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INVESTIGATING THE CRITICAL THINKING INDICATORS IN KENYA'S BASIC EDUCATION CURRICULUM

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ABSTRACT

There are numerous studies on critical thinking (CT), but only some, if any, have been done that relate CT indicators to classroom theory and practice, particularly in Kenya's basic education programs. This paper, therefore, was set to investigate a proposal by scholars and Kenyan education curricula reform reports infusing CT indicators in Kenya's basic education curriculum. The primary source of data included secondary reports from the curriculum reforms; Kenya Institute of Curriculum Development (KICD) reports (2017, 2019, and 2021), grade IV syllabus, secondary school science syllabus, and early education reports were used by the study to experiment with the model of CT integration. The data from reform reports were collected and analysed using a critical analysis/judgment model. The analysed categories were used to develop key theoretical propositions for the study. Theoretical propositions formed an explanatory theory that supported the analysis. From the analysis, all education reforms since independence have not recommended CT indicators as a teaching/learning goal for learners in Kenya's basic education curriculum. It is evident, therefore, that CT still needs to be developed in Kenya's basic education curriculum for learners in primary and secondary schools. If these learners are to become reflective and independent thinkers rather than passive recipients of information, then critical thinking must be infused into both the primary and secondary school curricula.

Keywords: Self-directed learning, Self-efficacy, Inquisitiveness, Remote-learning, Soft-skills, and Critical thinking.

INTRODUCTION

Learning goals at all educational levels tend to emphasise the development of critical thinking (CT) in teaching and learning. Policymakers and curriculum developers outlining the 21st-century competencies in many countries worldwide include CT as one of the core competencies, a skill many employers highly seek.

Critical thinking is constructive in this day and age when the impact of computers, the internet, and mobile technology raise the need for learners to be more discerning when reading, evaluating, and analysing virtual information readily available on artificial intelligence-enabled devices such as smartphones and computer-enabled web applications (Ennis, 2016; Hui, 2016; Namwambah, 2020).

So, what is non-critical thinking, and how different is it from critical thinking? Helpern (2003) describes non-critical thinking as 'automatic or non-directed thinking that needs little or no conscious evaluation and is not engaged for a specific purpose (Helpern, 2003). Non-critical thinking includes failing to support a conclusion with evidence, mere application, and rote memorisation. She argues that critical thinking connotes the reasoning that leads to a conclusion, the element of evaluating the thinking process, and aspects being considered in decision-making.

Critical thinking (CT) in this study is broadly defined as a skilful, reasonable thought that brings good judgment because it has criteria, is self-correcting, and is sensitive to a context given. Important and generalisable criteria for CT include strength, validity, reliability, consistency, evidence, relevance, and coherence.

Critical thinking involves self-correcting by focusing on one's thought processes to rectify and discover any challenge faced. Self-correcting toward individual improvement requires an active, persistent, and critical mind. It is sensitive to the context through the specific considerations of given circumstances, for overall configurations, untranslatability of different meanings, and any notable limitations in the thinking process (Ennis, 2016; Lai, 2011; Lipman, 1988).

Since independence in 1963, successive Kenya Governments have set up commissions and task forces to examine and assess the education status in the country and provide reports with recommendations on the best way forward. These have partly shaped and reformed the system of education to address or facilitate skilled workforce shortages, societal needs, and societal evils like ignorance, diseases, and poverty. Prominent scholars outside and in this country (Kenya) led those Commissions. Some of the main commissions of education and their recommendations since independence to the present include among other commissions; the 1999-Koech Report; the 1988-Kamunge Report; the 1982-Mackay Report; the 1976-Gachathi Report; 1972-Bessey report; and the 1964-Ominde report.

This paper analysed and assessed these reforms alongside the KICD 2016, 2017, 2018 & 2019 reports, the 2012-2013 task force reports on Kenyan education, the 8-4-4 and 2-6-6-3 or CBC education curriculums, and other reform reports on the education sector. From the analysis, the study provided a philosophical critique on the place of CT in teaching/learning in our basic education curriculum.

Commissions of Education reform report from Ominde in 1964 to Koech in 1999 articulated and developed national education goals (Kivuva, 2005; Namwambah, 2020; Ongesa, 2020). Most recommendations of these reforms were rejected or were partially implemented by the government due to the blunder by bureaucrats in education since 1963 to advise the government on the need for the reforms, what Kivuva (2005) called the punctuated treatment of Kenyan education where part of reforms was implemented and the other part (touching on core elements like creativity) was left out. Partial implementation of education reform reports with some key elements ignored such as critical thinking has been a significant setback since the onset of independence punctuated by government technocrats and policymakers (Amutabi, 2003; Basweti, 2019; Kivuva, 2005; Namwambah, 2020).

Education reform reports mainly focused on the curriculum implementation process, results, problem-solving and immediate challenges in the country, but, low key stakeholders and critical thinking that are highly needed for the 21st-century learner was ignored in the implementation and planning process either by policymakers or commission reform reports (Ongesa, 2020). The low-key stakeholders, according to the study and as commonly understood are students, parents, and teachers. Therefore, the government has used education for political reasons rather than for the academic progress of its citizens, hence failing to benefit the masses through those reforms (Basweti, 2019; Kivuva, 2005).

Kenyans were not happy especially with the reform of education in 1981, most specifically the recommendation to the creation of Moi University by the Mackay Commission as a technology-based university 1981, due to its inadequate facilities for training and unqualified staff (Amutabi, 2003). Other challenges were personnel with poor technological skills, unable to provide proper critical, technical, and creative skills in demand then. Critics argue that the school of medicine at the start produced incapable doctors who were only good for disease prevention but could not treat various diseases affecting those who were sick at that moment, thus, lacking critical skills in disease diagnosis and

treatment (Otiato, 2009). Education reform has been handled by politicians not as a technical process but as a political tool. Most education reforms were not to the satisfaction of low-key stakeholders (teachers, learners, and parents), more so the creation of the 8-4-4 curriculum by the Mackay Commission in 1982 (Amutabi, 2003). This is why Kenyan students, through their parents, flocked to universities and schools outside the country, mainly Ugandan schools and colleges, for 'A' level studies. For example, Makerere, Bugema, Busoga, and Kampala University were sought by many Kenyan students (Amutabi, 2003; Namwambah, 2020; Otiato, 2009).

Most Kenyans yearned to see a change in the 8-4-4 education curriculum/system though the handicap, according to the Kenyan government, is the resistance by teachers and parents and inadequate finance (Otiato, 2009). The proposed change of education curriculum was to replace the 8-4-4 curriculum, but parents and teachers did not accept that change (the Republic of Kenya, 2012). The government went ahead and introduced the 2-6-6-3 curriculum or Competency-Based Curriculum (CBC) (KICD, 2017) without the involvement of low-key and basic stakeholders (parents, teachers, and learners) and proper procedures.

Most teachers and even parents may not be aware of the expected content and development of the new curriculum because public participation in the sensitisation needs to be better done (Basweti, 2019). In the competency-based curriculum (CBC) or the 2-6-6-3, critical thinking is among the recommended seven core competencies (KICD, 2017) outlined to learners in basic education and beyond.

It is with great concern that learners at all levels of learning and especially those learners in primary and secondary schools, are to think before using their emotions (Ennis, 2018; Sande, 2020). This is important because those subjects which those learners presuppose to be difficult would be made part of their greatest thought to choosing. Ordinarily, in a classroom, thinking should be a collaborative process where learners would always know they are supposed to be in a learning community that shares common questions and concerns. The emphasis on the curriculum should be for learners to work together than compete, as witnessed with almost all curricula in Kenya, mostly the 8-4-4 curriculum and other curricula before the CBC was introduced (Basweti, 2019; Namwambah, 2020). Although CT is recognised as essential for all learners and would improve learners' abilities in Kenya, its implementation has always remained a challenge in the curriculum to achieve the required results.

Education is, therefore, academically oriented for office jobs, mostly in urban areas. Unemployment for school leavers up to date since 1963 is a thorny issue in education (KICD, 2017; Namwambah, 2020; Otiato, 2009).

PURPOSE OF THE STUDY

This study aimed to analyse the Kenyan basic education curriculum reform reports and assess the extent to which critical thinking indicators have been addressed in those reports.

METHODOLOGY

This study employed the critical method to actively and skillfully interpret, conceptualise, analyse and evaluate secondary sources of the Kenyan primary and secondary education curriculum reform reports (Monanda, 2015). In the analysis, the study agreed with specific points of view, proposed new points of view, rejected/dismissed existing points of view on the ground of inadequacy/irrelevance/incoherence and reconciled some points of view by appealing to some deeper, and higher principles. Documents analysed are: Kenyan education curriculum reform reports from scholars/policy makers since Kenya's independence (1963), the TSC Act of 2005, the task force reports of 2012 and 2013, KICD 2017, 2019 and 2021 curriculum reform reports, primary grade IV syllabus and chemistry-physics secondary syllabus, and other documents on critical thinking for secondary and primary schools' education levels. Part of the syllabus for primary and secondary schools selected is a representation of the whole syllabus for primary and secondary schools. The assumption was that every content of the syllabus should be inquiry-based because a critical thinking curriculum/syllabus/lesson is learner-centred and problem-based. The critical method analysis technique requires active imagination, creating possibilities, finding relationships, seeing patterns that may relate to CT, and breaking habits to discover new possibilities. The Socratic questioning method has been used to interrogate education curriculum reports since independence (1963) to date for any recommendation of inquiry-based questions to learners in the teaching-learning process. Inquiry-based questions promote the development of CT.

A. Analysis of the CT Gap in Kenyan Schools' Education Curriculum Reform Reports.

In 1964, the Ominde Commission addressed Kenyan education's challenge after independence by stating four broad clear goals; personal development and individual fulfilment, equality, national unity, development/respect of heritage, national development, and international consciousness.

Ominde focused more on academic education for elites. There was an outcry in 1966 that in education, there existed a dichotomy since it had no link with the labour market needs; there was the issue of unemployment of young people leaving schools since they lacked employable skills especially critical thinking (see also Otiato, 2009). A Kericho conference set to address those challenges did not attempt to include CT as one of the critical skills to increase graduates' employability or create job opportunities. Critical thinking skills include creativity, problem-solving strategy, inquiry-based learning, and self-efficacy. Those challenges are facing Kenyans even today.

The 1976 Gachathi Report, also known as the National Education Committee on Policies and Objectives (NCEOP), was appointed to restructure the curriculum to meet the country's educational goals' demands. Following the recommendation of the commission, critical thinking was left out during the reform process. How, then, should the education curriculum be built into an organised system to teach societal values to the youth of which CT is part? Critical thinking calls for learner-centred learning approaches like constructivism and problem-based learning. Some salient issues earmarked by Vision 2030 were stressed by NCEOP recommendations, such as free education in secondary and primary schools, vocational education, languages, mathematics, and science, which are the totality of political, economic, and social demands of Vision 2030. NCEOP forgot CT in the recommendations because, with CT, learners are likely to be able to critique existing knowledge to build better ideas. So, the challenges of the education curriculum from the colonial system were still similar since the report still needs to address the CT gap. Some of the challenges were a lack of absorption into employment for most school leavers, and neither could they create employment due to a lack of employable skills, mostly critical thinking. Education was intellectually based, examination-oriented, and learners were suitable for office jobs due to a need for job-creating skills.

Radical reforms were recommended by the Mackay Commission (1981) concerning the existing education curriculum by stating: "The most important goal of the Kenyan education curriculum is to equip and prepare its learners to be useful and happy members of society. They should accept and learn the nation's values to be happy and actively work for the development and societal maintenance for them to be useful" (see also MOE, 1998). A new curriculum, the 8-4-4, introduced by the Mackay Commission, required KCPE candidates to sit for 11 national exam subjects, including English, Kiswahili, Mathematics, Science, Agriculture, Religion, Geography, History, Civics, Art, Craft, and home science.

In secondary on the other hand, KCSE candidates were required to sit for a minimum of 9-subjects at the end of the four-year examination (KCSE) which include among others; English, Kiswahili, Mathematics, Chemistry, Biology, Physics, Religion, Geography, History, Commerce, Accounting, Economics, Agriculture, and Home Science (see also KNEC Report, 1988). This brought numerous challenges such as poor infrastructures due to a lack of enough classrooms & workshops; overloaded curriculum; curriculum and, low-key and relevant stakeholders who are parents and teachers; the country lacked proper critical thinking pedagogical experts and trained personnel (see also Amutabi, 2003; Muricho & Chang'ach, 2013; Otiato, 2009).

The presidential committee on Workforce and education beyond the next decade, or the Kamunge Commission (1988), was set to solve the challenges brought about by the Mackay Commission. The report did not identify any problem-based solving strategies and creativity as core competencies needed to solve challenges affecting the community at that time and in the future. Critical thinking was still missing in the report. If secondary and primary school learners are taught CT as the central focus during classroom discussions, they will likely develop a mind that can always reason and solve challenges they encounter in daily activities (see also Basweti, 2019; Namwambah, 2020). With CT, it would be easier to claim that learners would have employment-creating skills and be self-reliant. CT offers a huge advantage for learners. It assists them to have the best exposure in understanding others' views, be innovative and boost their knowledge for working best with different kinds of people under different circumstances.

Another commission, the Koech Commission of 1999, was set to find strategies through which the education curriculum would accelerate industry and technology in the country, social responsibility, lifelong learning, and national unity. The Koech report addressed areas such as equity, equality, access, and transition rate to education among others. Sifuna (2000) and our study have noted that different from early recommendations of the 8-4-4 system, there was some improvement from the Koech reform report recommendations like the expansion of secondary and primary education; elimination of inequalities in education on gender, social, and geographical; and improvement of the curriculum content that is manageable. The report also recommended an increase in education access through expanded continuing and alternative education, the introduction of technology, special education, early childhood education, and continuous assessment tests.

Going through the recommendation, the Koech Commission reform report still needed to identify CT as a vital learning/teaching skill in 21st-century Kenya (Otiato, 2009). Though promising, the report, too, still needs to be implemented. The report was rejected for political reasons rather than logistical and budgetary claims.

Formal education especially in the primary education curriculum, may only successfully meet the objectives of Vision 2030 with emphasis and training on CT. Critical thinking indicators such as intellectual learning standards having thought-provoking elements and logic should be infused into the curriculum during the teaching/learning process. This can be achieved when critical judgment models such as that of Socratic questioning, Bloom's taxonomic elements, Paul-Elder's (2008) critical thinking model, the RED model, and other known models of CT have been infused into the basic education curriculum in Kenya. These models introduce thought-provoking elements, criteria, and context that can guide how CT can be integrated during the teaching/learning process in a form globally recognised or accepted by the 21st-century learner (see also Harris, 2019; Nussbaum, 2020).

To reform training, research, and innovation in education another reform, Training Policy Framework, Research, and Education for Kenya in the 21st Century, contained in Sessional Educational Paper No 1 of 2005 was enacted. The government in the document stated ways to develop education better thus: providing equity, completion guidelines, access, and quality. The report should have addressed CT as the skill needed in teaching-learning. The document acknowledged that basic education curricula still had many issues, but of interest in this paper was the rot learning and teacher-centred teaching/learning strategy accompanied by poor testing and lack of critical thinking among learners and teachers. To address these challenges, the system of national assessment that was mandated to monitor learning from secondary and primary school competencies was to be established to enhance the school's capacity to carry out school-based assessment tests. This is yet to be implemented even today. This recommendation should have addressed the teaching/learning methodology that is teacher-centred. A learning and teaching pedagogy such as constructivism blended with logic, intellectual learning standards, and Socratic questioning or Socratic seminars that can promote critical thinking is needed to assist in developing a curriculum that is inquiry-based in approach and learner-centred.

With critical thinking in the learning/teaching curriculum, mainly for learners in the basic education curriculum, it will be easier for them to think autonomously. Critical thinking is highly needed in higher learning, the job market, and as the 21st-century soft skills for global citizenship (see also Lipman, 2003; Sande, 2020).

Developers of the CBC argue that the curriculum will use the philosophy of constructivism by Dewey (1966) that emphasises the learner as the centre of knowledge during the learning/teaching process. Contrary to this assertion, nowhere in the teaching curriculum for learners in grades 1 up to IV is constructivism applied (see also Basweti, 2019; Ongesa, 2020). Constructivism defines the role of the teacher as a guide but not as to teach or the centre of knowledge and that learners' guardians or parents should play an essential responsibility in their children's education during the learning process. Lumonya's (2020) observation that this study share note that constructivism will help those learning, to be free to open up their thoughts, and be in a position to apply, remember, listen, accept and recall points of view and information that may on some occasions, not be in agreement with their beliefs and positions held earlier. Through constructivism, learners can work as a collaborative community with inquiry questions with their teacher/instructor as a guide.

Up to grade (IV) of the CBC curriculum, critical thinking appears in several subject lessons according to KICD 2019 syllabus guiding curriculum implementation. In the syllabus, critical thinking requires learners to identify, remember, recall and even apply the skill learned in their day-to-day activities. Identifying, recalling, remembering, applying, and even understanding are lower-order thinking (LOT) skills according to Bloom's taxonomy (see also Bloch and Spataro, 2014). LOT skills cannot promote the development of CT since these skills cannot provoke learners to think beyond the common understanding. According to Bloom's taxonomy, critical thinking is within the higher-order thinking (HOT) skills. HOT skills usually require learners to analyse, evaluate, create and synthesise a given piece of work when the content is well-structured. Competent and committed tutors ready to infuse concrete and verifiable knowledge are needed (see also Basweti, 2019; Sande, 2020).

Further, following 2-6-6-3 curriculum recommendations, CT will be developed as per the age and class/level in the school calendar (see also KICD, 2017). At the pre-primary school level, for example, learners are expected to come up with the most appropriate ways of keeping and using their stationery for personal use safe.

They must also participate in community projects such as cleaning markets (see also KICD, 2017; KICD, 2019). Though technical and creative, proper ways of keeping stationery and other items safe are routine practices or a school culture but not a creative or critical skill. Towards the end of the basic education (secondary schools), students are, for example, to be asked to design the best ways of solving the challenge of meagre resources such as water, electricity, and food both within their school and their surrounding community concerning the demand of those resources (see also KICD, 2017). According to the study, it is only creative and critical if learners will first be asked/guided to identify those challenges (are taught intellectual learning standards having thought-provoking elements) (see also Paul-Elder, 2008) and then design the best practice or ways of dealing with/solving those challenges. Without learners' involvement in problem identification (having the intellectual curiosity to know) and designing ways of solving the problem, knowledge is neither creative nor critical. Hence the newly introduced 2-6-6-3 curriculum or (CBC) as the 8-4-4 and other education curricular reform reports needed to properly articulate how critical thinking was to be integrated during the teaching/learning process in primary and secondary schools.

Critical thinking can be infused when CT models such as Paul-Elder's (2008) critical thinking model and Harris 2015 critical thinking teaching RED model together with principles of philosophising (logic and epistemology) are employed during the teaching/learning process (see also Ongesa, 2020). On the contrary, the Kenyan government has only partially implemented education reform reports, with some recommendations ignored during the implementation process. In a country like Kenya, Critical thinking can best be developed in learners during the learning/teaching process in the basic education curriculum by employing both learner-centred teaching approach (constructivism), thought-provoking elements, and logic (inductive and deductive reasoning). The three need to be articulated in the curriculum reform reports.

The main impediment to reforms in education in Kenya is political intrigue in education matters. The political elite needs to allow technocrats in education to run educational matters and curriculum development (see also, Otiato, 2009). Education reforms discussed above only focused on solving the country's problems, curriculum, results, and processes.

Low-key stakeholders who include learners, teachers, and parents, and critical thinking have always been left out during the reform process (see also Basweti, 2019; Ongesa, 2020; Otiato, 2009; Ngaruiya,2023). Low-key stakeholders are the most influential group in education, and CT is the most sought 21st-century skill for higher education and the world of work. CT in learning and CT pedagogy as a teaching tool would assist teachers and learners in meeting the challenges faced in the world we live in today. Challenges such as unemployment, rot learning, and poor moral skills can be resolved through CT in education. With CT, learners are provoked to think and find the solution to these problems through creativity, conflict resolution, and collaborations in small learning communities of inquiry.

From the reports discussed, it is now clear that critical thinking in the progressive 2-6-6-3 curriculum, the 8-4-4 curriculum, and the previous educational reform reports are not well articulated because those curriculum reform reports did not define clearly critical thinking indicators that can be used to impart CT to learners during the learning/teaching process. In the reform reports, no clear critical thinking indicators are stated for infusing CT. CT indicators, for example, principles of logic (deductive and inductive reasoning), intellectual learning standards having thought-provoking elements, and epistemology (mainly constructivism), are not mentioned and need to be better defined if mentioned. KICD (2017) has only mentioned constructivism, according to Dewey (1966), as a learning technique, but going through the learners' syllabus/curriculum, there are no indicators of constructivism (see also Ongesa, 2020). Critical thinking teaching/learning models and theories that explain how CT is to be infused should also be included in the curriculum reforms. We argue for the infusion of CT within the realm of philosophy or by employing philosophical methods (epistemology, thought-provoking elements, and logic) at the level of HOTS, models, and theories.

Strategies/steps for solving a given problem are essential to understand how the problem is to be solved. The steps needed to solve a critical problem are logical and demand deductive and inductive reasoning to be actualised. Therefore, basic education curricula in Kenya need revision to incorporate principles of philosophising incredibly thought-provoking elements that employ Socratic questioning, logic (deductive and inductive reasoning), and epistemology (mainly constructivism or learner-centred learning approach). Using elements of logic, in our case deductive reasoning, learners shall be required to break complex or abstract problems/statements/information into small units that can be understood to get a clear

understanding or meaning from the problem or information under investigation. Inductive reasoning is applied in situations where ideas or concepts, such as critical thinking teaching pedagogy in a given subject such as mathematics meant to promote CT can be applied/generalised to all other subjects taught within a similar level in the school programs (curricular and co-curricular) to promote CT holistically and develop a school culture that practices CT.

A study on the effects of integrating CT into a preparation course for a teacher trainee by Sezer (2008) that this study share, found that teaching/stressing on learning CT, just in one subject area or topic in a given subject may bring about positive outcomes on attitudes of those entrusted to teach mathematics and all other courses or subjects offered in the program. Opinions and output of these teachers towards teaching mathematics and other subjects offered to secondary and primary school learners are positive (see also Sezer, 2008). Following Tessler's (2010) observation and basic education teaching/learning in Kenya, it means that applying an inquiry-based teaching/learning approach in just one science subject, be it biology or physics, or chemistry, can be translated not only in all other sciences but, in all other subjects offered in Kenya's secondary education curriculum (biology, chemistry, physics, computer, agriculture, mathematics, home science, and business). This in return can help those learners develop self-directed and flexible learning structures for the rest of their lives.

Constructivism is part of epistemology (a branch of philosophy that deals with the study of knowledge). It is a learner-centred learning approach where those learning are placed in small learning communities to inquire about and find solutions to problems for the task under study (Harris, 2015; Lumonya, 2020). In the constructivist classroom, the aim of learning is for a learner to develop his or her knowledge or understanding other than being given solutions to cram answers that are assumed to be correct and regurgitate others' meaning. Since education is interdisciplinary, learning can best be evaluated when its assessment process is made the basic part of learning. Making the assessment process part of learning is the best way to provide learners with quality knowledge during the learning process. Constructivism focuses on people's specific contexts in an education curriculum. According to constructivists, the reality is not communal but depends on personal perception and is socially constructed by actively involved individuals (see also Ongesa, 2020). It is assumed that individuals would seek to understand their worldviews; their goals depend on the worldviews related to what is taught and learned.

Therefore, curriculum or knowledge constructors are required to develop a curriculum in which those to whom it is meant to construct and negotiate mean together socially and historically. These observations are also shared by Feyerabendian (2010) and Vaishali & Misra (2020). Knowledge constructors (learners/teachers) are required to work in collaboration/community with policymakers/curricula specialists, as opposed to the current practices where knowledge emerges from the top administrators (policymakers and curriculum developers) of education down to the most important stakeholders (teachers and learners).

CT teachers and Constructivists may pose questions or problems and then try to guide their learners on how to find solutions on their own. Learning is constructed by all participants in a constructivist classroom (Vaishali & Misra, 2020). Constructivists, together with this study, assume that all learners, which is also true for Kenyan primary and secondary school learners coming to learning institutions, already have their ideas, understanding, and knowledge gathered from their lived experiences within the surrounding. Learners' prior experience forms the raw materials for the new ideas/knowledge they are learning. Learners in a constructivist classroom that is also good for critical thinking are given room to construct and reflect on their understanding for solving challenges that they come across using accumulated experience from their surroundings or before entering the class. Learners' full participation is needed during learning activities (most important in hands-on activities in secondary sciences; Biology, Physics, and Chemistry and in technical subjects; agriculture, computer studies, metalwork, home science, and woodwork). Creativity and analysis that form the core part of CT can be realised when learners in the subjects stated are allowed to develop their procedure, make observations and inferences instead of being given a procedure to confirm the needed observation as it happens in most Kenya's secondary experiments in sciences (physics, chemistry, and biology).

The Constructivism model needs learners who can reflect on and talk about the activities they are dealing with. This model heavily relies on corporation and collaboration among those learners who belong to the same communities of learning or classroom. Solving problems is the main activity that is done in a constructivist classroom. Inquiry-based learning methods are used by learners in the constructivist classroom or learning communities to investigate a topic, ask questions, and use various materials or resources to find solutions and answers.

Learners make assumptions, explore the content, and conclude, and, exploration may go on and on through questioning until a reliable and valid conclusion is found (see also Sande, 2020). To infuse CT into learning/teaching in a classroom, logic (deductive and inductive reasoning) and the constructivist model is vital elements because they give learners room to think and develop their knowledge based on the problem. Prior knowledge accumulated through experience by learners is important in education in developing new knowledge.

RESULTS AND DISCUSSION

The critical thinking indicators (models for teaching critical thinking, strategies for integrating critical thinking, elements of critical thinking, and logic) have yet to be addressed. If addressed, they need to be adequately articulated. The Kenyan CBC syllabus has stated that critical thinking (CT) would be developed in grade (IV) learners through identification, listing, recalling/remembering, or reproducing and understanding (see also KICD, 2017). Identification, recalling, listing, application, and reproducing are part of lower-order thinking (LOT) skills. Lower-order thinking skills cannot promote the development of CT. Critical thinking (CT) is part of higher-order thinking (HOT) and involves analysis, evaluation, and synthesis following the study finding and Bloch and Spataro (2014).

The study also found that elements of thought that include teaching learners how to ask thought-provoking questions, employing an inquiry-based learning approach, encouraging community learning inquiry, recognising assumptions, evaluating argument before giving solutions, and drawing conclusions after assessing the reliability of evidence given was not given due considerations. Thought-provoking questions 'Socratic in nature are recommended to ignite the thinking of learners this study has found. Curious learners are self-directed and autonomous. Thought-provoking questions require a critical mind to come up with an accurate response. These types of questions can promote the development of CT. On the contrary, lower-order thinking questions are given prominence by the Kenyan curriculum for learners in primary and secondary schools.

Learners placed together in small learning communities with other learners of like minds but having varied opinions can develop diverse ideas and come up with various solutions to a problem under study. If those solutions are evaluated further, they can produce reliable knowledge. Thought-provoking questions, therefore, can promote the development of CT. CBC does not encourage thought-provoking questions since most of the questions asked are of lower-order thinking.

Content that can promote CT must pose a challenge or some difficulties of some kind to be dealt with during the learning process. The CBC and 8-4-4 curricula do not pose challenging questions that are demanding and require rigorous thought by learners. A broader content should consider another perspective. The knowledge that can promote CT is also detailed and verifiable and should be relevant and valid according to the context, following our study findings and Paul-Elder's (2008) observations. The study found that broader and deeper content properties need to be included in the CBC and 8-4-4 education curricula. Grade (IV) and 8-4-4 learners' syllabi analysed as presented in KICD (2019) education curriculum promotes the teaching of lower-order content that is shallow and narrow. Such content cannot promote the development of CT.

Inquiry-based questions Socratic in nature are part of the main class content; therefore, in the process of instruction, a learner must respond to or answer inquiry-based questions. An inquiry-based question is meant to dig deeper for possibilities other than the one presented in the content. Objectives such as those mentioned where learners are required to identify, recall/remember, list, name, and apply are lower-order thinking objectives. They do not need rigorous discourse to know the meaning.

Higher-order thinking (HOT) instructions/objectives require learners to analyse, experiment, synthesise and evaluate why a particular concept is better or more applicable instead of an alternative. This, too, needed to be included in the CBC and 8-4-4 curriculum.

The study found that the 8-4-4 curriculum is teacher-centred, according to KICD (2017), where a learner is just an observer. The CBC, too, has only given learners a narrow opportunity to discover knowledge. Learners in both curricula are rarely involved in experimental design and problem identification. Suppose learners are involved in problem identification, designing experimental procedures, and doing those experiments or practical works with minimal teacher supervision. In that case, that learning is likely to promote the development of critical thinking in those learners. Contrary to the above observation, the teacher usually determines the problem to be investigated following the 8-4-4 curriculum. Tools of data collection, experimental procedure, how to write observations, tools of data analysis, discussion, and the conclusion are given or directed by the teacher (the teacher is the centre of focus).

The problem-based learning (PBL) approach is yet to be implemented in the CBC and the 8-4-4 curriculum, mainly for basic education learning.

Problem-based learning requires many factors in place; students' self-determination, well-constructed teams/communities of inquiry, competent tutors, well-structured problems, prior knowledge activation, and group dynamics this study, Basweti (2019) and Sande (2020) have found. Most of these factors need to be included in our secondary teaching, or if they are there, then most have not been put into practice in the teaching/learning process. Unless these factors are implemented during the teaching/learning process at the secondary level, the development of CT may be a challenge. Going forward, this factor should be implemented to develop CT during the teaching/learning process.

To this end, therefore, the two systems of education (CBC and 8-4-4 curriculum) and the Kenyan education curricula reforms since independence have not adequately defined how CT is to be developed in learners during the teaching/learning process. There needs to be proof from the two education systems and educational reforms that those elements of thought containing intellectual learning standards are applied during teaching/learning in Kenyan secondary and primary schools. Therefore, the Kenyan curriculum needs to be revised to include philosophical methodologies (mainly logic (inductive and deductive reasoning) and epistemology (constructivism) and CT dispositions (self-efficacy, inquisitiveness, and open-mindedness) to develop CT in both teachers and learners.

Using constructivism as a learner-centred e approach, those learning can be placed in small learning communities of inquirers with a friendly environment for each of them (self-efficacy) (see also Lipman, 2003) with instructions and tasks which are moderately difficult to find solutions on their own using an inquiry-based approach. An inquiry-based learning approach that is open in a friendly inquiry community encourages curiosity during the learning process. The task can be given in the form of Socratic questions to provoke learners' thoughts. Thought-provoking tasks are best in developing and promoting CT to those to whom the task is intended.

Learners in small collaborative learning communities of inquirers should be made as diverse as possible by those teaching them when given a task to solve. Our learners in those learning communities must be aware not to generalise wrongly outside the evidence provided. These learners' arguments should be balanced and fair, not biased. Conclusions to be drawn should logically follow from the evidence given. To effectively draw a valid conclusion, learners must understand the information writers give and weigh it from their reasoned experience to determine whether it is plausible.

CONCLUSION

The study analysed the Kenyan secondary and primary educational curriculum to establish the place of CT in the teaching/learning process. During the analysis, the following question was generated: To what extent have curriculum reforms in Kenya addressed the critical thinking gap at the basic education curriculum levels? The analysis and assessment found that all curriculum reforms in Kenya since independence have not indicated how CT is to be integrated during the teaching-learning process at primary and secondary schools. The 8-4-4 curriculum reform, for example, is a teacher-centred curriculum (see also KICD, 2017) that cannot promote the development of CT in the teaching-learning process. The CBC that has developed out of the KICD (2017) recommendations, up to grade IV, has only recommended teaching learners lower-order thinking skills of Bloom's taxonomy that cannot promote the development of CT after indicating that CT was one of the core competencies to be developed in learners. According to Bloom's taxonomy, CT is developed at the level of higher-order thinking skills (HOTS) (or through analysis, evaluation, and creativity). This means that all curricula reforms have yet to consider critical thinking during the teaching-learning process.

According to Paul-Elder's (2008) critical thinking learning model containing intellectual learning standards, most elements of thought need to be included in all the reform processes in the Kenyan basic education curriculum. Rules of reasoning or thinking or the logical elements (inductive and deductive reasoning) have yet to be considered by the reform process since independence is mostly for learners in primary and secondary schools. Constructivism as a learner-centred teaching-learning approach that requires learners to be placed in small communities of inquiry too was also found to need to be included in the curriculum reform process. A constructivist classroom encourages inquiry-based learning during the teaching/learning process. If given due consideration by Kenyan basic education curriculum reforms, learners will develop self-efficacy and be open to thoughts thus becoming critical. To this end, critical thinking indicators that contain all the elements stated above must be included in the Kenyan education curriculum reform process for learners in primary and secondary schools. Therefore, the critical thinking gap exists in the education curriculum for Kenyan primary and secondary school learners.

Hence, the Kenyan curriculum needs revision to include philosophical methodologies (mainly logic (inductive and deductive reasoning), epistemology (constructivism), and elements of thought to guide teachers and learners on how to develop CT in learners for primary and secondary schools.

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