

PROJECTION MODELS FOR SELECTED INFRASTRUCTURAL REQUIREMENTS FOR THE IMPLEMENTATION OF COMPETENCY-BASED CURRICULUM IN SENIOR SECONDARY SCHOOLS IN 2026, IN KENYA

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Abstract

The purpose of this study was to model projections of selected infrastructure requirements for the implementation of the CBC in Senior Secondary Schools. The new education system of 2-6-3-3-3 was launched in 2017 and named Competency Based Curriculum (CBC), which replaces the 8-4-4 system. A descriptive survey research design was adopted. All the primary and secondary schools in Kenya were the target population. Data was collected through questionnaires, document analysis, and direct observation. Infrastructural projection was arrived at through total projected enrolment for the year divided by learner number requirements for each based on the MOE policy. The study followed Thonstad's Grade Transition Model to project the CBC enrolment trends of the 2017 Grade One cohort to Junior and eventually Senior School. The findings indicated an increase in CBC enrolment over the years to 2026. The study further established that an increase in enrolment leads to an increase in physical infrastructure and average school size. According to the study's findings, the anticipated rise in senior secondary enrolment by 2026 will result in a deficit of some predicted facilities. As a result, the study suggested that the physical infrastructure be expanded. For the stakeholders, financial allocations will be considerably simpler with the Senior Secondary School enrolment forecasts for 2026. The findings of this study would also inform policymakers, including TSC and the Ministry of Education, to come up with practical policy reforms that would enhance the provision of quality education in Kenya.

Key terms: Competency Based Curriculum, infrastructure, model, projections.

1.0 INTRODUCTION

The 8-4-4 system was primarily replaced by the new 2-6-3-3-3 education system, which was introduced in 2017. The Competency-Based Curriculum (CBC) is intended to be completed in a total of nine years, including two years in pre-primary, six years in primary education, three years in junior secondary education, three years in senior secondary education, and three years at the university level. This curriculum is important because it prepares the learners for the real world by developing a range of skills and competencies such as communication, collaboration, and critical thinking. Therefore, the implementation should be done with a lot of planning in terms of infrastructure, among other requirements.

Jeng'ere (2017) defines competency as the capacity to effectively employ learning resources, including skills, knowledge, ethics, and attitudes, in a variety of real-world contexts, including educational, job, personal, and professional development. In contrast, Claro and Ananiadou (2009) define competence as the knowledge, skills, and attitudes necessary for a successful existence in a knowledge-based society. There are a number of outcomes, fundamental skills, content, and criteria assessments that define the curriculum (Claro & Ananiadou, 2009).

Carraccio et al. (2002) have detailed approaches to curricular design that are used in the implementation of competency-based education in various centres worldwide. The four main steps are as follows: the first is the identification of competencies, and the second is the determination of the components of the competency and the expected performance levels, which include professional tasks that are either sequentially or in sum. The tasks function as performance indicators or benchmarks that must be measurable in the aggregate to ascertain the extent to which a competency has been achieved. The performance criteria should establish the threshold for demonstrating the competencies. Therefore, it is necessary to establish the anticipated performance level for each benchmark in order to ascertain whether or not the competence has been attained. Third, the competency assessment is conducted using the preferred methods, such as criterion-referenced measures that compare performance against established standards or thresholds. Finally, the process is evaluated in its entirety, which enables program implementers to identify processes that can be improved to increase efficiency. This implies that the teaching and learning process must adapt its orientation from the rote memorisation of context knowledge to the acquisition of skills and competencies that are beneficial for resolving real-world problems (World Bank, 2011).

Thus, it is evident that the implementation of the CBC approach in educational institutions necessitates a thorough overhaul of the instructional, learning, and assessment processes. Therefore, it is imperative that teacher education programs be modified to provide teachers (both pre-service and in-service) with the necessary competencies to effectively address the obstacles associated with the implementation of Competency-Based Curriculum (CBC) in schools (Woods, 2008; Kitta & Tilya, 2010). This study is designed to project models for the necessary infrastructure requirements for the implementation of a Competency-Based Curriculum in Senior Secondary Schools in Kenya by 2026.

Efforts for implementation of the Competency-Based Curriculum must be comprehensive to prepare teachers and schools adequately for effective implementation of the competency-based curriculum. For teachers to carry out the implementation process well, they must have a positive attitude. Therefore, teachers' perceptions towards the curriculum are critical because they are the implementers. However,

Journal of Education Management and Leadership

since the introduction of a competency-based curriculum, there is little evidence that a study has been conducted to project the level of junior and senior secondary schools preparedness to implement the curriculum in terms of teachers required, instructional material, infrastructure and enrolment projections in junior and senior secondary schools in 2023 and 2026 respectively and yet very soon we are moving towards the implementation of the curriculum at this level. This study aims to develop projection models for the necessary infrastructure requirements for CBC implementation in Senior Secondary Schools in Kenya by 2026.

2.0 LITERATURE REVIEW

In 1988, the IMF implemented structural adjustment programs that integrated cost-sharing into the education sector. The parents purchased books and equipment and contributed to the development of the institutions. As a result of this measure, parents and community members were unable to provide sufficient support, making education seem financially inaccessible for many households. (World Bank, 1995).

The demand for education in East African countries has been on the rise as a result of the increased enrollment of primary school students. The demand for secondary education was so high that secondary institutions were expanded to the local level in order to satisfy it. In this region, Nandi South Sub-County is a typical representative of a Kenyan rural sample opportunity; however, numerous challenges have been reported. The private educational sector has historically been the primary source of funding for governments to address the excess demand at the post-primary level, as public resources are restricted. As a consequence, the region has experienced limitations in the provision of high-quality primary and secondary education (Wedgwood, 2006). As Kenya is not an exceptional case, the objective of the present investigation was to predict specific infrastructure requirements for senior secondary schools in Kenya in 2026.

There was a 22 per cent increase in the Net Enrolment Rate when FPE was implemented in 2003. For the year 2007, Kenya's national enrolment rates were 5.0 per cent for males and 3.0 per cent for females (MOE, 2009). In 2016, the national enrolment rate for males was 7.46 per cent, while for girls, it was 5.48 per cent. Consequently, the overall dropout rate was 6.47 per cent. Despite the fact that enrolment rates have been increasing over the years, the rate of increase has been inconsistent (MoE, 2009). This image suggests that enrollment remains an issue in Kenya. The specified infrastructure requirements for the implementation of Senior Secondary Schools in Kenya in 2026 were projected in this study.

The Education Sector Report (2016) indicates that secondary schools in the country were unable to accommodate more than 80 per cent of Kenya Certificate of Primary Education candidates to Form One due to infrastructure deficiencies. This implies that the development of infrastructure continues to be a challenge for various institutions.

The education ministry's 2015 proposals said the government at the national and county levels would have to pay for all infrastructure development in public schools. In the year's budget, the government had allocated KSh1.2 billion for this (<https://africacheck.org>).

Furthermore, it is imperative that the curriculum change take place in the classroom, necessitating that teachers implement the curriculum document by adapting to the new teaching platforms and methodologies, thereby enhancing the learning abilities of their students (Eamon, 2005). Classroom size is

Journal of Education Management and Leadership

a critical educational indicator that is defined as the number of students or pupils in a classroom. Effective learning and teaching are facilitated by a reduced class size, regardless of the educational level. The purpose of this research is to estimate the number of classrooms and other selected infrastructure that will be necessary in 2026 for the successful implementation of CBC at the Senior Secondary School level in Kenya.

3.0 METHODOLOGY

The study used a descriptive survey research design of past time series of important indicators like population size and structure, demographic trends, enrolment and government policies on education. To project future school enrolment, at least four general types of basic information are needed. The first relates to the population of school age, the second to pupil enrolment, the third to various rates and ratios derived from the first two types of data, and the fourth to questions of administrative policy affecting education in general and school enrolment in particular (Mehta, 1994). Projection of the future size of the school-age population enrolled at any level of education constitutes the starting point of educational planning. This is so because it provides the basis for estimating the future number of schools, classrooms, teachers, textbooks, funds, and other facilities.

This study was carried out in Kenya. Vihiga County was purposively sampled as the accessible study population. Vihiga County is one of the 47 counties that were created when a new national constitution was promulgated in Kenya on 27th August 2010. In the 2019 Census Report, the county had a total population of 554,622 with a population density of 1,045 people per square kilometre. Nairobi County is leading with a population of 6,247 people per square kilometre, followed closely by Mombasa County with 5,495 people per square kilometre, and Vihiga comes third. Vihiga County was purposively selected because, according to the Vihiga County Integrated Development Plan 2018-2022, the high population density has negatively impacted the available resources, including land, forests and wetlands. This, therefore, means that the educational resources are also overstretched, and thus, careful planning is needed in the implementation of CBC. According to the KPHC 2019 report, the poverty level of the county is at 39 per cent against the national's at 45 per cent. This means that stakeholders contribute less to the provision of teaching/ learning resources in the implementation of CBC. Despite the fact that there is FPE and Subsidised Secondary Education, high poverty may also negatively affect enrolment if planning is not done well.

The county borders Kakamega County to the North, Nandi County to the East, Kisumu County to the South and Siaya County to the West. Vihiga County has an annual average rainfall of between 1800mm and 2000mm with an average temperature of 24^oc (Republic of Kenya, 2019). The county has 150 secondary schools with an enrollment of 39,413 students, and there are 457 primary schools in total (County Government of Vihiga, 2018).

This study targeted all primary schools because they will produce pupils for Junior Secondary Schools who will thereafter transit to Senior Secondary Schools. Secondary schools were also targeted in this study as they will receive students for Junior and Senior Secondary education under CBC. The population of the study was the MoE County Director of Education from the sampled county, 457 head teachers and 150 principals of the sampled schools.

Journal of Education Management and Leadership

This study targeted all primary schools which have released pupils to Junior Secondary and eventually will release them to Senior Secondary Schools education under the new curriculum.

Sampling involves making conclusions about an entire population using a subset of the population (Orodho, 2004). The research purposely sampled all 161 principals and 457 head teachers. The schools were categorised into various categories based on their characteristics. That is boarding girls, boys or mixed, day girls, boys or mixed, and both day and boarding boys, girls or mixed.

Questionnaires, document analysis, and direct observation were the main research instruments that were determined and tied to the study methodology. These methods were used to get data from key respondents in order to model projections of the enrolment and requirements for Senior Secondary Schools for the implementation of CBC in Kenya.

There were two questionnaires for the head teachers of primary schools and the principals of secondary schools. A questionnaire for Primary School heads sought information on total enrolment from 2017 to 2021 in primary schools. The questionnaire for secondary school principals sought information on total enrolment in secondary schools in 2017-2021.

Data from this enrolment pattern was then used to come up with projections for the enrolment at Senior Secondary School in 2026. This was further used in the projection of the targeted requirements for the implementation of CBC at the Senior Secondary School in the year 2026.

Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning to an assessment topic (Bowen, 2009).

The NEMIS output software was analysed to get information on enrolment.

An observation schedule was used to determine the available number of selected infrastructures such as classrooms, toilets, dormitory facilities, technical facilities, and laboratories in schools.

To enhance the reliability of the instruments, a pre-test study was conducted in five schools in one of the sub-counties. Reliability of a research instrument involves administering the same instrument twice to the same group of subjects (Mugenda & Mugenda, 2003). The second administering was done after a time-lapse of one week. The scores from both tests were correlated to determine their reliability using Pearson's Product moment correlation. The content validity of the instruments was obtained by the researcher discussing the items in the instruments with university supervisors, other lecturers in the department and colleagues. The advice given by these people helped the researcher improve the validity of the research instruments.

Before embarking on the data collection exercise, the researcher obtained a research permit from the National Council of Science and Technology and sought clearance from the County Commissioner and the County Education office in the sampled Counties. The researcher visited the sampled schools and obtained permission from the school authorities to collect data.

The projection of infrastructure requirements was based on the MoE policy, where the target class sizes for pre-primary, primary, and secondary levels are 30, 50, and 45, respectively. This study applied these

respective class sizes to the projected Grade 10, 2026 enrolment to obtain the projected number of classrooms required in the county for the implementation of CBC at Senior Secondary School.

4.0 FINDINGS AND DISCUSSION

The study sought to model projections of selected infrastructure requirements for the implementation of the CBC in Senior Secondary Schools in Kenya. The educational resources projected in this study are laboratories, classrooms, toilets, technical facilities, boarding facilities and dining facilities.

Laboratories

The ministry's Registration Guidelines for Basic Education Institutions states that the new CBC-compliant schools must have room for the learning paths that the students choose. Every Senior Secondary School must provide facilities capable of providing a minimum of two educational pathways, along with all the corresponding courses within those pathways. Senior Secondary Schools that provide STEM subjects will also have the necessary additional resources to offer all four STEM tracks (MoE, 2019).

The total number of laboratories in each school is six, as each scientific discipline at the Junior and Senior levels necessitates a dedicated laboratory. Thus, the total number of required laboratories across the 161 schools is 966 (6 laboratories per school). The study conducted a survey of principals to determine the extent of laboratory facilities in their schools. The survey revealed that 114 laboratories are currently available in the 161 institutions that were surveyed, resulting in a shortage of 852 laboratories. This is consistent with the research conducted by Njagi (2018), which sought to ascertain whether the recently established secondary schools in the Mathira constituency had functional laboratories for scientific disciplines such as chemistry, physics, and biology. Only 20 per cent of the principals reported having equipped science laboratories in their schools. However, a substantial majority of 80 per cent of the principals reported that their institutions lacked adequately equipped laboratories. Njagi (2018) observed that numerous schools had a laboratory that was essentially a standard classroom with elongated tables and seats, with a single faucet situated at one end of the space. A laboratory is an essential facility for the effective instruction of science-based subjects in secondary school. Nevertheless, the National Government Constituency Development Fund had commenced the construction of laboratories at two schools. The absence of necessary facilities directly hindered the teaching of science-related subjects. This research supports Rotich's (2004) assertion that schools in Kenya face substantial obstacles as a result of inadequate physical facilities, supplies, equipment, and instruments. The findings of Hanushek (2004) that a lack of essential physical resources, such as laboratory apparatus, impedes learning are corroborated by the observations.

The research conducted by Achimungu (2016) in Nigeria, which also discovered that secondary school chemistry curricula were adversely affected by a lack of science laboratories and inadequate school infrastructure, is consistent with this discovery regarding the adequacy of secondary school science laboratories. These results also support the findings of two previous studies that discovered that secondary schools in Ethiopia are severely deficient in laboratory facilities and specialised science classrooms (Zengele & Alemeyahu, 2016; Daba & Anbesaw, 2016). The three research projects share a common thread: they all focus on developing nations that lack the necessary infrastructure for scientific institutions. The findings are consistent with those of Pareek (2019), who discovered that the majority of Indian secondary institutions lacked their own scientific laboratories. Only one of the twenty-one schools that were examined contained a science laboratory that was entirely operational.

Journal of Education Management and Leadership

These findings imply that the number of science laboratories is insufficient, as the necessary number is three, with one laboratory designated for each of the three natural science subjects: Biology, Chemistry, and Physics. This situation would have a detrimental effect on the implementation of CBC at Senior Secondary Schools, as students and teachers will be required to alternate the use of the same facilities for practical sessions, thereby reducing efficiency.

Additionally, it was discovered that the institutions lacked any language or geography laboratories. This is consistent with the results of a study conducted by Mikanjuola and Sidiq (2013), which analysed the essential resources required to teach and learn geography in senior secondary schools in Ekiti State, Nigeria. Language and geography laboratories were discovered to be absent in all institutions (100%). The absence of language laboratories has a detrimental impact on the capacity of students to effectively acquire communication and language skills. Students are unable to effectively acquire language proficiency due to the absence of a language laboratory, which prevents them from understanding the mechanics of speech production, including the function of articulators and the essential components of speech development.

Furthermore, it was observed that the laboratory space allocated to each student in a specific class was inadequate to support experimental activities despite the existence of 114 scientific laboratories in a variety of institutions. This suggests that the desired outcome may not be accomplished through practical learning due to the high student-to-teacher ratio in the practical sessions. The effective learning of certain students may be impeded by the absence of laboratory access, as they are unable to fully engage in experiments and make accurate observations. The process of learning is optimised when learners actively engage in it by conducting observations, devising experiments, and documenting their discoveries. Students frequently observe teacher-led demonstrations in groups of 10 or more, as the substantial student body in secondary institutions frequently requires a transition from hands-on activities. This has a significant effect on practical sessions. In the same vein, Mukami (2015) discovered that the primary activities in the laboratories in Kenya were teacher demonstrations, which was attributed to an unusually high number of students. In the same vein, the STEM Pathway's success necessitates the establishment of additional laboratories in order to accommodate the anticipated high enrolment in Senior Secondary Schools.

Classrooms

According to Ruth and Ramdas (2020), the 8-4-4 curriculum was unable to fulfil its goal of preparing students for self-sufficiency due to a number of factors, including a lack of funding and resources, unskilled instructors, overcrowding in the classrooms, and high rates of student attrition. Our educational institutions lack the prerequisites for CBC to function at its best: a low Pupil-Teacher Ratio, adequate physical facilities, and small class sizes. It is critical to base planning and budgeting on the predicted total of 152,324 pupils enrolled in Junior Secondary Schools and Senior Secondary Schools in Vihiga County if we want to ensure high-quality education. This will make it possible to distribute sufficient funds for education in accordance with the MOE-recommended standard ratios. A student-teacher ratio of 45:1 was used to calculate the required number of classes in relation to the predicted student body.

$152324/45=3384.9778$ classrooms (Rounded to 3385 classrooms)

Journal of Education Management and Leadership

Currently, there are 1747 classes in the 161 schools sampled, occasioning a deficit of $3385 - 1747 = 1638$ classrooms. There is an urgent need to build 1,638 classrooms for use in Vihiga County's junior and senior high schools in order to meet the quality education indicator of a Pupil Classroom Ratio of 45:1. The insufficiency of sufficient classrooms in secondary schools hindered the provision of high-quality instruction. This indicates that comprehensive strategies should be implemented to build an additional 1,638 classrooms in Vihiga County by the year 2028.

This aligns with Njagi 's (2018) research, which identified physical buildings as one of the insufficient physical facilities. This hindered the process of instruction and acquisition of knowledge in recently formed secondary institutions. Njagi (2018) also noted that certain classes were taught in a temporary dining hall, especially when there were divided disciplines like Geography and History, Business Studies and Agriculture, and Biology/Physics.

Toilets

Table 1: Number of Toilets in Vihiga County

No. of toilets	Freq.	Per cent	Cum.
3545	161	100.00	100.00
Total	161	100.00	100.00

Projected Enrolment

Toilet Ratio of girls

$$152324/25 = *6092.96 \text{ (Rounded to 6093)}$$

Table 1 indicates that the 161 schools sampled currently have 3545 toilet doors, resulting in a deficit of 2548 toilet doors if we apply the MoE's standard of 25 doors for female students and 30 doors for male students. In order to ensure that all students have access to adequate lavatory facilities, we employ the female-student ratio. Most learners will miss entire lessons as a result of the resultant queues, despite their physical presence at school, due to the deficit of 2548 toilets.

Library Facilities

Table: Adequacy of Library Facilities

Scale:0-10	Freq.	Per cent	Cum.
0	12	7.45	7.45
1	1	0.62	8.07
2	17	10.56	18.63
3	6	3.73	22.36
4	14	8.70	31.06
5	49	30.43	61.49
6	39	24.22	85.71
7	10	6.21	91.93
8	12	7.45	99.38
9	1	0.62	100.00
Total	161	100.00	

Journal of Education Management and Leadership

On a scale of 0-10 where 0=NOT AVAILABLE and 10=FULLY AVAILABLE 12 of the 161 principals of secondary schools in Vihiga county said their schools did not have library facilities while only one rated library facilities at 9. Summary statistics suggest a mean and standard deviation of 4.73913 and 2.090221, respectively, with the minimum and maximum values at 0 and 9, respectively.

This suggests that by 2028, the current library facilities need to be doubled in order to cater for the entire CBC enrolment at the senior secondary school level. This is because libraries encourage independent reading and exploration to improve literacy and academic success, which are key to CBC. Libraries also teach students how to research effectively, including how to find relevant resources and cite them.

Facilities for Technical Subjects

On a scale of 0-10 where 0=NOT AVAILABLE and 10=FULLY AVAILABLE. 17 of the 161 principals of secondary schools in Vihiga County said their schools did not have facilities for technical subjects, while only 1 rated such facilities at 10. Summary statistics suggest a mean and standard deviation of 4.565217 and 2.069972, respectively, with the minimum and maximum values at 0 and 10, respectively.

This is clearly presented in Table 3. This suggests that by 2028, the current facilities for technical subjects need to be more than doubled to cater for the entire CBC enrolment at the secondary school level.

Table 3: Adequacy of technical subject facilities.

Scale 0-10	Freq.	Per cent	Cum.
0	17	10.56	10.56
2	8	4.97	15.53
3	7	4.35	19.88
4	20	12.42	32.30
5	68	42.24	74.53
6	23	14.29	88.82
7	6	3.73	92.55
8	11	6.83	99.38
10	1	0.62	100.00
Total	161	100.00	

According to the data, 17 schools were found to be without a computer lab. Schools risk falling behind in obtaining computer literacy skills—essential competencies in the CBC curriculum—if they do not have access to this resource. The integration of information and communication technology (ICT) into the classroom is impeded by the lack of access to computers and the Internet. Teaching and learning with technology is more effective than the traditional classroom setting, according to a Malaysian study by Ghaviefekr and Rosdy (2015). For students to be able to access and search for content, a computer laboratory is essential. There can be no separation between the library and the computer labs.

Journal of Education Management and Leadership

Without access to computers in the classroom, pupils are left in the dark about modern technology, and the goal of secondary school students acquiring computer literacy skills will remain a distant dream. Raising secondary school pupils' proficiency in computer science should be an official priority for the MOE.

Boarding Facilities

On a scale of 0-10 where 0=NOT AVAILABLE and 10=FULLY AVAILABLE, the mean for the 37 schools with boarding facilities in Vihiga County is 6.162162 with a standard deviation of 115 out of 1.848626. This suggests that by 2028, the current boarding facilities will need an improvement of up to 43.98 per cent to cater for the entire CBC enrolment in boarding schools ($6.162162/11 \times 100 = 56.019655$; $100 - 56.019655 = 43.980345$)

Table 4: Adequacy of boarding facilities

Scale	Freq.	Per cent	Cum.
0	1	2.70	2.70
4	1	2.70	5.41
5	6	16.22	21.62
6	12	32.43	54.05
7	8	21.62	75.68
8	8	21.62	97.30
9	1	2.70	100.00
Total	37	100.00	

Dining facilities

Table 5: Adequacy of dining facilities

Scale 0-10	Freq.	Per cent	Cum.
0	106	65.84	65.84
3	2	1.24	67.08
4	5	3.11	70.19
5	11	6.83	77.02
6	17	10.56	87.58
7	14	8.70	96.27
8	5	3.11	99.38
9	1	0.62	100.0
Total	161	100.00	

On a scale of 0 to 10, where 0 = NOT AVAILABLE and 10 = FULLY AVAILABLE. Only 1 of the 161 principals of secondary schools in Vihiga County rated their dining facilities as 9, while 106 of them reported that their schools lacked such amenities. According to summary statistics, the mean and standard deviation are 2.049689 and 2.953391, respectively, with the minimum and maximum values being 0 and 9, respectively. It is suggested that the current dining facilities require an enhancement of up to 81.37 per cent by 2028 to accommodate the entire CBC enrolment at the secondary school level ($2.049689/11 \times 100 = 18.633536$; $100 - 18.633536 = 81.366464$).

Journal of Education Management and Leadership

The projected enrolment was used to project the number of required classrooms, which was calculated using a pupil-to-classroom ratio of 45:1. The resulting number was 3385. Currently, the 161 schools that were sampled have 1747 classes, resulting in a deficit of 1638 classrooms. Each junior and senior school will require a laboratory for each science subject, resulting in a total of six laboratories per school. Consequently, the projected number of laboratories is 966. The current number of laboratories in the 161 institutions that were sampled is 114. Therefore, a projection of 852 laboratories must be prepared. It is anticipated that the current boarding facilities will require an improvement of up to 43.98 per cent in order to accommodate the entire CBC enrolment in boarding institutions at the Senior School level. This implies that the current dining facilities must be enhanced by up to 81.37 per cent by 2028 to accommodate the entire CBC enrolment at the secondary school level. A projection of the current technical subject facilities indicates that they must be more than multiplied by 2028 to accommodate the entire CBC enrolment at the secondary school level.

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusion: Vihiga County CBC Grade 1 cohort enrolment will increase from 17990 learners in 2017 to 24,361 learners in 2026 when they join Senior School. Junior School enrolment is projected to go up from 21,844 learners in 2023 to 23491 learners in 2025. The suggested PTR for Vihiga area Junior and Senior Secondary Schools is 45:1, which means that by 2028, 3,385 teachers will be needed to manage the many pathways of the 2-6-6-3 system of education and improve the quality of education provided in the area. By 2030, there will be a deficit of 872 teachers in Junior and Senior Secondary Schools in Vihiga County if the current number of teachers is maintained. Senior Schools in Vihiga County will require 5,098 classrooms to attain the pupil-classroom ratio of 45:1. A projection of 6093 toilets is required against the available 3545 considering the MOE guideline of 25 girls per toilet in order to have sufficient toilets for the implementation of CBC at Senior Schools in Vihiga County in 2026. It is necessary to project 966 laboratories in order to effectively implement CBC at Junior and Senior Schools in Vihiga County. A current shortage of 852 laboratories has resulted from the fact that only 114 laboratories out of 161 schools were sampled. There were insufficient scientific, computer, and geography labs and no language labs, as mandated by the current curriculum, in the majority of the schools. According to the study's findings, laboratories are crucial for implementing competence-based curricula effectively. In this case, the competence-based curriculum will not be able to produce the desired results in secondary schools unless the necessary laboratory facilities are built. Due to overcrowding in practical sessions and perhaps poor performance on examinations, students study more theoretically than practically due to a lack of adequate laboratory facilities. It is projected that the current boarding facilities in Vihiga County will need an improvement of up to 43.98 per cent in order to cater for the entire CBC enrolment in boarding schools at Senior Schools. A projection of the current facilities for technical subjects shows that they need to be more than doubled to cater for the entire CBC enrolment at the Senior secondary school level by 2028.

Recommendations: The analysis clearly indicated that secondary schools in Vihiga County will require additional classrooms, boarding facilities, technological facilities, and restrooms in order to accommodate the projected increase in student enrollment by 2026. In order to accommodate the expected rise in enrollment at the Senior School in 2026, it is recommended that additional Constituency Development Funds be granted to the existing day secondary schools in Vihiga County to enhance their instructional facilities. This report also suggests that Boards of Management should seek funding to construct more physical infrastructure and expand the existing 161 secondary schools. This will enable schools to provide the high-quality education outlined in Kenya Vision 2030. There will be a rivalry among Junior Secondary

students, Senior Secondary students, and 8-4-4 students due to the limited availability of laboratory facilities and equipment. Moreover, the absence of Geography and Language laboratories impeded the efficient progress and attainment of necessary skills in those disciplines. This study suggests that the MOE, Science and Technology should develop a policy to ensure that schools have adequate laboratory facilities and teaching-learning resources for effective curriculum implementation. The policy should focus on establishing, procuring, and utilising these resources efficiently. The government should engage in collaboration with stakeholders, including the community, to provide the necessary facilities such as science, geography, language, and computer laboratories. The Teachers Service Commission should implement a systematic strategy to hire an additional 872 educators to teach in Junior and Senior Secondary Schools in Vihiga County by 2028. The analysis clearly demonstrates that Vihiga County has numerous sub-county secondary schools that are fiscally unfeasible and incapable of accommodating Senior school classes. This report suggests that the MOE should evaluate these schools in order to elevate them to the status of Junior Secondary Schools. The MOE should conduct an assessment of sub-county and secondary schools to identify those with sufficient facilities that can be upgraded to senior secondary schools. This report suggests the establishment of day school wings in every senior secondary school as a means to increase student enrollment without overburdening boarding facilities.

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