



INFLUENCE OF HEADTEACHERS' MANAGEMENT OF PHYSICAL INFRASTRUCTURE ON ATTAINING CBE-SET GOALS AMONG JUNIOR SCHOOL LEARNERS IN KAJIADO CENTRAL SUB-COUNTY, KENYA

Catherine Siimoi Metekai,

Paul Maithya,

Mwaura Kimaniⁱ

Maasai Mara University,

School of Education,

Narok, Kenya

Abstract:

This study examined the influence of Headteachers' Management of physical infrastructure on the attainment of CBE set goals among Grade Seven learners in junior schools in Kajiado Central Sub-County of Kenya. A descriptive survey design was adopted, integrating quantitative and qualitative approaches. The target population comprised 3,640 learners, 520 teachers, and 104 headteachers, from which a sample of 360 learners, 226 teachers, and 11 headteachers was drawn using Yamane's formula and purposive sampling. Data were collected using questionnaires, observation checklists, headteacher interviews and document analysis of KPSEA records. Quantitative data were analyzed using descriptive statistics, while qualitative data were thematically analyzed and triangulated with quantitative results. Observation checklist results revealed disparities in infrastructure: while 61.1% of schools had adequate classrooms, 38.9% experienced overcrowding. Only 55.6% had science laboratories and ICT devices, and 61.1% had adequate play materials. Document analysis indicated that KPSEA mean scores averaged 251.67, with attendance rates at 85% and retention rates at 89%, though some schools recorded attendance as low as 75%. These disparities were strongly linked to resource availability. The study concluded that CBE goal attainment in Kajiado Central Sub-County is shaped by physical infrastructure, learning materials, and teacher qualifications. The study recommends increased investment in school physical infrastructure, particularly classrooms, sanitation, and ICT and science facilities, to address overcrowding and resource constraints.

Keywords: headteachers' management, physical infrastructure, CBE, junior school, Kajiado

ⁱ Correspondence: email katesiimoi9@gmail.com, winnienduko367@gmail.com

1. Introduction

Education systems worldwide are adapting to rapid transformations to gain global relevance in the 21st century, increasingly emphasizing competency-based learning. Curricular reforms aim to develop learners with the capabilities to use critical thinking and problem-solving techniques and exhibit creativity and lifelong learning (UNESCO, 2020). These reforms depend on appropriate and well-utilized educational resources to support the regularization of the curriculum. Significant investment in school infrastructure, learning technologies, teacher training, and instructional resources has made fantastic strides in improving student outcomes and realizing education goals in developed countries like Finland and Canada (Schleicher, 2018).

In the Kenyan context, Competency-Based Education (CBE) was introduced in 2017 by the Kenya Institute of Curriculum Development (KICD) as a shift from the 8-4-4 education system, which consisted of eight years of primary education, four years of secondary education, and four years of university education. The CBE has seven core competency areas: communication and collaboration, critical thinking, creativity and imagination, citizenship, digital literacy, learning to learn, and self-efficacy (KICD, 2020). Realizing these goals will depend on enough human, physical, and instructional resources. The Ministry of Education (2022) highlights the need for Infrastructure, appropriate instructional materials, and well-trained teachers as key to the successful implementation of CBE. According to Mulatya, Muna and Kipchumba (2024), some junior schools in disadvantaged and semi-arid areas have non-existent laboratory facilities, textbook shortages, and limited digital resources.

In Kajiado Central Sub-County, most junior schools are in rural and pastoralist areas where accessing school resources becomes challenging. According to the Education – County Government of Kajiado (2017), some schools are temporarily housed, have insufficient sanitation, and lack digital tools and libraries. Few trained teachers can teach using CBE pedagogy, and the supply of science equipment is either lacking or underutilized. Kajiado County Directorate of Education (2022) found that infrastructure and instructional gaps have continuously been regarded as key setbacks to equitable educational outcomes in the Sub-County. These circumstances cast doubt on the extent to which the CBE goals have been achieved in such settings. This study intends to investigate the extent to which CBE goals in junior schools in Kajiado Central Sub-County are facilitated or hindered by the availability and utilization of school resources, namely physical infrastructure.

2. Objective of the Study

- To determine the influence of Headteachers' Management of physical infrastructure on attaining CBE-set goals among Junior School Learners in Kajiado Central Sub-County, Kenya.

2.1 Research Question

- How does Headteachers' Management of physical infrastructure influence the attainment of CBE-set goals among Junior School Learners in Kajiado Central Sub-County, Kenya?

3. Literature Review

3.1 Influence of Headteachers' Management of Physical Infrastructure on Attaining CBE-Set Goals

Physical infrastructure — classrooms, laboratories, sanitation facilities, electricity, water, and digital spaces — constitutes the physical resource base on which CBE activities depend. The headteacher's management of this infrastructure, through planning, maintenance scheduling, allocation of learning spaces, and accountability for physical assets, determines whether available facilities actually support competency-based learning.

Globally, physical infrastructure has become a major determinant of effective delivery of competency-based curricula. The OECD (2019) notes that modern classroom designs incorporating natural light, movable furniture, and soundproofing support collaboration, creativity, and experiential learning. In Canada and Finland, infrastructure planning closely accompanies curriculum development, and Schleicher (2018), drawing on comparative case studies, found that learner-centred classrooms motivated students and facilitated active pedagogies among teachers. These findings underline that infrastructure contributes to CBE outcomes only when it is deliberately planned and managed around pedagogical intentions — a school-level leadership function.

At the continental level, infrastructure inadequacy forms a persistent obstacle to CBE implementation in sub-Saharan Africa. Bashir et al. (2018), through a mixed-methods cross-country study of 300 schools in fifteen African countries, reported overcrowded classrooms, poor sanitation, and absent electricity in most primary schools. Extending this evidence into East Africa, Mulatya et al. (2024), in a quasi-experimental study in Kenya, Tanzania, and Uganda, found a 27% difference in cognitive learning outcomes in favour of well-infrastructure schools. The consistency of these findings across designs strengthens the inference that infrastructure quality is causally linked to learning outcomes, while also raising the question of why schools with similar funding levels differ in facility condition — a question that points toward school-level management.

In Kenya, national evidence validates this trend. Keter (2023), in a descriptive survey of one hundred junior schools in Bomet Central Sub-County, found that over 80% lacked specialised science rooms, sanitation units, and ICT infrastructure, preventing CBE activities such as project-based learning. Similarly, Too, Kipkoech and Keter (2024), using a correlational design in Baringo County, reported a positive correlation ($r = 0.62$) between CBE-aligned infrastructure and learner competence acquisition. These studies treat infrastructure largely as an input variable, however, and give limited attention to

how headteachers' planning, maintenance, and supervision practices mediate the condition and utilisation of facilities.

At the local level, the Kajiado County Directorate of Education (2022) reported, through a full infrastructure audit applying census methodology to every public school in the area, that not less than 70% of junior schools in Kajiado Central Sub-County operated in semi-permanent buildings without electricity, piped water, or sufficient latrines, and lacked CBE-relevant facilities such as digital laboratories, drama rooms, and creative play spaces. The audit confirmed that infrastructure conditions in the Sub-County severely constrain CBE implementation, but as an administrative report, it did not examine the school-level management practices that might mitigate or compound these constraints. The literature under this objective therefore establishes a robust relationship between physical infrastructure and CBE outcomes at global, continental, national, and local levels. What remains insufficiently understood is the extent to which headteachers' management of physical infrastructure — prioritisation, maintenance, and supervision of facility use — influences the attainment of CBE-set goals where infrastructure is already deficient, which is precisely the situation prevailing in Kajiado Central Sub-County.

4. Methodology

The study adopted a descriptive survey design, integrating quantitative and qualitative approaches. The target population comprised 3,640 learners, 520 teachers, and 104 headteachers, from which a sample of 360 learners, 226 teachers, and 11 headteachers was drawn using Yamane's formula and purposive sampling. Data were collected using questionnaires, observation checklists, headteacher interviews and document analysis of KPSEA records. Quantitative data were analyzed using descriptive statistics, while qualitative data were thematically analyzed and triangulated with quantitative results.

5. Findings

5.1 Influence of Headteachers' Management of Physical Infrastructure on Attaining CBE-Set Goals

5.1.1 Learners' Perspectives on Headteachers' Management of Physical Infrastructure

To understand the role of headteachers' management of physical infrastructure in CBE delivery, learners were asked about the classrooms, learning environment, sanitation and activity spaces managed and maintained under school leadership. Responses are in Table 1.

Table 1: Learners' Responses on Physical Infrastructure

Indicator	Response	Frequency	Percentage (%)
Classrooms enough	Yes	268	77.1%
	No	79	22.9%
Classrooms conducive	Yes	255	73.3%
	No	93	26.7%
Toilets and water available	Yes	261	74.9%
	No	87	25.1%
Activity rooms available	Yes	183	52.5%
	No	165	47.5%

Source: Field data (2026).

Most learners (77.1%) believed their schools had enough classrooms, while 22.9% disagreed. Overall, this positive perception suggests that headteachers, working with sponsors, county authorities and parents, have generally planned and mobilised sufficient classroom space, but the 22.9% points to institutions where headteachers' planning, prioritisation and allocation of classroom infrastructure need reinforcement, as overcrowding constrains the group work central to CBE pedagogy.

On classroom conduciveness, 73.3% felt classrooms were clean, well-lit and ventilated, while 26.7% did not. Since the day-to-day maintenance of classrooms — cleaning schedules, minor repairs, ventilation and lighting — falls within the headteacher's supervisory and resource-utilisation role, the quarter that reported unconducive rooms signals weaknesses in how routine maintenance is planned, budgeted and accounted for. Sanitation and clean water are essential for regular attendance and learner health. 74.9% reported access, while 25.1% did not. The gap reflects inequities in headteachers' prioritisation and management of sanitation infrastructure, with direct consequences for girls' participation and, by extension, CBE's promise of inclusivity.

Finally, only 52.5% of learners confirmed the presence of activity rooms for music, drama or science, while 47.5% said they did not. This nearly even split is significant because CBE relies heavily on activity-based learning. Where headteachers have not planned, mobilised or repurposed spaces for such activities, schools deliver a narrower version of the curriculum, undermining creativity, innovation and practical competencies. Recent studies lend weight to these findings. Maluha, Gakunga and Mackatiani (2025) reported that although infrastructure was improving in Kenyan schools, gaps in classrooms, ICT devices and laboratories still constrained effective CBE implementation, especially in public schools where infrastructure management is more centralised. Ngeno, Mweru and Mwoma (2021) similarly found that physical infrastructure inadequacies in Kericho County hindered learner engagement, echoing the 22.9% here who said classrooms were insufficient. On sanitation, Dibaba, Alemu & Debela (2024), demonstrated in a systematic review that WASH interventions in schools directly improve attendance and learning, reinforcing the importance of the 74.9% reporting toilet and water access. Murithi and Yoo (2021) highlighted that conducive classroom environments and ICT access significantly shape teachers' CBE

implementation, complementing these learner perspectives. Together, these studies suggest that although infrastructure is on an upward trajectory, uneven headteacher-level management continues to undermine equity in CBE delivery.

5.1.2 Teachers' Perspectives on Headteachers' Management of Physical Infrastructure

Teachers also gave their views on the adequacy and suitability of infrastructure managed by their headteachers for CBE support. The focus was on the sufficiency of classrooms, conduciveness of the environment, sanitation, special rooms, and whether the general setup supported CBE. Responses are presented in Table 2.

Table 2: Teachers' Responses on Physical Infrastructure

Indicator	Response	Frequency	Percentage
Enough classrooms	Yes	128	61.0%
	No	82	39.0%
Classrooms conducive	Yes	133	63.3%
	No	77	36.7%
Sanitation facilities available	Yes	130	61.9%
	No	80	38.1%
Special rooms available	Yes	102	48.6%
	No	108	51.4%
Setup supports CBE	Yes	137	65.2%
	No	73	34.8%

Source: Field data (2026).

The findings show that 61.0% of teachers reported having enough classrooms while 39.0% did not. This shows that although most headteachers had allocated adequate classroom space, overcrowding remains a challenge in a significant number of schools. For CBE — which emphasises group work and interactive learning — insufficient classrooms undermine the curriculum's goal of active participation, and teachers in the 39.0% likely struggle to organise interactive activities in crowded spaces where the headteacher's classroom-allocation, timetabling and space-utilisation decisions have not addressed pressure on rooms.

On conduciveness, 63.3% affirmed their classrooms were well-lit, ventilated and comfortable, while 36.7% disagreed. More than a third of schools therefore still struggle with poor conditions such as inadequate lighting and ventilation. A conducive environment is not a luxury under CBE but a necessity, and its provision falls within the headteacher's routine supervision and maintenance role. Availability of sanitation facilities was confirmed by 61.9%, whereas 38.1% said such facilities were lacking. This points to progress alongside ongoing inequities in basic provision. Because sanitation is a prime example of a resource whose adequacy depends on headteachers' prioritisation, budgeting and accountability, the gap reveals uneven institutional performance in resource management.

One of the most concerning results relates to special rooms — laboratories, libraries or arts spaces. Only 48.6% reported their presence while 51.4% said they were

absent. This is critical because CBE relies heavily on activity-based and experiential learning. Without such spaces, headteachers are forced to confine CBE to traditional classrooms, restricting learners' opportunities to develop creativity, problem-solving and practical skills. This structural weakness points to the need for stronger institutional planning, mobilisation of partnerships and phased allocation of resources by school leadership.

Finally, 65.2% of teachers said the overall setup supported CBE delivery while 34.8% said no. Despite notable improvements, more than one-third of schools remain constrained by their infrastructure, meaning teachers must adapt CBE to existing limitations and headteachers must continue to plan, prioritise and account for infrastructural improvement.

These findings are echoed in recent research. Maluha, Gakunga and Mackatiani (2025) demonstrated that inadequate infrastructure in public schools significantly hampers CBE implementation, whereas private schools often benefit from more consistent management of special rooms and ICT facilities. Ngeno, Mweru and Mwoma (2021) reported that infrastructure deficits in Kericho County restricted CBE practices, particularly in rural schools. Dibaba, Alemu & Debela (2024), in a global meta-analysis, highlighted that sanitation and water facilities directly affect learner participation and outcomes, reinforcing the significance of the 38.1% reporting inadequate sanitation. Together, these studies confirm that while Kenya has made progress, disparities in how headteachers manage physical infrastructure continue to undermine equitable CBE rollout.

5.1.3 Integration and Triangulation on Physical Infrastructure

The combined analysis of learner and teacher responses, headteacher interviews, observation data and school records shows that headteachers' management of physical infrastructure had a meaningful influence on CBE goal attainment. Both learners and teachers frequently cited overcrowded classrooms, limited sanitation and the absence of laboratories and ICT spaces as challenges. Headteachers echoed these concerns, explaining that limited mobilisation of funds and delayed capital allocation constrained their ability to plan, prioritise and maintain infrastructure supportive of practical, group-based CBE learning. Observations confirmed these disparities in classroom space and learning facilities. Performance records further revealed that schools where headteachers had actively planned, allocated and supervised infrastructure use recorded higher attendance, improved learner retention and stronger KPSEA outcomes. Overall, the evidence consistently shows that where headteachers manage physical infrastructure effectively, a more supportive environment is created for achieving CBE goals.

6. Conclusion

The study concludes that headteachers' management of physical infrastructure plays an enabling role in CBE implementation. Adequate classrooms, sanitation and learning

spaces — planned, allocated and maintained under the headteacher's supervision — supported the practical, collaborative and activity-based approaches emphasised under CBE. Conversely, overcrowded classrooms and limited facilities in schools where infrastructure was not effectively prioritised or maintained restricted learner-centred strategies, particularly in rural and pastoralist schools, thereby affecting attendance, retention and overall performance.

7. Recommendations

Based on the finding that a substantial number of schools experienced overcrowded classrooms, inadequate sanitation and limited ICT and laboratory spaces, the study recommends strengthening headteachers' management of physical infrastructure through improved planning, resource mobilisation and supervision, alongside increased investment by national and county governments. Headteachers should prioritise expansion of classroom space, improvement of sanitation and establishment of functional ICT and science facilities, particularly in rural and pastoralist areas, and should account transparently for use of infrastructure funds. This directly responds to observation and document analysis findings that schools with better-managed infrastructure recorded higher attendance, improved retention and stronger learner performance.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

About the Author(s)

Catherine Siimoi Metekai, Postgraduate Student in Educational Administration, Maasai Mara University, Kenya.

Prof. Paul Maithya, Chair, Department of Education Management and Policy Studies (EMPS) in the School of Education, Maasai Mara University, Kenya.

Dr. Mwaura Kimani, Senior Lecturer, Department of Education Foundations and Psychology, School of Education, Maasai Mara University, Kenya. Coordinator of Postgraduate Studies in the School of Education.

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