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Implementing Competency Based Curriculum (CBC) in Kenya: Challenges and Lessons from South Korea and USA

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Abstract

This research examines the nature, enactment, and assessment of Competency-Based Curriculum (CBC) models in the United States and South Korea to highlight lessons and strategies that Kenya can utilize to improve CBC implementation. A scoping review of various databases was conducted to search for peer-reviewed articles documenting empirical evidence on implementing and assessing CBC education models in the USA, South Korea, and Kenya. Two researchers from each country screened, extracted the data, and evaluated the records using a custom quality rating scale following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension checklist for scoping reviews. Evidence from the USA and South Korea indicated that the implementation of CBC resulted in improved problem-solving skills, lifelong learning skills, self-efficacy, and autonomy in learners. There is limited evidence from Kenya on the effect of CBC models on learners' key competencies. Challenges in the three countries include lack of teacher training opportunities, low funding for implementation, inconsistent pedagogical approaches and assessment techniques. The Kenyan government and education stakeholders can address the CBC implementation challenges by using evidence from other studies and countries on teacher training and aligning goals at the school, local authority, regional authority, and national levels.

Keywords: critical thinking skills, competency-based curriculum, curriculum, Kenya, problem solving skills

1. Introduction

Empirical evidence suggests that effective teaching approaches are learner-centered and utilizes pedagogical techniques that encourage collaboration among learners, inquiry by learners, reflective and analytical thinking, creativity, and problem solving (Vavrus et al., 2011). Students need to develop these complex skills so that they can analyze the vast quantity of information available through technology; this need exists whether the students become manual laborers or managers (Vavrus et al., 2011). When educators equip learners with critical thinking and problem-solving skills, the students develop a deeper understanding of the content and will acquire the competencies needed to compete in the dynamic 21st century and to be responsible citizens (Katiba & Ji, 2017).

Critical thinking, problem solving, and creativity are key components of competency-based curricula or competency-based education (CBC or CBE). Previous studies demonstrate that when a CBC is implemented, students improve their problem solving, critical thinking, and lifelong learning skills; they also exhibit higher self-efficacy, engagement with peers, and conceptual understanding of material (c.f. Bostic et al., 2016; Choi & Woo, 2020; Koo, 2020; Kwak, 2019; Muthersbaugh et al., 2014; Strait, 2008; Lucey et al., 2018; Yuruk et al., 2009). Consequently, implementing CBC enhances students' readiness for college and for careers (Blumenthal & Rasmussen, 2015; Levine & Patrick, 2019).

An aim of CBC is to equip learners with attitudes, skills, and values that will enable them to solve everyday problems and to flourish in the competitive fast-paced global economy associated with the shifting technological demands and advancements in the 21st century (KICD, 2017, 2019). One tool of CBC to achieve this goal is continuous formative assessments rather than the summative high-stake exams of the previous system; making it a competency-based rather than an exam-performance-based education system (Imana, 2020). The Basic

Education Curriculum Framework details a structure for learners to develop foundational skills at pre-primary, lower, and upper primary levels, and specialize in various majors at the secondary level (KICD, 2017). This structure enables students to develop their competencies in skill-sets essential for good citizenship and in the world of work. This structure also provides opportunity for all children to succeed in their own chosen pathway (NESP, 2015).

In Kenya, those aged 15–24 years comprise 75% of the population (KNBS, 2019). Low employment levels in this age cohort negatively affect Kenya's economic growth as well as the extent to which it can benefit from fostering the skills and creative potential (Hall, 2017). An education system based on CBC has the promise of enabling Kenya to achieve the goals set forth in Kenya Vision 2030 and providing young Kenyans the critical thinking and problem-solving skills desired by employers (GOK, 2007; Rios et al., 2020). The current low employment levels of young Kenyans indicate the need to consider a different education approach to enhance the employability of this group.

Learning from other nations that have been through CBC adoption such as the United States of America (USA) and South Korea can help Kenya successfully implement CBC. The USA and South Korea are ideal models for Kenya to plan for CBC implementation as they approached CBC in different ways: the USA implemented a pure CBC model in a few school districts (Evans et al., 2019), while South Korea adopted CBC implementation across the nation through the '5–31 Educational Reform Plan' (So et al., 2017).

We chose to use South Korea as a model because of the high academic performance achieved by its primary and secondary education level students since the introduction of international achievement assessments, such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS) (So & Kang, 2014). The high South Korean student achievement has been sustained through the previously mentioned curricular reform that moved the South Korean education system away from being an exam driven one that created stress and unhappiness among students (Mullis et al., 2008). Currently, the Kenyan 8-4-4 education system is an exam driven one that needs to have its curriculum aligned to 21st century demands in the competitive modern economy (Mullis et al., 2008). The emerging economy of South Korea has experienced significant economic growth since the beginning of the 21st century, a trend that has continued apace since the recent curriculum reforms undertaken between 2015 and 2020 that have been associated with improvements in learning outcomes, critical thinking skills, and problem-solving skills (Choi & Woo, 2020; Koo, 2020; Kwak, 2019). Thus, the South Korean experience should be able to provide insights for CBC implementation in Kenya that may have society wide effects.

Furthermore, the first phase reforms in South Korea (2015–2020) mirrors the first stages of education reforms already implemented in Kenya. These include, the completion of a needs assessment for primary level curriculum by the Kenya Institute of Education in 2009 and the use of the findings from this assessment to help develop the recommendations from the Douglas Odhiambo task force for realignment of education in conjunction with Vision 2030 and the New Constitution in 2010 (Kabita & Ji, 2017; KICD, 2017). Effective CBC implementation would provide means for teacher training so they can better create environments for learners to acquire core competencies and skills essential in the world of work. To determine the progress of the CBC education reforms, Kenya's President Ruto appointed members to the Presidential Working Party on Education Reforms (PWPER) on 30 September 2022 (Ruto, 2022). Among the terms of reference for the PWPER crucial for enhancing the basic education as outlined on Gazette Notice No 11920 are assessing and recommending an appropriate structure for continued implementation of CBC and the conceptualization and implementation of key tenets guiding the competency-based approach including value-based education, community service learning, parental empowerment, and student engagement (Ruto, 2022). Most importantly, the curricula reforms in both Kenya and South Korea emphasized shifting away from knowledge delivery to competency development by promoting high-order thinking, critical reasoning, problem solving, experiential learning, inquiry based-orientation, and collaboration.

The choice to examine the CBC experience in the United States was informed by the long-history of the US CBC implementation process. CBC was initially proposed as a model for K-12 education in the 1970s after Bloom published his book on the concept of learning through mastery in 1968. At that time some school districts implemented aspects of CBC; however, issues of varying definitions of terms, development of enforceable policies, and evidence of program effectiveness slowed the implementation of CBC throughout the USA (Spady, 1977). Implementation of CBC in primary and high school programs within the USA has increased since the beginning of the 21st century as some states have adapted their high school graduation criteria to include products that indicate content mastery (Deye, 2018; Evans et al., 2019). Successful CBC implementation in USA has occurred in schools and school districts that focus on pedagogical concepts such as deeper learning,

student-centered learning, and personalized learning that could provide insights for improved learning outcomes and create demand driven human capital development at post-secondary institutions (Hernández & Darling-Hammond, 2019). Although the decentralized education system in USA differs from the centralized governance structure in Kenya, the challenges faced by state education departments in the USA when they work to implement CBC at elementary, intermediate and high school levels might not be very different from those experienced in Kenya since CBC was unveiled in 2017. Therefore, understanding strategies utilized in USA at various stages of implementation could inform reconceptualization of the curriculum and redesigning of professional development programs in Kenya.

Most importantly, a systematic investigation on the advantages and challenges the USA and South Korea have experienced in implementing CBC could instruct nations in the early stages of CBC adoption such as developing African countries including Kenya. However, there is a paucity of investigations focusing on challenges of CBC implementation that these nations have experienced. Therefore, this study was designed to systematically review the literature from the USA, South Korea, and Kenya to 1) investigate the status of CBC implementation and achievements in Kenya; and 2) examine the achievements and challenges of implementing CBC experienced by the USA and South Korea.

2. Methodology

A scoping type of review was chosen to describe the published research literature on the implementation of CBC in three target nations, the USA, South Korea, and Kenya (Arksey & O'Malley, 2005; Peters et al., 2015). The method allowed us to identify lessons Kenya can draw from these countries' experiences and recommendations for better outcomes (Levac, et al., 2010). This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) sequencing (Moher et al., 2009).

2.1 Inclusion and Exclusion Criteria

The inclusion criteria required that any included studies be original studies of education programs that reported on the implementation and assessment of CBC education models in primary through secondary school levels within the three nations studied. An additional inclusion criterion was that the students reported in the studies needed to be enrolled in a formal education system. The studies reviewed included 27 quantitative, 17 qualitative, and 14 mixed research designs. Studies were excluded if they were not original research articles, such as review articles, editorial papers, discussion panels, opinion pieces, policy briefs, or government white papers. Also, studies were excluded if they did not focus on CBC education models or programs or student outcomes from CBC education programs. Finally, studies were excluded if the CBC program was in higher education, in an informal education program, included students from other nations, or if they were written in languages other than English or Korean.

2.2 Search Strategies and Outcomes

The search was completed during August and September 2020. The review process began with a search for peer-reviewed articles on implementing and assessing CBC education models in the USA, South Korea, and Kenya. The published reports of interest were found by searching filtered information from the following online databases: USA – PsycINFO, ERIC, and Education Source; Korea – RISS and the National Assembly Library; and Kenya – PscyINFO, ERIC, Academic Search Complete, Africa wide information, Africa Bibliography, and MLA International Bibliography. The reference lists of the previously found articles were used to find other relevant studies. In addition, the Kenya search included manual searches for studies and gray literature on the listed topics.

The searches were limited to studies published in English for the USA and Kenya and to those published in Korean and English for the South Korean papers. The included studies were published between 2004 and 2020. Multiple search terms and combinations were used, such as competency-based education (curriculum), competencies, education system(s), education reforms, critical thinking skills, problem solving, problem-based learning, mastery-based education (curriculum), higher order cognitive skills, and higher order thinking skills. The screening process was conducted by separate teams of two researchers for each of the three nations. Within each team, the two team members worked independently. The database search at the identification stage generated 2285 articles for the USA, 2608 articles for South Korea and 381 articles for Kenya. After the removal of duplicate articles, 1873 USA, 829 South Korea, and 322 Kenya articles remained. Title and abstract screening using the inclusion and exclusion criteria resulted in 141 USA, 164 South Korea, and 51 Kenya articles remaining. The full text review process resulted in 40 USA, 7 South Korea, and 11 Kenya articles included in the study. Table 1 shows the reasons articles were removed on reading the complete articles for all three nations.

Table 1. Reasons the articles were removed from the study upon complete reading for each target nation

	Number of Articles		
Reason Articles Removed	USA	South Korea	Kenya
Research on teacher behavior/practice	36	0	9
Essay, opinion, or review article	20	11	12
Research on mathematics problem solving	11	0	3
Research on methods other than CBC	11	48	11
Research not on K-12 education	9	92	5
Research on other nations/in other languages	9	3	0

2.3 Quality Appraisal

An inductive content analysis (Elo & Kyngäs, 2008) was used for the quality appraisal of the studies. Since most published scales for evaluating the methodological quality of studies were designed to evaluate experimental research designs (Downs & Black, 1998; Moher et al., 2009), a custom quality rating scale based on PRISMA sequencing was designed to evaluate the studies included in this review (Appendix A). Scoping reviews often require creating a custom quality rating scale in order to adequately survey the varied scholarly articles on an emerging topic (Peters et al., 2015). The custom quality rating scale included items concerning the clarity of the design (3), thoroughness and rigor in the reporting of demographic data on the schools, teachers, and students (4), as well as specific analysis questions for the three groups of study designs, qualitative (4), quantitative, and mixed (3) (See Appendix A). The quantitative studies were separated as being either descriptive or quasi-experimental studies.

A four-level ordinal scale was created to rate the items in the quality rating scale. A score of 3 meant that the feature was strong, a score of 2 meant that the feature was moderate, a score of 1 meant that the feature was weak, and a score of 0 meant that the feature was absent. The ratings for each item were summed to determine an overall rating of each study. For the qualitative and quantitative studies, the ratings were as follows for each point total: 29–36, strong; 21–28, moderate; and 14–20, weak. Since the mixed design studies were rated on items that scored features of qualitative, quantitative, and mixed designs, the scale for rating these studies differed from the one used to rate the qualitative and quantitative design studies. These rankings for the point totals of the mixed designs were: 45–55 strong, 35–44 moderate, and 25–34 weak.

3. Results

3.1 Article Ratings and Patterns

As shown in Table 2, the agreement between reviewers for each country varied by the study research design. For the qualitative studies, complete agreement ranged from 56% (r = .570) for the USA to 80% (r = .909) for South Korea. For the quasi-experimental studies complete agreement ranged from 62% (r = .777) for Kenya to 85% for the USA (r = .846). For the descriptive quantitative studies complete agreement was more consistent with 69% (r = .809) and 70% (r = .880) for the USA and Kenya. Finally, for the mixed design studies complete agreement ranged from 58% (r = .723) to 100% (r = 1.000) for South Korea. After consulting on the definitions of the terms and reviewing the articles, each team of reviewers agreed on 100% of the ratings for all four study designs.

Table 2. Agreement and correlation between reviewer scores for each type of study by nation

Study Research Design	Kenya	South Korea	USA
Qualitative			
Complete Agreement	70%	80%	56%
Correlation	.869	.909	.570
Quantitative Quasi-Experimental			
Complete Agreement	62%		85%
Correlation	.777		.846
Quantitative Descriptive			
Complete Agreement	70%	87%	69%
Correlation	.880	.874	.809
Mixed Qualitative and Quantitative			
Complete Agreement	83%	100%	58%
Correlation	.906	1.000	.723

3.2 Included Studies and Patterns of Quality Ratings

Table 3 (provided as a supplemental document) shows descriptions of the included studies and their quality ratings. Although the majority of the studies were conducted in a single school, one large study included 125 schools. In addition, the topic of learning for the students varied from science to history to music to physical education.

3.3 The Current Status of CBC Implementation in Kenya

Given that CBC is in the early years of implementation in Kenya, a combination of Google Scholar and USA ERIC databases were used to identify all published articles on the topic. Minimal empirical research has been conducted on CBC curriculum in Kenya, so the initial search only yielded 51 articles. The PRISMA identification processes of reading the abstracts, removing duplicate articles, and preliminary review of the methodology section resulted in the majority of the studies identified in the previous stage not meeting the criteria for inclusion in the main study. Thus, only 11 articles remained for full text review. More than 60% of the articles removed presented findings that synthesized data from previous studies rather than the collection of original data. The data from the review articles were available through the original data studies reviewed. About 25% of the removed articles were opinion pieces or policy briefs. The other 15% of the removed articles did not have data collected from students, but reported perceptions from other stakeholders.

In Kenya, from the final eleven articles that met the PRISMA identification criteria for full review, seven studies employed quantitative research design, three studies used qualitative design, and one study utilized a mixed method research approach. From the seven quantitative articles four were rated by the two independent reviewers as weak, two were ranked as moderate, while one study was rated as strong. Among the three qualitative studies, one study was rated strong as it used a variety of qualitative research techniques including case studies, semi-structured interviews, observations, and narrative inquiry to document learners lived experiences on their engagement with the curriculum (Milligan, 2017). One of the other qualitative studies was rated as moderate (Carr-Hill et al., 2019) and the other was rated as weak (Amunga et al., 2020). The only mixed method research design (Chepsiror, 2020), was rated weak.

In general, a quasi-experimental research design was the study design most frequently used in Kenya (Aurah et al., 2014; Kibet & Kathuri, 2005; Wekesa & Ongunya, 2016). Most of the Kenyan studies that employed quasi-experimental design had higher ratings with two studies rated as medium strong, one rated as strong, and one study received a weak rating. Also, two of the studies used a cross-sectional survey design (Momanyi & Rop, 2020; Mutange, 2020). The authors presented the results of these studies through descriptive statistics without demonstrating the linkages of the design with theoretical frameworks and research questions/study objectives. One of the studies rated strong utilized a social justice and capabilities theoretical framework where the author completed a qualitative study to examine learners' experiences on the Kenyan 8-4-4 curriculum implemented in two secondary schools (Milligan, 2017).

Most of the Kenyan studies examined the effects of project-based learning on teaching in various secondary school subjects including biology, agriculture, and mathematics. The authors focused on the impact of the pedagogical approach on learners' performance in higher cognitive skills as well as their analytical skills in scientific research and their problem-solving skills (Kibet & Kathuri, 2005; Mutange 2020; Wekesa & Ongunya, 2016). In addition, two of the studies focused on the importance of experiential learning approach rather than content-based learning on learners' competencies such as creativity and problem solving (Aurah et al., 2014; Chesimet et al., 2016). These studies demonstrated how experiential learning influenced students' mathematics creativity as well its effect on metacognition and self-efficacy beliefs on high school students' genetics problem solving (Aurah et al., 2014; Chesimet et al., 2016). In addition, two studies examined teachers' preparedness to effectively implement the CBC curriculum and the level of competencies early grades teachers have on delivering the curriculum among learners transitioning from previous levels such as from Early Childhood Education (ECD) to grade 1 (Momanyi & Rop, 2020; Muthanje et al., 2020).

Given the importance of assessing how educators and parents perceived the ease and effectiveness of implementing CBC, one study explored the views of head teachers, teachers and parents concerning their roles in implementing CBC (Amunga et al., 2020) and another explored teachers' opinions on instructional aspects that could impede implementing CBC strategies (Chepsiror, 2020). Both of these studies reported challenges experienced by educators and parents (Amunga et al., 2020; Chepsiror, 2020). Even though scholars highlighted the challenges in implementing CBC, limited information was reported on the perceptions of learners concerning the curriculum. Student responses to implementation of CBC can affect their acquisition of the targeted higher-order skills that are required in the job market. As a contrast to CBC, Milligan (2017) used a narrative

inquiry to document the challenges learners' face in the traditional test-based curriculum. In spite of this finding, teachers and administrators continue to perceive that the competency assessments do not align with curricular needs, and continue employing high stakes examinations (Carr-Hill et al., 2019).

3.4 Experiences of CBC Implementation in USA

Implementation of any education program like CBC in the USA is mainly a local school district decision. Few school districts or state boards of education have embraced the CBC model of education. The design and outcomes of the studies reviewed indicate the fragmented implementation of CBC in the USA.

The studies in the review included 19 quantitative studies, nine qualitative studies, and 12 mixed method studies. The quality appraisal revealed that 21 of the 40 studies collected data that clearly would address the proposed research questions. Similarly, 24 of the studies focused on the research questions that were the target of this review; these studies included all three designs. Overall, the review indicated that the designs and results of the studies were weak for 13 of the studies, medium strength for 14 of the studies, and strong for 13 of the studies.

The researchers reported a variety of positive effects from the CBC programs, with most of these positive effects being qualitative changes. The authors of seven studies found improved problem-solving skills and student engagement (Bostic et al., 2016; Craig & Marshall, 2016; Eseryel et al., 2011; Gomez-Arizaga et al., 2016; Smither & Zhu, 2011). The authors of five other studies reported the students exhibited increased life-long learning skills and critical thinking skills (DeMink-Carthew & Olofson, 2020; Duesbery & Justice, 2015; Garrett, 2013; Lombardi et al., 2018; Muthersbaugh et al., 2014). Similarly, the authors of four other studies reported that the students in the CBC programs revealed better conceptual understanding of the academic content (Belland et al., 2011; Ives & Obenchain, 2006; Yuruk et al., 2009; Zhang et al., 2011). Several other authors reported improved student self-efficacy for exploring answers to genuine scientific and community problems and better dispositions toward science (Engels et al., 2019; Ferreira & Trudel, 2012; Knezek & Christensen, 2020; LaForce et al., 2017; Lawless & Brown, 2015; Lui et al., 2006; Muthersbaugh et al., 2014). Finally, the authors of two studies reported that the students in the CBC programs exhibited higher levels of engagement with their peers (Reid-Griffin et al., 2020; Strait, 2008).

Although CBC success was reported in most studies as discussed above, challenges were noted. Only three of the studies reported on experiential and project-based learning that were implemented in all of the students' classes (Cho & Brown, 2013; DeMink-Carthew & Olofson, 2020; Ryan & Cox, 2017) and one study compared a high school of CBC programs with those utilizing the test-based model (Craig & Marshall, 2018). Another challenge was that teacher training in the USA often does not provide opportunities for pre-service or in-service teachers to learn CBC techniques. One cause of this problem has been the state education department policies that focus on accountability at the teacher and school levels and result in statewide summative assessments (Cochran-Smith, Piazza, & Power, 2013). These assessments frequently have been associated with school funding and have resulted in teacher education and school curricula being driven to easily measured test-based education goals (Cochran-Smith et al., 2013). Cochran-Smith and Fries (2011) pointed out that policies governing teacher education in the USA are developed and enacted at multiple levels by federal, state, and local agencies. In addition, teacher education policy is developed and enacted by professional organizations, and national and regional accreditors, as well as by individual higher education institutions and alternate providers of preparation materials. Thus, there are many and sometimes conflicting perspectives on curriculum choices.

3.5 South Korea CBC Implementation

In South Korea, CBC has not been fully adopted to the primary and secondary education system, but continuous efforts to better implement CBC have been made since the national curriculum revision in 2015. Of the seven studies included in this review, five were based on qualitative methods, one on quantitative, and one on quantitative- qualitative mixed methods. Most of the qualitative studies (N = 5) focused on understanding teacher perceptions of CBC through interviews (Cho, 2017; Choi, 2018; Koo, 2019; Kwak, 2020) and analyses of case reports and curricula submitted by teachers (Hong & Kwak, 2014; Koo, 2019;). Two studies included quantitative and/or qualitative analyses of student perceptions (Choi & Woo, 2020; Ryu & Jin, 2016). These seven studies, regardless of their methodological differences, showed the positive impacts of CBC on teachers and/or students as well as challenges associated with the implementation of CBC.

The South Korean studies reported two sets of positive impacts: benefits to students/parents and to teachers. First, students showed increased autonomy and expertise when involved in CBC and improved critical thinking, inquiry, problem solving, communication, participation, and life-long learning skills compared to those in the traditional class (Choi & Woo, 2020; Koo, 2020; Kwak, 2019). Koo (2020) showed parallel results based on qualitative analyses of case reports submitted by multiple teachers who were teaching competency-based courses

and follow-up interviews with the teachers. Specifically, students understood broader contexts rather than individual topics separately, which improved their communication skills, knowledge and information processing skills, and the concept of community. Also, the students showed an increased level of active and self-initiated learning and self-reflection, appreciated the feeling of achievement, and were able to set a clear learning goal. For teachers, Koo (2020) reported that CBC assisted teachers in selecting clear learning objectives, resulting in increased attention levels among students, provided a broader view of educational activities that yield changes in teaching focus, and enabled process-centered evaluation.

In addition to the positive impacts, challenges were identified by researchers of the selected studies. Koo (2020) indicated that teachers were unsure about their approach to CBC and as a result, preferred a combination of traditional (i.e., textbook-centered) and competency-based (i.e., achievement-centered) education. Findings derived from Choi (2018) indicated that teachers needed clearer instructions on how to implement CBC, how to teach and assess, how to change school climate, and how to change their own perceptions toward CBC. Choi (2018) argued that successful implementation of CBC required helping teachers better understand the connection between competencies and content-knowledge in teaching and assessing how CBC develops that connection.

In many of the selected studies, insufficient support to implement CBC was identified as a barrier to its successful adoption. Koo (2020) found that teachers were not being supported by the school and higher-level administrators and urged multidimensional support from schools, students, parents, and the office of education. Ryu and Jin (2016) opined that it is essential to support teachers to reorganize course contents and materials by using real-life based approach and to develop appropriate pedagogy, learning modalities, and evaluation methods. To facilitate teaching and learning and ensure a competency-based education system rather than knowledge-based one, development of a workbook instead of a textbook, adopting a performance-oriented approach in classroom instruction, and modification of evaluation techniques to align with the shift in curricula was recommended (Cho, 2017; Choi, 2018).

4. Discussion

4.1 Kenya Could Benefit from the USA and South Korea CBC Implementation Models

Undoubtedly, understanding previous CBC models in the context of developed and developing economies and mapping of the key lessons from these countries implementation strategies is crucial for evidence-based decision making—particularly regarding policy and practice. Although the approaches to CBC applied by local school districts and state agencies in the US and national policy in South Korea have varied, and would similarly differ in the context of Kenya, essential elements that support implementing this curriculum model appear across the three nations (Blumenthal & Rasmussen, 2015; Levine & Patrick, 2019; Rudenstine et al., 2018; Kim, 2019).

The first element is that in the US, the knowledge, skills, or abilities that indicate a measure of competence or mastery in CBC programs are assessed using projects, portfolios, and tests. Deeper learning, student-centered learning, and personalized learning occur for CBC programs on a variety of topics including science, math, social science, music, service learning, and physical education (e.g., Behizadeh, 2014; Belland et al., 2019; Bostic et al., 2016; Dack et al., 2016; Johnson, 2011; Smither & Zu, 2011; Strait, 2008). These results indicate that implementing CBC programs should result in students who become life-long learners. Life-long learners have thinking dispositions that allow them to adapt to new situations throughout their lives.

The second element is that students proceed toward the learning objectives in each content area at their own pace, not as part of a classroom of students moving through content at a fixed pace. The third element is that the students receive instruction on the content in a manner specific to their current level of understanding; that material will become increasingly difficult at the individual pace of each student. Students can receive this content in the format most appropriate for them. The formats include, but are not limited to peer-to-peer instruction, live teacher instruction, recorded teacher instruction, books, and videos (Levine & Patrick, 2019; Rudenstine et al., 2018).

In contrast to the locally based implementation of CBC in the USA, the South Korean education system is a system-based shift that focuses on changing from knowledge delivery to competency development, from academic success to student success and well-being, and from the detailed prescription of a centralized curriculum to more autonomous decision making by teachers (So & Kang, 2014). For changes similar to these to occur in a nationalized Kenyan CBC program, major transformations would need to be implemented in three aspects of the program: the pedagogical approaches and the assessment criteria used, the overall academic objectives, and the role of teachers in driving learning and problem solving. In South Korea, curriculum scholars approached the implementation of a competency-centered curriculum from a clear perspective (Hong & Lee, 2012; Park, 2009; Shon, 2011; So, 2007; Yoon et al., 2007). These scholars identified competencies needed for

living in a twenty-first century society, which led to the exploration of ways to develop the national curriculum by focusing on these aspects (Hong & Lee, 2012; Park, 2009; Shon, 2011; So, 2007; Yoon et al., 2007). While the required competencies are context-based, Kenya would benefit from this South Korean strategy of identifying the competencies essential for success in the 21st century. Kenyan education leaders may most successfully implement a national CBC program by mapping the competencies identified as integral for learners as defined by the country's development agenda and vision 2030. This model may make it easier to track how these competencies are progressively being reinforced.

4.2 Lessons from the USA and South Korea as to CBC Implementation Challenges

Studies on implementing CBC programs in South Korea and the USA also provide evidence concerning the challenges encountered. Common challenges across both nations in their efforts to successfully implement CBC were lack of teacher training and academic administrative support (Cho, 2017; Choi, 2018; Hong & Kwak, 2014; Koo, 2020; Ryu & Jin, 2016; Cochran-Smith & Fries, 2011; Cochran-Smith et al., 2013; Evans et al., 2020). In an attempt to better align the current high-stakes university entrance exams with CBC, South Korean researchers have proposed strategies to better link the learning approaches to the students' summative assessments (e.g., Kang et al., 2019; Lee et al., 2016). A related challenge in the USA is a trend for school districts to lose independence and control over education due to the heavy emphasis on state-wide summative testing (Cochran-Smith et al., 2013; Evans et al., 2020).

Finally, since various key challenges impede the implementation of the CBC in Kenya, a multi-stakeholder partnership is needed to better utilize evidence from the USA and South Korea to address similar problems. These challenges include a lack of adequate financial resources for: acquisition of adequate, high quality approved textbooks, print, and digital materials for teachers and learners; professional development training for in-service teachers on CBC content as well as teaching methods; reducing the number of overcrowded classrooms that inhibit effective implementation of student centered pedagogy; increasing limited access to syllabus and learning materials for learners with special needs and generally for children's' developmental levels; and increasing parental involvement in the CBC implementation to improve public participation (Akala, 2021; Momanyi & Rop, 2020; Sossion, 2017; Ondimu, 2018; Sifuna & Obonyo, 2019; Katam, 2020), Hopefully, these changes can counter resistance from the public on implementing CBC by making clear its importance in the modern labor market and for good citizenship (Akala, 2021; Momanyi & Rop, 2020; Sossion, 2017; Ondimu, 2018; Sifuna & Obonyo, 2019; Katam, 2020).

5. Conclusion and Policy Recommendations

Based on the evidence reported in this scoping review, it is evident that learners equipped with problem-solving, critical thinking and creativity skills have an advantage for developing solutions for emerging problems on their own in comparison to their peers whose education does not focus on developing these core skills (Davidson et al., 2003; Greiff, et al., 2014). Therefore, it is crucial for government stakeholders to identify strategies that have worked in countries that previously adopted CBC such as South Korea and the USA, in order to equip teachers with classroom practices relevant in the modern economy. However, using the USA and South Korea experiences as case studies to provide insights for CBC implementation in Kenya has limitations. First, CBC implementation in the USA is fragmented and decentralized because the states, local communities, and local school districts have the mandate of designing the curriculum, administering assessments and evaluation resources, establishing standards, and determining criteria for enrollment and matriculation (Spady, 1977). In contrast, in Kenya the implementation is centralized. This difference means that Kenyan policymakers need to consider this governance issue when applying the USA model of CBC adoption. Second, although South Korea provides a case study from a developing economy for Kenyan policymakers and stakeholders to use in their CBC implementation, the student-centered and practical oriented CBC approach could limit the ability to determine improvements via internationally used education assessments such as PISA and TIMSS. Nevertheless, successful implementation of CBC requires refocusing educators' academic goals for learners toward acquisition of practical skills with an emphasis on developing key competences such as critical thinking, creativity, and reflective thinking, as well as developing teachers' perspective toward focusing on variations in learners' capabilities and developing adaptive pedagogies to use in classroom environments (So et al., 2017). Given the above-mentioned implementation challenges, we make the following policy recommendations:

1) Promoting in-service and pre-service teacher training

Among the major challenges to the implementation of the South Korean educational reforms was developing teacher preparedness to effectively execute the new curriculum. Thus, it is strategic for the Kenyan government to invest in teacher training at early stages of CBC implementation. The South Korean suggestions for improving

their implementation of CBC included teacher preparation for delivering quality skills and knowledge (Hong & Lee, 2012; Park, 2009; Shon, 2011; So, 2007; Yoon et al., 2007). Investing in teacher professional development remains a key factor for implementing the reforms and policies. Evaluating teacher training can be a reliable source of information on the effectiveness of the proposed practices, pedagogical approaches, and the short-term learning outcomes that can enhance evidence-based policy interventions.

For successful implementation of CBC, the Kenyan State Department for Early Learning and Basic Education needs to collaborate with the Teachers Service Commission, and the teachers' training institutes and colleges of education in the country to develop effective in-service and pre-service professional development programs. Kenya could borrow from the USA program of federal grants in 1968 to universities and colleges to develop model-training programs. These programs were initiated in response to lack of competency-based training for teachers and the realization that the learner's successful attainment of competences is dependent on the teachers' competences. The programs were characterized by "the precise specification of competences or behaviors to be learned, the modularization of instruction, evaluation and feedback, personalization, and field experience" (Tuxworth, 1989, p.10).

2) Aligning curriculum with the needs in the world of work

In order to develop a demand-driven approach for CBC implementation, Kenya Institute of Curriculum Development (KICD) should partner with the national human resource planning and development within the Ministry of Labour. In this case, the needs of the labor market will drive the pedagogical strategies employed and assessment criteria utilized to ensure that students experience effective learning processes. This structure could allow for continued reforms to address emerging needs in the rapidly changing economy. An example of this strategy occurred in the USA when "competency-based approach as a direct measure of student learning" (Curry & Docherty, 2017, p. 62) was triggered by the perception of technological advancement by the Soviet Union (Hodge, 2007).

3) Adapting learning assessment to CBC practice-based frameworks

We recommend KICD to work closely with the Kenya National Examinations Council (KNEC) and the newly created state department for the implementation of curriculum reforms in the Ministry of Education to develop frameworks for CBC assessments that align with labor market needs. Undoubtedly, a shift from content-based to competency-based curriculum calls for a change in the approaches utilized in developing objectives, milestones, and assessment methods through a demand driven system of thinking. Assessment criteria for CBC in Kenya should be designed to include alternative, practice-based techniques of measuring learners' achievement to determine how well students have developed the requisite problem-solving skills and key competencies needed in the labor market. For greater conceptual clarity, the concepts assessed in formative and summative assessments should be standardized (Evans et al., 2019). The concepts will vary by the students' grade level, career aspirations, and the realities about the world of work where those competencies will be utilized (Evans et al., 2019).

4) Involvement of teachers to own the curricula and inform implementation process

Evidence from this study revealed that inadequate involvement of teachers in the curriculum development process impedes effective implementation of a CBC. Thus, it is important to engage teachers throughout the implementation stages, including their participation in technical working groups that examine the gaps in the curriculum to foster improved pedagogical skills and techniques. Teachers also can be involved through government funded action-research to better identify challenges in the implementation process and as sources of recommendations on how to solve the challenges. For example, in South Korea teachers engaged in action-oriented research on CBC implementation (So et al., 2017). The financial support the teachers received enabled knowledge generation throughout the process of implementing the programs in their schools (So et al., 2017). The teachers can become agents of pedagogical change and increase relevance for the students by linking their students' classroom experiences to real-world situations (Hamre & Pianta, 2010; Zee & Koomen, 2016). These activities can help students be better positioned to practice meta-cognitive skills, facilitate critical thinking, deepen thought processing, and expand understanding (Hamre & Pianta, 2010; Zee & Koomen, 2016). This experience will consequently improve teachers' self-efficacy in regard to teaching creativity, critical thinking, and problem solving.

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Appendix A

Combined Qualitative Assessment				
	Scoring			
	3	Strong		
	2	Acceptable		
	1	Weak		
	0	Absent		
		Q1	Q2	Q3
Demographics				
Study Authors	**Year**	What is the academic level of the students? (Grade if given, or elementary, middle, high school)	How many classrooms/ teachers in sample?	How many students in sample?

Q4	Q5	Q6	Q7
Screening questions			
• Are there clear qualitative and/or quantitative research questions/objectives, or a clear mixed methods question/objective?	• Do the collected data allow the researcher to address the research question/objective?	Does the selection of qualitative, quantitative, or mixed methodology fit the purpose of the research? (Is the methodology appropriate?)	Is there a clear statement of the theoretical or conceptual framework for the study?

Q8	Q9	Q10	Q11	Q12
Context: I: Setting				
Is the geographical and education setting of the study clearly stated?	Does the setting seem appropriate and/or sufficiently specific for examination of the research question?	Do the authors provide a clear rationale for selecting the setting?	Do the authors provide sufficient detail about the setting?	Did the authors clearly state their inclusion/exclusion criteria for the setting and the sample?

Q13	Q14	Q15	Q16	
1. Qualitative				
1.1. Are the sources of qualitative data relevant and adequate to address the research question/objective?	1.2. In the data reduction/analysis is appropriate consideration given to how findings relate to the school and classroom, in which the data were collected?	1.3. Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?	1.4. Results are presented in an organized manner that answer the research questions.	*For the quantitative questions determine if section 2 or 3 is appropriate for the study being reviewed.*

Q17	Q18	Q19	Q20
2. Quantitative non- randomized			
2.1. Are participants (organizations) recruited in a way that minimizes selection bias?	2.2. Are measurements appropriate (clear origin, or validity known, or standard instrument) regarding the exposure/intervention and outcomes?	2.3. In the groups being compared (with intervention vs. without), are the participants comparable, or do researchers take into account (control for) the difference between these groups?	2.4. Are the statistical tools used appropriate for answering the researcher questions/objectives and for the data collected.

Q21	**Q22**	**Q23**	**Q24**
3. Quantitative descriptive			
3.1. Is the sampling strategy relevant to address the quantitative research question?	3.2. Is the sample representative of the population under study?	3.3. Are measurements appropriate (clear origin, or validity known, or standard instrument)?	3.4. Is there an acceptable response rate (60% or above)?

Q25	Q26	Q27		
4. Mixed methods				
4.1. Is the mixed methods research design relevant to address the qualitative and quantitative research questions/objectives, or the qualitative and quantitative aspects of the mixed methods question/objective?	4.2. Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)?	4.3. Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data in the discussion?	**Total Score**	**Comments**