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Research Article

Scaffolding Critical Thinking in Competency-Based Curriculum: Evidence from Integrated Science Instruction in Public Junior Schools in Nairobi County, Kenya

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Abstract

Critical thinking is widely recognized as a foundational skill for effective participation in the workforce and responsible citizenship. It involves analyzing, evaluating, and interpreting information to draw well-reasoned, defensible conclusions. The introduction of the Competency-Based Curriculum in Kenya, under the Competency-Based Education holistic approach, has included critical thinking as one of its core competencies. The study sought to determine how teachers are scaffolding critical thinking during the preparation and presentation of Integrated Science instruction in public junior schools in Nairobi County, Kenya. The study adopted a mixed-methods descriptive research design. The target population was 8,259 respondents: 7,598 learners, 643 teachers, and 18 Curriculum Support Officers (CSOs). The sample consisted of 382 respondents: 46 teachers, 328 learners, and 8 CSOs. Representative samples were selected through proportionate and systematic sampling. Data were collected using questionnaires and interviews. Quantitative data were analyzed descriptively using the Statistical Package for the Social Sciences (SPSS, Version 30.0), while qualitative data were analyzed thematically. The findings indicated that although teachers adopted learner-centered approaches, they faced significant challenges in planning and implementing critical-thinking strategies, mainly conceptual links, inquiry, evidence-based reasoning, reflection, and real-world application of scientific concepts. The study also identified curriculum interpretation as a barrier to implementing critical-thinking instruction, resulting in a gap between teachers' perceived skills and actual classroom practices. The findings inform educators on the status of implementing critical thinking under Competency-Based Education and highlight challenges experienced by teachers. The study concludes that teachers encounter difficulties in developing Integrated Science instruction that scaffolds critical thinking and recommends the development of a structured instructional design model to help them design such instruction.

Keywords

Conceptual Links, Critical Thinking, Curriculum Interpretation, Curriculum Support Officers, Scaffolding

1. Introduction

The quality of education influences individual lives and the economies of nations. The World Economic Forum (WEF) Future of Jobs report states that skills acquired through education, such as critical thinking, problem-solving, and creativity, are vital in the modern labor market [36]. These skills, often associated with advanced cognitive processes, have been ranked

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higher than technological literacy and management abilities in problem-solving and civic participation. Although automation continues to reshape work by removing many routine tasks, higher-order cognitive skills remain irreplaceable by Artificial Intelligence (AI). These skills help people think critically, reason reflectively, and generate knowledge that goes beyond what AI systems can do, given the limitations imposed by developers' parameters. This underscores the United Nations Educational, Scientific, and Cultural Organization (UNESCO) call for nations to adopt educational approaches that emphasize thinking, reasoning, and adaptability as essential learning outcomes [32].

Education should enable learners to understand the world around them by equipping them with the knowledge and skills needed for a meaningful existence. The Organization for Economic Co-operation and Development (OECD) situates critical thinking as a vital skill for navigating the economic and social challenges of the 21st Century [26]. It enables individuals to analyze, evaluate, and interpret information by deliberately applying cognitive skills to reach well-reasoned, defensible conclusions. The Future of Jobs report states that analytical thinking, creativity, and adaptability are becoming the most valued skills among employers [36]. Society in the 21st Century continues to undergo rapid change, requiring advanced cognitive abilities [25]. The rising demand for critical thinking in the knowledge economy has led to a global shift toward Competency-Based Curriculum (CBC), as countries adjust their education systems to meet these needs.

Defining and implementing critical thinking in school settings remains challenging. There is a persistent gap between curriculum goals and classroom practice in the operationalization of critical thinking [29]. Classroom instruction geared towards enhancing critical thinking in learners should employ teaching approaches that move learners toward active evaluation and reasoning. Such learner-centered approaches include the Socratic method, problem-based learning, inquiry-based instruction, structured classroom debates, and reflective journaling. However, studies on CBE implementation in Kenya show that teachers have continued to use teacher-centered instructional approaches that limit learners' opportunities to develop critical and creative thinking [13, 17, 22, 23, 35]. This practice has resulted in a persistent gap between curricular aspirations and classroom practice, raising queries about the extent to which the education system is preparing learners for an evolving society. The disconnect between curriculum goals and classroom practice is a significant issue in an education system intended to prepare learners for an evolving society. Consequently, the study sought to assess the classroom instruction teachers utilize during the preparation and presentation of Integrated Science instruction to ensure the continuous development of critical thinking in learners.

Classroom instruction should provide learners with opportunities to reflect on their reasoning as they link knowledge to real-life situations. Efforts to strengthen higher-order cognitive skills in Africa are gaining prominence as countries update their curricula to focus on skills relevant to the 21st Century and beyond. This response is driven by the African Union's Continental Education Strategy for Africa 2016-2025, which emphasizes Inquiry-Based Learning (IBL), problem-solving, and creativity as vital skills for transforming education systems and fostering sustainable development [1]. However, studies indicate that classroom instruction remains primarily teacher-centered in many Sub-Saharan African countries, with limited opportunities for learners to question existing knowledge, explore new ideas, or engage in higher-level reasoning [32]. Teachers use conventional teaching approaches that limit learners' engagement with concepts. In Ghana, basic school teachers report that limited knowledge of learner-centered classroom instruction strategies and inadequate time and resources have hindered the implementation of learner-centered instructional approaches [12]. This has resulted in instructional practices that expose learners to information to memorize for use in answering exam questions. Such learners experience challenges when they encounter situations that require decision-making. In Malawi, tutor attitudes and reliance on traditional didactic techniques have been identified as ongoing obstacles to the use of learner-centered methods in the nursing and midwifery technician programme. The practice has resulted in nurses and technicians who only follow procedures as prescriptions, irrespective of a patient's unique needs. In Uganda, inadequate teacher training has been reported as one of the key barriers to adopting learner-centered methods, alongside systemic constraints such as large class sizes and limited instructional resources [28]. Teacher education is largely informed by teacher-centered pedagogical approaches, which do not prepare teachers for the 21st century classroom. These findings align with large-scale assessments conducted by the Centre for Global Education Monitoring, which revealed ongoing gaps in learners' ability to apply knowledge, interpret information, and think logically, indicating that critical thinking has not yet been fully integrated into daily classroom practice [33]. These continental trends reveal a significant gap in the implementation of higher-order cognitive skills: while curricula across Africa are increasingly focused on 21st-century skills, most teachers lack structured teaching frameworks and practical tools to incorporate higher-order cognitive skills into lessons.

The Kenyan education system is not exempt from the challenge of preparing learners to apply knowledge in real-world situations. An examination of the implementation of the CBE found that schools still emphasize competitive exam-oriented performance over acquisition of skills [29]. As a result, learners are gradually drifting to rote memorization of concepts over analytical reasoning, problem-solving, creativity, and IBL. This may impede the actualization of the intended goals of CBE, especially the acquisition of critical thinking skills. Educational authorities should regularly review classroom practices to ensure they align with curriculum objectives. Additionally, there should be policies to guide and monitor how teachers integrate CBE core competencies into teaching and learning, enabling learners to engage meaningfully with the content. This calls for an urgent need for comprehensive teacher training to enhance pedagogical practices on CBE implementation in Kenyan junior schools [13].

Kenya Ministry of Education (MoE) has responded by engaging teachers in a retooling program designed to equip teachers with appropriate CBE-relevant instructional practices [31]. The current study, therefore, sought to determine the extent to which the retooling process has equipped teachers to address the pedagogical challenges documented in the implementation of learner-centered approaches in CBE classrooms in Kenya. Specifically, the study sought to analyze critical-thinking practices used by teachers during the preparation and presentation of Integrated Science instruction among junior school learners in Nairobi County.

1.1. Statement of the Problem

Critical thinking is widely recognized as a crucial skill for success in society and in the workforce. Countries have adopted education systems that emphasize developing critical thinking to prepare citizens for the 21st Century and beyond. Kenya's CBE system has included critical thinking among the core competencies learners should acquire. Acquisition of critical thinking skills can be achieved through consistent exposure to classroom instruction that encourages learners to analyze, evaluate, justify, create, and apply ideas to real-world situations. Teachers in Kenya have reported challenges in preparing learner-centred classroom instruction. The MoE has organized retooling programs to equip teachers with skills that align with the CBE pedagogical approaches. The study, therefore, sought to determine the extent to which the retooling programs have equipped teachers in public junior schools in Nairobi County with skills to scaffold critical thinking during the preparation and presentation of Integrated Science instruction.

1.2. Purpose of the Study

The purpose of this study was to assess teachers' practices during the preparation and presentation of Integrated Science instruction that scaffolds critical thinking among junior school learners in public junior schools in Nairobi County, Kenya.

1.3. Research Objective

The objectives of the study:

Assess instructional practices for scaffolding critical thinking in Integrated Science instruction during lesson preparation.

Assess instructional practices for scaffolding critical thinking in Integrated Science instruction during lesson presentation.

Third objective removed to be included in the next publication on critical-thinking evaluation practices whose data has already been collected.

1.4. Significance of the Study

The findings of the study provide insights into the actualization of critical thinking in Kenya's CBE system by revealing critical thinking instructional practices employed by teachers during lesson preparation and presentation. Critical thinking instructional practices equip learners with skills to analyze problems, evaluate evidence, justify conclusions, and apply scientific concepts to real-world situations, thereby supporting the development of a key competency in Kenya's CBE system holistic approach curriculum.

2. Literature Review

Nations are adopting education systems that focus on developing critical thinking. This is because critical thinking has become a key pillar of the new knowledge-based economy. The rising demand for workers with critical and creative thinking skills calls for a shift in education systems. However, despite the long-standing philosophical roots in the works of Plato and Socrates and its continued prominence in contemporary educational discourse, empirical evidence suggests that learners' critical thinking skills remain underdeveloped [8]. This calls for educators to rethink classroom instruction to enhance learners' critical thinking. Teachers should be intentional in designing classroom instruction that nurtures higher-order cognitive skills. This will ensure education systems graduate learners with improved abilities to analyze real-world problems, justify decisions, and present evidence-based arguments [26]. Teachers should use classroom instruction that encourages learners to focus on understanding, reflection, and the application of knowledge instead of passive memorization of concepts.

The Kenyan CBE emphasizes critical thinking as a core competency that learners are expected to develop. An examination of Constructivist Learning Theory (CTL) as a paradigm for fostering critical thinking, creativity, and problem-solving established that meaningful higher-order engagement occurs when teachers deliberately integrate constructivist strategies, such as collaborative learning, inquiry-based tasks, reflection, and scaffolded engagement, into instructional design [2]. The study concluded that critical thinking emerges when learners are meaningfully engaged in constructing understanding rather than passively receiving information. This places a demand on teachers to intentionally shift classroom instruction toward learner-centered practices to ensure graduates who can think critically and act creatively. The successful implementation of CBE in Kenya is anchored in the instructional practices teachers adopt. However, empirical studies show that teachers continue to use teacher-centered instructional approaches under CBE [13, 15, 17, 23, 35]. The practice is limiting CBE learners' opportunities to develop critical and creative thinking skills, which might result in similar challenges reported among 8-4-4 learners.

Critical thinking skills develop through meaningful and appropriately structured opportunities for practice. Consequently, when instructional preparation and presentation provide limited opportunities for learners to analyse, reason, evaluate, reflect and apply ideas, the development of critical thinking may be constrained. An examination of the development of critical thinking through scaffolded peer feedback in China found that systematic instruction can effectively enhance learners' critical thinking skills [9]. Learners who are continually exposed to validated pedagogical approaches, such as questioning, problem-based learning, and collaborative learning, significantly enhance critical thinking skills. The findings emphasize the importance of teachers' consistent use of classroom instruction that enhances learners' development of critical thinking skills. The findings align with the results of a systematic review and meta-analysis of empirical studies published from 2000 to 2024 to examine the effect of IBL on learners' critical thinking skills in science education [4]. The analysis revealed that IBL has a significant positive impact on learners' critical thinking. However, considerable heterogeneity suggested that contextual factors, such as teaching strategies, instructional duration, and assessment approaches, influence outcomes. Therefore, teachers should consistently engage in critical thinking instructional practices to ensure learners acquire higher-order cognitive skills.

Science education aims to help learners analyze, evaluate, and improve their thinking by applying knowledge in real life. Through science education, learners should acquire skills relevant to the 21st-century workforce. This is the goal of the Integrated Science education approach under Kenya's CBE system [20]. Integrated Science teachers are expected to design classroom instruction that not only delivers scientific content but also guides learners through structured inquiry, evidence-based reasoning, and the practical application of concepts. This teaching approach demands learner-centered IBL strategies. Teachers are expected to scaffold learners' inquiry processes with structured guidance and reflective prompts, ensuring learning goes beyond rote memorization. However, literature shows that Kenya's CBE teachers continue to face significant pedagogical and systemic challenges that directly impede the development of key skills in the new education system. The current study aimed to assess the critical thinking instructional practices employed by teachers in public junior schools in the preparation and presentation of Integrated Science instruction that enhances the continuous development of critical thinking among learners.

3. Methodology

3.1. Location of the Study

In Nairobi County, teachers and learners come from diverse socio-economic and cultural backgrounds. This provided good opportunities for divergent thinking about real-life challenges, creating an ideal environment to examine whether Integrated Science classroom instruction provides learners with continuous opportunities to enhance critical thinking as they share different perspectives of scientific concepts and create varied innovations.

3.2. Research Design

The study adopted a mixed-methods descriptive research design that involved analyzing teacher practices in preparing and presenting Integrated Science instruction that enhances the development of critical thinking in learners. A questionnaire was given to teachers and learners to identify contextual challenges and instructional needs during the preparation and presentation of Integrated Science. CSOs were interviewed to gather views on how teachers design classroom instruction that ensures critical thinking as a core component of the CBE.

3.3. Study Population, Sampling Technique, and Sample Size

The target population for the study comprised 7598 Grade Eight learners, 643 Grade Eight teachers, and 18 CSOs drawn from the 142 junior schools in Nairobi County. This resulted in a targeted population of 8,259 respondents. Representative samples were selected through proportionate and systematic sampling.

3.4. Sample Size for the Survey

The sample size was calculated using Yamane's formula, which is widely accepted for determining sample sizes in surveys with large populations [27]. According to the formula, the sample size, n, for the survey phase was obtained as 382. Table 1 presents the distribution of sample sizes among survey participants.

4. Results and Discussions

4.1. Response Rate

296 learners and 44 teachers completed the questionnaires, translating to response rates of 90.2% and 95.7%, respectively. Five CSOs were interviewed, translating to a response rate of 62.5%. A response rate of 50% or higher is sufficient, especially for data collected through face-to-face sessions [6].

4.2. Demographic Information

(59.5%) of learners were girls, and (40.5%) were boys, while more than half (52.3%) of teachers were male, and (47.7%) were female. Regarding professional qualifications, the majority (81.8%) of teachers held a Bachelor of Education (B.Ed.) degree, and all (100%) were trained in a science-related field (Chemistry, Biology, or Physics). These findings indicate an improvement in the professional qualifications of science teachers in public junior schools. In Kenya, the transition of the first cohort of Grade 7 learners to junior school faced challenges related to teacher specialization [16]. The majority (84.1%) of teachers report having 0 to 5 years of teaching experience, with more (95.5%) indicating they have taught Integrated Science for 1 to 3 years. Slightly over a tenth (15.9%) have more than five years of teaching experience, and none (0.0%) have taught Integrated Science for over three years. Although the teachers have relevant academic qualifications, they are still developing expertise in content delivery. This aligns with previous findings which found out that CBE teachers in Kenya lack pedagogical knowledge needed to design appropriate curriculum and instruction to operationalize CBE competencies, due to limited experience [13].

4.3. Instructional Practices for Preparing Integrated Science Instruction

The study sought to determine the frequency with which teachers consider practices for enhancing critical thinking when preparing Integrated Science instruction. Table 2 summarizes the responses obtained.

During the preparation of Integrated Science instruction to facilitate linking concepts with related prior concepts, the majority (72.7%) of teacher respondents indicate that they always consider identifying related prior concepts. In comparison, slightly more than a quarter (27.3%) indicate they do not. Almost two-thirds (61.4%) indicate they do not consider learners' previous misconceptions about related concepts, and a similar proportion (59.1%) indicate they do not plan activities to activate learners' prior related knowledge. Furthermore, nearly three-quarters (72.8%) of teacher respondents report that they do not design activities that build on learners' prior knowledge. According to the Meaningful Learning Theory (MLT), meaningful learning occurs when teachers intentionally connect new knowledge to learners' existing cognitive structures [5]. This connection helps learners see the relationships between concepts across different domains. Supporting the MLT, [18] states that when new information is presented without anchoring it to existing knowledge structures, it can lead to fragmented understanding, misunderstanding of concepts, or superficial learning, causing learners to rely on rote memorization. The absence of such practices may result in learners struggling with conceptual understanding, forming connections, and transferring knowledge across domains.

Regarding encouraging broad-based thinking about scientific concepts, over two-thirds (68.2%) of teachers indicate that they do not plan questions that promote inquiry into scientific phenomena. Three-quarters (75.0%) state they do not consider incorporating problem situations to stimulate learner curiosity. In comparison, nearly two-thirds (63.6%) indicate they do not plan for real-life contexts to foster student curiosity, a figure (65.9%) that corresponds with teachers who do not prepare for anticipated learner curiosity responses. An additional three-quarters (75.0%) of teachers say they do not consider designing prompts to encourage deeper thinking. These findings suggest that teachers in public junior schools in Nairobi County do not typically plan for inquiry-based questions, real-life problem scenarios, or prompts that promote advanced thinking in Integrated Science instruction. Vygotsky's social constructivist theory proposes that learners develop higher-order thinking when teachers provide structured scaffolding through questioning, guided inquiry, and dialogic interaction within the Zone of Proximal Development (ZPD) [34].

Regarding promoting focused investigation, nearly two-thirds (65.9%) of teacher respondents say they consider preparing Integrated Science instruction that is clearly stated, while a similar proportion (68.2%) always aim to create instruction that is easy to understand. Additionally, almost two-thirds (63.6%) of teacher respondents acknowledge ensuring that the Integrated Science instruction is straightforward for learners to follow. These findings show that teachers intentionally prepare clear, understandable Integrated Science instructions that are simple for learners to follow. Simplified, well-structured instructions reduce unnecessary cognitive load, allowing learners to concentrate their mental effort on grasping concepts and solving problems rather than trying to interpret unclear procedures [10]. Clear instructions minimize confusion and help learners understand task expectations, enabling them to participate more effectively in classroom activities. However, inquiry-based science instruction requires not only clear directions but also cognitively challenging questions, reflective prompts, and opportunities for evidence-based argumentation [7, 37]. Therefore, even though teachers in public junior schools in Nairobi County ensure they prepare Integrated Science instructions that are easy to follow on the surface, these instructions might not challenge learners to analyze evidence, justify conclusions, or engage in deeper reasoning. The instructional support may focus more on clear procedural guidance than on fostering higher-order thinking.

The teacher respondents were asked to state the reasons for not considering the practices mentioned in Table 2 when preparing Integrated Science Instruction. The responses are summarized in Table 3.

Half (50.0%) of teacher respondents ticked statements related to practices on linking concepts and encouraging broad-based thinking. A further 40.9% ticked against statements related to practices on facilitating linking concepts, encouraging broad-based thinking, and focusing on scientific investigation. These findings reveal a persistent challenge in preparing instruction that encourages broad-based thinking. Broad-based thinking is associated with the higher levels of the Revised Bloom's Taxonomy (RBT) [3]. Less than a tenth (6.8%) of respondents reported struggling to prepare instruction that encourages focus on scientific investigation, which may suggest that teachers find it easier to guide learners through structured investigations with clear procedures than to facilitate open-ended thinking. Open-ended thinking processes require learners to connect ideas, evaluate evidence, and transfer knowledge across contexts. CSO C3 stated that learners use Artificial Intelligence for project work instead of thinking through the work. The project work in the curriculum was designed to encourage critical thinking. The officer said, '*Critical thinking among our learners is at garbage in, garbage out because there is no structured investigation; all learners feed the system with one single instruction, and they all get a similar response, which the teacher is very excited about, without noticing there is no learning taking place*.' These findings suggest that facilitating higher-order cognitive processes remains a significant challenge in public junior schools in Nairobi County, which calls for structured instructional frameworks that support teachers to systematically scaffold learners' thinking from knowledge acquisition to reasoning and application, thereby enhancing the development of critical thinking, as one of the core competencies envisioned in the CBE.

The teacher respondents were asked to specify any other reason(s) that make them not consider the practices for enhancing critical thinking when preparing Integrated Science instruction. The responses were thematically categorized into time, pedagogy, resources, workload, or curriculum interpretation. Slightly more than a fifth (20.5%) of teacher respondents indicated that they do not consider the mentioned critical thinking practices due to challenges in interpreting the curriculum. The responses obtained are shown in Table 4.

4.4. Instructional Practices for Presenting Integrated Science Instruction

The study aimed to investigate the practices that teachers employ when delivering Integrated Science instruction. The responses obtained are summarized in Table 5.

During the presentation of Integrated Science, to facilitate the connection of concepts, more than two-thirds (68.2%) of teacher respondents indicate that they give learners an overview of related previous concepts, and more than three-quarters (77.3%) indicate that they encourage learners to identify connections between concepts. The majority (90.0%) of teacher respondents indicate they give learners time to engage as they identify related concepts, with more (88.6%) indicating that they ensure they clarify to learners how concepts build upon each other, and almost three-quarters (70.5%) admitting they give learners an introductory assessment on previously related concepts. These findings suggest that teachers in public junior schools in Nairobi County incorporate practices that facilitate the connection of concepts during Integrated Science instruction.

Regarding encouraging broader thinking during instruction, almost two-thirds (61.4%) of teacher respondents indicate that they encourage learners to generate questions about scientific concepts, with more than three-quarters (79.5%) indicating that they use probing questions to guide learners into deeper reasoning. The majority (86.4%) of teacher respondents indicate that they allocate time for learners to ask questions about new concepts, which is also reflected in a similar proportion (84.1%) of respondents who agree that they give learners time to explain their questions, as well as allow learners to discuss questions raised by others. Three-quarters (75.0%) of teacher respondents acknowledged that they do not reprimand learners who ask out-of-context questions, with more (86.4%) indicating that they can manage out-of-context questions without choking learner curiosity, and a further (79.5%) indicating they can design lessons that encourage exploration with relevant questions. The findings suggest that teachers in public junior schools in Nairobi County incorporate practices that encourage broader thinking on scientific concepts during the presentation of Integrated Science instruction.

To promote scientific investigations, more than half (61.4%) of teacher respondents admit that they allow learners to explore scientific ideas through experiments, with more than two-thirds (68.2%) indicating they give learners the freedom to express personalized observations, and more than three-quarters (77.3%) stating that they permit freedom in data analysis supported by scientific facts. A further majority (81.8%) of teacher respondents admitted that they guide learners in justifying scientific explanations and conducting investigations, with a high proportion (93.2%) indicating that they support learners' discussions to help them connect concepts. These findings suggest that many Integrated Science teachers are deliberately creating learner-centered classroom environments that support inquiry, scientific reasoning, and collaborative learning. However, the findings may also reveal an important contradiction within classroom practice. Although teachers report supporting investigations and learner expression through freedom in data analysis and learner-centered discussions, the findings from instructional practices in preparing Integrated Science instruction indicate that teachers have challenges designing instruction that links concepts to related prior concepts and encourages broad-based thinking about scientific concepts. Hence, the instructional process may still lack the systematic scaffolding necessary for sustained critical-thinking development. The CSO C1 indicated that a major activity teachers use to encourage the development of critical thinking in Integrated Science learning is asking learners to use digital devices to obtain print material, which is then used to create a Curiosity Chart placed at the back of the class. The officer indicated that learners take gallery walks and view the images, implying that when they do so, they engage in critical thinking because they will be thinking as they view the images. Such practices do not lead learners into investigative activities of scientific concepts nor engage in deeper thinking through curiosity. This response aligns with an earlier study finding which established that teachers often adopt visible learner-centered activities, such as group work and presentations, without fully integrating structured inquiry, guided reasoning, and reflective questioning that promote deeper cognitive engagement [29].

Regarding facilitating reflection and reasoning, the majority (90.9%) of respondents indicate that they allow learners to seek clarification of the instructions, and all (100.0%) admit they ask random questions to confirm the clarity of the instructions. These figures align with the proportion (97.7%) of teacher respondents who indicate that they help learners connect the instruction to real-life situations, with the majority (90.9%) indicating they attend to learners who express contempt for the given activity. The findings provide further justification that Integrated Science teachers are making efforts to create supportive and interactive learning environments that encourage learner participation, clarify instruction, and foster contextual understanding, as expected in a constructivist learning environment [30]. Additionally, CBE teachers in Kenya attempt to make lessons learner-centered and context-based despite challenges related to pedagogical preparation and competency implementation [13].

Regarding facilitating the application of knowledge, many (88.6%) of teacher respondents indicate that they encourage the application of knowledge in real-world situations, and almost two-thirds (63.6%) admit that they can explain to learners how specific concepts apply to real-world scenarios. However, the majority (93.2%) of respondents indicate that they encourage learners to connect their knowledge to societal challenges, and almost all (95.5%) of the teacher respondents allocate time to learners who struggle to apply their knowledge. The findings suggest that Integrated Science teachers in public junior schools in Nairobi County are deliberately promoting the application of scientific knowledge to authentic, socially relevant situations. The practice supports learners' movement toward competency-oriented knowledge application rather than rote memorization of facts to pass exams.

The respondents were asked to indicate the challenges that prevent them from considering the critical thinking practices mentioned when presenting Integrated Science instruction. Table 6 summarizes the responses.

Almost three-quarters (70.6%) of teacher respondents indicated that the challenges preventing them from adopting critical thinking practices in presenting Integrated Science instruction are experienced across three or more of the provided practice categories: facilitating connections among concepts, encouraging broad-based thinking and scientific investigations, reflecting on reasoning, and applying knowledge when presenting Integrated Science instruction.

The teacher respondents were asked to indicate other reasons they did not consider practices for enhancing critical thinking when presenting Integrated Science instruction. The responses were thematically grouped and summarized in the categories shown in Table 7.

The findings revealed notable variation in the proportions of teachers who indicated the reasons they did not consider practices that enhance critical thinking during preparation and during presentation. Although during lesson preparation, curriculum interpretation emerged as the most significant challenge, with a fifth (20.5%) of teacher respondents indicating it as a reason for not considering practices that enhance critical thinking, the proportion of teacher respondents with a similar challenge during presentation drastically decreased to almost a tenth (13.6%). A similar decline was noticed for time-related reasons, which dropped from (13.6%) during preparation to (6.8%) during presentation. However, the challenge with resources increased from (2.3%) during preparation to (9.1%) during presentation. Additionally, resources are a major challenge during presentation more than during preparation. IBL follows a highly systematic approach, which requires the teacher to select problems carefully; this has implications for time constraints [16]. The findings on resource-related challenges suggest that limitations in instructional materials become more evident during classroom implementation, particularly when conducting inquiry-based and practical science activities. The higher proportion (63.7%) of teachers reporting no challenges during lesson presentation compared to during preparation (54.5%) may suggest a misinterpretation of pedagogical practices; the teachers may be more confident in classroom delivery without paying attention to principles of learner-centered classroom practices, especially practices that promote higher-order thinking skills.

The study sought to establish how Grade Eight learners perceive the teacher practices during the presentation of Integrated Science instruction. An analysis showing the percentage difference between learner and teacher responses on the critical thinking activity is presented in Table 8.

The analysis of the percentage difference between the learner and the teacher responses revealed both areas of alignment and notable perception gaps. At the basic level of critical thinking, facilitating the connection of concepts, learner and teacher responses were relatively consistent. However, while the majority (90.9%) of teacher respondents felt that they adequately gave learners time to engage as they identified related concepts, slightly fewer (80.7%) of the learners agreed the time was sufficient. Additionally, while many (88.6%) of teacher respondents indicated they ensure they clarify how concepts build upon each other, fewer than three-quarters (71.6%) of learners agree with them. The findings suggest that although teachers in public junior schools in Nairobi County are making efforts to connect concepts in Integrated Science learning, learners feel they are not given sufficient time to engage with related concepts, nor are teachers sufficiently clarifying how concepts build on each other. Revisiting prior concepts and building on them over time can help learners perceive scientific ideas as interconnected, enabling them to develop integrated understandings. Structured connections can promote the development of organized knowledge of core scientific ideas [24]. In addition, if learners explore different facets of a complex phenomenon that include new scientific ideas and collect and analyze these new data, they can connect them to their prior experiences, which may provide a structure for building an integrated understanding of these new ideas [21].

The learner-teacher discrepancy was more evident in encouraging broader thinking on scientific concepts during the presentation of Integrated Science instruction. While three-quarters (75.0%) of the teacher respondents indicated that they do not reprimand learners who ask out-of-context questions, fewer than half (44.6%) of learners acknowledged the practice. Additionally, although the majority (86.4%) of teachers felt that they can manage learners' out-of-context questions without choking their curiosity, slightly more than a third (34.1%) of learners agreed with them. These findings show an apparent discrepancy between teachers' perceived practice of fostering inquiry and learners' actual experiences. Teachers in public junior schools in Nairobi County may unknowingly discourage learners from asking questions perceived as unrelated to the immediate lesson objectives, even though such questions can stimulate curiosity and deeper thinking. The Cognitive Load Theory suggests that carefully designed prompts and guided questioning help learners process complex information effectively and support understanding [10]. When teachers support learners in generating, asking, explaining, and discussing questions about scientific concepts, they help them process complex information more effectively, leading to a deeper understanding of the concepts.

The discrepancies in learner-teacher responses were more evident in higher-level critical thinking practices, particularly in facilitating reflection, reasoning, and knowledge application. The responses revealed a negative deviation in all critical thinking practices, as learners disagreed with the self-reported teacher practices. Notably, a response where all (100.0%) teacher respondents indicated that they ask random questions to confirm the clarity of instructions, slightly above three-quarters (78.7%) of learners acknowledge the practice. Similarly, almost all (97.7%) of teacher respondents indicate that they help learners connect the instruction to real-life situations, while only slightly more than three-quarters (79.4%) agree with them. Additionally, the majority (90.9%) of teacher respondents indicate they attend to learners who express contempt for the given activity, while slightly more than two-thirds (68.6%) of learners agree. The greatest disparity was observed in the facilitation of application of knowledge, where the majority (90.9%) of teacher respondents indicated that they reduce support when learners demonstrate reasoning, while slightly less than a third (32.4%) of learners agreed that teachers do so. While teachers perceive that they allow learners the autonomy to apply knowledge from a personal understanding, learners felt such freedom does not exist in the learning process. Teachers must be able to identify where learners are in their learning progression to provide appropriate support [14]. However, the Integrated Science teachers in public junior schools in Nairobi County tend to restrict learners within the confines of existing information from textbooks, thus limiting innovative and creative reasoning. These findings indicate gaps in how teachers and learners perceive critical-thinking-enhancing practices in Integrated Science learning.

Vygotsky's ZPD emphasizes that instructional support should be temporary and gradually withdrawn as learners gain independence in reasoning and problem-solving [34]. However, if scaffolding is not systematically withdrawn as learners demonstrate autonomy, they may become overly dependent on teacher guidance, thus limiting the development of self-regulation, independent inquiry, and autonomous problem-solving [10, 11]. Excessive support from Integrated Science teachers to CBE learners may therefore hinder learners' autonomy in analyzing evidence, justifying conclusions, and applying scientific reasoning, which are essential competencies in science education and innovation.

A notable positive deviation of more than a fifth (+21.5%) was noted under the application of knowledge. While almost two-thirds (63.6%) of teachers indicated that they explain to learners how specific concepts apply to real-world scenarios, many (85.1%) learners felt that teachers do explain this. What teachers feel is not happening in class, the learners perceive it differently. A challenge identified by T9 could justify the discrepancy: he does not consider critical thinking practices when preparing Integrated Science instruction, namely "*Diverse prior knowledge and misconceptions among learners*." While teachers consider learners' diverse prior knowledge a challenge, this information can help learners understand how concepts apply to real-world scenarios, even when the teacher has not explained them in detail. CSO 3 stated that the learners most often do more than the teacher instructed them to do, arguing that, '*We are preparing 21st-century learners, so once given a tip of information, they go an extra mile*.' Although less than two-thirds of teachers in public junior schools in Nairobi County acknowledge explaining to learners how specific concepts apply to real-world situations, more learners indicate that teachers do explain. This discrepancy could be due to the diverse prior knowledge learners bring to class from computer-based learning. The diverse prior knowledge T17 indicated was a challenge to plan for, and the heterogeneous learner levels, which make preparing for the lesson difficult, as mentioned by T5, may be positively impacting the development of higher-order thinking skills among learners. The core purpose of CBE is to implement an education system that prepares learners for the application of knowledge rather than for passing exams [19].

5. Recommendations

The findings of this study showed that although Integrated Science teachers in public junior schools in Nairobi County generally adopt learner-centered approaches, they face significant challenges in systematically supporting critical thinking during lesson planning, delivery, and assessment of Integrated Science learning. Based on these findings, the following recommendations are proposed.

The study recommends that researchers and the KICD develop and share structured instructional design frameworks that clearly guide teachers in implementing critical thinking during Integrated Science lesson preparation and presentation.

The study further recommends that the MoE implement a policy that clearly guides how teachers should be supported to design critical thinking instruction.

Teacher education institutions should include structured instructional design models for scaffolding critical thinking in both pre-service and in-service programs. This will ensure that future teachers can design classroom instruction that scaffolds critical thinking through inquiry, conceptual connections, reflection, and the real-world application of knowledge.

School principals and CSOs should improve instructional supervision by focusing on the quality of lesson planning and presentation practices rather than just lesson attendance. Classroom observations should assess whether, during lesson presentation, the classroom instruction promotes connection of concepts, inquiry, evidence-based reasoning, reflection, and the authentic application of scientific ideas.

Future research should design IDMs to help teachers scaffold critical thinking within CBE.

Abbreviations

AI	Artificial Intelligence
CBC	Competency-Based Curriculum
CBE	Competency-Based Education
CSOs	Curriculum Support Officers
IBL	Inquiry-Based Learning
MLT	Meaningful Learning Theory
OECD	Organization for Economic Co-operation and Development
RBT	Revised Bloom's Taxonomy
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WEF	The World Economic Forum
ZPD	Zone of Proximal Development

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Conflicts of Interest

The authors declare no conflict of interest.

Appendix

Table 1. *Distribution of the Survey Respondents.*

Region	Schools	Survey Sample Size			Total
		Teachers	Learners	CSOs	
Dagoretti	6	6	46	1	53
Embakasi	6	6	57	1	64
Kamukunji	5	5	46	1	52
Kasarani	6	6	29	1	36
Kibra/Langata	7	7	47	1	55
Makadara/Mathare	6	6	49	1	56
Roysambu/Ruaraka	5	5	35	1	41
Starehe/Westlands	5	5	19	1	25
Total		46	328	8	382

Table 2. *Teacher Practices when Preparing Integrated Science Instruction. N= 44.*

During the preparation of Integrated Science instruction, to	Does not consider %	Considers %	Total %
Facilitate linking concepts with previous related concepts, I:			
Identify the related prior concepts.	27.3	72.7	100

During the preparation of Integrated Science instruction, to	Does not consider %	Considers %	Total %
Identify learners' previous misconceptions about related concepts.	61.4	38.6	100
Plan for activities to activate learners' prior related knowledge.	59.1	40.9	100
Design activities that stimulate learners' prior knowledge.	72.8	27.2	100
Encourage broad-based thinking on scientific concepts, I:			
Plan questions that encourage inquiry into scientific phenomena.	68.2	31.8	100
Incorporate problem situations to stimulate learner curiosity.	75.0	25.0	100
Plan for real-life contexts to stimulate learner curiosity.	63.6	36.4	100
Prepare for anticipated possible learner curiosity responses.	65.9	34.1	100
Design prompts to support the learner's deeper thinking.	75.0	25.0	100
I encourage focused investigation by ensuring instruction:			
That is clearly stated.	34.1	65.9	100
That is easy to understand.	31.8	68.2	100
That is straightforward for learners to follow.	36.4	63.6	100

Table 3. *Challenges in Considering Critical Thinking Practices During Lesson Preparation. N=44.*

Challenges related to:	Response %	Cumulative (%)
Facilitating linking concepts with related previous ones.	2.3	2.3
Related to encouraging broad-based thinking on scientific concepts.	6.8	9.1
Encouraging focused scientific investigation.	-	9.1
Facilitate linking concepts and encouraging broad-based thinking	50.0	59.1
Facilitate linking concepts and focus on scientific investigation.	-	59.1
Facilitate linking concepts, encouraging broad-based thinking, and focusing on scientific investigation.	40.9	100

Table 4. *Other Reasons making Teachers not consider Practices for Enhancing Critical Thinking when Preparing Integrated Science Instruction. N= 44.*

Characteristic	Category%	Cumulative (%)
Time-related.	13.6	13.6
Pedagogy-related.	2.3	15.9
Resources-related.	2.3	18.2
Workload-related.	6.8	25.0
Curriculum Interpretation.	20.5	45.5
No other reason.	54.5	100

Table 5. Teacher Practices during Presentation of Integrated Science Instruction (Teacher responses, N=44).

During the presentation of Integrated Science instruction, to	Yes	No	Total
Facilitate the connection of concepts, I:			
Give learners an overview of related previous concepts.	68.2	31.8	100
Encourage learners to identify concept connections.	77.3	22.7	100
Give learners time to engage as they identify related concepts	90.9	9.1	100
Ensure I clarify how concepts build upon each other.	88.6	11.4	100
Give an introductory assessment on previously related concepts.	70.5	29.5	100
Encourage broader thinking during instruction, I:			
Encourage learners to generate questions about scientific concepts.	61.4	38.6	100
Use probing questions to guide learners into deeper reasoning.	79.5	20.5	100
Allocate time for learners to ask questions about the new concept.	86.4	13.6	100
Give learners time to explain their questions.	84.1	15.9	100
Allow learners to discuss questions raised by others in groups.	84.1	15.9	100
Don’t reprimand learners who ask out-of-context questions.	75.0	25.5	100
Can manage out-of-context questions without choking curiosity.	86.4	13.6	100
Design lessons that encourage exploration with relevant questions.	79.5	20.5	100
Encourage scientific investigations, I:			
Allow learners to investigate scientific ideas through experiments.	61.4	38.6	100
Give learners the freedom to express personalized observations.	68.2	31.8	100
Allow freedom in data analysis supported by scientific facts.	77.3	22.7	100
Guide learners to justify scientific explanations and investigations	81.8	18.2	100
Support learners’ discussions to help them connect concepts.	93.2	6.8	100
Facilitate reflection and reasoning, I:			
Allow learners to seek clarification of the given instructions.	90.9	9.1	100
Ask random questions to confirm the clarity of instructions.	100.0	0.0	100
Help learners connect the instruction to real-life situations.	97.7	2.3	100
Attend to learners who express contempt for the given activity.	90.9	9.1	100
Facilitate application of knowledge, I:			
Encourage application of knowledge in real-world situations.	88.6	11.4	100
Gradually reduce support when learners demonstrate reasoning.	90.9	9.1	100
Explain how specific concepts apply to real-world scenarios.	63.6	36.4	100
Encourage learners to connect their knowledge to societal challenges.	93.2	6.8	100
Allocate time to learners who struggle to apply knowledge.	95.5	4.5	100

***Table 6**. Challenges in considering Critical Thinking Practices when Presenting Integrated Science Instruction (N=44).*

Challenge related to:	Response (%)	Cumulative (%)
Facilitating reflection and reasoning	4.5	4.5
Facilitating application of knowledge	4.5	9.0
Connecting concepts and scientific investigation	2.3	11.3
Connecting concepts and reflection	4.5	15.8
Connecting concepts and applications	4.5	20.3
Broader thinking and scientific investigation	6.8	27.1
Multiple critical thinking categories	70.6	97.7
None	2.3	100.0

***Table 7**. Other Reasons why Teachers do not Consider Practices for Enhancing Critical Thinking when Presenting Integrated Science Instruction. (N= 44).*

Characteristic	Response (%)	Cumulative (%)	Corresponding Preparation (%)
Time-related	6.8	6.8	13.6
Resources-related	9.1	15.9	2.3
Workload-related	6.8	22.7	6.8
Curriculum Interpretation	13.6	36.3	20.5
No other reason was provided.	63.7	100	54.5

***Table 8**. Analysis of Percentage Difference Between Learner and Teacher Responses.*

During the presentation of Integrated Science instruction, to	LR (%)	TR (%)	Dev. (%)
Facilitate the connection of concepts, my teacher:			
Give learners an overview of related previous concepts.	85.8	68.2	+17.6
Encourage learners to identify the concept connection.	82.8	77.3	+5.5
Give learners time to engage as they identify related concepts.	80.7	90.9	-10.2
Ensure that they clarify how concepts build upon each other.	71.6	88.6	-17.0
Give an introductory assessment on previous related concepts.	81.1	70.5	+10.6
Encourage broader thinking during instruction, my teacher:			
Encourage learners to generate questions about scientific concepts.	82.8	61.4	+21.4
Use questions to guide learners into deeper reasoning.	85.8	79.5	+6.3
Allocate time to ask questions concerning the new concept.	74.3	86.4	-12.1
Give learners time to explain their questions.	89.9	84.1	+5.8
Allow learners to discuss questions raised by others.	78.7	84.1	-5.4
Does not reprimand learners who ask out-of-context questions.	44.6	75.0	-30.4
Can manage learners' out-of-context questions without intimidation.	65.9	86.4	-20.5
Encourage learners to explore concepts with relevant questions.	83.8	79.5	+4.3

During the presentation of Integrated Science instruction, to	LR (%)	TR (%)	Dev. (%)
Encourage scientific investigations, my teacher:			
Allow learners to investigate scientific ideas through experiments.	76.4	61.4	+15.0
Give learners the freedom to express personalized observations.	83.8	68.2	+15.6
Allow learners to analyze data scientifically.	61.5	77.3	-15.8
Guide learners in justifying scientific explanations and investigations	81.1	81.8	-0.7
Guide learners' discussions to help them connect concepts.	89.5	93.2	-3.7
Facilitate reflection and reasoning, my teacher:			
Allow learners to seek clarification of the given instructions.	82.4	90.9	-8.5
Ask random questions to confirm the clarity of instructions.	78.7	100.0	-21.3
Help learners connect the instruction to real-life situations.	79.4	97.7	-18.3
Attend to learners who express contempt for a given activity.	68.6	90.9	-22.3
Facilitate the application of knowledge, my teacher:			
Encourage learners to apply knowledge in real-world situations.	86.8	88.6	-1.8
Reduce support when learners demonstrate reasoning.	32.4	90.9	-58.5
Explain how specific concepts apply to real-world scenarios.	85.1	63.6	+21.5
Encourage learners to connect their knowledge to societal challenges.	79.1	93.2	-14.1
Pay attention to learners who struggle with applying knowledge.	78.7	95.5	-16.8

Key: LR= Learner Responses, TR= Teacher Responses, Dev.= Deviation

References

[1] African Union (2022). Continental Education Strategy for Africa 2026-2035: A Framework for Action. Accessed on 29th November 2024 from https://au.int/sites/default/files/documents/44940-doc-AU_CESA-2026-2035_Strategy_ENGLISH.pdf

[2] Almulla, M. Constructivism learning theory: A paradigm for students' critical thinking, creativity, and problem solving to affect academic performance in higher education. Cogent Education. 2023, 10(1). https://doi.org/10.1080/2331186X.2023.2172929

[3] Anderson, L., Krathwohl, D. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Longman.

[4] Arifin Z., Sukarmin, S., Saputro, S., Kamari, A. The effect of inquiry-based learning on students' critical thinking skills in science education: A systematic review and meta-analysis. Journal of Mathematics, Science and Technology Education. 2025, 21(3). https://doi.org/10.29333/ejmste/15988

[5] Ausubel, D., Novak, J., Hanesian, H. (1978). Educational psychology: A cognitive view (2nd ed.). Holt, Rinehart and Winston.

[6] Babbie, E., Mouton, J. (2002). Social research. Belmont, CA: Wadsworth Group.

[7] Bybee, R., Ruiz-Martin, H. The cognitive principles of learning underlying the 5E Model of Instruction. International Journal of STEM Education. 2022, 9(21), 1-9. https://doi.org/10.1186/s40594-022 00337-z

[8] Changwong, K., Sukkamart, A., Sisan, B. Critical thinking skill development: Analysis of a new learning management model for Thai high schools. Journal of International Studies. 2018, 11(2), 37-48. https://doi.org/10.14254/2071- 8330.2018/11-2/3

[9] Chen X. Developing critical thinking through scaffolded peer feedback: an action research on heuristic design. Front. Psychol. 2026, 17(8), 171-176. https://doi.org/10.3389/fpsyg.2026.1711768

[10] Chen, O., Paas, F., Sweller, J. A cognitive load theory approach to defining and measuring task complexity through element interactivity. Educational Psychology Review. 2023, 35(1), 63-82. https://doi.org/10.1007/s10648-023-09782-w

[11] Coffman, S., Iommi, M., Morrow, K. Scaffolding as active learning in nursing education. Teaching and Learning in Nursing: Official Journal of the National Organization for Associate Degree Nursing. 2023, 18(1), 232-237. https://doi.org/10.1016/j.teln.2022.09.012

[12] Danquah, E., Poku, D. Experiences of Teachers Implementing the Standards-Based Curriculum in La-Nkwantanang, Ghana: Should the Experiences be Overlooked? Pan-African Journal of Education and Social Sciences. 2024, 5(1), 28-40. https://doi.org/10.56893/pajes2024v05i01.03

[13] Gichuru, C. The Challenges Encountered in Implementing Competency-Based Curriculum Within Junior Secondary Schools in Kenya. International Journal of Education, Technology and Science. 2023, 4(1), 1675-1692. 8-gichurur-id-227-kenya-1675-1692-240815-165044 (2).pdf

[14] Hattie, J. (2012). Visible learning for teachers: Maximizing impact on learning. Routledge. New York.

[15] Isaboke, H., Mweru, M., Wambiri, G. Teacher Preparedness and Implementation of the Competency-Based Curriculum in Public Pre-Primary Schools in Nairobi City County, Kenya. International Journal of Current Aspects. 2021, 5(3), 32-53. https://doi.org/10.35942/ijcab.v5i3.186

[16] Ituma, M. Developing Instructional Processes for Competency-Based Learning of Integrated Science at Junior Secondary School in Kenya. Journal of Education and Practice. 2022, 13(35), 9-23. https://doi.org/10.7176/JEP/13-25-02

[17] Karua, G., Manyasi, B., Kara, A. Teacher Preparedness to Implement Competency-Based Curriculum in Public Primary Schools in Kinangop Sub-County, Kenya. International Journal of Scientific Research and Management (IJSRM). 2025, 13, 22-41. https://doi.org/10.18535/ijsrm/v13i02.ee01

[18] Kawira, J. (2022). Side Mirror to Success: Pointers for Successful Content Understanding, Retention & Appropriate Retrieval. Nairobi: Kijabe Printing Press.

[19] KICD. (2017). Basic Education Curriculum Framework. MoE, Kenya.

[20] KICD. (2022). Implementation Progress Report on the CBC. Nairobi, Kenya.

[21] Matewere, I., Msosa, A., Mfuni, J. Exploring perceived barriers to effective utilization of learner-centred teaching methods by tutors at Holy Family College of Nursing and Midwifery, Phalombe, Malawi. Malawi Medical Journal: The Journal of the Medical Association of Malawi. 2022, 34(3), 192-200. https://doi.org/10.4314/mmj.v34i3.8

[22] Mugambi, M., Mauti, J. Reconstructivism in Action: Teachers' Perspectives on Implementation of Competency-Based Education in Kenya's Public Junior Schools. East African Journal of Education Studies. 2025, 8, 402-418. https://doi.org/10.37284/eajes.8.4.4044

[23] Mwang'ombe, A. Competency-Based Curriculum (CBC) in Kenya: Teachers' understanding and skills, reality on the ground, successes, challenges and recommendations on the implementation of CBC in the education system. 2021. Retrieved from https://www.researchgate.net/publication/356267149

[24] Novak, A., Treagust, D. Supporting the development of scientific understanding when constructing an evolving explanation. Discip Interdscip Sci Educ Res. 2022, 4(3). https://doi.org/10.1186/s43031-021-00043-w

[25] Nur, J. The Role of Technology Integration in Enhancing Critical Thinking Skills. Journal of Educational Analytics. 2025, 4, 663-674. https://doi.org/10.55927/jeda.v4i3.363

[26] OECD (2019). OECD Future of Education and Skills 2030. Conceptual Learning Framework. Concept Note: Transformative Competencies for 2030. OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264276147-en

[27] Oluigbo, C., Ngozi, E., Ohaegbu, P. (2024). Determination of sample sizes in research using Taro Yamane formula: an overview.

[28] Onen, D., Ayiorwoth, H. Barriers to Adopting Learner-Centred Methods: Implications for Curriculum Implementation in Gulu City's Private Secondary Schools. Journal of Curriculum Development, Evaluation, and Education (JCDEE). 2025, 1(2), 153-169. https://doi.org/10.64948/JCDEE.v1.i2.2025.116

[29] Ongesa, C. Critical thinking skill gap in the Kenyan educational curriculum: The 21st-Century skills for the global citizen. Journal of Interdisciplinary Studies in Education. 2020, 9(SI), 178-191. https://files.eric.ed.gov/fulltext/EJ1265877.pdf

[30] Raslan, G. The Impact of the Zone of Proximal Development Concept (Scaffolding) on the Students' Problem-Solving Skills and Learning Outcomes. In: Marri, K., Mir, A., David, A., Emran, M. (eds) BUiD Doctoral Research Conference 2023. Lecture Notes in Civil Engineering. 2024, 473, 59-66. Springer, Cham. https://doi.org/10.1007/978-3-031-56121-4_6

[31] Republic of Kenya. (2023). Report of the Presidential Working Party on Education Reforms. Nairobi. Government Printer.

[32] UNESCO (2019): International Bureau of Mauritius: Focus on Competency-Based Education. https://www.ibe.unesco.org/en/news/mauritius-focuses-21stccompetences-and-holistic-education

[33] UNESCO. (2020). Global Education Monitoring Report. Inclusion and Education: all means all. Accessed on 25th November on https://doi.org/10.54676/JJNK6989

[34] Vygotsky, S. (1978). Mind in Society: The Development of Higher Psychological Processes. Harvard University Press.

[35] Wafubwa, R. Challenges of Teaching and Assessing the 21st-Century Competencies in Africa: A focus on the Kenyan New Curriculum of Basic Education. East African Journal of Education Studies. 2021, 3, 96-105. https://doi.org/10.37284/eajes.3.1.332

[36] WEF. (2025). The future of jobs report 2025. World Economic Forum. https://reports.weforum.org/docs/WEF_Future_of_Jobs_Report_2025.pdf

[37] Zainudin, A., Vianty, M., & Inderawati, R. The Practice and Challenges of Implementing Critical Thinking Skills in EFL Teachers' Questioning Behavior. English Review: Journal of English Education. 2019, 8(1): 51-58. https://journal.uniku.ac.id/index.php/ERJEE