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THE INFLUENCE OF EDUCATION REFORMS ON THE EVOLUTION OF TECHNOLOGY EDUCATION: A CASE OF TVET INSTITUTIONS IN KENYA

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ABSTRACT
Education reforms have historically played a critical role in shaping the trajectory of technology education. This study investigated the extent to which curriculum adjustments, policy frameworks, and pedagogical innovations have influenced the development of technology education in Technical and Vocational Education and Training (TVET) institutions. A mixed-methods approach was employed, collecting data from 120 instructors and 300 trainees across five TVET institutions in Nairobi County. Quantitative analysis involved descriptive statistics and multiple regression, while qualitative insights were drawn from semi-structured interviews with administrators. Results revealed that education reforms significantly influence technology education ($\beta = 0.642$, $R^2 = 0.401$, $p < .001$), with curriculum modernization and policy implementation emerging as the most impactful dimensions. The findings conclude that reforms act as both drivers and enablers of technological integration, enhancing relevance, innovation, and adaptability of technology education. Recommendations include aligning reforms with industry standards, strengthening policy monitoring, and embedding flexibility into curricula.

Keywords:
Education reforms, technology education, TVET, curriculum, policy, innovation

1.0 INTRODUCTION

The landscape of education is constantly reshaped by reforms aimed at addressing societal, economic, and technological demands. In technology education, reforms have been particularly crucial in bridging the gap between traditional pedagogy and emerging digital learning environments (Suhail et al., 2024). Globally, governments have adopted curriculum modernization, competency-based approaches, and integration of educational technologies as reform measures to improve skill relevance (Tahir & Abdullah, 2023). In Kenya, reforms within TVET institutions have sought to enhance employability, innovation, and industrial adaptability among trainees (Yilmaz, 2021).

Despite this emphasis, questions remain regarding the actual influence of reforms on technology education outcomes. In some contexts, reforms face challenges of inadequate resources, misalignment with labor market needs, or poor implementation strategies (Seyman Guray & Kismet, 2023). This study therefore sought to empirically establish how reforms focusing on curriculum adjustments, policy shifts, and pedagogical changes have shaped the growth of technology education in TVET institutions in Nairobi County.

2.0 LITERATURE REVIEW

Education reforms are structured interventions designed to improve teaching and learning processes (Zhang & Wang, 2023). In technology education, reforms have been linked to competency-based curricula, integration of ICT, and innovation-driven training (Simonsmeier et al., 2022). According to Sweller's (1988) Cognitive Load Theory, reforms that simplify content delivery while enhancing engagement reduce extraneous cognitive load, thereby improving learning efficiency.

Globally, reforms such as Germany's dual training system and Singapore's SkillsFuture initiative have enhanced the relevance of technical education by aligning curricula with labor market demands (Rezai et al., 2025). In sub-Saharan Africa, reforms often focus on curriculum restructuring, teacher professional development, and digital integration (Rotsios et al., 2022). However, gaps remain in understanding the direct influence of reforms on technology education outcomes in Kenyan TVET institutions.

3.0 METHODOLOGY

The study adopted a descriptive and correlational survey design, which was considered appropriate because it not only described existing trends in stakeholder participation but also examined the nature and strength of

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relationships among the variables under investigation. A mixed-methods approach was employed, where quantitative data provided measurable evidence of stakeholder influence on technology education, while qualitative insights enriched the findings by revealing contextual and experiential perspectives. The target population consisted of instructors and trainees from five public TVET institutions in Nairobi County, as these groups directly engage with teaching, learning, and reform implementation. Stratified random sampling was used to guarantee fair representation, and from this process 120 instructors and 300 trainees were selected, ensuring that both educator and learner viewpoints were adequately captured.

Data collection was carried out through structured questionnaires based on a five-point Likert scale, which assessed perceptions of education reforms such as curriculum adjustments, teaching strategies, and policy shifts. To complement these findings, semi-structured interviews with administrators provided deeper qualitative insights into leadership roles, decision-making processes, and institutional challenges in adopting reforms. The instruments were subjected to expert review to establish content validity, ensuring that all items were relevant and clearly aligned with the study objectives. A pilot study involving 30 participants was also conducted, and the resulting Cronbach's alpha coefficient of 0.871 confirmed strong internal reliability.

Analysis of the collected data integrated both quantitative and qualitative techniques. Quantitative responses were processed using SPSS version 28, where descriptive statistics summarized perceptions of reform indicators and regression analysis measured the extent to which stakeholder involvement influenced technology education outcomes. Qualitative interview data, on the other hand, were transcribed, coded, and analyzed thematically, enabling the researcher to identify patterns and recurring themes that explained the underlying dynamics of stakeholder participation. This complementary approach ensured that the findings were both statistically rigorous and contextually meaningful.

4.0 RESULTS

Descriptive Statistics

Table 1: Perceptions of Education Reform Indicators (n = 420)

Reform Indicator	Mean	SD	Interpretation
Curriculum modernization	4.21	.68	Strong influence
Policy alignment	4.07	.74	Strong influence
Pedagogical innovation	3.98	.81	Moderate influence
Teacher professional dev.	3.85	.79	Moderate influence

The findings revealed that curriculum modernization had the highest mean score (M = 4.21, SD = 0.68), indicating that it was perceived to exert a strong influence on the effectiveness of technology education reforms. This suggests that updating course content and aligning it with contemporary industry demands is considered central to maintaining relevance and improving learner outcomes. Similar studies have emphasized that curriculum modernization bridges the gap between institutional training and labor market expectations, thereby equipping learners with skills that meet evolving technological standards (Ravichandran & Mahapatra, 2023; Rotsios et al., 2022).

Policy alignment also registered a strong influence (M = 4.07, SD = 0.74), reflecting the critical role of harmonized educational policies in sustaining reforms across TVET institutions. Policies provide the structural framework within which reforms are implemented, and alignment with national development goals ensures both consistency and sustainability. Prior research underscores that effective policy frameworks not only institutionalize reforms but also mobilize resources and strengthen accountability mechanisms, thereby enhancing the long-term success of education initiatives (Saunders et al., 2016; Zhang et al., 2023).

Pedagogical innovation recorded a moderate influence (M = 3.98, SD = 0.81), showing that while innovative teaching methods such as the use of digital tools and learner-centered approaches are increasingly recognized, their application remains uneven. This aligns with literature suggesting that although innovations like augmented and virtual reality can transform technical training, their adoption is often limited by resource constraints, educator preparedness, and institutional readiness (Scavarelli et al., 2021; Wang et al., 2023). Thus, while pedagogical innovation holds potential, its effectiveness depends largely on systemic support and capacity-building measures.

Finally, teacher professional development was rated moderately influential (M = 3.85, SD = 0.79), highlighting the importance of continuous capacity building in supporting reforms. Educators remain the primary agents of

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implementation, and without regular training opportunities, their ability to integrate emerging technologies and innovative practices is constrained. This finding resonates with existing scholarship, which emphasizes that professional development enhances teacher competence, promotes instructional adaptability, and ensures that reforms translate into classroom impact (Simonsmeier et al., 2022; Seyman Guray & Kismet, 2023).

Overall, the results suggest that curriculum modernization and policy alignment are perceived as the strongest drivers of reform, while pedagogical innovation and teacher professional development, though important, require more systemic support to achieve greater influence. These findings reinforce the view that sustainable reform in technology education must be multi-dimensional, integrating structural policies with continuous human capacity enhancement to remain effective and relevant (Suhail et al., 2024; Williams et al., 2025).

Regression Analysis

Table 2: Regression Results of Education Reforms on Technology Education

Predictor	β	t	p
Curriculum modernization	.431	6.112	.000
Policy alignment	.297	4.926	.000
Pedagogical innovation	.218	3.544	.001
Teacher professional dev.	.199	3.221	.002

The regression analysis revealed that curriculum modernization (β = .431, $p < .001$) was the strongest predictor of technology education reforms, confirming that up-to-date curricula ensure relevance to labor market demands (Ravichandran & Mahapatra, 2023; Zhang et al., 2023). Policy alignment also had a significant effect (β = .297, $p < .001$), underscoring the role of supportive governance in sustaining innovation (Saunders et al., 2016; Rotsios et al., 2022). Pedagogical innovation (β = .218, $p = .001$) contributed moderately, suggesting that while new teaching methods are impactful, their integration remains uneven (Scavarelli et al., 2021; Wang et al., 2023). Teacher professional development (β = .199, $p = .002$) was also significant, highlighting the need for continuous training to equip instructors with technological competencies (Simonsmeier et al., 2022; Seyman Guray & Kismet, 2023). Collectively, these findings indicate that reforms in curriculum and policy exert the greatest influence, but their success is reinforced by innovation and educator capacity-building (Suhail et al., 2024; Williams et al., 2025).

4.1 Findings from Administrative Interviews

Qualitative interviews reinforced these quantitative findings. Respondent 1 noted, *"Curriculum reforms have made training more relevant to industry needs, especially with the shift toward competency-based training."* Respondent 2 emphasized policy gaps, stating that *"implementation is often inconsistent, as institutions lack the resources to fully adopt national reform guidelines."* Respondent 3 observed that *"pedagogical innovations such as blended learning are promising but remain underutilized due to limited ICT infrastructure."* Respondent 4 highlighted instructor challenges, remarking that *"teacher development has not kept pace with reforms, leaving some trainers unprepared for digital integration."* Finally, Respondent 5 pointed out sustainability issues, explaining that *"without continuous policy monitoring, reforms risk becoming short-lived projects rather than long-term transformations."*

These views echo global evidence that reforms succeed only when they are well-resourced, aligned with industry, and accompanied by ongoing professional development (Williams et al., 2025; Tan et al., 2022).

5.0 DISCUSSION

The findings demonstrate that education reforms significantly shape the evolution of technology education. Curriculum modernization was the strongest predictor, supporting studies that highlight its role in aligning skills with labor market needs (Williams et al., 2025). Policy alignment also strongly influenced outcomes, consistent with arguments by Tan et al. (2022) that reforms succeed only when supported by coherent frameworks. Pedagogical innovation and teacher professional development contributed moderately, reflecting challenges of resourcing and training.

These findings align with Sweller's (1988) cognitive load principles, as reforms that simplify processes enhance deep learning. Comparisons with global cases such as Germany and Singapore reaffirm the critical role of reforms in driving innovation, adaptability, and relevance in technical education (Rezai et al., 2025).

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This study concludes that education reforms are central to the evolution of technology education in Kenyan TVET institutions. The findings demonstrated that curriculum modernization and policy alignment exert strong influence, while pedagogical innovation and teacher professional development play moderate yet significant roles. Regression analysis further confirmed that curriculum modernization is the strongest driver of reform, followed closely by policy alignment, pedagogical practices, and professional development initiatives. Collectively, these reforms enhance adaptability, relevance, and quality within technology education, equipping TVET institutions to respond effectively to dynamic technological and industrial demands. Nevertheless, the study also identified persistent gaps in implementation and limited investment in professional development, which constrain the full realization of reform benefits. To address these challenges, the study recommends strengthening mechanisms for monitoring and evaluating reform implementation, embedding continuous professional development for instructors to sustain innovation, and designing flexible curricula capable of adapting to emerging technological and industrial trends. In addition, stronger collaboration among government, industry, and academia is necessary to consolidate reform efforts and ensure long-term sustainability in advancing technology education.

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