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The Implementation Gap: Prohibitive Costs and Systemic Deficits as Barriers to Competency-Based Curriculum in Africa

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Abstract: ***Background:*** *Competency-based curriculum (CBC) reforms have been widely adopted across Africa to transform education systems from traditional knowledge transmission models toward learner-centered approaches emphasizing practical skills and 21st-century competencies. However, a persistent implementation gap between policy aspirations and classroom realities threatens to undermine these reforms, with prohibitive costs and systemic deficits identified as primary barriers to effective implementation.* ***Objectives:*** *This study investigated the financial barriers and systemic deficits impeding CBC implementation in African education systems, examined their interrelationships and impacts on implementation effectiveness, and identified contextually appropriate strategies for bridging the implementation gap.* ***Methods:*** *Employing a mixed-methods convergent parallel design, the study was conducted across six African countries (Kenya, Rwanda, Nigeria, Tanzania, South Africa, and Ghana) with 1,847 participants including teachers, administrators, curriculum specialists, and policymakers selected through stratified random sampling. Quantitative data collected through validated structured questionnaires were analyzed using descriptive statistics, independent samples t-tests, ANOVA, Pearson correlations, multiple linear regression, and structural equation modeling. Qualitative data from 72 semi-structured interviews, 18 focus group discussions, and document analysis of 94 policy documents complemented quantitative findings through thematic analysis and methodological triangulation.* ***Results:*** *Financial barriers were substantial across all countries ($M = 4.20/5.0$), with technology integration ($M = 4.41$), learning materials ($M = 4.35$), and infrastructure development ($M = 4.28$) representing the most prohibitive costs, though significant cross-country variations existed ($F = 19.85$, $p < .001$, $\eta^2 = 0.051$). Systemic deficits were pervasive, with 71.3% of respondents identifying them as major or extreme barriers; teacher pedagogical capacity (78.3% prevalence; $M = 4.18$), resource allocation mechanisms (76.1%; $M = 4.11$), and monitoring systems (74.2%; $M = 4.05$) constituted the most severe deficits.* ***Conclusions:*** *The implementation gap in African CBC initiatives resulted from the intersection of prohibitive costs and systemic deficits operating as mutually reinforcing barriers, with particularly severe impacts in rural contexts threatening to exacerbate educational inequalities. Successful implementation required moving beyond superficial curriculum reforms toward comprehensive transformation of resource allocation, institutional capacity, and implementation support structures sustained over extended timeframes through phased, prioritized approaches; comprehensive teacher capacity building and institutional strengthening systems; and equity-focused resource mobilization addressing urban-rural disparities.*

Keywords: competency-based curriculum, educational equity, curriculum implementation, education policy

Introduction

The global shift toward competency-based curriculum (CBC) represents a fundamental transformation in educational philosophy, moving away from traditional knowledge transmission models toward learner-centered approaches that emphasize practical skills, critical thinking, and real-world application. Across Africa, numerous countries have embarked on ambitious curriculum reform initiatives designed to align their education systems with 21st-century demands and labor market needs (Prosper Mubangizi, 2020; Salazar-Fernandez et al., 2021). However, the journey from policy formulation to classroom implementation has been fraught with significant challenges that threaten to undermine these well-intentioned reforms. While competency-based education promises to produce graduates equipped with relevant skills for employment and entrepreneurship, the reality on the ground reveals a persistent implementation gap characterized by resource constraints, infrastructural deficiencies, and systemic weaknesses that disproportionately affect African nations (Cook, 2022; Geera & Onen, 2023).

This study examines the critical disconnect between policy aspirations and practical realities in implementing competency-based curriculum across African educational contexts. Despite growing recognition of CBC's potential to address skills mismatches and improve learning outcomes, implementation efforts have consistently encountered formidable barriers rooted in economic constraints and institutional inadequacies (Fatimah et al., 2023; Pepin et al., 2017). The prohibitive costs associated with teacher training, learning materials, infrastructure development, and continuous assessment systems present immediate obstacles, while deeper systemic deficits in areas such as teacher capacity, administrative structures, monitoring mechanisms, and stakeholder engagement create persistent challenges that extend beyond mere financial considerations (Monica, 2022; Vergel et al., 2018). Understanding these barriers is essential for developing contextually appropriate strategies that can bridge the implementation gap and realize the transformative potential of competency-based education in Africa (Putro, 2023; Ssentanda & Wenske, 2023).

Background of the Study

The adoption of competency-based curriculum in Africa emerged from a broader global education reform movement that gained momentum in the late 20th and early 21st centuries. International frameworks such as UNESCO's Education for All initiative, the Millennium Development Goals, and subsequently the Sustainable Development Goals have emphasized the need for education systems that produce not merely literate individuals but competent citizens capable of contributing meaningfully to economic

development and social progress. African countries, recognizing the limitations of traditional examination-oriented systems that prioritized rote memorization over practical application, began embracing CBC as a pathway to educational transformation (Franco et al., 2023).

Countries across the continent have undertaken various forms of curriculum reform incorporating competency-based principles. Rwanda implemented its competency-based curriculum in 2015, emphasizing active learning and practical skills development. Kenya launched its CBC in 2017, restructuring its entire education system from the traditional 8-4-4 model to a 2-6-3-3-3 framework focused on nurturing learners' talents and competencies. South Africa, Tanzania, Nigeria, and numerous other African nations have similarly embarked on curriculum reforms incorporating competency-based approaches with varying degrees of comprehensiveness and success (Jamil et al., 2020; Julius & Isaac Kazaara, 2025; O'Sullivan & Ring, 2021).

The theoretical foundation of competency-based education rests on constructivist learning principles that position learners as active participants in knowledge construction rather than passive recipients of information. CBC emphasizes learning outcomes rather than time spent in classrooms, focusing on what learners can demonstrate they know and can do (Katurebe & Nalukwago, 2024; Mubaraka, 2023). This approach requires significant shifts in pedagogical practices, assessment methods, teacher roles, and educational infrastructure. Teachers must transition from being knowledge deliverers to facilitators of learning, employing varied instructional strategies including collaborative learning, project-based activities, and experiential learning opportunities. Assessment shifts from summative examinations toward continuous, formative evaluation that provides ongoing feedback to support learner development (Aheisibwe & Barigye, 2023; Chemutai et al., 2023)t.

However, the implementation of such comprehensive reforms in resource-constrained African contexts presents unique challenges. Many African education systems continue to grapple with foundational issues including inadequate infrastructure, large class sizes, insufficient teaching materials, poorly trained educators, and limited technological access. The economic realities of African nations, many of which allocate substantial portions of national budgets to education yet still face significant resource gaps, create tensions between reform ambitions and implementation capacities. Furthermore, systemic weaknesses in areas such as educational governance, quality assurance mechanisms, stakeholder coordination, and community engagement compound the challenges of implementing competency-based approaches effectively (Ma et al., 2022).

The implementation gap between policy and practice in African CBC initiatives reflects broader challenges in educational development on the continent. While governments produce comprehensive policy documents outlining reform objectives, pedagogical frameworks, and implementation timelines, the translation of these policies into classroom realities often falters due to insufficient attention to implementation prerequisites and sustainability mechanisms. This gap raises critical questions about the appropriateness of educational models developed primarily in Western contexts for African settings, the adequacy of implementation support provided to educators and institutions, and the sustainability of reform efforts that depend heavily on external funding and technical assistance.

Problem Statement

Despite widespread adoption of competency-based curriculum reforms across Africa, a significant implementation gap persists between policy intentions and classroom realities, fundamentally undermining the potential of these educational innovations to transform learning outcomes and develop 21st-century competencies among African learners. This gap is primarily driven by two interconnected categories of barriers: prohibitive costs associated with CBC implementation and systemic deficits within African education systems (Julius, 2025b; Julius & Nelson, 2024).

The financial barriers to CBC implementation are substantial and multifaceted. Teacher professional development programs required to equip educators with competency-based pedagogical approaches demand significant investment in training workshops, ongoing mentorship, and continuous capacity building (Julius & Geofrey, 2025; Julius & Twinomujuni, 2025). The development and procurement of learner-centered teaching and learning materials, including manipulatives, laboratory equipment, technology tools, and diverse reading resources, impose considerable costs on education systems already struggling with basic resource provision. Infrastructure modifications necessary to support active learning environments—including classroom reconfiguration, science laboratories, technology integration, and inclusive learning spaces—require capital investments that many African countries find prohibitive (Ndomondo et al., 2022; VERGUN et al., 2021). Additionally, the shift from traditional examination-based assessment to continuous, formative assessment increases administrative costs related to assessment materials, record-keeping systems, and teacher workload.

Beyond financial constraints, systemic deficits within African education systems create persistent obstacles to effective CBC implementation. Many teachers lack the foundational pedagogical knowledge and practical skills necessary to facilitate competency-based learning, having themselves been trained in traditional teacher-centered models. Educational administration and management structures often remain hierarchical and bureaucratic, ill-suited to the flexibility and responsiveness required for effective CBC implementation. Monitoring and evaluation systems are frequently inadequate, lacking the capacity to track implementation fidelity, identify challenges, and provide timely support to struggling schools and teachers (Charles et al., 2023). Stakeholder engagement mechanisms remain weak, with limited meaningful participation from parents, communities, and learners themselves in the reform process.

These barriers manifest in observable classroom realities: teachers reverting to familiar lecture-based methods despite CBC policy requirements; learners lacking access to essential learning materials and resources; assessment practices continuing to emphasize

memorization despite curriculum emphasis on practical application; and learning outcomes failing to reflect the ambitious competencies outlined in policy documents (Arinaitwe, 2021; Julius, 2025a). The implementation gap not only wastes scarce educational resources but also perpetuates educational inequalities, as schools in well-resourced urban areas may successfully implement CBC elements while rural and marginalized communities fall further behind.

This problem demands urgent attention because education represents Africa's most critical investment in human capital development and future prosperity. Without addressing the implementation barriers that prevent competency-based curriculum from translating into improved learning experiences and outcomes, African nations risk perpetuating educational systems that fail to prepare learners for the demands of rapidly evolving economies and societies. Understanding the specific nature, extent, and interrelationships of these cost and systemic barriers is essential for developing pragmatic, context-appropriate strategies that can bridge the implementation gap and enable African education systems to realize the transformative potential of competency-based education.

Main Objective of the Study

To investigate and analyze the prohibitive costs and systemic deficits that constitute barriers to effective implementation of competency-based curriculum in African education systems, and to identify contextually appropriate strategies for bridging the implementation gap between policy aspirations and classroom realities.

Specific Objectives

1. To assess the specific financial barriers associated with implementing competency-based curriculum in African educational contexts, including costs related to teacher training, learning materials, infrastructure development, and assessment systems, and to determine their relative impact on implementation effectiveness across different educational settings.
2. To examine the systemic deficits within African education systems that impede competency-based curriculum implementation, including teacher capacity gaps, administrative and management weaknesses, inadequate monitoring and evaluation mechanisms, and insufficient stakeholder engagement structures.
3. To identify and evaluate contextually appropriate strategies, best practices, and innovative approaches that can mitigate financial constraints and address systemic deficits to enable sustainable and effective implementation of competency-based curriculum in resource-constrained African educational environments.

Research Questions

1. What are the specific financial costs associated with implementing competency-based curriculum in African education systems, and how do these prohibitive costs vary across different contexts and impact the effectiveness of CBC implementation at the classroom level?
2. What systemic deficits exist within African education systems that serve as barriers to competency-based curriculum implementation, and how do these deficits interact with financial constraints to create and perpetuate the implementation gap?
3. What contextually appropriate strategies, innovations, and best practices can African countries adopt to overcome financial barriers and address systemic deficits in order to bridge the implementation gap and achieve effective, sustainable competency-based curriculum implementation?

Methods.

This study employed a mixed-methods convergent parallel design to comprehensively investigate the prohibitive costs and systemic deficits that constituted barriers to competency-based curriculum implementation in Africa. The research was conducted across six African countries (Kenya, Rwanda, Nigeria, Tanzania, South Africa, and Ghana) selected through purposive sampling to represent diverse geographic regions, economic contexts, and stages of CBC implementation. The quantitative phase utilized a cross-sectional survey design with a sample size of 1,847 participants, calculated using G*Power software to detect a medium effect size ($f^2 = 0.15$) with 80% statistical power at $\alpha = 0.05$ significance level, accounting for a 15% non-response rate. The sample comprised 1,200 teachers, 420 educational administrators, 150 curriculum specialists, and 77 policy makers, selected through stratified random sampling proportionate to country population and ensuring representation across urban-rural locations, school types (public/private), and educational levels (primary/secondary). Data were collected using validated structured questionnaires with Likert-scale items measuring financial barriers ($\alpha = 0.89$), systemic deficits ($\alpha = 0.92$), and implementation effectiveness ($\alpha = 0.87$). Quantitative data analysis employed descriptive statistics (means, standard deviations, frequencies) to characterize barrier profiles, independent samples t-tests and one-way ANOVA with post-hoc Tukey tests to examine differences across contexts, Pearson correlation analysis to explore relationships between variables, multiple linear regression to identify predictors of implementation effectiveness, and structural equation modeling (SEM) using maximum likelihood estimation to test hypothesized pathways linking financial barriers and systemic deficits to the implementation gap, with model fit assessed through CFI (> 0.95), TLI (> 0.95), RMSEA (< 0.06), and SRMR (< 0.08) indices. The qualitative phase involved 72 semi-structured interviews with purposively selected key informants (24 teachers, 18 head teachers, 15 education officers, 9 curriculum developers, and 6 ministry officials) and 18 focus group discussions with 126 participants (teachers, parents, and learners) to explore lived experiences, contextual nuances, and implementation strategies (Nelson et al., 2022, 2023). Ethical approval was obtained from relevant institutional review boards and ministries of education in participating countries, with informed consent secured from all participants, confidentiality maintained through anonymization, and data stored securely according to institutional protocols.

Results.

Table 1: Descriptive Statistics and Comparative Analysis of Financial Barriers to CBC Implementation Across Countries

Financial Barrier Category	Overall Mean (SD)	Kenya M (SD)	Rwanda M (SD)	Nigeria M (SD)	Tanzania M (SD)	South Africa M (SD)	Ghana M (SD)	F-statistic	p-value	η^2
Teacher Training Costs	4.12 (0.83)	4.25 (0.79)	3.89 (0.86)	4.38 (0.75)	4.18 (0.81)	3.76 (0.91)	4.21 (0.78)	18.42	<.001	0.048
Learning Materials & Resources	4.35 (0.76)	4.48 (0.71)	4.15 (0.82)	4.52 (0.68)	4.41 (0.74)	3.98 (0.89)	4.39 (0.73)	15.73	<.001	0.041
Infrastructure Development	4.28 (0.81)	4.42 (0.76)	4.08 (0.85)	4.45 (0.73)	4.35 (0.79)	3.87 (0.93)	4.31 (0.77)	17.29	<.001	0.045
Assessment System Costs	3.87 (0.91)	3.95 (0.88)	3.68 (0.95)	4.08 (0.82)	3.91 (0.89)	3.52 (1.02)	3.89 (0.87)	11.24	<.001	0.030
Technology Integration	4.41 (0.79)	4.53 (0.74)	4.22 (0.84)	4.58 (0.71)	4.47 (0.76)	4.05 (0.91)	4.45 (0.75)	16.87	<.001	0.044
Continuous Professional Development	4.19 (0.85)	4.31 (0.81)	3.95 (0.90)	4.35 (0.78)	4.24 (0.83)	3.84 (0.96)	4.18 (0.82)	13.56	<.001	0.036
Overall Financial Barriers	**4.20 (0.68)**	**4.32 (0.64)**	**4.00 (0.73)**	**4.39 (0.61)**	**4.26 (0.66)**	**3.84 (0.79)**	**4.24 (0.65)**	**19.85**	**<.001**	**0.051**

Note: Ratings on 5-point Likert scale (1 = Not a barrier, 5 = Extreme barrier); N = 1,847; η^2 = eta-squared effect size

The descriptive statistics revealed that financial barriers to CBC implementation were perceived as substantial across all six African countries, with the overall mean score of 4.20 (SD = 0.68) indicating that respondents consistently rated cost-related obstacles between "significant barrier" and "extreme barrier" on the five-point scale. One-way ANOVA demonstrated statistically significant differences across countries for all financial barrier categories (all $p < .001$), though the effect sizes were small to medium (η^2 ranging from 0.030 to 0.051), suggesting that while country-level variations existed, financial constraints represented a pervasive challenge across diverse African contexts. Post-hoc Tukey tests (not shown in table) indicated that South Africa consistently reported significantly lower barrier ratings compared to Nigeria ($p < .001$), Kenya ($p < .001$), and Tanzania ($p < .01$), likely reflecting its relatively stronger economic position and higher education expenditure as a percentage of GDP. Technology integration emerged as the most severe financial barrier (M = 4.41, SD = 0.79), followed closely by learning materials and resources (M = 4.35, SD = 0.76) and infrastructure development (M = 4.28, SD = 0.81). The relatively lower mean for assessment system costs (M = 3.87, SD = 0.91), while still substantial, suggested that this represented a comparatively less prohibitive barrier, possibly because formative assessment could be partially implemented using low-cost methods. The standard deviations across all categories ranged from 0.68 to 0.91, indicating moderate variability in perceptions within countries, which reflected heterogeneity in school contexts, resource availability, and individual experiences with CBC implementation.

The findings from Table 1 illuminated the multidimensional nature of financial barriers impeding CBC implementation and demonstrated that cost-related constraints operated as systemic rather than isolated challenges across the African continent. The particularly high ratings for technology integration costs (M = 4.41) aligned with theoretical expectations, as competency-based approaches typically required digital resources, internet connectivity, and technological infrastructure that remained scarce in many African educational settings. This finding resonated with existing literature documenting the digital divide in African education systems, where even basic technological tools such as computers, projectors, and reliable electricity were unavailable in substantial proportions of schools, particularly in rural areas. The elevated concern regarding learning materials and resources (M = 4.35) reflected the pedagogical shift inherent in CBC from teacher-centered instruction relying primarily on textbooks to learner-centered approaches requiring diverse manipulatives, reference materials, laboratory equipment, and hands-on learning tools. The traditional model of education delivery in Africa had been relatively cost-efficient precisely because it minimized resource requirements beyond basic textbooks and classroom space; the transition to CBC fundamentally disrupted this cost structure by demanding substantially increased per-learner investment in varied learning resources. The significant country-level variations, despite the overall pattern of high barrier ratings, suggested that national economic contexts, education budget allocations, and political commitment to reform implementation mediated the severity of financial constraints. South Africa's comparatively lower barrier ratings, despite still indicating substantial challenges (overall M = 3.84), reflected the country's greater fiscal capacity and more developed educational infrastructure, though even this relatively advantaged context faced considerable implementation obstacles. Conversely, Nigeria's

highest ratings across most categories (overall M = 4.39) occurred despite being Africa's largest economy, suggesting that aggregate economic indicators did not automatically translate into adequate educational resource allocation, and that factors such as population size, competing development priorities, governance challenges, and educational budget execution affected implementation capacity. The consistent identification of financial barriers across all participating countries, regardless of their diverse economic profiles and implementation stages, indicated that CBC models developed primarily in high-income contexts required substantial adaptation to become financially sustainable in resource-constrained African environments, and that implementation strategies needed to prioritize cost-effectiveness, local resource utilization, and phased implementation approaches rather than attempting comprehensive, resource-intensive reforms simultaneously across all educational dimensions.

Table 2: Prevalence and Severity of Systemic Deficits as Barriers to CBC Implementation

Systemic Deficit Domain	% Reporting as Major/Extreme Barrier	Mean (SD)	Urban M (SD)	Rural M (SD)	t-statistic	p-value	Cohen's d
Teacher Pedagogical Capacity	78.3%	4.18 (0.88)	3.95 (0.91)	4.38 (0.79)	-8.42	<.001	0.50
Pre-service Teacher Preparation	71.5%	3.98 (0.95)	3.76 (0.98)	4.17 (0.88)	-7.31	<.001	0.44
Administrative Support Systems	68.9%	3.89 (0.97)	3.64 (1.01)	4.11 (0.88)	-8.15	<.001	0.49
Monitoring & Evaluation Mechanisms	74.2%	4.05 (0.91)	3.82 (0.95)	4.25 (0.83)	-7.98	<.001	0.48
Quality Assurance Capacity	69.7%	3.92 (0.93)	3.70 (0.97)	4.11 (0.85)	-7.44	<.001	0.45
Stakeholder Engagement Structures	64.8%	3.76 (1.02)	3.58 (1.06)	3.92 (0.96)	-5.63	<.001	0.34
Parental & Community Involvement	66.2%	3.81 (1.00)	3.55 (1.05)	4.04 (0.89)	-8.24	<.001	0.49
Leadership Capacity for Change	70.4%	3.96 (0.96)	3.73 (1.00)	4.16 (0.87)	-7.57	<.001	0.46
Resource Allocation Mechanisms	76.1%	4.11 (0.89)	3.88 (0.93)	4.31 (0.80)	-8.18	<.001	0.49
Policy-Practice Alignment	72.8%	4.01 (0.92)	3.79 (0.96)	4.20 (0.84)	-7.52	<.001	0.45
Overall Systemic Deficits	**71.3%**	**3.97 (0.78)**	**3.74 (0.82)**	**4.17 (0.70)**	**-9.26**	**<.001**	**0.56**

Note: Ratings on 5-point Likert scale (1 = Not a barrier, 5 = Extreme barrier); N = 1,847; Cohen's d = standardized mean difference

The descriptive analysis revealed that systemic deficits represented pervasive barriers to CBC implementation, with 71.3% of respondents rating the overall systemic challenges as major or extreme barriers, and an overall mean of 3.97 (SD = 0.78) indicating consistently high concern across all measured domains. Independent samples t-tests demonstrated statistically significant urban-rural disparities across all ten systemic deficit domains (all $p < .001$), with Cohen's d effect sizes ranging from 0.34 to 0.56, indicating small to medium practical significance. Rural schools consistently reported significantly higher systemic barriers compared to urban schools, with the overall rural mean of 4.17 (SD = 0.70) substantially exceeding the urban mean of 3.74 (SD = 0.82), yielding a moderate effect size (d = 0.56) that suggested meaningful practical differences in implementation contexts. Teacher pedagogical capacity emerged as the most severe systemic deficit (M = 4.18, SD = 0.88), with 78.3% of respondents identifying this as a major or extreme barrier, and the urban-rural gap was particularly pronounced (d = 0.50). Resource allocation mechanisms constituted the second most severe systemic challenge (M = 4.11, SD = 0.89; 76.1% prevalence), followed by monitoring and evaluation mechanisms (M = 4.05, SD = 0.91; 74.2% prevalence). Stakeholder engagement structures represented the comparatively least severe systemic deficit (M = 3.76, SD = 1.02; 64.8% prevalence), though even this "lowest" rating still indicated substantial barriers to implementation. The standard deviations across systemic deficit domains (ranging from 0.78 to 1.02) suggested moderate to considerable variability in individual perceptions, which was expected given the heterogeneity in institutional contexts, leadership quality, and local implementation support across the 1,847 respondents.

The findings in Table 2 revealed that systemic deficits operated as fundamental structural barriers that transcended mere resource availability and reflected deeper institutional weaknesses within African education systems. The identification of teacher pedagogical capacity as the most severe systemic deficit (78.3% prevalence; M = 4.18) was particularly significant because it highlighted that even when financial resources became available, the human capacity to effectively implement competency-based approaches

remained inadequate. This finding suggested that many African teachers, having been educated and trained in traditional teacher-centered, content-focused systems, lacked the pedagogical repertoire necessary for facilitating learner-centered, competency-focused instruction that characterized CBC. The substantial urban-rural disparity in teacher capacity (d = 0.50) illuminated how systemic inequities compounded implementation challenges, with rural teachers facing more limited access to professional development opportunities, peer learning networks, mentorship support, and exposure to innovative pedagogical practices. This geographic inequality threatened to exacerbate existing educational disparities, as learners in already disadvantaged rural communities encountered teachers least equipped to implement the pedagogical innovations central to CBC. The high ratings for resource allocation mechanisms as a systemic barrier (76.1% prevalence; M = 4.11) indicated that even when national education budgets included provisions for CBC implementation, the translation of these allocations into actual resources reaching schools and classrooms was impeded by bureaucratic inefficiencies, corruption, unclear guidelines, and weak financial management systems at decentralized levels.

The prominence of monitoring and evaluation mechanisms as a systemic deficit (74.2% prevalence; M = 4.05) revealed critical weaknesses in implementation support structures that would enable identification of challenges, provision of targeted assistance, and continuous improvement of CBC practices. Effective CBC implementation required robust feedback loops through which education authorities could track implementation fidelity, identify struggling schools and teachers, understand context-specific obstacles, and adjust support accordingly; the absence of such mechanisms meant that implementation proceeded without adequate guidance, quality assurance, or responsive problem-solving. The substantial but comparatively moderate concern regarding stakeholder engagement structures (64.8% prevalence; M = 3.76) suggested recognition that successful educational transformation required active participation from parents, communities, learners, and other stakeholders, yet formal mechanisms for meaningful engagement remained underdeveloped in many contexts. The consistent pattern of significantly higher systemic barriers in rural compared to urban contexts (overall d = 0.56) represented perhaps the most troubling finding, as it indicated that CBC implementation was creating or reinforcing a two-tiered education system where urban schools with better infrastructure, more qualified teachers, stronger administrative support, and greater stakeholder capacity could meaningfully attempt CBC implementation, while rural schools lacked the fundamental systemic prerequisites for success. This urban-rural implementation gap had profound equity implications, as rural populations, who already faced socioeconomic disadvantages, were being further marginalized through an educational reform that their local schools could not effectively implement. The overall pattern of findings suggested that addressing systemic deficits required comprehensive, long-term institutional strengthening efforts that extended far beyond the typical focus on curriculum documents and teacher training workshops to encompass fundamental reforms in teacher education systems, educational governance structures, quality assurance mechanisms, and stakeholder participation frameworks.

Table 3: Correlation Matrix and Multiple Regression Analysis Predicting CBC Implementation Effectiveness

Variables	1	2	3	4	5	6	7
1. Implementation Effectiveness	-						
2. Financial Barriers	-.58***	-					
3. Systemic Deficits	-.64***	.71***	-				
4. Teacher Training Adequacy	.52***	-.49***	-.56***	-			
5. Administrative Support	.48***	-.43***	-.61***	.54***	-		
6. Resource Availability	.55***	-.67***	-.52***	.47***	.49***	-	
7. Years Since CBC Adoption	.23***	-.18***	-.21***	.28***	.25***	.19***	-

*Note: N = 1,847; ***p* < .001*

Multiple Regression Results Predicting Implementation Effectiveness

Predictor Variable	B	SE	β	t	p	VIF
Constant	4.87	0.23	-	21.17	<.001	-
Financial Barriers	-0.28	0.04	-.26***	-7.18	<.001	2.34
Systemic Deficits	-0.36	0.04	-.32***	-8.92	<.001	2.51
Teacher Training Adequacy	0.22	0.03	.21***	7.33	<.001	1.87
Administrative Support	0.15	0.03	.14***	5.01	<.001	1.93
Resource Availability	0.24	0.03	.23***	8.00	<.001	2.12
Years Since CBC Adoption	0.08	0.02	.09***	4.00	<.001	1.15

Model Summary: $R^2 = .587$, Adjusted $R^2 = .586$, $F(6, 1840) = 437.23$, $p < .001$

The Pearson correlation analysis revealed strong and statistically significant bivariate relationships among all variables examined (all p < .001). Implementation effectiveness demonstrated substantial negative correlations with both financial barriers (r = -.58) and systemic deficits (r = -.64), indicating that higher levels of these barriers were associated with significantly poorer implementation

outcomes. The correlation between financial barriers and systemic deficits was notably strong (r = .71), suggesting considerable overlap or reciprocal influence between these two categories of implementation obstacles. Implementation effectiveness showed positive correlations with teacher training adequacy (r = .52), administrative support (r = .48), resource availability (r = .55), and years since CBC adoption (r = .23), indicating that these factors were associated with better implementation outcomes. The multiple regression model predicting implementation effectiveness was statistically significant ($F(6, 1840) = 437.23$, $p < .001$) and explained 58.7% of the variance ($R^2 = .587$), representing a large effect according to Cohen's conventions. All six predictor variables contributed significantly and uniquely to implementation effectiveness (all $p < .001$). Systemic deficits emerged as the strongest predictor ($\beta = -.32$), followed by financial barriers ($\beta = -.26$), resource availability ($\beta = .23$), teacher training adequacy ($\beta = .21$), administrative support ($\beta = .14$), and years since CBC adoption ($\beta = .09$). The negative beta coefficients for financial barriers and systemic deficits confirmed that increases in these barriers predicted decreases in implementation effectiveness, while the positive coefficients for the remaining predictors indicated that improvements in these areas predicted enhanced implementation. Variance inflation factors (VIF) ranged from 1.15 to 2.51, all well below the conventional threshold of 10, indicating that multicollinearity did not substantially compromise the regression estimates despite the moderate to strong intercorrelations among predictor variables.

The correlation and regression analyses provided robust quantitative evidence that both financial barriers and systemic deficits operated as significant impediments to effective CBC implementation, with systemic deficits exerting a slightly stronger independent effect ($\beta = -.32$) compared to financial barriers ($\beta = -.26$) when accounting for other implementation factors. This finding challenged simplistic narratives that attributed implementation failures primarily to resource scarcity and highlighted that institutional capacity, organizational structures, and human capital represented equally or more critical determinants of implementation success. The very strong correlation between financial barriers and systemic deficits (r = .71) suggested these constructs were empirically intertwined, reflecting a reality where resource constraints both resulted from and contributed to systemic weaknesses; for instance, inadequate teacher training systems (a systemic deficit) increased the costs of remedial professional development (a financial barrier), while insufficient education budgets (a financial constraint) prevented development of robust quality assurance mechanisms (a systemic deficit). Despite this substantial correlation, the regression analysis demonstrated that both constructs retained significant independent predictive power, justifying their conceptualization as distinct though related categories of implementation barriers. The model's substantial explanatory power ($R^2 = .587$) indicated that the selected variables captured major determinants of implementation effectiveness, though the remaining 41.3% of unexplained variance suggested additional factors—potentially including political will, cultural contexts, community dynamics, or implementation strategies—also influenced outcomes.

The positive predictors in the regression model illuminated pathways through which implementation effectiveness could be enhanced despite the presence of barriers. Resource availability emerged as a particularly strong facilitator ($\beta = .23$), confirming that tangible investments in learning materials, infrastructure, and tools translated meaningfully into improved implementation, even when broader financial constraints persisted. This finding suggested that strategic, targeted resource allocation—focusing on high-impact inputs rather than attempting comprehensive provision—could meaningfully advance implementation even in resource-constrained contexts. Teacher training adequacy ($\beta = .21$) represented another substantial facilitator, reinforcing the critical importance of adequately preparing educators for the pedagogical shifts required by CBC; this effect operated independently of broader systemic deficits, suggesting that focused interventions to strengthen teacher capacity could yield implementation gains even when broader institutional weaknesses remained unaddressed. The modest but significant effect of years since CBC adoption ($\beta = .09$) indicated a learning curve phenomenon where implementation gradually improved over time, likely reflecting growing teacher familiarity, accumulation of contextual adaptations, development of support materials, and resolution of initial implementation challenges. However, the relatively small magnitude of this temporal effect suggested that time alone was insufficient to overcome implementation barriers, and that without deliberate efforts to address financial and systemic obstacles, implementation quality would remain suboptimal even years after policy adoption. The pattern of findings underscored the multidimensional nature of the implementation challenge and the necessity of comprehensive strategies that simultaneously addressed resource provision, capacity building, institutional strengthening, and sustained support over extended timeframes rather than expecting any single intervention to catalyze successful implementation.

Table 4: Structural Equation Model Path Coefficients Linking Barriers to Implementation Gap

Hypothesized Path	Standardized Coefficient (β)	SE	z	p	95% CI
Direct Effects					
Financial Barriers → Implementation Gap	.31	.04	7.75	<.001	[.23, .39]
Systemic Deficits → Implementation Gap	.38	.04	9.50	<.001	[.30, .46]
Financial Barriers → Systemic Deficits	.72	.03	24.00	<.001	[.66, .78]
Teacher Capacity → Implementation Gap	-.24	.03	-8.00	<.001	[-.30, -.18]

Resource Context → Financial Barriers	-.56	.04	-14.00	<.001	[-.64, -.48]
Resource Context → Systemic Deficits	-.28	.04	-7.00	<.001	[-.36, -.20]
Institutional Capacity → Systemic Deficits	-.65	.03	-21.67	<.001	[-.71, -.59]
Indirect Effects					
Financial Barriers → Systemic Deficits → Implementation Gap	.27	.03	9.00	<.001	[.21, .33]
Resource Context → Financial Barriers → Implementation Gap	-.17	.02	-8.50	<.001	[-.21, -.13]
Resource Context → Systemic Deficits → Implementation Gap	-.11	.02	-5.50	<.001	[-.15, -.07]
Institutional Capacity → Systemic Deficits → Implementation Gap	-.25	.03	-8.33	<.001	[-.31, -.19]
Total Effects					
Financial Barriers → Implementation Gap (Total)	.58	.04	14.50	<.001	[.50, .66]
Systemic Deficits → Implementation Gap (Total)	.38	.04	9.50	<.001	[.30, .46]

Model Fit Indices: $\chi^2(124) = 287.36$, $p < .001$; CFI = .968; TLI = .961; RMSEA = .027 (90% CI: .023-.031); SRMR = .034
Note: N = 1,847; Implementation Gap coded such that higher scores indicate greater gap (poorer implementation)

The structural equation model demonstrated excellent fit to the observed data across all evaluated indices: the Comparative Fit Index (CFI = .968) and Tucker-Lewis Index (TLI = .961) both substantially exceeded the conventional threshold of .95, indicating that the hypothesized model accounted for 96-97% of the covariation among observed variables. The Root Mean Square Error of Approximation (RMSEA = .027, 90% CI: .023-.031) was well below the .06 cutoff for good fit, and the Standardized Root Mean Square Residual (SRMR = .034) was substantially below the .08 threshold, collectively indicating that the model accurately represented the underlying relationships in the data. While the chi-square test was statistically significant ($\chi^2(124) = 287.36$, $p < .001$), this was expected given the large sample size (N = 1,847) and did not indicate poor model fit, as chi-square is highly sensitive to sample size. All hypothesized direct paths were statistically significant (all $p < .001$) with standardized coefficients ranging from -.65 to .72 in absolute value, indicating substantial effect magnitudes. The direct effect of systemic deficits on the implementation gap ($\beta = .38$) slightly exceeded the direct effect of financial barriers ($\beta = .31$), though both represented substantial influences. The path from financial barriers to systemic deficits was particularly strong ($\beta = .72$), indicating that financial constraints substantially exacerbated systemic weaknesses. Resource context exerted a substantial negative effect on financial barriers ($\beta = -.56$), indicating that better-resourced national contexts experienced fewer financial obstacles to implementation. Institutional capacity strongly predicted lower systemic deficits ($\beta = -.65$), confirming the critical role of pre-existing institutional strength in mediating implementation challenges.

The indirect effects revealed important mediating pathways through which barriers influenced implementation outcomes. Financial barriers influenced the implementation gap not only directly ($\beta = .31$) but also indirectly through their effect on systemic deficits ($\beta = .27$), resulting in a total effect of .58 that substantially exceeded the direct effect alone. This mediation pattern indicated that financial constraints operated both as immediate obstacles (e.g., lack of materials directly impeding teaching) and as upstream factors that degraded systemic capacity (e.g., insufficient funding preventing development of monitoring systems), which subsequently impeded implementation. Resource context influenced the implementation gap entirely through indirect pathways, with no direct path specified in the model; its total indirect effect (-.28, calculated by summing the two indirect pathways shown) indicated that national resource availability influenced implementation primarily by shaping the severity of financial barriers and systemic deficits rather than through direct mechanisms. Similarly, institutional capacity influenced implementation gap entirely through its effect on systemic deficits ($\beta = -.25$ indirect effect), confirming that strong pre-existing institutions facilitated implementation by building robust implementation support systems rather than through unmediated pathways.

The structural equation modeling results provided sophisticated insights into the complex causal architecture linking financial barriers, systemic deficits, and implementation outcomes, revealing that the implementation gap resulted from both direct barrier effects and indirect effects mediated through interconnections among barrier categories. The finding that systemic deficits exerted a slightly stronger direct effect on implementation gap ($\beta = .38$) compared to financial barriers ($\beta = .31$) reinforced the regression findings and provided additional support for the argument that institutional capacity, human capital, and organizational structures represented critical—not merely supplementary—determinants of implementation success. However, when considering total effects including indirect pathways, financial barriers emerged as the stronger overall influence ($\beta = .58$ total effect) because they operated both directly and by exacerbating systemic deficits. This pattern suggested that addressing financial constraints could yield

compounding benefits by simultaneously removing direct obstacles and enabling strengthening of systemic capacities, whereas addressing systemic deficits in isolation (without alleviating financial pressures) might prove more challenging. The exceptionally strong path from financial barriers to systemic deficits (β = .72) was particularly illuminating, as it quantified the extent to which resource scarcity undermined institutional capacity; chronic underfunding prevented education systems from investing in teacher training infrastructure, quality assurance mechanisms, monitoring systems, and administrative capacity that constituted the systemic foundations for effective implementation.

The mediating pathways identified in the model carried important implications for intervention design and resource allocation. The substantial indirect effect of financial barriers through systemic deficits (β = .27) indicated that approximately 47% of the total effect of financial barriers on implementation gap was mediated through their degradation of systemic capacity (indirect effect of .27 divided by total effect of .58). This mediation suggested that short-term financial injections without sustained investment to build systemic capacity would yield limited long-term implementation improvements, as the absence of robust systems would prevent effective utilization of even temporarily available resources. Conversely, the finding that resource context influenced implementation entirely through indirect pathways (total indirect effect = -.28) indicated that national wealth or education budgets translated into implementation success primarily by enabling adequate resource provision and institutional development rather than through other mechanisms; this underscored that the pathway from national resources to classroom implementation required deliberate policy choices to allocate resources toward implementation priorities rather than occurring automatically. The complete mediation of institutional capacity's effect through systemic deficits (β = -.25) suggested that countries or regions with stronger pre-existing educational institutions experienced implementation advantages specifically because these institutions enabled more effective monitoring, support, quality assurance, and adaptation during implementation. The excellent model fit statistics provided confidence that the hypothesized causal structure accurately represented the data-generating processes, though the cross-sectional nature of the data precluded definitive causal inferences. The model's ability to explain substantial variance in implementation gap while achieving excellent fit indices validated the theoretical framework positioning prohibitive costs and systemic deficits as central mechanisms producing the policy-practice gap in CBC implementation, and highlighted the necessity of comprehensive intervention approaches that simultaneously addressed resource provision, institutional strengthening, and capacity building to bridge the implementation gap effectively.

Conclusion

This study investigated the prohibitive costs and systemic deficits that constituted barriers to effective competency-based curriculum implementation in African education systems, examining their nature, prevalence, interrelationships, and impacts on the implementation gap between policy aspirations and classroom realities. Addressing the first specific objective, the findings revealed that financial barriers represented substantial obstacles across all six participating countries (overall M = 4.20), with technology integration costs (M = 4.41), learning materials and resources (M = 4.35), and infrastructure development (M = 4.28) emerging as the most prohibitive cost categories, though significant cross-country variations reflected differing economic contexts and resource allocation priorities. Regarding the second specific objective, systemic deficits were found to be pervasive and severe, with 71.3% of respondents identifying overall systemic challenges as major or extreme barriers; teacher pedagogical capacity (78.3% prevalence; M = 4.18), resource allocation mechanisms (76.1% prevalence; M = 4.11), and monitoring and evaluation systems (74.2% prevalence; M = 4.05) constituted the most critical systemic weaknesses, and rural schools experienced significantly more severe systemic barriers than urban schools across all domains (d = 0.56). The multiple regression analysis demonstrated that both financial barriers (β = -.26) and systemic deficits (β = -.32) independently predicted implementation effectiveness, collectively explaining 58.7% of variance, with systemic deficits exerting slightly stronger effects, while positive predictors including resource availability (β = .23), teacher training adequacy (β = .21), and administrative support (β = .14) identified pathways for enhancing implementation. The structural equation modeling results revealed complex causal pathways whereby financial barriers influenced implementation gap both directly (β = .31) and indirectly through exacerbating systemic deficits (β = .27, mediated effect), resulting in a substantial total effect (β = .58), while systemic deficits exerted direct effects (β = .38) on implementation outcomes; importantly, financial barriers strongly predicted systemic deficits (β = .72), indicating that resource scarcity fundamentally degraded institutional capacity, and contextual factors including national resource context and institutional capacity influenced implementation entirely through their effects on these barrier categories. Addressing the third specific objective regarding contextually appropriate strategies, the findings suggested that bridging the implementation gap required comprehensive, multi-pronged approaches that simultaneously addressed resource provision through strategic, targeted allocation prioritizing high-impact inputs; systemic strengthening through substantial investment in teacher education systems, quality assurance mechanisms, and administrative capacity; phased implementation strategies that acknowledged resource constraints and built capacity incrementally; enhanced stakeholder engagement to mobilize community resources and support; and sustained political commitment with adequate long-term financing rather than short-term interventions. The study concluded that the implementation gap in African CBC initiatives resulted from the intersection of prohibitive costs and systemic deficits operating as mutually reinforcing barriers, that these obstacles were particularly severe in rural contexts thereby threatening to exacerbate educational inequalities, and that successful implementation required moving beyond superficial curriculum document reforms toward fundamental transformation of resource allocation, institutional capacity, and implementation support structures sustained over extended timeframes.

Recommendations

Establish Phased, Prioritized Implementation Frameworks with Differentiated Resource Allocation: African governments and education authorities should abandon comprehensive, simultaneous implementation approaches in favor of strategic, phased models that prioritize high-impact, cost-effective interventions and acknowledge resource constraints. Implementation frameworks should differentiate resource allocation based on contextual readiness, focusing initial investments on foundational prerequisites including teacher pedagogical capacity development, essential learning materials, and basic infrastructure before advancing to resource-intensive components such as comprehensive technology integration.

Develop Comprehensive National Systems for Sustained Teacher Capacity Building and Institutional Strengthening: Addressing the most critical systemic deficit requires transforming teacher education and professional development from fragmented, one-time workshops to comprehensive, sustained capacity-building systems embedded within education infrastructure. This recommendation encompasses reforming pre-service teacher education programs to incorporate competency-based pedagogies, practical teaching experiences, and assessment literacy; establishing national or regional teacher development centers providing ongoing professional learning opportunities, resource libraries, and demonstration classrooms; implementing structured mentorship and coaching systems connecting experienced CBC practitioners with teachers requiring support; and creating teacher learning communities and professional networks facilitating peer collaboration, lesson study, and collective problem-solving.

Implement Equity-Focused Resource Mobilization and Allocation Strategies Addressing Urban-Rural Disparities: The substantial urban-rural implementation gaps identified in this study demand deliberate equity-focused policies ensuring that CBC implementation does not exacerbate existing educational inequalities. Governments should adopt differentiated funding formulas providing enhanced per-learner allocations to rural and disadvantaged schools to compensate for contextual challenges and higher implementation costs, establish dedicated rural education infrastructure funds addressing basic prerequisites including classroom facilities, water and sanitation, electricity, and connectivity before expecting advanced CBC implementation, and create incentive structures including salary premiums, housing support, and career advancement opportunities attracting and retaining qualified teachers in rural areas.

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