficit, and the institutional professional development frameworks that could address it but largely do not, has severed the mediating pathway through which infrastructure should be converted into learning quality. Student access inequality and fragmented governance constrain both the equity reach and systemic sustainability of whatever quality individual institutions have achieved.

Kenya's digital CBE quality gap is primarily a governance failure interacting with infrastructure and pedagogical constraints, rather than a problem resolvable through technology acquisition or curriculum reform alone. Infrastructure, lecturer TPACK, and student access all matter; the evidence reviewed here suggested that governance determines whether and how these pieces are aligned and resourced. The fact that intra-institutional coordination is critically under-theorised for resolving governance failures in African institutional contexts applies with direct force to Kenyan universities (Ang'ana, 2025; Fernández et al., 2023; Otieno, 2021). The four proposed strategies—sequenced infrastructure investment, institutionally sustained TPACK development, mobile-first pedagogical design, and governance reform for agility—are interdependent. Each depends on the governance architecture that intra-institutional collaboration makes possible; none delivers its potential without it.

Progress toward Kenya's Vision 2030, AU Agenda 2063, and SDG 4 depends, more than policy documents typically acknowledge, on getting this internal governance question right. Two contributions are offered. Methodologically, deploying constructivism, CHAT, and critical digital pedagogy as mutually reinforcing, multi-level lenses demonstrated that the quality gap operates simultaneously at pedagogical, institutional, and political-economic levels, and that any analysis that reduces it to a single level will miss most of what drives it. At the applied level, this appears to be the first systematic deployment of Ang'ana's (2025) AMM governance framework in a higher education context. Its productive application

here suggests the framework extends productively to any institutional environment characterised by fragmented internal coordination, a description fitting the majority of African public universities.

References

- Aboagye, E., Yawson, J., & Appiah, K. N. (2021). COVID-19 and e-learning challenges in African higher education. *Journal of Educational Technology & Online Learning*, 4(1), 1–15.
- African Population and Health Research Center. (2025). *Strengthening the implementation of the Competency-Based Curriculum (CBC) at the junior secondary school level in Kenya*. APHRC. <https://aphrc.org/publication/strengthening-the-implementation-of-the-competency-based-curriculum-cbc-at-the-junior-secondary-school-level/>
- African Union. (2022). *Digital Education Strategy and Implementation Plan 2022–2028 (DESIP)*. African Union Commission.
- Allais, S. (2014). *Selling out education: National qualifications frameworks and the neglect of knowledge*. Sense Publishers.
- Ang'ana, G. A. (2025). Re-thinking good governance in Africa: The strategic role of intra-government collaboration and responsible negotiation. *International Journal of Research and Innovation in Social Science*, 9(4), 540–561. <https://doi.org/10.47772/IJRISS.2025.90400043>
- Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT-TPCK. *Computers & Education*, 52(1), 154–168. <https://doi.org/10.1016/j.compedu.2008.07.006>
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Beetham, H., & Sharpe, R. (Eds.). (2019). *Rethinking pedagogy for a digital age* (3rd ed.). Routledge.
- Bervell, B., & Arkorful, V. (2020). ICT integration and digital learning in African universities. *International Journal of Educational Technology in Higher Education*, 17(1), 1–20. <https://doi.org/10.1186/s41239-020-00197-z>
- Biggs, J. (2003). *Teaching for quality learning at university* (2nd ed.). Open University Press.
- Bond, M., Bedenlier, S., Marin, V. I., & Handel, M. (2021). Emergency remote teaching in higher education. *The Internet and Higher Education*, 50, Article 100748. <https://doi.org/10.1016/j.iheduc.2021.100748>
- Booth, A., Papaioannou, D., & Sutton, A. (2016). *Systematic approaches to a successful literature review* (2nd ed.). SAGE Publications.
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/QRJ0902027>
- Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G., & Rodes, V. (2020). A global outlook to the interruption of education due to COVID-19 pandemic. *Asian Journal of Distance Education*, 15(1), 1–126. <https://doi.org/10.5281/zenodo.3878572>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Castañeda, L., & Selwyn, N. (2018). More than tools? Making sense of the ongoing digitizations of higher education. *Teaching in Higher Education*, 23(4), 1–16. <https://doi.org/10.1080/13562517.2018.1465887>
- Castro Benavides, L. M., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors*, 20(11), Article 3291. <https://doi.org/10.3390/s20113291>
- Commission for University Education. (2014). *Universities standards and guidelines*. https://cesaam.egerton.ac.ke/images/accreditation/general/CUE_universities_standards_and_guidelines_2014.pdf
- Commission for University Education. (2024a). *Strategic plan 2024–2028*. https://www.cue.or.ke/index.php?option=com_phocadownload&view=category&id=12%3Ageneral&Itemid=39
- Commission for University Education. (2024b). *Quality audit and standards division*. https://www.cue.or.ke/index.php?option=com_content&view=article&id=197
- Commonwealth of Learning. (2019). *Quality assurance for open, distance and e-learning: A guide for institutions and systems*. <https://www.col.org/resources/quality-assurance-open-distance-and-e-learning>
- Communications Authority of Kenya & Kenya National Bureau of Statistics. (2025). *Analytical report on ICT based on the 2023/24 Kenya housing survey: Urban–rural digital divide*. Communications Authority of Kenya. <https://www.knbs.or.ke/reports/analytical-report-on-ict-based-on-the-2023-24-kenya-housing-survey/>
- Czerniewicz, L. (2020). *What we learnt from going online during university shutdowns in South Africa*. Philipps-Universität Marburg.
- Czerniewicz, L., & Brown, C. (2014). The habitus of digital strangers in higher education. *British Journal of Educational Technology*, 45(6), 1035–1049. <https://doi.org/10.1111/bjet.12180>
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2019). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140. <https://doi.org/10.1080/10888691.2018.1537791>
- Denyer, D., & Tranfield, D. (2009). Producing a systematic review. In D. A. Buchanan & A. Bryman (Eds.), *The Sage handbook of organizational research methods* (pp. 671–689). Sage Publications.
- Engeström, Y. (1987). *Learning by expanding*. Orienta-Konsultit.

- Engeström, Y. (2001). Expansive learning at work. *Journal of Education and Work*, 14(1), 133–156. <https://doi.org/10.1080/13639080020028747>
- Falloon, G. (2020). From digital literacy to digital competence. *Educational Technology Research and Development*, 68(5), 2449–2472. <https://doi.org/10.1007/s11423-020-09767-4>
- Fernández, A., Gómez, B., Binjaku, K., & McVitty, D. (2023). Digital transformation initiatives in higher education institutions: A multivocal literature review. *Education and Information Technologies*, 28(5), 5417–5442. <https://doi.org/10.1007/s10639-022-11432-3>
- Freire, P. (1970). *Pedagogy of the oppressed*. Continuum.
- Gachau, A. (2026). Assessment of ICT readiness for online learning transformation in public universities in Kenya. *The Strategic Journal of Business & Change Management*, 13(2), 126–136.
- Gkrimpizi, T., Peristeras, V., & Magnisalis, I. (2023). Classification of barriers to digital transformation in higher education institutions. *Education Sciences*, 13(4), 1–30. <https://doi.org/10.3390/educsci13040399>
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, M. A. (2020). *The difference between emergency remote teaching and online learning*. Educause Review. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>
- Howard, S. K., Ma, J., & Yang, J. (2016). Student rules: Exploring patterns of students' computer-efficacy and engagement with technology. *Computers & Education*, 101, 29–42. <https://doi.org/10.1016/j.compedu.2016.05.008>
- Instefjord, E. J., & Munthe, E. (2017). Educating digitally competent teachers. *Teaching and Teacher Education*, 67, 37–45. <https://doi.org/10.1016/j.tate.2017.05.016>
- Kashorda, M., & Waema, T. (2014). *E-readiness survey of Kenyan universities*. Kenya Education Network (KENET).
- Kenya Institute for Public Policy Research and Analysis. (2024). *Addressing Kenya's digital divide: County disparities and strategies for inclusive growth (Discussion Paper No. 354)*. KIPPRA. <https://repository.kippira.or.ke/handle/123456789/5254>
- Kenya National Bureau of Statistics. (2024). *Kenya housing survey 2023/24*. Government of Kenya.
- Kenya National Qualifications Framework Act. (2014). *Kenya National Qualifications Framework Act, No. 22 of 2014*. Government of Kenya.
- Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital transformation: An overview of the current state of the art of research. *SAGE Open*, 11(3), 1–15. <https://doi.org/10.1177/21582440211047576>
- Macrine, S. L. (Ed.). (2020). *Critical pedagogy in uncertain times*. Palgrave Macmillan.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge. *Teachers College Record*, 108(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Mtebe, J. S., & Raisamo, R. (2014). Challenges and instructors' intention to adopt and use open educational resources in higher education in Tanzania. *International Review of Research in Open and Distributed Learning*, 15(1), 249–271. <https://doi.org/10.19173/irrodl.v15i1.1687>
- Mulder, M. (2017). *Competence-based vocational and professional education* (2nd ed.). Springer.
- Mutisya, D. N., & Makokha, G. L. (2016). Challenges affecting adoption of e-learning in public universities in Kenya. *E-Learning and Digital Media*, 13(3–4), 140–157. <https://doi.org/10.1177/2042753016661768>
- Mwangi, C. N. (2021). Outcomes-based education and the Kenya National Qualifications Framework. *Journal of Education Policy*, 36(2), 223–242. <https://doi.org/10.1080/02680939.2020.1761187>
- Ndofirepi, A. P. (2020). Decolonizing the African university curriculum. *Journal of Higher Education in Africa*, 18(1), 61–82. <https://doi.org/10.14426/jhea.v18i1.1546>
- Ng'ethe, N., Afeti, G., & Latema, C. (2016). *Differentiation and articulation in tertiary education systems*. Centre for Research on Globalisation and Tertiary Education Systems. <https://ideas.repec.org/b/wbk/wbpubs/6451.html>
- Nsengimana, V. (2020). Implementation of competency-based curriculum in Rwanda. *Rwandan Journal of Education*, 5(1), 32–48.
- Omondi, A., & Kariuki, M. (2022). ICT infrastructure and digital learning in Kenyan universities: A gap analysis. *East African Journal of Information Technology*, 5(2), 145–167. <https://doi.org/10.37284/eajit.5.2.797>
- Otieno, W. (2021). Governance and institutional change in Kenyan public universities. *Journal of Higher Education Policy and Management*, 43(4), 389–402. <https://doi.org/10.1080/1360080X.2021.1939995>
- Owidi, S., Wangila, E. W., Shiundu, J. O., & Simiyu, A. M. (2023). Post-COVID-19 analysis of the status of online infrastructure use by public universities in Kenya: The case of Masinde Muliro University of Science and Technology. *African Journal of Empirical Research*, 4(2), 76–87. <https://doi.org/10.51867/ajernet.4.2.11>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., & Moher, D. (2021). The PRISMA 2020 statement. *BMJ*, 372(n71), 1–9. <https://doi.org/10.1136/bmj.n71>
- Phillips, M., Schoch, K., Ryan, T., Tan, K., & Hudson, P. (2019). Assessing the effectiveness of professional learning for technology integration. *British Journal of Educational Technology*, 50(6), 3063–3076. <https://doi.org/10.1111/bjet.12650>
- Piaget, J. (1972). *The psychology of the child*. Basic Books.
- Prinsloo, P. (2023). Digital transformation and student vulnerability in higher education. *Distance Education*, 44(3), 1–15. <https://doi.org/10.1080/01587919.2023.2237522>
- Prior, L. (2003). *Using documents in social research*. SAGE Publications.

- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the COVID-19 crisis. *Post-digital Science and Education*, 2(3), 923–945. <https://doi.org/10.1007/s42438-020-00155-y>
- Redecker, C. (2017). *European framework for the digital competence of educators: Dig-CompEdu*. Publications Office of the European Union. <https://doi.org/10.2760/159770>
- Santoveña-Casal, S., & López, A. P. (2024). Mapping digital pedagogies in higher education. *Frontiers in Education*, 9, 1–22. <https://doi.org/10.3389/feduc.2024.1348029>
- Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to predicting teachers' adoption of technology. *Computers & Education*, 128, 13–35. <https://doi.org/10.1016/j.compedu.2018.09.009>
- Selwyn, N. (2016). *Education and technology: Key issues and debates* (2nd ed.). Bloomsbury Academic.
- Selwyn, N. (2022). Digital education in a post-pandemic world. *Postdigital Science and Education*, 4(3), 733–740. <https://doi.org/10.1007/s42438-022-00341-4>
- Sturing, L., Biemans, H. J. A., Mulder, M., & De Bruijn, E. (2011). The nature of study programmes in vocational education: Evaluation of the model of strong competence-based education. *Vocations and Learning*, 4(3), 191–210. <https://doi.org/10.1007/s12186-011-9059-4>
- Tarus, J. K., & Gichoya, D. (2015). E-learning in Kenyan universities: Preconditions for successful implementation. *Electronic Journal of Information Systems in Developing Countries*, 70(1), 1–16. <https://doi.org/10.1002/j.1681-4835.2015.tb00474.x>
- Tarus, J. K., Gichoya, D., & Muumbo, A. (2015). Challenges of implementing e-learning in Kenya. *International Review of Research in Open and Distributed Learning*, 16(1), 120–141. <https://doi.org/10.19173/irrodl.v16i1.1816>
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8(45), 1–10. <https://doi.org/10.1186/1471-2288-8-45>
- Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education. *Educational Technology Research and Development*, 65(3), 555–575. <https://doi.org/10.1007/s11423-016-9481-2>
- UNESCO. (2025). *Assessing internet development in Kenya using the Internet Universality ROAM-X indicators*. UNESCO.
- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, 28(2), 118–144. <https://doi.org/10.1016/j.jsis.2019.01.003>
- Vygotsky, L. S. (1978). *Mind in society*. Harvard University Press.
- Wanjohi, R. N., Njoroge, P. N., & Wambugu, L. N. (2025). Technology-enhanced learning and teaching in Kenyan universities: Opportunities, constraints, and student experiences. *Journal of the Kenya National Commission for UNESCO*, 5(1), 45–68.
- Waweru, P. N. (2018). Barriers to technology adoption in teaching and learning: A Kenyan perspective. *Research in Comparative and International Education*, 13(2), 239–258. <https://doi.org/10.1177/1745499918777838>

Conflicts of Interest: The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding Statement: The author received no financial support for the research, authorship, and/or publication of this article.

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