REPUBLIC OF KENYA

CEMASTEA

**Research & Development Knowledge Management (R&D KM)**

**POLICY BRIEF:**

# A BASELINE STUDY ON IMPLEMENTATION OF CBC IN STEM RELATED SUBJECTS IN JUNIOR SCHOOLS

In the year 2023 schools admitted the first batch of learners in Junior School (JS). Learners were expected to have acquired certain Knowledge, skills and attitudes at primary school level as a prerequisite for learning STEM related subjects at JS. This formed the entry behaviour that the learner was required to demonstrate as they join the next level of education. Teachers and headteachers are handling learners at JS for the first time. Learners, teachers and the headteachers have a shared responsibility with the school to provide an enabling environment that is conducive to learning and which motivates the learner to achieve their full potential. Competencies learnt at JS will enable learners to join career pathways of their interest and have the best competencies in at senior school (SS) level. This will produce manpower that is rich with skills to fast-track the achievement of vision 2030 and the global Sustainable Development Goals (SDGs).

## What was the issue?

This policy brief has been developed for "A BASELINE STUDY ON IMPLEMENTATION OF CBC IN STEM RELATED SUBJECTS IN JUNIOR SCHOOLS. The focus of the study was to address the following research objectives:

a) To establish learners' attitudes towards STEM related subjects in Junior School
b) To determine teacher's ability to implement formative assessment to support learning in STEM related subjects
c) To establish the extent of pedagogical leadership support in implementation of CBC in JS.

d) To establish the status of learning facilities that support STEM related subjects.

The objective of this policy brief is to position the research work and findings within the broader policy context, including policy strategies and inform decision- making processes.

**Justification of the study**

Learners attitude towards learning is influenced by teachers' pedagogical approaches, learning resources and pedagogical leadership practices. In STEM related subjects, learner-centred pedagogical approaches, adequate provision of learning resources and efficient pedagogical leadership is necessary for effective learning. Since JS is domiciled at primary school for the first time in Kenya perhaps no studies have examined how learners' attitude, learning resources, and teacher's pedagogical approaches, would influence the learning of STEM related subjects. The findings of this study will provide insights on how teachers can mentor learners on how to improve their competences as they go through JS. The study will guide CEMASTEA to develop interventions for in-service training programmes for teachers and headteachers. Further, the study outcome will provide useful information to policy makers and other stakeholder in the education sector concerning any gaps related to teachers and school infrastructure necessary for implementation of STEM education at JS.

## Key Findings and Recommendations from the Research

**Objective 1:**

**To establish learners' attitudes towards STEM related subjects in Junior School**

**Findings**

1) Integrated Science was the most liked subject among Science-related subjects with 41.5% of learners selecting it as their favourite.

*Recommendation*

a) Teachers need to sustain this 'liking' of science-related subjects by supporting learners to apply science knowledge in their daily activities,

making science lessons interesting, easy to understand and relating science to STEM pathway and future careers.

2) Over 70% of learners agreed with the presuppositions about learning Mathematics indicating that the majority had a favorable attitude towards the subject.

*Recommendation*

*a)* Teachers need to sustain this 'liking' of Mathematics by helping learners apply mathematics knowledge in daily/real life activities/experiences, making mathematics lessons interesting, easy to understand, and supporting learners to meet expectations in mathematics performance.

*3)* The least liked subjects among Science related subjects were Life Skills at 2.5% and Pre-technical at 8.1%.

*Recommendation*

a) To achieve the essence of JS there should be continuous support by teachers and parents to learners through mentor-ship and career guidance to understand the value of subjects offered that inform learners' career pathways or gain of intended competencies.

b) CEMASTEA should mainstream School visits and School Outreach program within its programs targeting all counties across the country to enhance teacher and learner mentorship.

**Objective 2:**

**To determine teacher's ability to implement formative assessment to support learning in STEM-related subjects**

**Findings**

1) Based on the lesson observation which focused on various performance indicators of a lesson delivery, a lesson delivery index was 2.7342 on a scale of 1 to 5. This is between fairly adequate.

*Recommendation:*

a) While the mean index indicates a baseline level of fairly adequate, the emphasis should be placed on continuous improvement to move towards the higher end of the scale. There is a need for professional development opportunities that target

pedagogical skills such as how to address learners' questions, misconceptions and reinforce learning at each step.

2) Lesson observation also indicated that 53.1% of teachers used lecture/teacher-centred method and did not encourage questions from learners or did it inadequately. Further, lesson observation revealed that teachers had challenges in implementing formative assessment in the classroom.during lessons to gauge learners' understanding of the concepts taught. This implies that teachers had challenges in implementing formative assessment in the classroom.

*Recommendations:*

a) There is a need for further training of teachers on CBA specifically on formative assessment to enhance the understanding of how assessment as and for learning needs to be done in the learning process.
b) Teachers require further support/training on how to elicit learners' ideas and how to address misconceptions from learners
c) Teachers require further training on strategies of engaging learners in meaningful activities/learning experiences during and after lessons.
d) TSC should use an affirmative approach when advertising for teachers to ensure more teachers of science related subjects are recruited.

3) Some of the newly recruited teachers are unfamiliar with CBC components, CBA, professional documents components and have challenges handling the learning process. According to teachers content in integrated science and pre-technical studies, is very technical to the teachers. Most teachers lack the pedagogical skills to integrate ICT into teaching and learning.

*Recommendations*

a) The teachers need to be trained regularly on ICT integration, formative assessment, and CBC components as well as be sensitized on professional documents.
b) There is need for school-based teacher support which will encourage teachers to form communities of practice and cluster lesson study to assist one another in CBC implementation.

c) On content delivery, Quality Assurance and Standards monitoring and evaluation unit, (QASO) should ensure that effective quality teaching and learning take place in all JSS schools in Kenya.

*4)* The CBC has many new and unique areas which were not there in the previous curriculum, such as integrated science, physical education and sports, pre-technical studies, performing arts, visual arts among others. Head-teachers and teachers expressed the need to be further grounded on the contents of these areas. Comments were, *"I didn't learn agriculture even in high school yet am teaching, I don't know how to go about teaching PE, I didn't do physics in high school, I don't know how I'll teach some topics in integrated science'*

*Recommendation*

a) Heads of Institutions require more capacity building on the various aspects of the competency Based curriculum and more particularly on Pedagogical content knowledge to be able to support the teachers.

b) The teachers require continuous in-service training and school-based support especially on areas they were not trained in or even did not pursue in their secondary school to effectively implement the CBC.

5) The interpretation of the CBC curriculum designs, planning of the CBC lesson plan with various new aspects, such as pertinent and contemporary issues and values, key inquiry question were other areas cited by participants as challenging.

*Recommendation*

a) Teachers need continuous training and school-based teacher support on pedagogical content Knowledge

**Objective 3:**

**To establish the extent of pedagogical leadership support in implementation of CBC in JS.**

**Findings**

1) Head-teachers have been trained on leadership strategies, learner management, resource mobilization, financial management and CBC but not much on mentoring novice teachers, especially with a higher academic qualification

than them. However, the level of application/support of the concepts trained varied from one head-teacher to the another.

*Recommendation:*

a) There is a need to provide head-teachers with continuous professional development opportunities to enhance the implementation of CBC in JSS, particularly training on various aspects of pedagogical leadership, such as mentoring novice teachers on quality lesson planning and implementation.

**Objective 4:**

**To establish the status of learning facilities that support STEM related subjects.**

**Findings**

1) From the group discussion with learners, a significant proportion of learners reported to dislike their schools because of;

i. *Unclean environment which includes dirty toilets, walls, dusty floors, leaking roofs and littered compounds*.

ii. *Fields not being adequate for sports*.

iii. Congested c*lassrooms, poor arrangements of seats and the physical learning environment*

*Recommendation*

a) To enhance learner appreciation of their schools, it is important to provide conducive school environment in terms of cleanliness, adequate toilets, well maintained classrooms, adequate field activities, interpersonal relationships and clear school rules.

b) MoE through QAS unit to follow up on implementation of guidelines on CBC seating arrangement in classrooms.

2) Only 16.78%, of public schools, either have a science room or get access to one when required. Availability/access and use of school resources and infrastructure is inadequate and both learners and teachers were unable to use the relevant instructional materials/content intended to develop the desired competencies at JS level.

*Recommendations:*

a) All classroom teachers handling JS learners should undergo short course training on improvisation and innovation of learning resources as a deliberate

effort geared towards jump-starting effective learning process for competency development.

b) Ministry of education together with the relevant government agencies and strategic stakeholders/partners should provide appropriate and sufficient school resources and infrastructure such as the science kit, drawing instruments and equipment career brochures and magazines among other basic resources. This could follow the manufacturer/publisher-direct-to-school distribution model/policy for efficiency and cost-effectiveness.

c) Digital resources like virtual labs should be availed to teachers as a supplement to the actual science rooms/science kits for lesson preparation. Teachers can use the same to simulate laboratory activities promoting deeper understanding of scientific knowledge. ICT offers affordance to both learners and teachers since the virtual content does not get depleted; it is self-paced and can be repeated over and over again without affecting the results.

3) 9.58% of JSS schools were more than 10km from TVET institutions especially in the rural areas. 37.13% of headteachers indicated that they don't know any TVET institution near their JSS, which could as well imply that such institution were not near their schools. Moreover, many JSS schools though near/neighbouring secondary schools had not made mutual agreements with the neighbouring secondary schools. Only 30.8% and 13.5% of schools had made mutual agreements on sharing integrated science and pre-technical studies resources respectively with TVETs or secondary schools. Lack of adequate resources compromised learning.

*Recommendation:*

a) Ministry of education at county level and other government agencies such as KEMI and CEMASTEA should proactively sensitize management teams (BoM/PTA) from both JSS and secondary schools on the need to adhere to MoE guidelines on institutional resource sharing.

4) The text books though being the main source of instructional content were not adequate. None of the subjects had a textbook-learner ratio of 1:1. The textbook-learner ratio even in the new learning areas such as pre-technical

studies, Physical education and sports. In SNE schools, textbooks had been distributed however they were not adapted to their specific needs.

*Recommendations:*

a) MoE should streamline the textbooks distribution policy to ensure timely delivery of the books directly to schools or at least to the sub-county level.
b) There is need to establish JS content hubs/repositories/clouds under the MoE/KICD/CEMASTEA/KISE websites as a stopgap measure for teacher's use in the process of textbooks distribution.

5) 56.9% of the digital resources in JS located in rural and semi-urban localities were not functional and those functional were rarely used.

*Recommendation:*

a) Regular monitoring and support of schools by the ministry of education to ensure regular maintenance of these digital resources for effective development of digital literacy skills as envisioned in CBC curriculum.

**Conclusions**

Capacity building and strengthening teachers are crucial in successfully implementing CBC content in Junior schools. This will equip teachers will relevant pedagogical content knowledge and skills, who will in turn mentor and guide learners towards STEM pathway as they proceed to senior school. Despite the induction, retooling and training of teachers in junior schools on CBC implementation, teachers still encounter challenges applying the requisite skills. These challenges are particularly pronounced in new content areas such as Pretechnical studies, Agriculture and Nutrition and Integrated Science. This is attributed to the fact that these areas were optional under 8-4-4- but now they are compulsory under CBC. This pushes teachers to teach areas that they have never learnt including during their secondary education. Efforts by the Ministry of Education, Sagas such as CEMASTEA and the Teachers Service Commission need to be concerted and focused to address these challenges comprehensively. By providing targeted school-based teacher support and resources improvisation, these efforts can help teachers overcome obstacles and achieve better results in CBC implementation.

**References**


1. Addisu S. G. | Maria P. (Reviewing editor) (2020). Factors affecting the attitudes of students towards learning English as a foreign language, Cogent Education, 7:1, DOI: 10.1080/2331186X.2020.1738184.
2. Ireri, E. M., Mukirae, N., & Otieno, M. (2022). Influence of Infrastructural Facilities and Staffing on Students' Academic Performance in National Secondary Schools in Kenya. *East African Journal of Education Studies*, *5*(2), 175-185.
3. Njurai, E and Ratemo, J. O. (2023). STEM Integration Model for Secondary Education in Kenya, *Journal of the Kenya National Commission for UNESCO*, *3* (1), 2958-7999.
4. Yan, Z., Li, Z., Panadero, E., Yang, M., Yang, L., & Lao, H. (2021). A systematic review on factors influencing teachers' intentions and implementations regarding formative assessment. *Assessment in Education: Principles, Policy & Practice*, *28*(3), 228-260.