

Kenya's Vision 2030 and the Efficacy of CBC in Primary and Secondary Schools in Siaya County: Teacher Requirement Projections

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Abstract: Quality education is attributed to sustainability of key educational resource requirements among them adequate well-trained teachers, without which the implementation of Competency Based Curriculum (CBC) geared towards provision of quality education envisaged in Kenya's Vision 2030 may be hampered. This paper purposed to project the teacher requirement for provision of quality education in primary and secondary schools in Siaya County by the year 2030. The study was founded on the system theory and adopted Trend analysis and descriptive survey designs to achieve its objective. Purposive sampling was used to select, TSC County Human Resource officer, TSC sub-county directors, MOE sub-county directors and an officer from KNBS. Primary data was collected through Data Analysis Proformas and Key Informant Interview (KII) Guides. Pupil-Teacher Ratio method and Method based on number of pupils per class and hours taught by a teacher were used to project the teacher requirement in primary and secondary schools respectively. Projection of teacher requirement in primary schools in Siaya County was estimated at an increase of 9.81% between 2024 and 2030. It was found that teacher requirement at Junior secondary school will increase by 33.44% between 2021 and 2030 while the Senior secondary school teacher requirement was expected to increase by 29.63% between 2026 and 2030. These study findings will inform TSC, the Ministry of Education, KICD and other stakeholders on the adequate number of teachers required as a key educational resource in effective implementation of the 2.6.3.3 system of education and in achieving quality education envisaged in vision 2030. Due to inadequacy of teachers in the County, the study recommends allocation of more funds to the Teachers' Service Commission to enable it to hire adequate number of teachers that meet the enrolment rate in both primary and secondary schools.

Key Words: Teachers, Vision 2030, Quality Education, Competency Based Curriculum, Primary Schools, Secondary Schools

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I. Introduction

Sustainable Development Goal 4 commits every single country to ensure inclusive and equitable quality education and promotion of lifelong learning opportunities for all through the accomplishment of ten targets. It recognizes the importance of knowledge, skills, attitudes and values for a sustainable future. Through Target 4.7, SDG 4 focuses on the content of education beyond reading and mathematics, and explicitly links education to the broader sustainable development agenda. It calls for equipping students with the knowledge and skills to foster sustainable development – for instance through education for sustainable development – as well as education for human rights, gender equality and the promotion of global citizenship [1]. This goal, however, cannot be achieved without having adequate quantity and quality of teachers to facilitate the acquisition of knowledge, skills, attitude and values amongst learners.

The distinctive characteristics of knowledge-based economy are its dependence on human capital inputs, on know-how and skill, competence and expertise. It is for this reason that there is a shift from traditional content (knowledge)-based teaching to Competence-Based Teaching and Learning (CBTL). Research has also shown that content-based teaching and learning is based on the rote memorization of factual knowledge while competence-based teaching and learning focuses on understanding the concepts, skills and competencies which in turn calls for changes in teaching, learning and assessment approaches. These findings are crucial especially for the purpose of aligning teacher requirement with enrolled student population rates in schools. The adoption of competence-based teaching and learning offers a promise for improvement of quality of education [2]. However, quality of education is dependent on provision of key educational resources such as adequate number of teachers.

II. Literature Underpinning

Adoption of the Competence Based Curriculum

Kenya's major curriculum reforms necessitated by deliberations between the Education Commission and the government were experienced in 1985. This saw the country's education structure and curriculum changed from 7 years of primary education to 8; from 6 years of secondary education to 4; and from a minimum of 3 years of university education to 4, hence the 8.4.4 system [3]. This has, however, over time, been met with a lot of criticisms with most Kenyans opining that it is of importance to adopt a Competency-Based Approach (CBA) that would promote application rather than mere acquisition of knowledge. According to the Report on Needs' Assessment for Secondary Level Curriculum in Kenya [4], Kenyans expressed the desire to have a curriculum that empowers learners with 21st century skills to help them thrive rather than survive in this era. Based on this feedback, Kenya Institute of Curriculum Development (KICD), proposed to adopt a Competency-Based Curriculum (CBC) approach in the reforms. In view of Kenya being a signatory to the United Nations' Sustainable Development Goals (SDGs) that were unveiled in 2016, general education and specifically the curriculum that learners interact with will play a major role in helping Kenya achieve her Vision 2030. Competency Based Curriculum therefore provides an excellent opportunity to align the education sector to the SDGs [5].

Current Status of Teacher Resources

As curriculum reforms gain momentum in Kenya, it is important to note that the national needs assessment study carried out by Kenya Institute of Curriculum Development in 2016 found out that the current scenario in Kenya paints a picture of scarcity of educational resources. Among these resources is inadequacy of teaching staff that has immensely contributed to poor delivery of the 8.4.4 system of education and access to quality education. This implies that unless there are efforts to provide such resources, there will be no assurance of provision of quality education promised by Competency Based Curriculum. Curriculum development is a complex and gradual process; there are no quick-fixes. To this effect, Kenya's Basic Education Curriculum Framework is the outcome of extensive stakeholder engagement, a national needs assessment study, deliberations from a national curriculum reform conference and several benchmarking studies. This framework has therefore been developed to actualize the new reforms in education in Kenya as the country embraces the new education system, namely 2.6.3.3 [6]. The new curriculum structure follows 2 years of pre-primary, 3 years of lower primary, 3 years of upper primary, 3 years of lower secondary, 3 years of senior secondary and 3 years of tertiary education [7].

However, these reforms have implications on teacher requirements in both primary and secondary schools. The Competency Based Curriculum has been successful in Finland because of increased contact between teachers and pupils due to low Pupil Teacher Ratio (PTR) [8]. Table 1 shows PTR in countries that have successfully adopted CBC in comparison to the PTR in Kenya.

Table 8: Teacher-Pupil Ratio in Countries with Competency Based Curriculum

SN	Country	PTR in Primary	PTR in Secondary
1	Canada	17	19
2	China	17	13
3	England	15	19
4	Finland	13	13
5	Ghana	27	16
6	Malaysia	12	12
7	Singapore	15	12
8	South Africa	30	27
9	South Korea	16	14
10	Kenya	41.5	41.1

Table 1 indicates that most countries where CBC has succeeded have low pupil teacher ratios. Finland for instance, the country with the best education system in the world, has a pupil teacher ratio of 13:1 in both primary and secondary schools [8]. The rolling out of CBC in Kenya is as a result of benchmarking in the countries shown in Table 1 for which Kenya on the contrary, has the highest PTR of 41:1 [9].

Findings of studies by Makunja [10] and Muneja [11] have demonstrated that overcrowded classrooms, high PTR and heavy work load for teachers have hampered effective implementation of competence-based curriculum in Tanzania. While the adoption of competence-based teaching and learning offers a promise for improvement of quality of education [1], inadequacy of educational resources still remains a widely recognized barrier by scholars to effective implementation of the curriculum. It was therefore important to establish the teacher requirement that would enable Kenya to effectively implement CBC hence providing quality education

to the citizens by the year 2030. To achieve this, a preliminary survey was deemed necessary in determining the current status of teachers in Siaya County as shown in Table 2.

Table 2: Current Status of Teacher Resources in Primary and Secondary Schools in Siaya County

Sub-county	Primary School Teachers			Secondary School Teachers		
	No. of Schools	TSC	BOM	No. of Schools	TSC	BOM
Siaya	133	1282	130	50	534	340
Bondo	128	1089	248	39	512	315
Gem	119	1127	83	47	547	332
Rarieda	119	996	74	47	486	199
Ugenya	86	830	150	31	346	217
Ugunja	71	704	47	24	293	198
Total	656	6028	732	238	2718	1601

Based on the enrolment in primary and secondary schools in Siaya County, the Pupil Teacher Ratio in primary schools in the county was 44:1 while the Pupil Teacher Ratio in secondary schools in the county is 62:1. To curb the problem of teacher shortage, the Boards of Management in primary and secondary schools in Siaya County had resorted to hiring BOM teachers. These results concur with findings of a study by Munyasia [12] on influence of board of management teachers' wage bill on provision of quality education in Gem sub-county, Siaya, which established that schools in Siaya County had hired teachers under the boards of management terms and that wages for these teachers were being drawn from the vote heads meant for improvement of school infrastructure.

Projecting Teacher Requirement for Provision of Quality Education

Teacher resources is a vital input into the education process as teachers are responsible for the delivery of the curriculum and hence are critical in determining the quality of education [13]. Every education system is only as good as the teachers who provide the hands-on schooling. Study after study has confirmed their critical role in improving education quality and learning outcomes, which is why SDG 4 calls specifically for a major increase in the supply of qualified teachers and more support from the international community for teacher training in developing countries [14].

Knowing how many teachers are needed in a system is crucial in advancing its success [15]. Predicting the number of teachers is based on estimated demand for schooling considering the school age population, gross enrolment rate and average pupil teacher ratio. It is then necessary to estimate number of new teachers needed as a result of additional positions and teacher attrition in both private and public schools [16]. Projections are based on the assumption that the past trends will continue to operate in the future and are usually extrapolations of past and present population trends into the future [17].

The number of primary teachers in Sub-Saharan Africa may have to rise by 68 percent, from 2.4 to four million in the period from 2006 to 2015 in order to meet the requirements of providing universal primary completion [16]. Even where there are sufficient teachers, they are not always employed where they are most needed, or specialized in the appropriate subjects. As secondary education continues to grow around the world, there will likely be high demand for secondary teachers especially in the Science, Technology and Engineering and Mathematics (STEM) subjects [15]. Knowing how many teachers are needed is crucial to understanding the labor market needs and thus ensuring that every community has access to a sufficient supply of well-qualified teachers. One of the biggest challenges in estimating demand is navigating the difference between ideal demand and actual demand.

Estimating teacher demand means forecasting the number of teachers necessary to teach the forecasted number of pupils. According to ILO [18], the number of teachers needed is not only dependent on the number of pupils but also on system efficiency and how teachers are deployed to meet education quality and equity goals. It was observed that teacher requirement depends on three main factors: the number of people to be taught (enrolment), the relationship between the number of people to be taught and teachers (pupil teacher ratio) and the number of new teachers needed to replace those leaving the profession.

In Kenya, teachers' recruitment and deployment is done by the Teachers Service Commission (TSC). The TSC was established by the TSC Act CAP 212 of the Laws of Kenya [19]. Since its inception in 1967, TSC had been employing teachers through supply-driven process. It was until 1998 when the government of Kenya froze teacher recruitment as a cost cutting measure. Consequently, there was understaffing in schools. This led to adoption of demand driven policy on teacher recruitment in 2001 [20]. Under demand-driven teacher recruitment policy, the government has been employing limited number of secondary school teachers annually [21].

Following the introduction of the Free Primary Education (FPE) in 2003 in Kenya, there was upsurge in enrolment, which together with freezes in teacher recruitment has resulted to high PTR hence exerting pressure on the human resource [22]. A sufficient supply of teachers should be available to meet the expected increase in students' enrolment in primary schools as a result of increased enrolment in primary schools due to the free primary education. Demand for primary school teachers is likely to increase as a response to demographic changes, growth in the private school sector, and increased recruitment associated with higher flows out of teaching due to retirement [13].

Methods Used in Projection of Teacher Requirement

Enrolment statistics forms the basis for many investment decisions in education. A teacher is the most important academic input especially at the primary level and teacher's salaries accounts for a major share of recurring expenditure on education. Projections on requirements of teachers follow enrolment projections. The most commonly used methods of teacher projections are pupil teacher ratio and method based on the number of pupils per class and hours taught by a teacher [12].

Pupil Teacher Ratio Method

The pupils-teacher ratio method calls for a calculation based on the pupil-teacher Ratio formula. In projecting teacher requirements, the base year ratio is computed, and on the basis of resources available, the pupil-teacher ratio is projected or fixed in the future. While taking into account the total additional requirement of teachers, one should consider the rate of replacement of teachers. The steps for projecting teacher requirements can be divided into two parts: Calculating the total number of teachers required and calculating the net additional teachers required during the year. Net additional requirement of teachers is then obtained by considering the annual replacement of teachers on account of attrition like death, resignation, retirement among other things, on the part of teachers. Calculations are based on the following pupil-teacher ratio formula:

$$T_s^t = \frac{E_s^t}{R_s^t}$$

Where T_s^t = Number of teachers at a particular time (t) and for particular stage or school (s); E_s^t = Enrolment at particular time (t) for particular stage or school (s); and R_s^t = Teacher-Pupil Ratio at a particular time (t) for particular stage or school (s).

One of the basic assumptions of this method is that it is the number of students and not their grade distribution which is important. The distinction between stage and school needs to be carefully noted. For stage-wise enrolment, stage-wise teachers are required for calculating teacher-pupil ratio. This method, though very simple, is suitable for making projections mainly at the primary stage of education where specialized teaching is not a norm. For other stages of education, this method is not suitable.

According to Teachers' Service Commissions staffing manual of 2008, deployment of teachers in primary schools is based on an establishment of one teacher per class plus 2.5 percent of the total number of teachers in a sub-county. This is applied while at the same time maintaining the official PTR of 40:1. Therefore the estimation factor of establishing the projected primary school teachers required each year is total enrolment in a year divided by 40 and then add 2.5% which is summarized as $(N/40) + 2.5/100 * N/40$ where N stands for total enrolment.

Method Based on Number of Pupils per Class and Hours Taught by Teacher

This is a method used for projections of teacher requirements in the future. It takes into account the size of the class, the number of hours the students receive instructions per week and the number of hours taught by a teacher per week. This method requires a number of information which includes enrolment at every grade; average number of hours per week for a student as per the time-table; average number of students taught at the same time by one teacher; and average number of student-hours per week taught by a teacher. According to this method, the requirement of teachers is determined by the following procedure:

$$T = \frac{E \times H_s}{R \times H_t}$$

Where T = Number of teachers required; E = Projected enrolment; R = Average number of students per teacher or per instructional group or size of average class; H_s = Average number of weekly hours per student which is generally prescribed in the school curricula; and H_t = Average number of weekly hours per full-time teacher. The above equation is very useful for planning purposes. All the different factors can be planned, as none of them is constant. In this equation, the number of teachers required is directly proportional to the number of pupils and the average weekly hours per student. If the number of hours taught per week by the teacher is equal

to the number of hours of teaching required by the students, the equation will become simple and identical to the PTR method:

$$T = \frac{E}{R}$$

In case, the authorities decide the teacher-pupil ratio or the same is prescribed as a norm, then the method presented above may not be used to work out the number of teachers. Naturally, the educational administrator will consider certain factors, such as the immediate past trend in teacher-pupil ratio, logic for increased or reduced ratio, their financial implications and availability of funds.

According to TSC staffing manual of 2008, deployment of secondary school teachers in Kenya is according to the curriculum Based Establishment. Each teacher is required to teach a minimum of 27 lessons per week translating to 18 hours in a week. Each stream of a class has at least 9 lessons of 40 minutes translating to 30 hours in a week. Institutional administrators are however allocated a lower work load to allow them more time for administrative duties. This is done while at the same time striving to achieve the official PTR of 40:1. The estimation factor for the projection of secondary school teachers' required in a year is generated as follows: one stream is allocated 30 hours in a week while one teacher covers 18 hours per week giving a factor of $(30/18 * N/40)$ which is summarized as $(1.667 * N/40)$ where N is the total secondary schools enrolment in a given year [23].

In Kenya, there was a general increase in PTR from 34 in 2002 to 45 in 2008 nationally in primary schools. Oloo [24] revisits the Republic of Kenya's (2005C) observation that there was need to urgently implement the TSC teachers staffing norms of 2005 that recommended balancing of teachers and decentralization of teachers recruitment for primary and secondary levels of education in Kenya and that that would allow the government to distribute primary school teachers across regions based on the recommended PTR 45:1 for high potential and 25:1 for ASAL regions. TSC came up with a manual of staffing functions in 2008 from a research done in 2005 which stipulated that in primary schools, there would apply two scenarios where first, one teacher per class plus 2.5 percent with no provision for administrative allowance and a second one of PTR of 45: 1 in high potential areas and 25:1 in low potential areas with provision of 0.75 full time equivalent administrative allowance [24]. The study also analyzed two scenarios for the secondary schools with the first based on the existing staffing norm where the weekly work load per teacher was 27 lessons (18 hours) per week of student- teacher contact time and second scenario which was based on the recommended staffing norm where the weekly work load per teacher was 30 lessons (20 hours) per week of student teacher contact hour.

The projection done for both primary and secondary schools is shown in Table 3.

Table 3: Teacher Requirement for Schools in Kenya

Teacher requirements in primary schools			
Primary schools	Teachers on Duty	Projected Total	Gap
Scenario 1 (PS1)	170, 611	215, 791	45,180
Scenario 2 (PS2)	170, 611	193, 350	22, 739
Teacher requirements in secondary schools			
Secondary schools	Teachers on Duty	Projected total	Gap
Scenario 1 (SS1)	57,209	65,609	8,400
Scenario 2 (SS2)	57,209	63,139	5,900

Source: ROK (2005c)

Table 3 indicates that scenario 1 would project teacher requirement for primary schools to be 215,791 in 2005 giving a shortage of 45, 180 teachers while scenario 2 gave a projection of 193,350 teachers in 2005 giving a shortage of 22,739 teachers. The table also indicate secondary school teacher requirement using scenario 1 as 65,609 teachers giving a shortage of 8,400 teachers whereas scenario 2 projected 63,139 teachers giving a shortage of 5,900 teachers in 2005. There are many ways of determining teachers staffing requirements. Some of these norms include Curriculum Based Establishment (CBE), Pupil-Teacher Ratio (PTR), Subject Cluster, Number of Teachers per Class, and Class Size. Secondary school teachers staffing needs in Kenya are determined based on the CBE [21].

Both Oloo [24] and Wamukuru [25] projected teacher requirement at the national level. However, these two projections on teacher requirement are too general and do not consider the regional disparities in distribution of teachers. A critical challenge, according to Republic of Kenya [5], relates to teachers' availability. In Kenya, there is inequitable distribution of teachers at the primary school level. There are also regional inequalities. The projections at the national level are based on the average teacher requirement in the country and may not give the exact number of teachers that each county requires hence the disparities and inequalities. This study therefore projected teacher requirement in primary and secondary schools in Siaya

County by determining the exact number of teachers required in each of the six sub-counties and summing them up to come up with teacher requirement at the County level by 2030.

III. Materials and Methods

The study used descriptive research design and trend analysis [27] of past time series of important indicators like population size and structure, demographic trends, enrolment and government policies on education. Descriptive survey design was suitable for this study because it enabled collection of data in detail and description of human capital requirement in relation to provision of quality education in primary and secondary schools in Siaya County.

The study was conducted in Siaya County which comprises six sub-counties namely Siaya Bondo, Gem, Rarieda, Ugenya and Ugunja. Siaya County was picked because of inadequacy of human capital in the wake of implementation of 2.6.3.3 system of education. The target population comprised of all 6-17 years old population which was 339, 251 according to 2019 census. This population was 234, 382 in primary schools and 104, 869 in secondary schools according to 2019 census results [28]. Purposive sampling was used to select TSC county human resource officer, TSC sub-county directors, MOE sub-county directors of education, County Quality Assurance and Standards Officer Siaya and an officer from Kenya National Bureau of Statistics.

Data collection was done by use of Data Analysis Proformas and Key Informant Interview (KII) guides. Reference was made to past projection studies and the relevant data collection forms generated by Ministry of Education – Education Management Information System (MOE –EMIS) section in Kenya to develop the Data Analysis Proformas. The selection of the data analysis proforma and key informant interview guide was guided by the nature of data that was supposed to be collected, the time available for research as well as objectives for the study.

Data Analysis Proforma for the Kenya National Bureau of Statistics (DAPKNBS) sought information on population estimates for school age population (6-17 years) in Siaya County from 2016 to 2020. This information was used by the researcher to project school age population for primary (6-11 years), junior secondary (12-14 years) and senior secondary (15-17 years) in the six sub-counties in Siaya County for the period 2021 to 2030 using the compounded growth rate method. There were two Data Analysis Proformas for the Ministry of Education. Data Analysis Proforma for Ministry of Education Primary Enrolment (DAPMOEPE) sought information on total enrolment from 2016 to 2020 per sub-county in primary schools. Data Analysis Proforma for Ministry of Education Secondary Enrolment (DAPMOESE) sought information on total enrolment from 2016 to 2020 per sub-county in secondary schools. These two proformas were also used to seek information on total enrolment from 2016 to 2020 at the county level. This data was used by the researcher to project students' enrolment in primary, junior and senior secondary school in the six sub-counties in Siaya County for the period 2021 to 2030 using the Enrolment Ratio Method.

Data on school age population and enrolment in primary, junior and senior secondary schools enabled the author to establish teacher requirement in primary, junior and senior secondary schools in Siaya County by 2030. The Data Analysis Proforma for Teachers Service Commission (DAPTSC) sought information on the current number of teachers and number of schools per sub-county. This proforma was also used to seek information on number of teachers and schools at the county level. Data on current number of teachers per sub-county enabled the author to establish the additional number of teachers required in primary and secondary schools Siaya County by 2030. Collection of the same data set at the sub-county level and the county level was meant to enable triangulation.

Key Informant interview (KII) guide was also used for the TSC county HRO and as opined by Creswell [29], individual interviews can take different forms i.e. face-to-face, one-on-one, in person interview or telephone conversations (p. 178). The KII Guide for TSC County Human Resource sought information on the major causes of teacher shortage in Siaya County, measures put in place to retain teachers in the county and measures put in place to ensure that the current shortage of teachers in the county does not affect provision of quality education.

The number of projected primary school teachers required each year was obtained by taking projected total enrolment in a year divided by 40 and then add 2.5% which is summarized as $(N/40) + 2.5/100 * N/40$ where N stands for total projected enrolment. For secondary schools, the estimation factor for the projection of teachers' required in a year was generated as follows: one stream is allocated 30 hours in a week while one teacher covers 18 hours per week giving a factor of $(30/18 * N/40)$ which is summarized as $(1.667 * N/40)$ where N is the total secondary schools enrolment in a given year [23].

IV. Results and Discussion

The objective of this paper was to project teacher requirement in primary and secondary schools in Siaya County by the year 2030. According to Teachers service commissions staffing manual of 2008, deployment of teachers in primary schools is based on an establishment of one teacher per class plus 2.5 percent

of the total number of teachers in a sub-county. This is applied while at the same time maintaining the official PTR of 40:1. Therefore the estimation factor of establishing the projected primary school teachers required each year is total enrolment in a year divided by 40 and then add 2.5% which is summarized as $(N/40)+2.5/100*N/40$ where N stands for total enrolment.

According to TSC staffing manual of 2008, deployment of secondary school teachers in Kenya is according to the curriculum Based Establishment. Each teacher is required to teach a minimum of 27 lessons per week translating to 18 hours in a week. Each stream of a class has at least 9 lessons of 40 minutes translating to 30 hours in a week. Institutional administrators are however allocated a lower work load to allow them more time for administrative duties. This is done while at the same time striving to achieve the official PTR of 40:1. The estimation factor for the projection of secondary school teachers' required in a year is generated as follows: one stream is allocated 30 hours in a week while one teacher covers 18 hours per week giving a factor of $(30/18 * N/40)$ which is summarized as $(1.667*N/40)$ where N is the total secondary schools enrolment in a given year [23]. Applying the above formulae to the projected enrolment, the author projected teacher requirement for primary and secondary schools in the six sub-counties in Siaya County. Table 4 shows the projected teacher requirement in primary schools in Siaya County.

Table 4: Projected Teacher Requirement for Primary Schools in Siaya County by 2030

Year	Siaya	Bondo	Gem	Rarieda	Ugenya	Ugunja	Siaya County	Trend (%)
2021	1524	1153	1250	1065	948	719	6659	
2022	1537	1152	1275	1093	975	749	6782	1.85
2023	1339	990	1122	963	859	670	5942	-14.14
2024	1224	918	1026	877	699	610	5354	
2025	1230	921	1051	900	704	634	5440	
2026	1236	925	1077	924	709	657	5528	
2027	1241	928	1103	948	714	668	5602	
2028	1246	930	1130	973	718	700	5698	
2029	1251	932	1158	999	723	726	5788	
2030	1255	934	1186	1024	727	752	5879	
Trend (%)	2.53	1.82	15.59	16.80	4.10	23.23	9.81	

Table 4 shows projected primary teacher requirement in the six sub-counties of Siaya County for the period 2021 to 2030. Due to the projected increment in enrolment in primary schools between 2021 and 2022, the number of teachers required in the county is projected to increase by 1.85% from 6,659 in 2021 to 6,782 in 2022. This teacher requirement is however projected to decrease by 14.14% from 6,782 in 2022 to 5,942 in 2023. This will be as a result of transition of the 12-year-old school population to junior secondary schools hence a reduction in primary school enrolment in the year 2023. Under the 2.6.3.3 system of education, teacher requirement for primary schools in Siaya County is projected to increase by 9.81% from 5,354 in 2024 to 5,879 in 2030. Teacher requirement in primary schools in Siaya, Bondo, Gem, Rarieda, Ugenya and Ugunja sub-counties is projected to increase by 2.53%, 1.82%, 15.59%, 16.8%, 4.10% and 23.23% respectively between 2024 and 2030. Table 5 shows the current staffing in primary schools in Siaya County.

Table 5: Staffing in Primary Schools in Siaya County in the Year 2020

Sub-county	No of schools	Curriculum Base Establishment	Teachers on Duty	Teachers on Duty (%)	Teacher shortage	Teacher shortage (%)
Siaya	133	1485	1282	86.3	203	13.7
Bondo	128	1331	1089	81.8	242	18.2
Gem	119	1441	1127	78.2	314	21.8
Rarieda	119	1156	996	86.1	160	13.9
Ugenya	86	905	830	91.7	75	8.3
Ugunja	71	748	704	94.1	44	5.9
Siaya County	656	7066	6028	85.3	1038	14.7

Source: TSC Siaya County office, 2020

Table 5 shows that the highest shortage of primary school teachers (21.8%) in Siaya County is in Gem sub-county. Teacher requirement in Siaya County is projected to reach 6659 in the year 2021. The Teachers on Duty in 2020 are 6028. This implies that 631 teachers need to be employed in the county by the end of the year 2020 to address the teacher shortage in the county. However, there is a shortage of 1038 teachers in the county

as indicated in Table 5. This clearly indicates that there are very many primary schools in Siaya County with few enrolled pupils hence putting more pressure on the teacher requirement. The low enrolment in primary schools leads to under-utilization of teachers.

However, the current shortage of teachers in the county is estimated to only last up to the year 2022. In the year 2023, the teacher requirement in the county will be 5,942. If the county maintains 6,028 teachers employed by the Teachers' Service Commission, then there will be no shortage of teachers in 2023. However, mechanisms need to be put in place to address the current teacher shortage so that it does not affect the quality of education in both the 8.4.4 and the 2.6.3.3 systems of education. As the Teachers' Service Commission deploys primary school teachers who have met the requirements of teaching in secondary schools across the country, it should do so in phases and also recruit more intern teachers to temporarily curb teacher shortage in primary schools between the years 2021 and 2022 and also manage the transition crisis in junior secondary schools in the year 2023. The intern teachers can be offered permanent employment in the year 2023. This will cut on costs of education without compromising quality of education both at the primary and junior secondary levels of education. Projected teacher requirement in junior secondary schools in the six sub-counties is shown in Table 6.

Table 6: Projected Teacher Requirement for Junior Secondary Schools by 2030

Year	Siaya	Bondo	Gem	Rarieda	Ugenya	Ugunja	Siaya County	Trend
2021	886	837	945	799	618	597	4682	%
2022	955	906	1034	866	683	650	5092	
2023	1357	1120	1158	1024	1058	751	6466	38.10
2024	1775	1436	1494	1318	1384	976	8383	
2025	1867	1483	1554	1373	1484	1030	8790	87.73
2026	1654	1298	1352	1196	1332	906	7739	
2027	1445	1118	1160	1030	1164	792	6709	-13.32
2028	1221	940	977	871	989	670	5668	
2029	1285	975	1018	910	1057	708	5953	
2030	1353	1011	1060	950	1127	747	6248	10.23
Trend (%)	52.73	20.83	12.19	18.88	82.25	25.04	33.44	

Table 6 shows the projected teacher requirement for junior secondary schools in the six sub-counties. As junior secondary schools admit grade 7 students in 2023, there will be the 8.4.4 students in the same schools. Teacher requirement in junior secondary schools in Siaya County is projected to increase by 38.10% from 4,682 in 2021 to 6,466 in 2023. In 2024 and 2025, the double intakes (Form ones under 8.4.4 and Grade 7 under 2.6.3.3 systems of education) will increase the teacher requirement from 6,466 in 2023 to 8,790 in 2025. This is an equivalent of 87.73% increment in teacher requirement between 2021 and 2025. The teacher requirement in the county will however decrease by 13.32% from 7,739 in 2026 to 6,709 in 2027. This will be as a result of the exiting of all the 8.4.4 students in 2027. In 2028, only the junior secondary school age population will be in junior secondary schools. Teacher requirement will therefore increase by 10.23% from 5,668 in 2028 to 6,248 in 2030. Teacher requirement in junior secondary schools in Siaya County is therefore projected to increase by 33.44% from 4,682 in 2021 to 6,248 in 2030. By 2030, increment in teacher requirement will be highest in Ugenya sub-county at 82.25% and lowest in Gem sub-county at 12.29%. Table 7 shows the staffing in secondary schools in Siaya County in the year 2020.

Table 7: Staffing in Secondary Schools in Siaya County in 2020

Sub-county	No of schools	Curriculum Base Establishment	Teachers on Duty	Teachers on Duty (%)	Teacher shortage	Teacher shortage (%)
Siaya	51	889	534	60.1	355	39.9
Bondo	41	860	512	59.5	348	40.5
Gem	47	748	547	73.1	201	26.9
Rarieda	48	890	486	54.6	404	45.4
Ugenya	32	566	346	61.1	220	38.9
Ugunja	24	535	293	54.8	242	45.2
Siaya County	243	4488	2718	60.6	1893	39.4

Source: TSC Siaya County office, 2020

There are currently 2,718 teachers employed by TSC and teaching in secondary schools in Siaya County. Table 7 shows that the teacher shortage in secondary schools in Siaya County is 39.4%. These findings concur with findings of a study by Munyasia [12] on influence of Board of Management teachers' wage bill on provision of quality education in Gem sub-county, Siaya which found that public secondary schools in Gem sub-County had a shortage of TSC teachers. The shortage of 39.4% means that Boards of management for secondary schools in Siaya County have to hire 39.4% of the total teaching force. Expenditure on wage bill of BOM teachers hampers the expansion of educational facilities as the funds meant for expansion are being used to pay teachers hired by Boards of management [12]. Teacher requirement in junior secondary schools in Siaya County is projected to reach 8,790 by 2025 as schools in the county admit students at junior secondary level. There are currently 2718 teachers in secondary schools in Siaya County. This is just but 30.92% of the teachers required in junior secondary schools by 2025. Qualitative data from the Key Informant Interview guide for TSC county human resource officer revealed that the ever-increasing enrolment in schools due to 100% transition policy does not match the TSC rate of employing teachers hence causing teacher shortage in the county. One of the major causes of teacher shortage in Siaya County according to TSC county human resource officer is lack of teachers trained in technical subjects like drawing and design, Agriculture, Computer studies and sciences. Schools with vacancies in these subjects have failed to get teachers even after TSC advertising these subject combinations.

Qualitative data from the Key Informant Interview guide for TSC county human resource officer on causes of teacher shortage in the county also indicated that accessibility to some schools in the sub-counties makes staffing a challenge hence leading to teacher shortage. Posting of teachers to schools across Mageta Island, which is in Bondo sub-county has proved a challenge as some teachers end up turning down the employment offer. As secondary schools implement the competency-based curriculum, universities should endeavor to train enough teachers to teach technical and science subjects in secondary schools in Kenya. Table 8 shows the projected teacher requirement for senior secondary schools in Siaya County by 2030.

Table 8: Projected Teacher Requirement for Senior Secondary Schools by 2030

Year	Siaya	Bondo	Gem	Rarieda	Ugenya	Ugunja	Siaya County
2026	830	894	1074	827	696	528	4849
2027	877	959	1157	882	754	561	5190
2028	926	1027	1242	939	815	594	5543
2029	976	1098	1330	997	877	629	5908
2030	1028	1172	1421	1058	943	665	6286
Trend (%)	23.78	31.10	32.23	27.95	35.49	25.96	29.63

The first class under the 2.6.3.3 system of education will be admitted in Grade 10 in the year 2026. However, senior secondary schools shall continue hosting the 8.4.4 students till the year 2027. Teacher requirement in senior secondary schools in Siaya County is therefore projected to increase by 29.63 % from 4,849 in 2026 to 6,286 in 2030. Projection of teacher requirement in junior secondary schools indicates that by 2030, Siaya County will need 6,248 teachers to teach in junior secondary schools. The teacher requirement in junior and senior secondary schools in Siaya County by 2030 will therefore stand at 12,534. The 2718 teachers in secondary schools in Siaya County therefore constitute 21.69% of the total teacher requirement by 2030. The Teachers' Service Commission therefore needs to plan to hire 9,816 teachers for both junior and senior secondary schools in Siaya County by 2030. Failure to provide adequate number of teachers will compromise the education standards in the county. Figure 1 shows the projected teacher requirement for primary, junior and senior secondary schools in Siaya County by the year 2030.

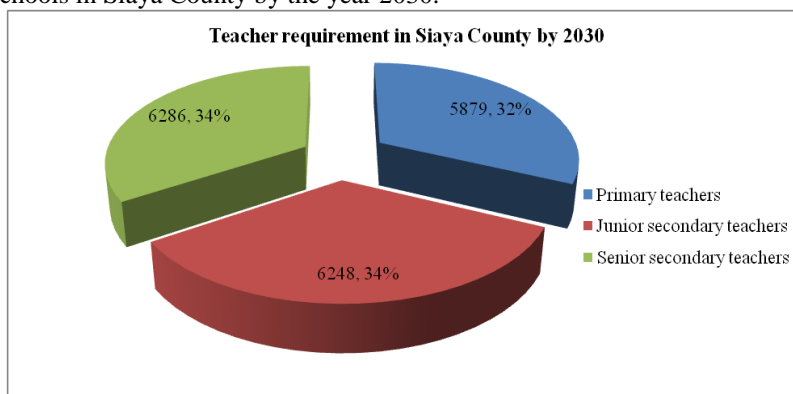


Figure 1: Teacher Requirement Projections in Siaya County by 2030

As shown in Figure 1, the total teacher requirement in primary, junior and senior secondary schools in Siaya County will be a total of 18,413 by the year 2030. Junior and senior secondary schools will each require 34% of the teaching force in Siaya County while primary schools will take 32%. Teachers' service commission should therefore plan to increase the teaching force in secondary schools in Siaya County in order to achieve quality education envisaged in Kenya vision 2030.

V. Conclusion and Recommendation

Teacher requirement in primary schools in Siaya County is therefore projected to increase by 9.81% from 5,354 in 2024 to 5,879 in 2030. Primary schools in Siaya County will therefore need 5,879 teachers by 2030 to enhance provision of quality education in the county. If the current number of teachers is retained (6028), there will be an excess of 149 teachers in primary schools in Siaya County by 2030. Junior secondary schools in Siaya County require 6,248 teachers to enhance provision of quality education by 2030. Senior secondary schools in the county require 6,286 teachers to handle the various pathways under the 2.6.3.3 system of education. There are currently 2,718 teachers employed by TSC in secondary schools in Siaya County. If the current number of teachers is retained, there will be a shortage of 9, 816 teachers in junior and senior secondary schools in Siaya County by 2030.

Based on the above, this paper recommends that the Teachers' Service Commission should gradually deploy the 149 primary school teachers who have acquired Bachelors of Education to teach in junior secondary to avoid under-utilization of teachers in primary schools in Siaya County by 2030. TSC should also have a plan of employing an additional 9,816 teachers to teach in junior and senior secondary schools in Siaya County by 2030.

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