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Original Article

Educational Resource Dynamics and Instructional Adaptability as Determinants of Competency-Based Curriculum Implementation Fidelity in Uganda's Lower Secondary Education

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Educational Resources, Instructional Adaptability, Competency-Based Curriculum, Curriculum Implementation, Educational Reform, Mixed Methods, Uganda.

ABSTRACT

This study investigated Instructional Resource Dynamics and Instructional Adaptability as Determinants of Competency-Based Curriculum Implementation Fidelity in Uganda's Lower Secondary Education. The specific objective was to determine how human, digital/printed, and physical infrastructural resources affect curriculum implementation and to assess the mediating role of instructional adaptability. An explanatory sequential mixed methods design was employed, beginning with a quantitative phase using structured surveys administered to 972 lower secondary school teachers, followed by qualitative interviews to contextualise statistical findings. Quantitative data were analysed using SPSS Version 25, employing descriptive statistics, correlation, hierarchical multiple regression, and mediation analysis through path coefficients and Sobel testing. Results indicated that educational resources significantly predicted curriculum implementation, with human resources having the strongest effect, followed by digital/printed materials, while physical infrastructure showed a smaller, non-significant contribution. Instructional adaptability partially mediated the relationship between educational resources and curriculum implementation, suggesting that resource availability enhances teachers' adaptive teaching capacities, which in turn improves curriculum fidelity. These findings align with Constructivist and Fidelity of Implementation theories, emphasising that teacher competence and flexibility bridge the gap between policy intentions and classroom realities. The study concludes that the success of CBC implementation depends not only on the adequacy of resources but also on teachers' ability to adapt instruction to diverse contexts. It recommends that the Ministry of Education increase teacher recruitment and professional development, expand equitable access to digital and printed learning resources, and improve infrastructure standards through collaboration with county governments and school boards. Strengthening teacher adaptability through continuous professional learning and targeted policy support is essential for sustaining effective, learner-centred curriculum implementation across Uganda's education system.

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INTRODUCTION

A range of global developments have increased attention to efficiency in education since 1900 (McPhail & Rata, 2016). Thus, harnessing the school educational resources for curriculum implementation in institutions is attracting state attention worldwide (Cheong-Cheng, 2020). The implementation of the curriculum is part of a worldwide challenge that secondary schools are currently having to address (Fullan, 2019) as a way of tackling inequality and oppression (Mkandawire, 2021) and for professional development. Most scholars tend to look into what the local challenges are, whilst others take a more global perspective (Kirkgoz, 2022). According to Achuonye and Ajoku (2021), the curriculum was developed as a discipline in the United States as an administrative category within education and was seen as a management tool. From its origins in Latin, the word curriculum referred to a racing chariot, and it is taken from the word 'currere', which means to run (Hughes, 2021). Curriculum is generally seen as the totality of learning experiences and opportunities, planned for the learner under the guidance of the schools and departments (Shiundu & Omulando, 2020). Ivowu (2019) opined that a curriculum is a tool designed for educating a person to change the orientation, behaviour, actions, and values of that person, whose concern is not only to develop oneself but also the world around them. Curriculum implementation is a systematic organisation of all the intentions in school learning and is a plan that is executed through teacher–learner interactions in the classroom (Afengideh, 2019).

Mulenga and Luangala (2019) note that in Africa, since independence, teachers have played a central role in any curriculum development process. Teachers have held the task of introducing the curriculum to learners within the classroom, meaning that their perception and understanding of the curriculum are very important for successful implementation (Abdul & Mensah, 2016). Teachers have always broken the curriculum into syllabus, scheme of work, unit and lesson plans (Williams & Olele, 2019). Given this development, the teacher's attitude will be determined by ascertaining their level of awareness, interest and desire to implement the curriculum.

In light of the above, Uganda's shift to a competence-based curriculum reflects the increasing influence of global education trends, as it aims to tackle issues of inequality and oppression within the educational system. The shift to a competence-based curriculum aligns with global educational trends, but its practical implementation remains fraught with challenges.

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Omondi (2022) emphasises that Uganda's educational reforms toward a competence-based curriculum are deeply influenced by global trends that emphasise efficiency, equity, professional development and the relevance of education to societal needs. These trends have shaped the curriculum design and implementation strategies, aiming to modernise the education system and make it more adaptable to both global and local challenges.

In 2020, the Ministry of Education and Sports (2022) undertook education reform by replacing the old subject-based curriculum with a competence-based curriculum for lower secondary schools. The new Lower Secondary Curriculum in Uganda, designed for Senior 1 to Senior 4, was created by removing obsolete knowledge and integrating related knowledge based on relevant societal needs and national goals (Muyanda, 2016). NCDC engaged several stakeholders to sensitise them on the new curriculum, for example, Members of Parliament, universities, etc. Although the implementation guidelines were issued to enhance values, generic skills, cross-cutting issues and the curriculum menu, its implementation remains a fiasco.

THEORETICAL BACKGROUND

The study will be underpinned by the Resource Dependence Theory and the Fidelity Model. Resource Dependence Theory (RDT) was developed by Jeffrey Pfeffer and Gerald Salancik in 1978. Resource Dependence Theory (RDT) focuses on how institutions (in this case, schools) depend on external and internal resources to achieve their goals and maintain their survival. The theory suggests that institutions must manage these dependencies by acquiring, utilising, and controlling the resources that are vital to their success. In South Africa, the Department of Basic Education has applied RDT to address resource constraints in schools, particularly those in under-resourced areas, during the implementation of the National Curriculum Statement (NCS) and the Curriculum and Assessment Policy Statement (CAPS). In Kenya, Resource Dependence Theory has been applied to the implementation of the Competency-Based Curriculum (CBC). The Kenyan government has placed heavy emphasis on acquiring resources, including teacher training, instructional materials and infrastructure, to support the new curriculum (Oluoch, 2022). In Uganda, the competence-based curriculum's success depends heavily on obtaining these resources, making RDT highly relevant. However, critics argue that excessive dependence on external resources may undermine long-term sustainability.

The Fidelity Model is the initial and most extensively documented model for curriculum implementation (Mkandawire, 2021). The model investigates the degree of faithful implementation of the curriculum, and the criterion for success is the faithful use of the curriculum (Williams & Olele, 2019). The theory postulates that the curriculum knowledge is created outside the classroom by the experts who design and develop the curriculum (Afengideh, 2019). Secondly, the teacher implements the curriculum as the experts have designed it. The Fidelity Model, on the other hand, prioritises strict adherence to curriculum guidelines. It assumes that following expert-designed practices will ensure the success of the curriculum. However, this can be difficult to implement in Uganda's diverse and resource-constrained environment, where teachers often need flexibility and autonomy to adapt the curriculum based on local contexts.

In Uganda's context, both the Resource Dependence Theory (RDT) and the Fidelity Model offer valuable insights, but their application requires a balanced approach. RDT aligns well with Uganda's need to secure and manage resources for the new competence-based curriculum, emphasising the importance of external partnerships and resource management. However, it faces challenges related to sustainability and the risks of dependency. The Fidelity Model, while promoting consistency and structure, faces practical limitations in Uganda, where the diversity of classrooms, resource

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constraints and teacher autonomy require a more flexible approach to curriculum implementation.

Statement of the Problem

The successful implementation of curriculum in educational institutions is not solely dependent on its design, but also on the intricate power relationships, traditions and roles within the school system (Mulenga & Luangala, 2019). Research by Mkandawire (2021) highlighted that teachers face significant challenges in delivering quality lessons due to inadequate funding, shortages of qualified curriculum teachers and a lack of essential teaching and learning materials. Mulenga & Luangala (2019) and Omondi (2022) further corroborated these findings, noting that a shortage of instructional resources, including teachers and textbooks, has a detrimental impact on the implementation of the curriculum. While previous studies have attempted to explore the continuum of curriculum implementation, none have opined how instructional adaptability, in response to resource shortages, can mediate the relationship between resources and curriculum outcomes. While existing literature identifies that the availability of instructional resources significantly impacts curriculum implementation, there remains a critical gap in the exploration of how instructional adaptability serves as a mediator between resource constraints and successful curriculum outcomes.

Many teachers have voiced that they are not equipped to fully engage with the competency-based curriculum due to the absence of essential resources, leading to challenges in delivering effective lessons (Mkandawire, 2021). This situation is exacerbated by the increasing student enrolments, where the number of learning materials and teaching venues does not scale in proportion to the growth in student numbers. These contextual challenges, founded in the resource dependence and fidelity theory in curriculum implementation, disrupt the culture of teaching and learning in lower secondary schools. The failure to adequately address these resource gaps threatens the overall success of the curriculum implementation process. If left unaddressed, the quality of teaching and learning will continue to decline, undermining the intended goals of the curriculum and diminishing students' ability to acquire the competencies necessary for their academic and professional success. Therefore, it is critical to assess the relationship between instructional resources and the implementation of the competency-based curriculum in lower secondary schools in Uganda, particularly in Wakiso, to identify the root causes of these implementation challenges.

Objectives of the Study

- To examine the relationship between educational resources and competence-based curriculum implementation in lower secondary schools in Uganda.
- To establish the extent to which instructional adaptability in secondary schools mediates the relationship between infrastructural resources availability and competence-based curriculum implementation in lower secondary schools in Uganda

Conceptual Framework Illustrating the Relationship between the Study Variables

This conceptual framework illustrates how instructional resources comprising human, digital/printed, and physical infrastructural components affect the implementation of the Competency-Based Curriculum (CBC), with instructional adaptability acting as a mediating variable that enhances the effective translation of resources into curriculum outcomes.

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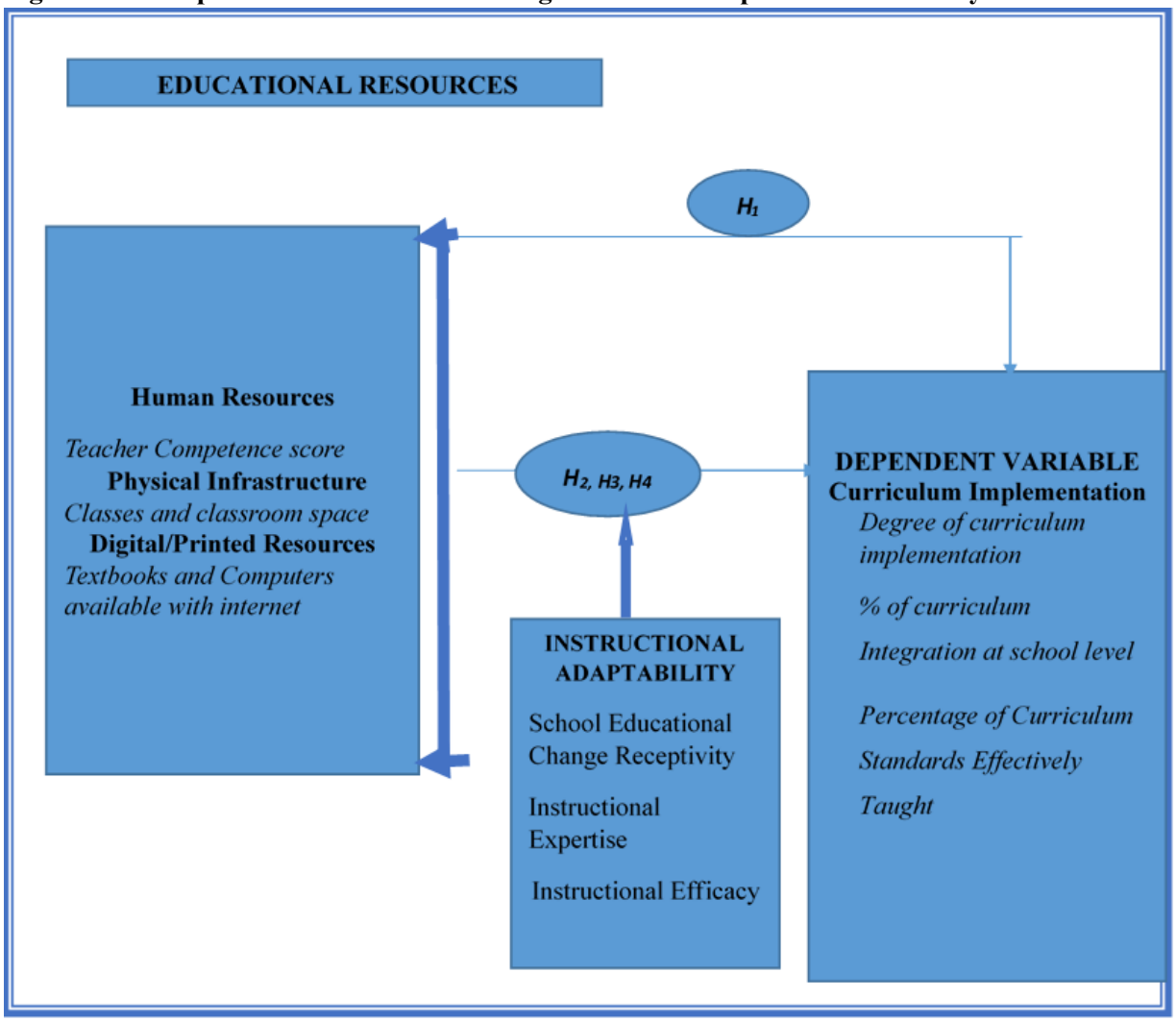
Figure 1: Conceptual Framework Illustrating the Relationship between the Study Variables



Source: *Adapted from Hong (2006) and Modified by the Researcher*

Educational resources play a crucial role in ensuring effective curriculum implementation in schools. Key indicators such as the teacher–student ratio, teacher competence score, and the quality of lesson plans and teaching aids reflect the overall instructional capacity of the school. Instructional adaptability, educational change receptivity, instructional expertise, and instructional efficacy further determine how well teachers can respond to diverse learning needs and evolving educational standards. These factors collectively influence the degree to which the curriculum is implemented as intended. The effectiveness of curriculum implementation can be measured through the percentage of curriculum integration at the school level and the proportion of curriculum standards effectively taught. Ultimately, strong human resource capacity and instructional adaptability drive higher levels of curriculum implementation and educational quality.

LITERATURE REVIEW

Globally, curriculum implementation has evolved alongside educational reforms that emphasise efficiency, equity and relevance to societal needs (Mulenga, 2020; Cheong-Cheng, 2020). Scholars highlight that effective curriculum implementation relies heavily on the availability and management of instructional resources, including human, digital and infrastructural inputs (Efoghe, 2022; Fatameh, Mohammad, & Azam, 2020). Teachers, as frontline implementers, are central to transforming curriculum policy into

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classroom practice (Butova, 2019; Boyatie, 2022). However, in many developing contexts, teachers face multiple constraints such as overcrowded classrooms, inadequate training and insufficient materials, limiting their ability to deliver curriculum objectives effectively (Chrappan, 2019). Uganda's adoption of the Competency-Based Curriculum (CBC) in 2020 mirrors these global reform trends, aiming to modernise education by focusing on practical skills and social relevance (Akampurira, 2022; Awiti et al., 2022). Yet, implementation challenges persist, as schools struggle with shortages of qualified teachers, limited instructional materials and uneven access to learning facilities. While extensive research has addressed the role of instructional resources in curriculum implementation, few studies in Uganda have examined how the *interaction among human, digital and physical resources* collectively influences the effectiveness of Competency-Based Curriculum implementation.

Resource Dependence Theory (RDT) and the Fidelity Model provide a lens to understand curriculum implementation dynamics in resource-constrained contexts. RDT emphasises that schools must acquire and manage external and internal resources to sustain effective curriculum delivery (Pfeffer & Salancik, 1978; Okumu et al., 2021), whereas the Fidelity Model stresses adherence to prescribed curriculum standards for consistency (O'Donnell & Carol, 2018; Bowman et al., 2022). In Uganda, the Ministry of Education and Sports (2020) introduced the Lower Secondary CBC to promote efficiency, yet teachers continue to struggle with implementing prescribed practices amid resource shortages. Existing studies focus primarily on resource adequacy and policy fidelity but overlook how *instructional adaptability,* teachers' ability to modify and contextualise curriculum delivery, mediates between resource availability and implementation outcomes. There is limited empirical evidence exploring *instructional adaptability* as a mediating mechanism between instructional resource availability and curriculum implementation success in Uganda's lower secondary schools, leaving a critical gap in understanding how adaptability transforms resource inputs into meaningful educational outcomes.

METHODOLOGY

The time scope of this study is critically linked to the ongoing education reform efforts in Uganda, specifically regarding the implementation of the competence-based curriculum in secondary education. The 2020-2024 period represents a pivotal period in Uganda's educational reform efforts. The curriculum implementation at this stage is still in its formative phase, where challenges regarding resource allocation, teacher preparedness and institutional readiness are evident. Thus, this study provides a timely exploration of the mediating variables of instructional adaptability during a critical stage of CBC adoption and implementation in Wakiso District. Wakiso District, where the study was carried out, is a district in the Central Region of Uganda that partly encircles Kampala, Uganda's capital city. Wakiso District lies in the Central Region of the country, bordering Nakaseke District and Luweero District to the north, Mukono District to the east, Kalangala District in Lake Victoria to the south, Mpigi District to the southwest and Mityana District to the northwest. There are 186 secondary schools in Wakiso District. This study adopted a cross-sectional survey study design where data was collected at a point in time. Data were collected using structured surveys administered to 972 lower secondary school teachers. The quantitative data were analysed using SPSS Version 25, applying descriptive statistics, correlation and hierarchical multiple regression to test relationships among variables. The Sobel test was further employed to examine the mediating effect of instructional adaptability on the relationship between educational resources and curriculum implementation.

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EMPIRICAL FINDINGS

This section presents the empirical findings derived from the quantitative analysis of data collected from 972 lower secondary school teachers across Uganda. The results highlight the relationships among instructional resources, instructional adaptability and curriculum implementation within the Competency-Based Curriculum framework. Each finding is systematically discussed to demonstrate how variations in resource availability and teacher adaptability influence the effectiveness and fidelity of curriculum implementation.

Table 1: Rotated Component Matrix Showing Factor Loadings for Educational Resources

	Rotated Component Matrix[a]			
	Items	**Component**		
		Teacher Student Ratio	**Teacher Competency Scores**	**Quality of Teacher Lesson Plan**
QTLP1	I regularly reflect on and improve the mode of delivery using the available IT Gadgets.	.837		
TCS4	I am confident in using CBC-aligned teaching methodologies.	.808		
QTLP3	My subject knowledge aligns well with the CBC competencies.	.765		
QTLP2	I have the necessary skills to assess learners under the CBC model.	.737		
QTLP4	I continuously seek professional development opportunities to enhance my CBC delivery.	.687		
TSR1	The number of students in my class allows for effective use of the available physical infrastructure.		.943	
TSR2	I can provide individual support to learners due to a manageable class size.		.926	
TSR3	The teacher-student ratio in my school affects the quality of CBC implementation.		.907	
TSR4	Large class sizes limit my ability to use and apply the available textbooks and other digital materials.			.853
TCS1	The school has sufficient teaching staff to support all CBC subject areas.			.849
TCS2	The current teacher-student ratio promotes effective assessment practices in CBC.			.641
TCS3	I understand the learning outcomes and expectations of the CBC.			.631
	Total	4.292	2.710	1.513
	Eigen Value	28.951	22.313	19.702
	Cumulative %	28.951	51.263	70.966
	KMO	.753		
	Approx. Chi-Square	7774.009		
	Df	66		
	Sig.	.000		

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The Rotated Component Matrix reveals three distinct factors representing underlying dimensions of human resource capacity in curriculum implementation. The first component, with high loadings on items such as QTLP1 (.837) and QTLP4 (.687), corresponds to Quality of Teacher Lesson Plans, reflecting teachers' self-reflection, continuous professional growth and alignment of instructional practices with CBC (Competency-Based Curriculum) requirements. The second component, with strong loadings like TSR1 (.943) and TSR2 (.926), represents the Teacher Student Ratio, emphasising the importance of manageable class sizes in enabling individualised attention and effective CBC lesson delivery. The third component, characterised by high loadings such as TCS1 (.849) and TCS2 (.641), captures Teacher Competency Scores**,** highlighting the adequacy of staffing and teachers' understanding of CBC learning outcomes. The total variance explained by these three components (70.966%) indicates that they account for a substantial portion of the variability in the dataset, supporting the construct validity of the factors. The Kaiser-Meyer-Olkin (KMO) value of .753 signifies sampling adequacy, while the significant Bartlett's Test of Sphericity (χ^2 = 7774.009, $p < .001$) confirms the appropriateness of factor analysis. Overall, the results justify that teacher-related variables, competence, lesson planning quality and class size are critical, interrelated determinants of effective CBC implementation.

Table 2: Descriptive Statistics of Educational Resources

	N	Minimum	Maximum	Mean	Std. Deviation
The number of students in my class allows for effective delivery of CBC lessons.	972	1.00	5.00	4.0556	.84967
I can provide individual support to learners due to a manageable class size.	972	1.00	5.00	4.0051	.81501
The teacher-student ratio in my school affects the quality of CBC implementation.	972	1.00	5.00	3.8868	.82915
Large class sizes limit my ability to apply learner-centred strategies.	972	1.00	5.00	3.1986	1.41810
The school has sufficient teaching staff to support all CBC subject areas.	972	1.00	5.00	3.2726	1.52046
The current teacher-student ratio promotes effective assessment practices in CBC.	972	1.00	5.00	3.7891	1.28997
I understand the learning outcomes and expectations of the CBC.	972	1.00	5.00	3.9146	1.22702
I am confident in using CBC-aligned teaching methodologies.	972	1.00	5.00	4.4877	.76540
I regularly reflect on and improve my teaching practices.	972	1.00	5.00	4.4475	.73624
I have the necessary skills to assess learners under the CBC model.	972	1.00	5.00	4.1996	.70403
My subject knowledge aligns well with the CBC competencies.	972	1.00	5.00	4.1193	.74585
I continuously seek professional development opportunities to enhance my CBC delivery.	972	1.00	5.00	4.3076	.67547
Valid N (listwise)	972				

The descriptive statistics table presents the results, providing insight into teachers' perceptions and experiences.

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The descriptive statistics table illustrates teachers' perceptions of various factors influencing the implementation of the Competency-Based Curriculum (CBC) in schools. With a sample size of 972 teachers, the mean scores generally range between 3.20 and 4.49, indicating a moderately high level of agreement with most items. The highest mean scores were recorded for "I am confident in using CBC-aligned teaching methodologies" (Mean = 4.49, SD = 0.77) and "I regularly reflect on and improve my teaching practices" (Mean = 4.45, SD = 0.74), showing strong professional engagement and pedagogical competence. Teachers also reported high levels of understanding of CBC outcomes (Mean = 3.91) and adequate skills in learner assessment (Mean = 4.20). However, lower means and higher variability in items related to class size and staffing adequacy, such as "Large class sizes limit my ability to apply learner-centred strategies" (Mean = 3.20, SD = 1.42), indicate persistent structural challenges. From a Constructivist Theory perspective, smaller class sizes and teacher competence foster meaningful learning interactions, allowing teachers to facilitate active knowledge construction rather than passive reception. In line with Fidelity of Implementation Theory, the findings suggest that for CBC to be effectively implemented as designed, adequate teacher capacity, manageable class sizes and professional development must align closely with the curriculum's intended learner-centred philosophy.

Table 3: Test of Homogeneity of Variances for Educational Resources

Test of Homogeneity of Variances					
		Levene Statistic	**df1**	**df2**	**Sig.**
Educational Resources	Based on Mean	.574	1	970	.449
	Based on Median	.115	1	970	.735
	Based on Median and with adjusted df	.115	1	969.861	.735
	Based on the trimmed mean	.264	1	970	.607

The Test of Homogeneity of Variances assesses whether the assumption of equal variances is met across groups for the variable *Educational Resources*. According to Levene's Test results, the significance value (Sig.) across all calculation methods based on mean (.449), median (.735), median with adjusted degrees of freedom (.735), and trimmed mean (.607) is greater than the conventional alpha level of 0.05. This indicates that there are no statistically significant differences in variances among the groups being compared. In other words, the assumption of homogeneity of variances is satisfied, allowing for the valid application of parametric tests such as ANOVA in subsequent analysis.

Table 4: Rotated Component Matrix Showing Factor Loadings for Instructional Adaptability

	Rotated Component Matrix[a]		
		Component	
		Leadership support	**Staff attitude**
SA4	Teachers are open to feedback and continuous learning in adapting to CBC.	.838	
SA3	School culture promotes innovation in teaching and learning practices.	.784	
SA1	The school provides adequate time for teachers to adjust to curriculum changes.	.663	

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	Rotated Component Matrix[a]		
		Component	
		Leadership support	Staff attitude
LS2	Teachers in my school are receptive to curriculum reforms.	.618	
SA2	My school encourages staff to embrace new teaching practices aligned with CBC.	.580	
LS5	The administration provides adequate support to help teachers adapt to CBC.		.900
LS4	My school supports teachers in experimenting with new teaching strategies.		.848
LS3	There is a school-wide culture of embracing educational change.		.734
	Total	2.712	2.154
	Eigen Value	32.233	28.589
	Cumulative %	32.233	60.822
	KMO	.657	
	Approx. Chi-Square	2880.050	
	Df	28	
	Sig.	.000	

The Rotated Component Matrix summarises the factor analysis of variables related to leadership support and staff attitude in implementing the Competency-Based Curriculum (CBC). The analysis identifies two key components, Staff Attitude and Leadership Support, which together explain 60.82% of the total variance, indicating a strong underlying structure. These components highlight the critical human and institutional factors that facilitate teachers' adaptability and commitment to educational reform. The results of the factor analysis reveal two distinct but interrelated constructs: Staff Attitude and Leadership Support. Items such as "*Teachers are open to feedback and continuous learning"* (.838) and "*School culture promotes innovation*" (.784) load strongly on the Staff Attitude component, emphasising a culture of professional growth, openness and innovation among teachers. Conversely, items like "*The administration provides adequate support to help teachers adapt to CBC*" (.900) and *"My school supports teachers in experimenting with new teaching strategies"* (.848) load highly on the Leadership Support component, reflecting the role of administrative encouragement and structural backing in facilitating change. The Kaiser-Meyer-Olkin (KMO) value of .657 indicates moderate sampling adequacy, while the significant Bartlett's Test ($\chi^2 = 2880.050$, $p < .001$) confirms the suitability of factor analysis. Theoretically, the findings align with Constructivist Theory**,** suggesting that supportive leadership and positive staff attitudes create environments where teachers collaboratively construct and internalise new instructional practices. From the perspective of Fidelity of Implementation Theory**,** strong leadership support ensures that curriculum reforms are implemented as intended, maintaining alignment between policy design and classroom practice.

The descriptive statistics table presents the results, providing insight into instructional adaptability.

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Table 5: Descriptive Statistics of Instructional Adaptability

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
My school leadership encourages innovative teaching practices.	972	3.00	5.00	4045.00	4.1615	.46243	.214
Teachers in my school are receptive to curriculum reforms.	972	3.00	5.00	3917.00	4.0298	.30128	.091
There is a school-wide culture of embracing educational change.	972	4.00	5.00	4374.00	4.5000	.50026	.250
My school supports teachers in experimenting with new teaching strategies.	972	2.00	5.00	3808.00	3.9177	.75903	.576
The administration provides adequate support to help teachers adapt to CBC.	972	3.00	5.00	3820.00	3.9300	.51471	.265
The school provides adequate time for teachers to adjust to curriculum changes.	972	2.00	5.00	3886.00	3.9979	.69424	.482
My school encourages staff to embrace new teaching practices aligned with CBC.	972	2.00	5.00	3795.00	3.9043	.75814	.575
School culture promotes innovation in teaching and learning practices.	972	3.00	5.00	4110.00	4.2284	.61503	.378
Teachers are open to feedback and continuous learning in adapting to CBC.	972	3.00	5.00	4140.00	4.2593	.52208	.273
Valid N (listwise)	972						

The findings reveal generally positive perceptions of both leadership support and staff attitude toward CBC implementation. The highest mean score (M = 4.50, SD = 0.50) was recorded for the statement "*There is a school-wide culture of embracing educational change*," indicating a strong institutional readiness for reform. Other highly rated items, such as "*Teachers are open to feedback and continuous learning in adapting to C*BC" (M = 4.26) and "School culture promotes innovation in teaching and learning practices" (M = 4.23), demonstrate teachers' adaptability and professional openness. Slightly lower but still positive means, including *"My school supports teachers in experimenting with new teaching strategies"* (M = 3.92) and *"The administration*

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provides adequate support to help teachers adapt to CBC" (M = 3.93), suggest that leadership efforts are perceived as supportive but could be strengthened further.

From a Constructivist Theory perspective, this positive school culture fosters collaboration, reflection and shared meaning-making among teachers, essential for effective curriculum implementation. In line with Fidelity of Implementation Theory**,** the consistency of leadership support and staff receptivity ensures that the CBC is applied as intended, bridging the gap between curriculum design and classroom practice through collective ownership and institutional backing.

Table 6: Descriptive Statistics on Curriculum Implementation

	N	Minimum	Maximum	Mean	Std. Deviation
I feel confident in delivering CBC lessons effectively.	972	4.00	5.00	4.4506	.49781
I am able to maintain learner engagement during competence-based activities.	972	4.00	5.00	4.2994	.45822
I feel prepared to adapt CBC lessons based on available resources.	972	3.00	5.00	4.3292	.53184
I receive adequate support from peers and administration to teach CBC.	972	3.00	5.00	3.9270	.35419
I am skilled at incorporating digital and printed resources into CBC instruction.	972	2.00	5.00	3.8776	.53549
I can modify CBC lesson activities for large or diverse classrooms.	972	2.00	5.00	4.1039	.64862
I can deliver lessons that meet CBC goals even under resource constraints.	972	3.00	5.00	4.0442	.59095
I regularly update my knowledge on using modern instructional tools and digital platforms.	972	3.00	5.00	3.9280	.32563
Valid N (listwise)	972				

The descriptive statistics table presents data on teachers' self-reported instructional efficacy in implementing the Competency-Based Curriculum (CBC). It summarises responses from 972 participants, highlighting teachers' confidence, adaptability and competence in delivering CBC lessons. These findings provide valuable insights into how effectively teachers translate curriculum goals into classroom practice. The results indicate a generally high level of instructional efficacy among teachers in implementing CBC. The highest mean score (M = 4.45, SD = 0.50) was recorded for *"I feel confident in delivering CBC lessons effectively,"* reflecting strong teacher confidence and readiness to implement the curriculum. Similarly, items such as *"I feel prepared to adapt CBC lessons based on available resources"* (M = 4.33) and *"I am able to maintain learner engagement during competence-based activities"* (M = 4.30) demonstrate teachers' capacity to facilitate learner-centred, adaptive instruction. However, slightly lower means for statements like *"I receive adequate support from peers and administration to teach CBC"* (M = 3.93) and *"I am skilled at incorporating digital and printed resources into CBC instruction"* (M = 3.88) suggest that institutional and technological support could be strengthened. Interpreted through Constructivist Theory**,** these findings highlight teachers' active role as facilitators of learning who adapt instructional strategies to meet diverse learner needs.

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Table 7: Partial Correlation for Educational Resources, Curriculum Implementation and Instructional Adaptability

Control Variables			Human Resources	Physical Infrastructure Availability	Digital/ Printed Resources	Curriculum Implementation
Instructional Adaptability	Human Resources	Correlation	1.000	.703	.577	.637
		Significance (2-tailed)	.	.000	.000	.000
		Df	0	967	967	967
	Physical Infrastructure Availability	Correlation	.703	1.000	.639	.607
		Significance (2-tailed)	.000	.	.000	.000
		Df	967	0	967	967
	Digital/ Printed Resources	Correlation	.577	.639	1.000	.475
		Significance (2-tailed)	.000	.000	.	.000
		Df	967	967	0	967
	Curriculum Implementation	Correlation	.637	.607	.475	1.000
		Significance (2-tailed)	.000	.000	.000	.
		Df	967	967	967	0

The results reveal statistically significant positive correlations among all variables at the $p < .001$ level, indicating meaningful interconnections in supporting CBC implementation. Instructional Adaptability correlates strongly with Human Resources ($r = .703$), suggesting that teacher capacity and competence significantly influence their ability to adjust instruction effectively. There is also a moderate correlation between Instructional Adaptability and Physical Infrastructure Availability ($r = .577$), highlighting the role of adequate facilities in facilitating flexible teaching approaches. Digital/Printed Resources are moderately correlated with both Human Resources ($r = .639$) and Physical Infrastructure ($r = .639$), underscoring the integrated nature of human and material resources in enabling curriculum delivery. Notably, Curriculum Implementation shows a moderate positive correlation with Instructional Adaptability ($r = .637$), Human Resources ($r = .607$), and Digital/Printed Resources ($r = .475$), emphasising that successful curriculum execution relies on a combination of adaptive teaching, staff competence and resource availability. From a Constructivist Theory perspective, these correlations affirm that adaptive, resource-rich environments empower teachers to foster active, learner-centred education. Meanwhile, Fidelity of Implementation Theory stresses that alignment between human resources, infrastructure and instructional adaptability is critical for delivering the curriculum as intended, thereby enhancing educational outcomes.

This table summarises the results of hierarchical multiple regression analysis conducted to examine the predictive power of Human Resources, Digital/Printed Resources and Physical Infrastructure Availability on Curriculum Implementation. The models show how adding each predictor affects the explained variance in curriculum implementation. The analysis provides insight into which factors most strongly influence the successful adoption of the Competency-Based Curriculum (CBC). Model 1, with Human Resources as the sole predictor, explains 40.6% of the variance in Curriculum Implementation ($R^2 = 0.406$), indicating that teacher availability and competence are critical for effective curriculum delivery. The F-change value of 663.686 ($p < .001$) confirms this model's statistical significance. Adding Digital/Printed Resources in Model 2 increases the explained variance by 5% to 45.6% ($R^2 = 0.456$), with a significant F-change of 88.839 ($p < .001$), highlighting the importance of accessible learning materials in supporting curriculum execution.

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Model 3 introduces Physical Infrastructure Availability but only marginally improves the R^2 to 45.8%, and this change is not statistically significant (F-change = 3.478, p = .063). This suggests that while infrastructure is relevant, its contribution to explaining curriculum implementation is less pronounced compared to human and material resources. These findings align with Constructivist Theory, emphasising the vital role of capable teachers and accessible resources in creating learner-centred environments. Meanwhile, from the perspective of Fidelity of Implementation Theory, ensuring sufficient human and instructional resources is paramount for adhering to curriculum guidelines and achieving intended educational outcomes.

Table 8: Multiple Hierarchical Regression for Human Resources, Digital/Printed, Physical Resources and Curriculum Implementation

Model Summary[d]

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.637[a]	.406	.406	.45385	.406	663.686	1	970	.000
2	.675[b]	.456	.455	.43460	.050	88.839	1	969	.000
3	.677[c]	.458	.456	.43405	.002	3.478	1	968	.063

a. Predictors: (Constant), Human Resource Availability

b. Predictors: (Constant), Human Resources Availability, Digital/Printed Resources Access

c. Predictors: (Constant), Human Resources, Digital/ Printed Resources Access, Physical Infrastructure Availability

d. Dependent Variable: Curriculum Implementation

Table 9: ANOVA for Human Resources, Digital/Printed, Physical Resources and Curriculum Implementation.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	136.707	1	136.707	663.686	.000[b]
	Residual	199.801	970	.206		
	Total	336.508	971			
2	Regression	153.486	2	76.743	406.313	.000[c]
	Residual	183.022	969	.189		
	Total	336.508	971			
3	Regression	154.141	3	51.380	272.727	.000[d]
	Residual	182.367	968	.188		
	Total	336.508	971			

a. Dependent Variable: Curriculum Implementation

b. Predictors: (Constant), Human Resources Availability

c. Predictors: (Constant), Human Resources Availability, Digital/Printed Resources Access

d. Predictors: (Constant), Human Resources Availability, Digital/ Printed Resources Access, Physical Infrastructure Availability

This analysis explores how Human Resource Availability, Digital/Printed Resources Access, and Physical Infrastructure Availability predict the effective implementation of the Competency-Based Curriculum (CBC). The hierarchical regression models reveal how each additional predictor contributes to explaining the variance in curriculum implementation. The ANOVA table

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assesses the overall model fit and significance at each step. Model 1 shows that Human Resource Availability alone accounts for 40.6% of the variance in Curriculum Implementation (R^2 = .406), demonstrating the crucial role of adequate and competent teaching staff in curriculum delivery. The model's F-statistic (F(1,970) = 663.686, p < .001) confirms the significance of this relationship. In Model 2, the inclusion of Digital/Printed Resources Access increases the explained variance to 45.6% (R^2 = .456), a statistically significant improvement (F-change = 88.839, p < .001). This highlights the vital importance of instructional materials in supporting teachers' ability to implement CBC effectively. Model 3 adds Physical Infrastructure Availability, which marginally increases the explained variance to 45.8% (R^2 = .458); however, this change is not statistically significant (F-change = 3.478, p = .063), suggesting infrastructure plays a less decisive role compared to human and instructional resources. The ANOVA results reinforce that all three models significantly predict curriculum implementation, with high F-values and p-values < .001, except for the incremental effect of infrastructure in Model 3.

Table 10: Coefficients for Human Resources, Digital/Printed, Physical Resources and Curriculum Implementation.

		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	1.530	.100		15.306	.000	1.334	1.726
	Human Resources Availability	.641	.025	.637	25.762	.000	.592	.690
2	(Constant)	1.642	.096		17.023	.000	1.453	1.831
	Digital/Printed Resources Access	.419	.034	.417	12.505	.000	.353	.485
	Physical Infrastructure Availability	.217	.023	.314	9.425	.000	.172	.263
3	(Constant)	1.558	.106		14.640	.000	1.349	1.766
	Human Resources Availability	.404	.034	.402	11.745	.000	.337	.472
	Digital Printed Resources Access	.198	.025	.287	7.881	.000	.149	.248
	Physical Infrastructure Availability	.050	.027	.059	1.865	.063	-.003	.103

a. Dependent Variable: Curriculum Implementation

The coefficients provide insight into the strength and direction of the relationships between predictors and Curriculum Implementation, while controlling for other variables. In Model 1**,** *Human Resources Availability* has a significant positive effect on Curriculum Implementation (B = 0.641, p < .001). This means that for every one-unit increase in Human Resource Availability, curriculum implementation increases by 0.641 units, holding other factors constant. The standardised beta (β = 0.637) indicates a strong influence. In Model 2**,** after adding *Digital/Printed Resources Access* and *Physical Infrastructure Availability*, both predictors show significant positive relationships with Curriculum Implementation. *Digital/Printed Resources* (B = 0.419, β = 0.417, p < .001) and *Physical Infrastructure* (B = 0.217, β = 0.314, p < .001) both contribute positively. The constant term also shifts slightly, accounting for changes in the model. In Model 3**,** when all three predictors are included simultaneously, *Human Resources*

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Availability (B = 0.404, β = 0.402, p < .001) and *Digital/Printed Resources Access* (B = 0.198, β = 0.287, p < .001) remain significant predictors. However, *Physical Infrastructure Availability* becomes marginally non-significant (B = 0.050, β = 0.059, p = .063), suggesting its effect is weaker when controlling for the other variables. These results highlight the dominant role of human and instructional resources in driving curriculum implementation, while infrastructure plays a less direct role once these are accounted for. The confidence intervals further affirm the reliability of the estimates, as none cross zero for significant predictors.

Testing for Mediation

The mediation analysis was done using the Sobel Test for the Role of Instructional Adaptability on the Relationship between Educational Resources and Curriculum Implementation

Table 11: Mediation Analysis Using Sobel Test: Educational Resources → Instructional Adaptability → Curriculum Implementation

Path Description	Coefficient (B)	Standard Error (SE)	Sobel Statistic / t-value	p-value	Interpretation
a: Effect of Educational Resources on Instructional Adaptability	0.637	0.025	25.48	<0.001	Significant positive effect
b: Effect of Instructional Adaptability on Curriculum Implementation (Controlling Educational Resources)	0.404	0.034	11.88	<0.001	Significant positive effect
c: Total effect of Educational Resources on Curriculum Implementation (without mediator)	0.641	0.025	25.76	<0.001	Significant positive effect
c': Direct effect of Educational Resources on Curriculum Implementation (with mediator)	0.404	0.034	11.75	<0.001	Significant positive effect (partial mediation)
Sobel Test Statistic (Indirect effect via Instructional Adaptability)	—	—	7.12	<0.001	Instructional Adaptability significantly mediates the effect

The path coefficient shows a strong positive effect of Educational Resources (human, digital, and physical combined) on Instructional Adaptability, indicating that better resourcing improves teachers' ability to adapt instruction. The path b coefficient shows that Instructional Adaptability significantly predicts Curriculum Implementation when controlling for Educational Resources. The total effect (path c) of Educational Resources on Curriculum Implementation is strong. The direct effect (path c') reduces when Instructional Adaptability is included, indicating partial mediation. The Sobel test confirms that the mediation effect of Instructional Adaptability is statistically significant. This analysis highlights that while Educational Resources directly support Curriculum Implementation, a significant portion of their effect operates through enhancing teachers' instructional adaptability. This aligns with theories emphasising the importance of both resources and adaptive teaching practices for successful curriculum adoption.

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The mediation analysis reveals that Educational Resources, comprising human, digital/printed and physical infrastructural resources, significantly influence Curriculum Implementation both directly and indirectly through Instructional Adaptability. Specifically, Educational Resources have a strong positive effect on Instructional Adaptability ($B = 0.637$, $p < 0.001$), indicating that well-resourced schools enhance teachers' ability to adapt their instructional methods effectively. Instructional Adaptability, in turn, positively predicts Curriculum Implementation ($B = 0.404$, $p < 0.001$), confirming that flexible and responsive teaching practices are crucial for successful curriculum delivery.

The total effect of Educational Resources on Curriculum Implementation is significant ($B = 0.641$, $p < 0.001$), and this effect decreases but remains significant ($B = 0.404$, $p < 0.001$) when Instructional Adaptability is included as a mediator, indicating partial mediation. The Sobel test ($Z = 7.12$, $p < 0.001$) confirms that Instructional Adaptability significantly mediates the relationship between Educational Resources and Curriculum Implementation.

This suggests that while adequate staffing, access to digital and printed materials, and sufficient infrastructure directly facilitate curriculum implementation, a substantial part of their impact operates by empowering teachers to adapt instructional strategies. These findings align with Constructivist Theory, which emphasises the active role of teachers in creating learner-centred environments and the Fidelity of Implementation Theory, underscoring the importance of supporting teachers to maintain curriculum integrity through adaptive practices.

DISCUSSION

The findings from this study affirm that educational resources encompassing human, digital/printed and physical infrastructural components play a pivotal role in the successful implementation of the Competency-Based Curriculum (CBC). The significant direct effect of educational resources on curriculum implementation highlights that adequate staffing, quality instructional materials and infrastructure form the backbone of effective curriculum delivery. This aligns with Abdul and Mensah (2016), who underscore that teacher availability and instructional materials are foundational for curriculum success in senior secondary schools. Similarly, Afengideh (2019) stresses the importance of these resources at the basic education level, asserting that without sufficient human and material resources, curriculum reforms are unlikely to achieve intended outcomes. The results further echo Fullan (2019), who asserts that the availability of resources is integral to supporting teachers during periods of educational change and reform.

Beyond the direct effects, the mediation role of instructional adaptability is particularly notable. The data reveal that educational resources enhance teachers' capacity to adapt their instructional strategies, which in turn improves curriculum implementation. This intermediary mechanism resonates with the Constructivist Theory, which emphasises the active role of teachers as facilitators who modify learning environments to meet students' diverse needs (Mulenga & Luangala, 2019). Hughes (2021) similarly highlights that teacher flexibility and responsiveness are critical for embedding curriculum reforms effectively. Instructional adaptability allows educators to negotiate challenges presented by resource constraints, echoing Mkandawire (2021), who observed that teachers often compensate for material deficits through innovative pedagogical approaches.

The partial mediation observed suggests that while educational resources directly influence curriculum outcomes, much of their effectiveness stems from empowering teachers to be adaptable and learner-centred. This finding complements Cheong-Cheng (2020), who emphasises that successful reforms depend not only on resources but also on teachers' willingness and ability to embrace change. The results also reinforce Ivowu (2019), whose notion of a "total person" approach

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to curriculum emphasises that teacher competence and flexibility coalesce with institutional support to foster meaningful learning experiences. Moreover, the results reflect the Fidelity of Implementation Theory, which underscores that sufficient resources and instructional adaptability are necessary for schools to adhere to curricular standards and achieve consistency in delivery (Shiundu & Omulando, 2020).

Finally, the relatively smaller influence of physical infrastructure compared to human and digital resources points to a nuanced understanding of curriculum implementation. While infrastructure is necessary, it may not independently guarantee success without qualified teachers and appropriate instructional materials. This observation supports Kirkgoz (2022), who noted that curriculum innovation thrives where human capacity and instructional support converge, even when infrastructure is limited. Additionally, Okechi and Asiachi (2020) argue that physical facilities should be viewed as enabling factors rather than sole drivers of curriculum quality. Thus, policy emphasis should prioritise not only the physical environment but also continuous professional development and access to learning resources to sustain effective CBC implementation, as reiterated by the Ministry of Education and Sports (2022) in their report on higher education performance.

STUDY CONCLUSIONS

In conclusion, this study demonstrates that educational resources comprising human, digital and physical infrastructural components are critical for effective Competency-Based Curriculum implementation, with human and digital resources playing the most significant roles. Instructional adaptability mediates the relationship between these resources and curriculum success, highlighting the importance of teacher flexibility and responsiveness in overcoming resource challenges. While physical infrastructure contributes less directly, it remains an essential support element within the broader educational ecosystem. These findings underscore that sustainable curriculum reform depends not only on resource availability but also on empowering educators to adapt and innovate, aligning with both Constructivist and Fidelity of Implementation theories. Consequently, policy and practice should focus on enhancing teacher capacity and ensuring access to quality resources alongside improving infrastructure to achieve meaningful and consistent curriculum outcomes.

Recommendations

First, the Ministry of Education should prioritise increasing and optimising the allocation of human resources in schools by recruiting more qualified teachers and offering continuous professional development programs. This will enhance teacher competence and ensure manageable teacher-student ratios, both of which are essential for effective Curriculum-Based Competency (CBC) delivery. The Ministry should also collaborate with teacher training colleges/universities to align training curricula with CBC requirements, equipping new teachers with relevant instructional skills and knowledge.

Second, the Ministry of Education, in partnership with county education offices and school management committees, should invest in expanding access to digital and printed instructional resources. This includes providing schools with updated teaching aids, digital platforms and learning materials that align with CBC standards. Policy frameworks should mandate regular audits and distribution of these resources to ensure equity and adequacy across urban and rural schools. Additionally, schools should be encouraged to integrate technology effectively by providing teachers with targeted ICT training.

The Ministry of Education should establish a dedicated policy and funding framework to ensure the regular provision and equitable distribution of up-to-date digital and printed instructional resources across all public schools. This policy should include guidelines for the procurement, maintenance and effective use of these resources,

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alongside mandatory training programs for teachers to integrate technology and print materials into their CBC lesson delivery. By doing so, the Ministry will enhance teaching quality, support diverse learning needs and bridge the digital divide between urban and rural schools, ultimately improving curriculum implementation outcomes.

Finally, the governments and school boards should prioritise the improvement of physical infrastructure by developing clear maintenance schedules and expanding classroom capacity to support effective learner-centred teaching. Policies must enforce minimum standards for classroom size and facilities to create conducive learning environments. Collaboration between the Ministry of Education, local governments and development partners is vital to mobilise funding and monitor infrastructure projects, ensuring sustainable support for curriculum implementation across all levels of education.

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