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Pedagogical Approaches and Institutional Factors Influencing Skills Acquisition for Labour Market Integration in TVET Institutions in Kenya: A Systematic Review

Chola Mwasi Raphael and Wanami Simon

Department of Technology Education, School of Education, University of Eldoret, P.O. Box 1125-30100, Eldoret, Kenya

Abstract

Technical and Vocational Education and Training (TVET) sector in Kenya constitutes a strategic pillar of the country's industrialization agenda under Vision 2030 and the Bottom-Up Economic Transformation Agenda. As the government intensifies efforts to reposition TVET as a pathway to meaningful employment, concerns persist regarding the alignment between institutional training outputs and labour market requirements. Despite growing empirical attention to factors affecting training quality, no comprehensive synthesis has examined how pedagogical approaches and institutional capacities collectively shape skills acquisition and subsequent labour market integration. This gap limits evidence-based policy formulation for enhancing TVET graduate employability. This systematic review examined pedagogical approaches, institutional capacities, and their interactions influencing skills acquisition and labour market integration outcomes for TVET graduates in Kenya. The study was guided by ecological systems and situated learning theories. Following PRISMA 2020 guidelines, comprehensive searches of Scopus, Web of Science, ERIC, ProQuest, Google Scholar, AJOL, and Kenyan institutional repositories identified 872 records. After screening and eligibility assessment, 55 empirical studies (2010–2026) were synthesized. The study utilized standardized tools for data extraction and quality appraisal, primarily employing narrative synthesis. Despite CBET policy mandates, lecture-based pedagogies persisted (86.5% of instructors) due to resource constraints and trainer capacity deficits. Work-integrated learning demonstrated superior employability outcomes yet remained limited by fragmented industry partnerships. Institutional capacity constraints were systemic: 93.06% of trainers not advancing qualifications, 72% lacking CBET-specific training, and graduation rates at only 27% nationally. Regional disparities were pronounced, with graduates outside Nairobi facing 54–69% lower formal employment odds. Positive interaction effects occurred where institutional investments aligned with pedagogical reform

employability rates increased from 73.97% to 80.3% in well-resourced institutions. Pedagogical effectiveness and institutional capacity interact ecologically to determine graduate outcomes. Policy ambitions for competency-based training cannot succeed without concurrent investment in trainer development, infrastructure modernization, and industry partnership institutionalization. Closing implementation gaps requires recognizing that effective TVET depends upon aligned investments across pedagogical, institutional, and labour market system levels.

Keywords: TVET, competency-based education, pedagogical approaches, institutional capacity, skills acquisition, employability, Kenya

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Correspondence: cholaraphael09@gmail.com

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Introduction

Technical and Vocational Education and Training (TVET) serves as a critical mechanism for equipping individuals with practical competencies required for employability and socioeconomic development in the twenty-first century (Lema, 2024; Mutembei, 2024; Varma & Malik, 2023). It supports the acquisition of technical competencies, soft skills and adaptive capabilities needed in dynamic economies (Mante, Okoye & Hui, 2025; Kamaruzaman et al., 2025). According to UNESCO frameworks, TVET contributes directly to sustainable development through its alignment with decent work, innovation, and inclusive growth agendas (Tun & Tin, 2025). In addition, TVET systems are increasingly expected to respond to rapid technological change, globalization, and evolving industry demands, which has intensified the focus on effective pedagogical approaches and institutional capacity in delivering relevant skills (Mante et al., 2025; Varma & Malik, 2023). Unlike traditional academic pathways, TVET emphasizes hands-on learning, practical skill application, and direct alignment with industry requirements, making it instrumental in bridging the gap between education and employment (Varma & Malik, 2023). The acquisition of employable skills through TVET is particularly vital for fostering economic growth and addressing persistent skills mismatches in labor markets worldwide (Kailo & Njagi, 2025). As global economies evolve, TVET institutions are increasingly tasked with not only transmitting technical knowledge but also cultivating soft skills

such as communication, teamwork, problem-solving, and adaptability that enhance graduates' capacity to navigate dynamic work environments (Varma & Malik, 2023; International Labour Organization, 2024). This pedagogical approach emphasizes the demonstrated ability to apply knowledge, skills, and attitudes to complete work activities to defined performance standards as expected in real workplace environments (Kenya National Qualifications Authority, 2024). Additionally, innovative teaching methodologies including problem-based learning, work-integrated learning, and dual training systems that combine classroom instruction with on-the-job training have gained traction as effective strategies for enhancing skill acquisition and ensuring graduates are job-ready (Kailo & Njagi, 2025; Varma & Malik, 2023).

Globally, nations have embraced diverse strategies to strengthen TVET systems, with Germany, Switzerland, and Singapore developing exemplary models that emphasize strong industry-academia partnerships, competency-based curricula, and practical training components (Varma & Malik, 2023). Germany's dual vocational training system alternates between classroom instruction and workplace training, while Switzerland's apprenticeship model places apprentices in workplace settings 70–80% of the time, both producing highly skilled, job-ready workforces (Varma & Malik, 2023). Singapore's Institute of Technical Education further demonstrates this transformation through competency-based approaches, state-of-the-art facilities, and robust industry partnerships (Varma & Malik, 2023). These global best practices demonstrate that effective TVET systems require both appropriate pedagogical approaches and adequate institutional capacities including modern infrastructure, qualified trainers, continuous professional development, and strong industry linkages (International Labour Organization, 2024; Varma & Malik, 2023). Recent global evidence from the International Labour Organization (ILO) and World Bank indicates that skills training interventions and TVET programming are effective in improving labor market outcomes, particularly in low- and middle-income countries (International Labour Organization, 2024). A comprehensive meta-analysis of 220 youth-targeted active labor market programs across 62 countries revealed that interventions combining skills training with soft skills development and certification upon completion yield the best outcomes for youth employability (International Labour Organization, 2024).

In Africa, TVET systems face unique challenges related to rapid population growth, limited formal job creation, and the need to prepare youth for predominantly informal economies (Adeosun et al., 2023; Lorato et al., 2023). The continent experiences a significant skills gap, with approximately 10 to 12 million young Africans entering the labor market annually, yet only about 3 million formal jobs being created (World Bank, 2025). This disparity pushes millions into informality or leaves them excluded from economic participation altogether, highlighting the urgent need for TVET systems that equip graduates with both technical skills and entrepreneurial competencies (World Bank, 2025). Across the continent, firms consistently cite skills shortages as a top constraint to hiring and expansion, indicating a fundamental misalignment between training provision and market demands (World Bank, 2025). The African Union's Agenda 2063 and various regional initiatives have emphasized the need for harmonized, quality-assured TVET systems that can produce skilled human capital capable of driving industrialization and economic

transformation. However, many African TVET institutions continue to grapple with outdated curricula, inadequate infrastructure, insufficient industry linkages, and pedagogical approaches that remain predominantly theoretical rather than practical (Mante et al., 2025; Kenya National Qualifications Authority, 2024; Majola, 2024). Furthermore, digital transformation presents both opportunities and risks, as graduates face irrelevance without emerging technologies and digital competencies in curricula (Kenya National Qualifications Authority, 2024). Addressing these gaps requires systematic reforms in pedagogical approaches, institutional capacity strengthening, and enabling policy environments that foster industry collaboration (World Bank, 2025).

Kenya has positioned TVET as a central pillar for achieving its development aspirations under Vision 2030, which envisions transforming the country into a newly industrialized, globally competitive middle-income nation (Ministry of Education, 2024; TVET Curriculum Development, Assessment and Certification Council, 2024). The Education Cabinet Secretary Julius Migos Ogamba emphasized this strategic positioning, noting that TVET plays a great role in spurring industrialization in Kenya as a clear step toward achieving Vision 2030, particularly through the successive implementation of Competency-Based Education and Training (CBET) designed to equip Kenyan youth with hands-on skills for industrial participation (Kenya News Agency, 2024). This policy prioritization reflects a broader recognition that sustainable economic transformation requires skilled technical personnel capable of driving innovation and productivity across manufacturing, construction, agriculture, and emerging digital sectors (Ministry of Education, 2014; TVET Curriculum Development, Assessment and Certification Council, 2024).

The implementation of CBET in Kenya represents a fundamental paradigm shift, with the government developing over 400 competency-based curricula in close consultation with industry experts to ensure direct applicability to real-world job roles (Ministry of Education, 2024). The Kenya National Qualifications Framework (KNQF) Act of 2014 and the TVET Act of 2013 provide the legislative foundation for these reforms, establishing mechanisms for quality assurance, curriculum development, assessment, and certification (Ministry of Education, 2014; TVET Curriculum Development, Assessment and Certification Council, 2024). The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) and the Technical and Vocational Education and Training Authority (TVETA) play key roles in regulating standards, accrediting institutions, and ensuring that training programs remain relevant to evolving technological changes and market demands (Ministry of Education, 2014; Technical and Vocational Education and Training Authority, 2024).

Despite these policy advances, significant challenges persist in translating framework intentions into effective training outcomes. Recent evaluations indicate that a substantial mismatch remains between skills imparted by TVET institutions and those required by the labor market, with employers consistently reporting deficiencies in job-readiness, hands-on competencies, and adaptability among new recruits (Kenya National Qualifications Authority, 2024). Industry involvement in curriculum design, work-based learning, and graduate assessment remains fragmented and inconsistent, limiting the ability of training programs to effectively influence employment outcomes (Kenya National Qualifications

Authority, 2024). Additionally, institutional capacity challenges including inadequate training facilities, limited exposure of trainers to modern technologies, insufficient professional development opportunities, and gaps in infrastructure hinder the implementation of learner-centered pedagogical approaches (International Labour Organization, 2024; Kailo & Njagi, 2025).

Research conducted in Kenyan TVET institutions reveals that while trainers generally possess adequate academic qualifications, many rely on lecture-based, teacher-centered methods that prioritize theoretical knowledge over practical skill development (Kailo & Njagi, 2025). The lack of modern training equipment, large class sizes, and limited industrial attachment opportunities for both trainers and trainees further compound these challenges (Kailo & Njagi, 2025; Kenya National Qualifications Authority, 2024). Moreover, the responsibility for securing industrial attachments often falls on students themselves, with limited institutional support in creating networks with industries (Kenya National Qualifications Authority, 2024). These systemic gaps contribute to the continued production of graduates who possess theoretical knowledge but insufficient practical skills aligned to evolving labor market needs, particularly in high-demand sectors such as digital technology, renewable energy, construction, and logistics (Kenya National Qualifications Authority, 2024).

Existing literature on Kenyan TVET has tended to examine pedagogical approaches or institutional factors in isolation, producing fragmented insights that limit evidence-based policy and practice improvements. No comprehensive systematic review has yet synthesized the available empirical evidence on how pedagogical approaches and institutional capacities collectively shape skills acquisition and labor market integration outcomes for TVET graduates in Kenya. This knowledge gap impedes the development of targeted interventions to enhance training quality, institutional effectiveness, and graduate employability. Consequently, this systematic review seeks to synthesize existing evidence on the pedagogical approaches and institutional factors influencing skills acquisition and labor market integration in Kenyan TVET institutions, thereby informing policy refinement and institutional strengthening efforts.

Theoretical Foundation

This review was guided by ecological systems and situated learning theories as discussed below.

Ecological Systems Theory

Urie Bronfenbrenner developed ecological systems theory in 1979, proposing that human development occurs within nested environmental systems such as microsystem, mesosystem, exosystem, and macrosystem with interactions across levels shaping individual outcomes (Bronfenbrenner, 1979). Evans and Kersh (2006) later applied this framework to vocational education and training, emphasizing how workplace learning environments interact with educational institutions to produce employability outcomes. For this study on Kenyan TVET, ecological systems theory provides the structure for understanding how pedagogical approaches at the classroom level (microsystem) are fundamentally shaped by institutional resources and governance (exosystem), industry partnerships connecting education and work (mesosystem), and national policy priorities including Vision 2030 industrialization goals (macrosystem). The theory explains why identical CBET curricula produce different skills

acquisition outcomes across institutions because microsystem pedagogical quality depends upon exosystem resource flows, mesosystem industry connectivity, and macrosystem economic structures.

Situated Learning Theory

Jean Lave and Etienne Wenger developed situated learning theory in 1991 with Wenger (1998) subsequently extending the framework through communities of practice theory. The theory proposes that learning is fundamentally social and embedded within authentic contexts, with newcomers acquiring capabilities through progressive engagement in practitioner communities rather than through abstract classroom instruction alone. For this study, situated learning theory explains why work-integrated learning, dual training, and industrial attachment consistently demonstrate superior employability outcomes compared to classroom-only instruction because these approaches enable legitimate peripheral participation in workplace communities of practice where authentic technical and professional competencies are developed. The theory illuminates why the persistence of lecture-based methods in Kenyan TVET produces skills mismatches: abstract decontextualized learning fails to develop the situated competencies employers value. The evidence that industry partnerships enable effective pedagogy, and that trainer industrial experience improves skills transfer, aligns with situated learning theory's emphasis on boundary crossing between educational and workplace contexts.

Methodology

Research Design

This study employed a systematic literature review (SLR) approach to synthesize empirical evidence on pedagogical approaches and institutional factors influencing skills acquisition and labor market integration in Kenyan TVET institutions. Systematic reviews were particularly appropriate for this investigation as they provided rigorous, transparent, and reproducible methods for identifying, evaluating, and synthesizing dispersed research findings to generate comprehensive evidence-based conclusions (Jaya et al., 2025). The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure methodological rigor, minimize bias, and enhance the reliability of findings (Page et al., 2021).

Research Questions

The review addressed three primary research questions that guided the search strategy, inclusion criteria, and data synthesis. First, what pedagogical approaches were employed in Kenyan TVET institutions to facilitate skills acquisition for labour market integration? This question examined the specific teaching methodologies, curriculum delivery modes, and learning strategies implemented across various TVET contexts in Kenya. Second, what institutional capacities and factors influenced the effectiveness of skills acquisition and graduate employability in Kenyan TVET institutions? This question explored the structural, human resource, and organizational elements that enabled or constrained quality training provision. Third, how did pedagogical approaches and institutional factors interact to influence labour market integration outcomes for TVET graduates in Kenya? This question investigated the synergies and relationships between teaching practices and institutional environments in producing job-ready graduates.

Search Strategy

A comprehensive and systematic literature search was conducted across multiple electronic databases to ensure broad coverage of relevant studies from diverse disciplinary and geographic sources. The selected databases included Scopus, Web of Science, ERIC (Education Resources Information Center), ProQuest Dissertations and Theses Global, Google Scholar, and African Journals Online (AJOL). Scopus and Web of Science provided access to high-impact international peer-reviewed journals in education, vocational training, and labour economics. ERIC served as the premier database for education literature, capturing specialized journals and grey literature in vocational education. ProQuest Dissertations and Theses Global ensured inclusion of unpublished doctoral and masters research that contained valuable empirical data on Kenyan TVET. Google Scholar complemented these databases by capturing citations to seminal works and emerging research not yet indexed in traditional databases. African Journals Online (AJOL) was specifically included to access African-published research that was not indexed in Western-centric databases, ensuring representation of local scholarship and contextual perspectives. Additionally, the search extended to institutional repositories including the Kenya Education Network (KENET), University of Nairobi Digital Repository, and Strathmore University Research Repository to capture locally produced theses and policy documents.

The search strategy utilized Boolean operators (AND, OR, NOT) and database-specific syntax to maximize sensitivity and precision. The core search string combined four conceptual domains: TVET context, Kenyan focus, pedagogical and institutional factors, and skills or employment outcomes. The specific search string included: ("Technical and Vocational Education and Training" OR "TVET" OR "vocational education" OR "technical education" OR "further education" OR "career and technical education") AND ("Kenya" OR "Kenyan" OR "East Africa") AND ("pedagogy" OR "pedagogical approach" OR "teaching method" OR "instructional strategy" OR "competency-based education" OR "CBET" OR "work-integrated learning" OR "work-based learning" OR "dual training" OR "apprenticeship" OR "problem-based learning" OR "project-based learning" OR "practical training") AND ("institutional capacity" OR "institutional factor" OR "infrastructure" OR "facilities" OR "equipment" OR "trainer qualification" OR "teacher competency" OR "professional development" OR "industry linkage" OR "industry partnership" OR "employer engagement" OR "institutional leadership" OR "quality assurance") AND ("skills acquisition" OR "competency development" OR "employability" OR "labour market integration" OR "employment outcomes" OR "job readiness" OR "workplace preparedness" OR "graduate destination" OR "transition to work"). The search was limited to English-language publications due to resource constraints, though this limitation was explicitly acknowledged as a potential source of language bias that may have excluded relevant Swahili-language research.

Eligibility Criteria

The review employed clearly defined eligibility criteria to ensure consistent and transparent study selection. Studies were included if they focused on TVET institutions, trainers, trainees, or graduates in Kenya as the primary population of interest. The phenomena of interest included examination of pedagogical approaches, teaching methodologies, curriculum

delivery modes, or institutional factors such as infrastructure, trainer capacity, industry partnerships, and quality assurance mechanisms. Eligible outcomes encompassed skills acquisition indicators, competency development assessments, employability measures, labour market integration metrics, employment rates, job readiness evaluations, employer satisfaction ratings, or graduate self-efficacy regarding workplace preparedness. Regarding study design, the review included empirical research employing quantitative, qualitative, or mixed methods approaches, as well as systematic reviews, meta-analyses, and rigorous policy evaluations. Acceptable publication types comprised peer-reviewed journal articles, conference proceedings with full papers, doctoral and masters theses, government reports, and publications from reputable international organizations such as the World Bank, ILO, and UNESCO. The time period was restricted to publications from 2010 to 2026 to capture research relevant to recent policy reforms, particularly the implementation of the TVET Act (2013), the Kenya National Qualifications Framework Act (2014), and the subsequent transition to competency-based education and training.

Studies were excluded if they focused on TVET contexts outside Kenya without substantive Kenyan analysis, unless they were explicitly comparative studies with Kenya as a primary case. General education or higher education research without specific TVET focus was excluded. Purely theoretical or conceptual papers lacking empirical data, opinion pieces, editorials, commentaries, and non-systematic literature reviews were not included. Publications in languages other than English and studies that did not address skills acquisition, pedagogical approaches, or institutional factors as central themes were excluded to maintain focus on the review objectives.

Study Selection Process

The study selection process followed a systematic three-phase approach designed to maximize transparency and minimize selection bias. In Phase 1, Identification, all search results were imported into Mendeley reference management software for duplicate removal. Both automated deduplication using software algorithms and manual verification were conducted to ensure each study was represented only once, with particular attention to identifying duplicates across databases where the same study may have been indexed differently (Jaya et al., 2025). In Phase 2, Screening, two independent reviewers screened titles and abstracts against the eligibility criteria. Studies that clearly did not meet the population, context, or outcome criteria were excluded at this stage. Disagreements between reviewers were resolved through discussion or consultation with a third reviewer when consensus could not be reached. In Phase 3, Eligibility Assessment, full-text articles of potentially relevant studies were retrieved and independently assessed by two reviewers against all inclusion and exclusion criteria. Reasons for exclusion at this stage were documented using a standardized form to enable transparency and potential sensitivity analysis. Inter-rater reliability was calculated using Cohen's kappa coefficient to assess the level of agreement between reviewers, with values above 0.75 indicating excellent agreement. The entire selection process was documented using a PRISMA 2020 flow diagram indicated in Figure 1, which reported the number of records identified from each database, duplicates removed, records screened, full-text articles assessed for eligibility, and studies included in the final review, along with

reasons for exclusion at each stage (Page et al., 2021).

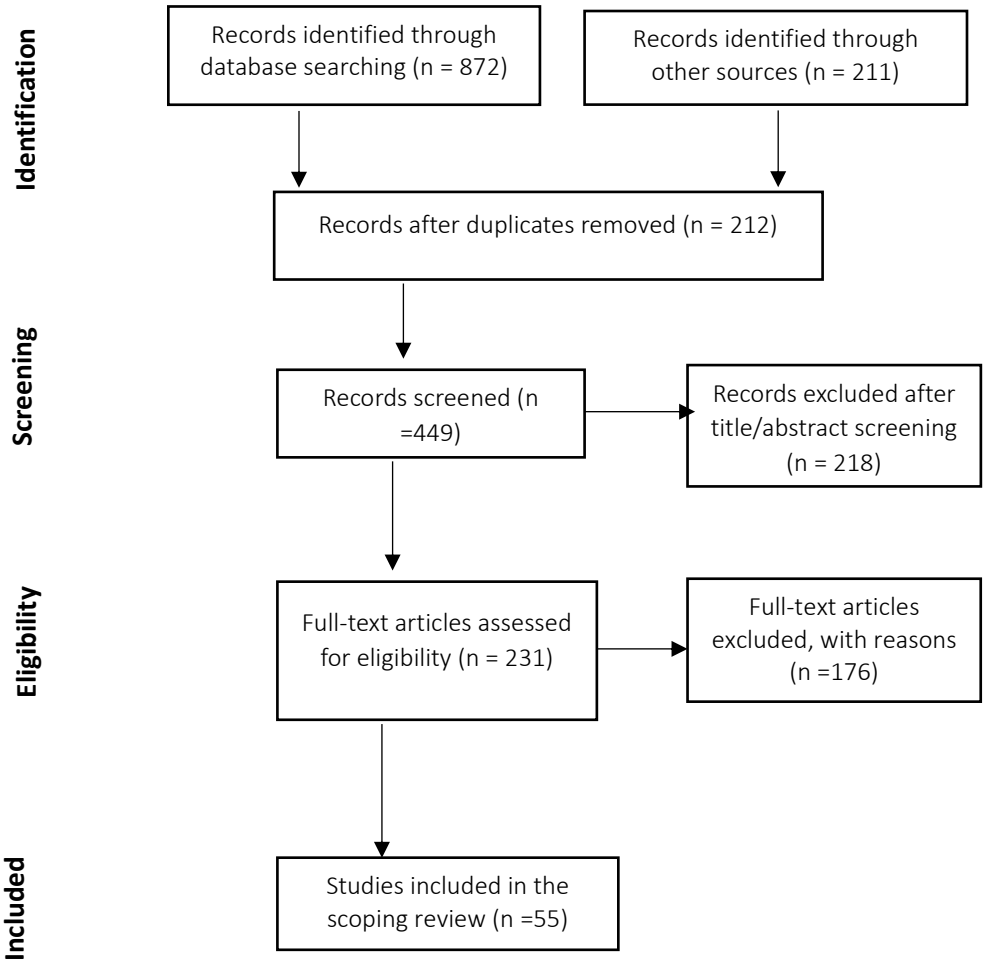

Figure 1. PRISMA flow diagram of included articles for systematic review

Data Extraction

A comprehensive and standardized data extraction form was developed based on the research questions and piloted on a subset of five included studies to ensure clarity, completeness, and usability. The form was refined based on pilot testing before full-scale extraction began. The data extraction process captured bibliographic information including author names, year of publication, title, journal or source name, volume and issue numbers, page range, DOI or URL, and funding sources if declared. Study characteristics included the research design and methodological approach, specific methods employed, sample size and sampling strategy, participant characteristics detailing TVET level (craft, diploma, or higher diploma), field of study or occupational area, and geographic location within Kenya.

Pedagogical approaches were documented through detailed description of teaching methodologies such as competency-based education and training, work-integrated learning,

problem-based learning, project-based learning, dual training systems, and apprenticeships, alongside curriculum delivery modes, duration and structure of practical training components, and specific strategies for soft skills development including communication, teamwork, problem-solving, and adaptability.

Institutional factors encompassed infrastructure quality and adequacy, availability and modernity of equipment and tools, trainer qualifications including academic credentials and industry experience, professional development opportunities provided to trainers, nature and extent of industry partnerships, employer engagement in curriculum design and delivery, institutional leadership and governance structures, and quality assurance mechanisms and accreditation status. Outcome measures included specific indicators of skills acquisition and competency development, methods of employability assessment, employment rates and graduate destination data, job readiness evaluation tools, employer satisfaction surveys, and graduate self-efficacy or confidence measures. Data extraction was conducted independently by two reviewers, with discrepancies resolved through discussion and consensus, or by consulting a third reviewer when necessary.

Quality Appraisal

The methodological quality of the included studies was rigorously evaluated by two independent reviewers using study-specific standardized tools, including the Joanna Briggs Institute (JBI) checklists for quantitative and qualitative research and the Mixed Methods Appraisal Tool (MMAT) for integrated designs. These assessments prioritized the credibility and congruence of research methods, focusing on factors such as participant recruitment, data reliability, and statistical rigor. Notably, no studies were excluded based on quality scores to ensure the inclusion of contextually rich Kenyan data; instead, these ratings were used to weight the evidence, perform sensitivity analyses, and inform the final interpretation of the findings.

Data Synthesis

A narrative synthesis approach was adopted due to anticipated heterogeneity in study designs and outcome measures across the Kenyan TVET context. The synthesis proceeded through four structured steps: descriptive analysis of study characteristics, thematic analysis using deductive and inductive coding, pattern identification to map relationships between variables, and evidence assessment based on study quality and consistency. Where sufficient homogeneity existed, sub-group analyses or meta-analysis were conducted to quantify effect sizes.

Results and Discussion

Search Results and Study Selection

The systematic search yielded 872 initial records from electronic databases supplemented by grey literature from government agencies and international organizations. After removing 212 duplicates, 449 records underwent title and abstract screening against eligibility criteria, resulting in 231 full-text articles assessed for eligibility. Of these, 55 studies met all inclusion criteria and were synthesized in the final review: 25 studies addressing pedagogical approaches and skills acquisition, 20 studies examining institutional capacities and factors, and 10 studies investigating interactions between pedagogical approaches and institutional factors.

Pedagogical Approaches and Skills Acquisition

The adoption of CBET emerged as the dominant pedagogical reform across Kenyan TVET institutions, with twelve studies examining its implementation and effects on skills acquisition. Kogo (2022) conducted a comprehensive assessment in the North Rift region involving approximately 10,000 trainers and 2,000 trainees, finding significant positive correlations between CBET components and training quality: staff capacity building ($r = .612$), classroom instruction ($r = .476$), and workplace learning ($r = .638$). Notably, regression analysis identified workplace learning as having the strongest effect on quality training ($\beta = .273$), underscoring the critical importance of practical, industry-aligned pedagogy. However, Kogo also documented that practical training remained limited due to inadequate workshop facilities, indicating that institutional resource constraints directly constrain pedagogical effectiveness.

Caroline (2025) examined institutional preparedness across nineteen TVET institutions involving 1,263 trainers and 69,158 trainees, revealing a significant implementation gap: while CBET was widely adopted at the policy level, actual classroom practice remained poorly implemented. The study identified outdated curricula, weak dissemination mechanisms, and limited trainer capacity as primary barriers constraining effective pedagogical delivery. This finding aligns with Kailo and Njagi (2025), who found that pedagogies aligned with industry improved employable skills acquisition, but infrastructure gaps and limited trainer industrial exposure weakened effectiveness. The evidence suggests that CBET implementation requires simultaneous investment in trainer professional development and physical resources to achieve intended skills acquisition outcomes.

Muchira et al. (2023) employed a mixed-methods approach to assess curriculum integration across TVET institutions, finding limited incorporation of practical learning and weak coverage of both soft and technical skills. The study documented that resource gaps and low adoption of practical pedagogy directly reduced employability outcomes, establishing a clear causal pathway between pedagogical approach, resource availability, and labour market readiness. This finding was corroborated by Kigen (2023), whose large-scale survey of 20,857 respondents in Kisumu County found that outdated curricula and limited equipment reduced the effectiveness of pedagogical approaches in enhancing employability.

Work-integrated learning, including industrial attachment, apprenticeships, and dual training systems, demonstrated consistently positive effects on skills acquisition and employability across multiple studies. Mwaura, Mugwe, Edabu, and Thinguri (2022) examined industrial attachment effectiveness in Nairobi County TVET institutions, finding that work-based learning significantly improved employability skills, though alignment between training and attachment experiences required strengthening. This finding supports the theoretical proposition that authentic workplace experiences bridge the gap between classroom learning and labour market requirements.

Mutembei, Kibaara, and Gichohi (2024) investigated industrial engagement across six TVET institutions, documenting a strong positive relationship between industry engagement and employability skills development. The study explicitly recommended dual training systems combining classroom and workplace

learning, a finding echoed in their subsequent 2023 study of teaching-learning resources in Meru County, which found that availability of modern training tools influenced employability skills, with inadequate resources weakening practical training outcomes. Migiro, Kisilu, and Dimo (2022) focused specifically on mechanical engineering students in national polytechnics, demonstrating that work-based learning significantly enhanced technical skill acquisition, providing discipline-specific evidence for the general effectiveness of experiential pedagogical approaches.

The interaction between pedagogical approach and institutional industry partnerships emerged as a critical theme. Mutungi, Kibaara, and Mwirichia (2023) surveyed 361 respondents across TVET institutions, finding that curriculum updates, technology integration, and industry partnerships collectively enhanced employability skills acquisition and influenced student institutional selection. This suggests that prospective trainees recognize and value institutions offering industry-aligned pedagogical approaches, creating market pressure for pedagogical modernization.

Evidence on learner-centered and experiential pedagogies revealed significant potential when implementation barriers are addressed. Kobia et al. (2024) examined 357 trainees and trainers in Meru County, finding that learner-centered pedagogy, practical-based learning, and experiential approaches significantly influenced practical skills acquisition. The study documented that poor pedagogy led to low creativity and productivity, establishing a direct link between instructional quality and graduate capability. Owuor, Ooko, and Natade (2025) investigated experiential learning in Western Kenya, finding that trainer competence significantly affected pedagogy and skills acquisition ($F = 2.84$, $p = 0.011$), with weak professional development limiting the effectiveness of experiential approaches.

Ndeda, Wambiya, and Getui (2021) examined transformative learning pedagogy among 231 Bachelor of Technology graduates, finding that this approach improved employability through enhanced critical thinking and applied skills. This higher education-level evidence suggests that advanced pedagogical approaches may be particularly effective for developing the cognitive and metacognitive skills required for complex labour market navigation. Mumbe (2020) surveyed 300 respondents in Kilifi County, documenting a significant relationship between pedagogy and employable skills, while noting that weak career guidance reduced training effectiveness, indicating that pedagogical approaches must be complemented by institutional support systems.

The integration of technology into TVET pedagogy emerged as an increasingly important theme, with studies examining both traditional technology integration and innovative delivery modes. Ngware et al. (2024) assessed the Whole Youth Development (WYD) approach among 3,452 students, 347 instructors, and 171 heads across TVET institutions, finding that skills acquisition was higher in well-equipped institutions and that pedagogy integrating digital and soft skills improved labour market readiness. However, resource disparities significantly affected outcomes, suggesting that technology-enhanced pedagogy may exacerbate rather than reduce inequities if resource distribution remains unequal.

Mutebi, Kerre, and Mubichakani (2023) conducted a quasi-experimental study examining online pedagogy for practical skills, finding that online pedagogy can effectively support practical

skills training when well designed, expanding flexibility in TVET delivery. This finding is particularly significant given infrastructure constraints in many Kenyan institutions, suggesting that alternative delivery modes may help overcome physical resource limitations if digital infrastructure is adequately developed. Okumu and Kenei (2023) surveyed 9,045 trainers across 176 institutions, finding that integration of transferable skills and multiple learning pathways improved adaptability and employability, supporting a diversified pedagogical approach rather than single-method reliance.

Multiple studies examined how institutional factors mediate the relationship between pedagogical approaches and skills acquisition outcomes. Moustafa (2024) surveyed 301 TVET managers across Nairobi metropolitan counties, finding that curriculum review and structured implementation improved employability, with institutional planning influencing how pedagogy translates into labour market skills. This finding highlights the importance of organizational processes in pedagogical effectiveness. El Sallaly, Riungu, and Rintari (2023) examined 353 TVET management staff, finding that curriculum aligned with labour market needs and practical training improved graduate employability, calling for regular curriculum updates to maintain relevance. The temporal dimension of pedagogical effectiveness emerged in Orodho's (2025) historical reconstruction of TVET in Kenya, which found that CBET and digital pedagogies improved access and relevance, but governance and trainer capacity gaps limited effectiveness. This longitudinal perspective suggests that pedagogical reforms require sustained institutional support to achieve lasting impact. Kigen and Ng'eno (2024) examined skills-oriented training models in Kisumu County, finding that skills acquisition was constrained by weak curriculum alignment and limited resources, reinforcing the need for integrated pedagogical and resource investments.

Institutional Capacities and Skills Acquisition

Trainer capacity emerged as the most frequently examined and consistently critical institutional factor across the reviewed studies. Chepkoech, Khatete, and Wanjala (2021) conducted a comprehensive assessment involving 400 trainers from public TVET institutions in Western Kenya, documenting severe human resource constraints: 79% of institutions reported understaffing, 93.06% of trainers were not advancing their education, and the majority held academic degrees outside the TVET mandate. Critically, the study found that only 22.5% of ideal skill formation was being achieved, indicating a massive deficit in institutional human capital capacity. Anindo (2016) examined three TVET institutions in Nairobi County, finding that trainer qualifications and availability of modern equipment significantly influenced employable skills acquisition, with lack of industrial exposure limiting training effectiveness.

The TVETA Annual Returns Report (2024) provided national-level confirmation of these challenges through a census of all registered TVET institutions. The data revealed that only 27% of trainees graduated, falling below the 33.3% target, with 43.58% of trainers holding bachelor's degrees, merely 0.68% possessing PhDs, and 10.67% below minimum Craft qualifications. Dropout rates were significantly higher in STEM fields (7-9%), where trainer shortages were most acute. These statistics reveal a structural crisis in TVET human capital that directly undermines skills acquisition,

completion rates, and ultimately graduate employability.

Mumbe (2020) examined 300 respondents across TVET institutions in Kilifi County, documenting a strong relationship between institutional resources—including trainer qualifications—and employable skills acquisition, while finding that inadequate facilities and weak career guidance reduced employability outcomes. This finding was corroborated by Owuor, Ooko, and Natade (2025), who investigated 131 respondents in Western Kenya and found that trainer competence significantly influenced implementation and employability outcomes, while institutional support systems remained weak. The evidence consistently indicates that trainer quality, measured by academic credentials, industrial experience, and pedagogical preparation, constitutes a foundational institutional capacity that enables or constrains all other training activities.

Continuous professional development (CPD) for trainers was identified as a crucial yet underdeveloped institutional mechanism for maintaining and enhancing human resource capacity. Njenga (2024) conducted qualitative interviews and document analysis with TVET teachers across Kenya, finding that CPD practices mirrored general education approaches rather than addressing TVET-specific needs. Industrial attachment opportunities were added but not systematized, and teacher characteristics influenced learning method choices, suggesting that generic CPD fails to address the specialized requirements of technical and vocational instruction. Mutuerandu, Thinguri and Chui (2026) examined 373 participants in Nairobi County, finding that tutors' capacity building was crucial for CBET implementation, with 72% of trainers lacking adequate competency-based instruction training. The study explicitly recommended national CPD policy establishment and industry immersion programs for trainers, recognizing that pedagogical reform cannot succeed without concurrent human resource development.

Infrastructure and equipment availability emerged as a second critical domain of institutional capacity, with studies consistently documenting resource constraints that limit practical training and skills acquisition. Kigen (2023) conducted a large-scale survey of 20,857 respondents in Kisumu County, finding that inadequate funding, outdated curricula, and limited equipment reduced employability outcomes. This finding aligns with Kahiga, Kibaara, and Gichohi (2024), who examined 11 TVET institutions in Nyeri County and documented a strong link between institutional capacity and competitiveness, finding that lack of ICT labs, workshops, and learning resources hindered training quality.

The Training Resources Study in Meru County (2025) established a statistically significant positive relationship between training resources and practical skills acquisition, identifying modern industry-relevant equipment and adequate workshop facilities as key factors. The study explicitly recommended resource investment and industry partnerships to address identified gaps. Kobia, Kirugua, and Obote (2025) examined trainees in Meru County TVET institutions, finding that availability of modern, industry-relevant resources significantly improved practical skills acquisition. This evidence converges on the conclusion that physical resource availability is not merely a supportive condition but a determining factor in whether institutions can deliver competency-based training that produces job-ready graduates.

Technological infrastructure and readiness for emerging technologies presented particularly concerning findings. Okumu and Kenei (2024) surveyed 187 TVET institutions across all 47 counties, finding that while 21,148 functional computer devices existed nationally, readiness for artificial intelligence adoption was constrained by lack of legal policy frameworks, poor internet connectivity, and inadequate trainer digital competencies. Agallo (2023) examined determinants of e-learning management system adoption in Nairobi County TVET institutions, finding that adoption depended on institutional ICT infrastructure and support systems, with weak digital capacity limiting modern skills acquisition. These findings suggest that the digital transformation of economies presents both opportunities and risks for Kenyan TVET, as institutions lacking technological infrastructure may produce graduates ill-prepared for technology-mediated work environments.

The structure and quality of institutional relationships with industry emerged as a critical factor mediating between training provision and labour market outcomes. Mutembei, Kibaara, and Gichohi (2024) examined six TVET institutions, documenting that institutional partnerships significantly improved employability, while weak industry engagement limited labour market alignment. This finding was reinforced in their 2023 study of TVET graduates in Meru County, which found that weak institutional support and inadequate resources limited employability despite training completion. The evidence indicates that industry linkages are not merely supplementary to institutional capacity but constitute a core component that enables authentic work-integrated learning and ensures curriculum relevance.

The Kenya National Qualifications Authority (2024) evaluation of industry readiness provided comprehensive evidence on partnership structures, finding that industry involvement in curriculum design and assessment remains fragmented across the sector. While the Young Africa Works program strengthened 25 institutions through industry linkages and modern infrastructure, skills mismatches persisted in transport and logistics, electrical, and construction sectors. This suggests that even targeted partnership interventions may be insufficient to overcome systemic misalignments between training provision and market demand.

Mutungi, Kibaara, and Mwirichia (2023) surveyed 361 respondents in Nairobi County, finding that institutions with strong partnerships and modern technology produced better employability outcomes. This finding indicates that industry linkages and technological capacity interact synergistically, with well-connected institutions better able to acquire and maintain modern equipment that reflects current workplace technologies. The Kenya Coast National Polytechnic Tracer Study (2025) documented that employability rates increased from 73.97% to 80.3% following implementation of dual training and strengthened industry linkages, with 85% of employers valuing practical experience. However, dissatisfaction with audio-visual aids (46%) and reference materials (50%) among graduates indicated that even relatively well-connected institutions face resource constraints affecting training quality.

Institutional governance and funding mechanisms emerged as structural factors shaping capacity development and skills acquisition outcomes. Macharia and Ondabu (2025) analyzed panel data from 12 TVET institutions between 2019 and 2023,

finding that government funding (HELB, capitation) and institutional size explained 66.9% of enrolment variation, indicating that financial capacity shapes institutional performance and, by extension, training quality. Caroline (2025) examined 19 TVET institutions, finding that institutional preparedness including resources, curriculum, and governance significantly influenced CBET implementation success and skills outcomes.

Orodho (2025) conducted a historical reconstruction of TVET in Kenya from 1965 to 2025, finding that institutional reforms and CBET adoption improved relevance, but governance and capacity gaps persisted. This longitudinal perspective suggests that governance deficiencies represent a chronic condition constraining institutional effectiveness across policy eras. Kigen and Ng'eno (2024) examined students and institutional leaders in Kisumu County, finding that weak institutional systems and outdated curricula constrained skills acquisition and labour market readiness, reinforcing the importance of organizational processes in mediating training outcomes.

Regional disparities in institutional capacity and outcomes represented a critical finding with equity implications. The Lund University Regional Disparities Study (2025) analyzed TVET graduates across all regions of Kenya, finding significant regional effects on formal employment: graduates in Western Kenya were 69% less likely, those in Nyanza 60% less likely, and those in Eastern region 54% less likely to secure formal employment compared to their Nairobi counterparts. These disparities indicate unequal distribution of institutional capacity bundles including infrastructure, trainer quality, and industry connectivity across the national TVET landscape, suggesting that national policy approaches may inadvertently reproduce or exacerbate spatial inequalities.

The structural organization of training programs and availability of student support services emerged as factors influencing completion and employability outcomes. Jahonga, Musera, and Ngala (2024) examined 1,834 graduates from national polytechnics, finding that modular program structures significantly improved employment outcomes compared to non-modular alternatives, with lower relative risk for unemployment. Job search intensity and migration patterns were critical for employment, suggesting that institutional career support services and placement assistance may enhance labour market integration. This finding indicates that program design features modularity, flexibility, support services constitute institutional capacities that affect graduate outcomes beyond core training content.

Fatma (2017) examined 282 respondents in National Youth Service Industrial and Business Schools, finding that integration of life skills depended on institutional support, resources, and monitoring systems, with weak institutional coordination affecting delivery. Ngulu (2023) investigated 21 vocational institutions in Makueni County, finding that institutional factors such as infrastructure, qualified instructors, and guidance systems influenced access and skill development. These studies suggest that holistic institutional capacity including academic, practical, and psychosocial support systems is required for effective skills development.

Interaction Effects Between Pedagogical Approaches and Institutional Factors

The most consistently documented interaction effect involves institutional resource constraints forcing pedagogical approaches that diverge from

policy intentions. Anindo (2018) provided foundational evidence through a descriptive survey of 405 respondents across three TVET institutions in Nairobi County, finding that teachers mainly used lecture methods (86.5%), demonstration (62.5%), and discussion (55%) due to large class sizes and inadequate equipment. Work-based learning remained limited by institutional constraints, with 70% reporting teacher inadequacy that forced multi-grade teaching and part-time hires. Critically, all four institutional factors teaching methods, training equipment availability, teacher adequacy, and academic qualifications significantly influenced employable skills acquisition, establishing the interaction framework that subsequent studies elaborated.

Kailo and Njagi (2025) corroborated and extended these findings through a quantitative survey of TVET institutions nationwide, documenting that predominant use of lecture methods (teacher-centered, theory-based) resulted directly from inadequate resources and large classes. Demonstration and practical-oriented strategies were limited by equipment shortages, with pedagogical choices explicitly constrained by institutional capacity deficits. This evidence indicates that the persistence of traditional teaching methods in Kenyan TVET is not merely a trainer preference or habit but an adaptive response to structural conditions that limit practical training delivery.

The interaction between pedagogical approach and human resource capacity was further examined by Mutuerandu, Thinguri and Chui (2026) through a mixed-methods study of 373 participants in Nairobi County. The study found that 72% of trainers lacked adequate competency-based instruction training, yet tutors' capacity building was crucial for CBET implementation. Institutional investment in continuous professional development and industry immersion programs directly improved pedagogical effectiveness and graduate readiness, demonstrating that trainer capacity development can mediate the relationship between institutional constraints and teaching quality. This finding suggests that targeted human resource investments can partially compensate for broader resource limitations, though systemic constraints persist.

Maingi and Musyoka (2026) employed mixed methods with 296 participants from Kenyan national polytechnics, finding a strong positive correlation ($r=0.874$) between trainee attitudes and assessment effectiveness. Transparency and learner preparation in CBET assessment were influenced by institutional commitment to quality assurance, with practical training effectiveness dependent on industry partnership structures. This evidence indicates that the success of competency-based pedagogical approaches requires institutionalized quality systems that extend beyond individual trainer competence to encompass organizational processes and external partnerships.

Gachahi et al. (2025) conducted a case study at Nyeri National Polytechnic with 363 respondents, finding that trainers demonstrated 74% advanced-level pedagogical knowledge, with 68.8% using modern methods (Universal Design for Learning, active learning) while 31.2% relied on traditional approaches. Notably, 38.9% used traditional written assessments despite CBET mandates for practical competency evaluation, indicating that institutional support for innovative pedagogy and assessment modernization directly correlated with graduate competency development. This finding reveals a disconnect between pedagogical reform and assessment practices, with institutional quality

assurance gaps undermining intended learning outcomes.

The interaction between financial resources and pedagogical transformation emerged as a central theme across multiple studies. Ngeera and Muriithi (2025) conducted an exploratory mixed-methods study with 70,591 participants in Mt. Kenya East Region, finding that inadequate funding significantly affected CBET implementation and practical skills delivery. Financial resource constraints directly limited the pedagogical shift from theory-based to competency-based instruction, with recommended interventions including timely capitation disbursement and standardized minimum funding benchmarks. This evidence establishes funding as a foundational enabler of pedagogical reform, with financial shortfalls cascading into teaching practice limitations.

Keter (2025) examined perceptions of 50 VTC managers through descriptive cross-sectional mixed methods, finding that while managers viewed CBET as timely and industry-relevant, major implementation barriers included trainer unpreparedness (pedagogical), lack of instructional materials and equipment (institutional), and poor linkages between TVET CDACC and institutions (organizational). These interacting constraints limited labour market readiness outcomes, demonstrating that pedagogical reform requires simultaneous attention to human resources, physical resources, and governance structures. The study illustrates how multiple institutional factors can compound to constrain pedagogical effectiveness even where policy support exists.

The interaction between program design features and institutional support services significantly influenced graduate employment trajectories. Jahonga, Musera, and Ngala (2024) employed multinomial logistic regression with 1,834 graduates from national polytechnics, finding that modular programs significantly improved employment outcomes versus non-modular alternatives, with lower relative risk for unemployment. Job search intensity and migration patterns were mediated by institutional career support services, while regional disparities in formal employment access indicated unequal institutional capacity distribution across Kenya. This evidence suggests that pedagogical program structure and institutional support services interact synergistically to influence labour market integration, with well-designed programs in well-supported institutions producing superior outcomes.

The Kenya Coast National Polytechnic Tracer Study (2025) provided comprehensive evidence of positive interaction effects through a survey of graduates and employers across 11 academic departments. The study documented that employability rates increased from 73.97% to 80.3% following implementation of dual training, CBET curriculum rollout, strengthened industry linkages, soft skills development, and Recognition of Prior Learning (RPL) programs. While 58.87% reported job-training alignment and 85% of employers valued practical experience, dissatisfaction with audio-visual aids (46%) and reference materials (50%) indicated persistent resource-pedagogy interaction constraints. This evidence demonstrates that integrated interventions combining pedagogical reform, institutional capacity building, and industry partnership development can produce measurable improvements in graduate outcomes, even when resource limitations persist.

The TVETA Annual Returns Report (2024) provided national-level evidence of the interaction between human resource capacity and pedagogical outcomes

through a census of all registered TVET institutions. The data revealed that overall graduation rates reached only 27% (below the 33.3% target), with 43.58% of trainers holding bachelor's degrees, merely 0.68% possessing PhDs, and 10.67% below minimum Craft qualifications. Dropout rates were higher in STEM fields (7-9%) where trainer shortages were most acute, indicating that institutional human resource capacity directly constrained pedagogical quality and completion outcomes. This macro-level evidence confirms that trainer qualification deficits interact with pedagogical demands to produce systemic inefficiencies in skills development.

Conclusion

Kenyan TVET stands at a critical juncture. Vision 2030 ambitions for industrialization and human capital development require a TVET system capable of producing job-ready graduates at scale. The evidence synthesized in this review indicates that pedagogical approaches remain predominantly theory-based and teacher-centered despite national policy mandates for practical, learner-centered instruction. The persistence of lecture methods (86.5% of instructors), driven by inadequate resources, large class sizes, and trainer capacity deficits, creates a fundamental implementation gap between CBET policy intentions and classroom realities. Work-integrated learning, dual training, and experiential pedagogies demonstrate superior outcomes where implemented, but their reach remains limited by institutional constraints.

Also, institutional capacity deficits are systemic and multidimensional, encompassing severe human resource shortages (93.06% of trainers not advancing qualifications, 72% lacking CBET-specific training), inadequate infrastructure and equipment, fragmented industry partnerships, and governance weaknesses. These capacity constraints are not randomly distributed but concentrate in specific regions (Western, Nyanza, Eastern), institutional types (VTCs, rural colleges), and fields (STEM disciplines), producing marked inequities in training quality and graduate outcomes.

Hence, pedagogical effectiveness and institutional capacity interact ecologically to determine labour market integration outcomes. Resource constraints force pedagogical conservatism, while targeted capacity investments can enable pedagogical innovation even within resource limitations. Integrated interventions combining trainer development, curriculum modernization, industry partnerships, and infrastructure investment produce synergistic effects that exceed the sum of isolated reforms. However, persistent assessment misalignment, financial instability, and regional disparities continue to undermine overall sector performance.

Recommendations

Policy Implications

The evidence synthesis yields several actionable policy implications for Kenyan TVET and similar context:

1. Pedagogical transformation requires simultaneous investment in trainer professional development, infrastructure modernization, and industry partnership institutionalization. The evidence that 72% of trainers lack CBET-specific training indicates that curriculum reform alone is insufficient. A national CPD policy with mandatory industry immersion programs should accompany all pedagogical reforms.

2. Regional disparities (54-69% lower formal employment odds outside Nairobi) and institutional type variations require differentiated funding formulas rather than uniform capitation. Enhanced resource allocation to underserved regions and institution types, potentially through conditional grants tied to performance indicators, could address spatial inequities.
3. Voluntary Memorandums of Understanding have proven inadequate for ensuring authentic work-integrated learning. Sector skills councils with mandatory employer participation in curriculum governance, combined with tax incentives or public procurement preferences for training-involved firms, could strengthen industry linkages.
4. The persistence of traditional written assessments (38.9% of cases) despite CBET mandates indicates quality assurance gaps. External assessment moderation, tracer study systematization, and graduate outcome accountability mechanisms should be institutionalized to ensure alignment between pedagogical intentions and practices.
5. The finding that funding delays directly limit pedagogical transformation indicates need for timely, predictable financing. Capitation disbursement schedules should be legally protected, and contingency funds established for institutions facing cash flow disruptions.
6. Given evidence that online pedagogy can effectively support practical skills training when well-designed, strategic investment in digital infrastructure and trainer digital competencies could expand access and flexibility, particularly for underserved populations.

Practice Implications

For TVET institutional leaders and practitioners, the review suggests:

1. Prioritize demonstration, project-based learning, and work-integrated methods even within resource constraints, as these approaches demonstrate superior employability outcomes. Use limited equipment for intensive, rotated practical sessions rather than distributing inadequate resources thinly across all trainees.
2. Advocate for and participate in industry immersion programs, professional learning communities, and CBET-specific training. Mentor junior trainers and document effective practices to build institutional pedagogical knowledge.
3. Move beyond formal MoUs to substantive collaboration including curriculum co-development, workplace training provision, and graduate placement tracking. Document partnership outcomes to demonstrate value to employers.
4. Implement authentic competency assessment using workplace simulations, portfolios, and employer evaluation even where national examination systems lag, building evidence for policy advocacy.
5. Conduct regular tracer studies and graduate destination surveys to demonstrate institutional effectiveness, identify improvement areas, and inform resource advocacy.

Limitations and Future Research

This review acknowledges limitations affecting conclusion strength. The predominance of cross-sectional designs limits causal inference; regional coverage concentrates in accessible areas; temporal focus on recent reforms limits historical understanding; and restriction to English-language publications may exclude indigenous perspectives.

Future research should prioritize: (1) experimental or quasi-experimental evaluations of specific intervention bundles; (2) qualitative research examining institutional change processes and stakeholder experiences (3) economic analyses of cost-effectiveness for different capacity investment strategies.

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