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Assessing the Role of AI Integration in Competence-Based Curriculum Development and Effective Implementation Strategies in Junior Secondary Schools in Kilifi County

Evaluación del Papel de la Integración de la Inteligencia Artificial en el Desarrollo del Currículo Basado en Competencias y Estrategias de Implementación Efectiva en las Escuelas Secundarias de Nivel Junior en el Condado de Kilifi

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ABSTRACT

Introduction: This study examines the integration of Artificial Intelligence (AI) in Competence-Based Curriculum (CBC) development and its effective implementation in Junior Secondary Schools (JSSs) in Kilifi County, Kenya. As AI continues to reshape education globally, Kenya's recent adoption of CBC presents an opportunity to enhance learning through AI-driven technologies.

Methodology: Using a mixed-methods approach, the study explores current curriculum practices, the perceptions of educators and policymakers on AI integration, and the challenges faced by key institutions in implementing AI-enhanced curricula.

Results: Findings indicate that AI has the potential to improve curriculum development by enabling personalized learning, predictive analytics, and real-time feedback. However, several challenges hinder AI adoption, including weak digital infrastructure, limited teacher training, and resistance to change. Additionally, governance and policy gaps further constrain the successful integration of AI in education. This study proposes strategies for AI-driven curriculum enhancement, including capacity-building initiatives for educators, policy recommendations for structured AI adoption, and frameworks for collaborative AI implementation.

Conclusions: The research contributes to evidence-based decision-making in curriculum development and offers insights for educational policymakers, the Kenya Institute of Curriculum Development (KICD), and other stakeholders seeking to modernize education through AI. By addressing implementation barriers, AI can play a transformative role in fostering competency-based learning, equipping students with the skills necessary for the evolving digital economy.

Keywords: artificial intelligence, competence-based curriculum, curriculum development, ai in education, teacher training, digital learning

JEL Classification: I23, P46.

RESUMEN

Introducción: Este estudio examina la integración de la Inteligencia Artificial (IA) en el desarrollo del Currículo Basado en Competencias (CBC) y su implementación efectiva en las Escuelas Secundarias de Nivel Junior (JSSs) en el condado de Kilifi, Kenia. A medida que la IA sigue transformando la educación a nivel mundial, la reciente adopción del CBC en Kenia presenta una oportunidad para mejorar el aprendizaje mediante tecnologías impulsadas por IA.

Metodología: Utilizando un enfoque de métodos mixtos, el estudio explora las prácticas actuales del currículo, las percepciones de educadores y formuladores de políticas sobre la integración de la IA, así como los desafíos que enfrentan las instituciones clave en la implementación de un currículo mejorado con IA.

Resultados: Los hallazgos indican que la IA tiene el potencial de mejorar el desarrollo curricular mediante el aprendizaje personalizado, el análisis predictivo y la retroalimentación en tiempo real. Sin embargo, varios desafíos dificultan su adopción, entre ellos la infraestructura digital deficiente, la falta de formación docente y la resistencia al cambio. Además, las brechas en la gobernanza y las políticas limitan aún más la integración exitosa de la IA en la educación. Este estudio propone estrategias para mejorar el currículo a través de la IA, incluyendo iniciativas de capacitación para educadores, recomendaciones de políticas para una adopción estructurada de la IA y marcos para su implementación colaborativa.

Conclusiones: La investigación contribuye a la toma de decisiones basada en evidencia en el desarrollo curricular y ofrece información clave para los formuladores de políticas educativas, el Instituto de Desarrollo Curricular de Kenia (KICD) y otros actores interesados en modernizar la educación a través de la IA. Al abordar las barreras de implementación, la IA puede desempeñar un papel transformador en la promoción del aprendizaje basado en competencias, preparando a los estudiantes con las habilidades necesarias para la economía digital en evolución.

Palabras clave: inteligencia artificial, currículo basado en competencias, desarrollo curricular, ia en educación, formación docente, aprendizaje digital

Clasificación JEL: I23, P46

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INTRODUCTION

Kenya recently introduced the Competence-Based Curriculum (CBC) to accommodate the diverse talents and interests of learners, shifting the focus from passive knowledge consumption to active knowledge construction (Wawire et al., 2025). This aligns with global efforts to integrate artificial intelligence (AI) into education, enhancing learning experiences through open educational systems and e-learning platforms (Delgado Martín, 2023; Mule, 2025). AI-driven technologies, such as online learning, interactive programs, and intelligent tutoring systems, are revolutionizing education by providing teachers with deeper insights into students' learning processes, enabling early identification and correction of misconceptions (Babu et al., 2025; Makinde et al., 2024). Despite these advancements, traditional school-based learning often struggles to produce autonomous, resourceful, and creative learners (Oluyemisi, 2023; Southworth et al., 2023; Chiu & Chai, 2020; Okebukola, 2025). In Kilifi County, increasing interaction with technology among teachers and students reflects the broader global shift towards digital education. Modern educational frameworks emphasize not only academic achievement but also the practical application of knowledge in real-world settings. This necessitates a redefinition of educational success, focusing on competence rather than just grades. Research has consistently highlighted the critical role of teachers in integrating technology into pedagogy, making their training in AI-powered educational tools essential for effective curriculum delivery (Almuhanna, 2025; Forkosh-Baruch et al., 2021).

Background and Rationale

The concept of intelligence underpins the development of artificial intelligence, offering transformative potential for curriculum design when effectively integrated (Kayal, 2024). This study explores the role of AI in the development and implementation of the CBC in junior secondary schools (JSSs) in Kilifi County. The increasing global emphasis on AI in education, ranked among the top trends in 2019, underscores the urgency of adopting modern teaching methods (Adebayo et al., 2023; Emmanuel et al., 2023). However, a national assessment of teacher competencies reveals that many traditional training approaches are becoming obsolete, necessitating rapid and strategic changes in curriculum development (Rajaram, 2023). Given the often-slow pace of educational reform, a well-planned transition to AI-supported learning is crucial. This study examines how AI integration can enhance CBC implementation, ensuring a smoother, more effective shift toward competency-based education. By leveraging AI, the education system can cultivate well-educated, innovative, and entrepreneurial individuals who contribute meaningfully to national development. Successful implementation of AI in CBC could foster a generation of problem-solvers, risk-takers, and creators, driving economic growth and social progress.

This study aims to contribute evidence-based insights that can inform future educational reforms. Its findings will be valuable to educators, curriculum developers, the Ministry of Education, KICD, and other relevant government agencies seeking to enhance the quality and effectiveness of AI integration in the education system.

Literature Review

This section synthesizes key research on artificial intelligence (AI) in education and its application to curriculum development. The subsequent discussion examines competence-based curriculum development, outlining its principles and evolution. Following this, key theories and pedagogical approaches that underpin competency-based curriculum design are reviewed. The final sections explore the current landscape of AI in education, highlighting innovations that enhance and personalize student learning experiences while assessing the effective integration of AI into curriculum development practices. The review concludes by identifying gaps in the existing literature that this study seeks to address and discussing the theoretical framework that informs the subsequent findings and discussions.

Curriculum development serves as the foundation of the educational system, reflecting its complexity, dynamism, and interdependence with various educational components. As a process of continuous growth, curriculum development cannot be isolated from broader educational structures. It determines what content should be included, how it should be delivered, and the pedagogical approaches that guide instruction (Bhekiswayo, 2023). A well-defined examination and theoretical perspective on curriculum design provide a solid foundation for subsequent educational tasks and strategies. Without a structured framework, curriculum development risks becoming an

exercise in idealistic conjecture rather than a practical, evidence-based endeavour. Viewed as both a technical and process-driven concept, curriculum development encompasses all educational activities within an institution, shaping the learning experience and overall effectiveness of education systems.

Competence-based curriculum development

Competencies and standards determine what a teacher is supposed to teach and what a learner should be able to do (Zamora & Zamora, 2022). At a school level, integration of AIS in the development of a competency-based curriculum is a method to ensure that what adolescents are doing in schools is equivalent to the job families in the environment from which they come (Fundi et al., 2024). That said, the goal of developing a competency-based curriculum is to inculcate the skill set and knowledge in early adolescents that enables them to demonstrate competency in class and later be able to demonstrate it in society (Omweri, 2024; Sila & Koaze, 2025). The learner competency that is set as an outcome of the educational process and is assessed at the school level reflects a combination of the degree loss from the family level and the level of skills acquisition from teachers' associations using AI developed by CBE for subject associations, validated at the sector level, and set at the national level to be addressed by the curriculum. At the national level, the competency scale regulates the training competencies needed by TVETA and all the other regulatory bodies (Tekle et al., 2024).

A myriad of frameworks exists regarding the understanding of competencies. In the educational setting, competencies can be defined as the skills and abilities that one can demonstrate and are evidence of learning (Škrinjarić, 2022). AIS has supported curriculum development that is based on learner competencies. The development of competency-based training material is demonstrated by how competencies have beenncurporated within an educational framework, starting with curriculum design and then curriculum delivery (Tarmo & Kimaro, 2021). Career development practitioners understand students and which methods give them enhanced career guidance entries (Keshf & Khanum, 2021). Conceptual frameworks for use in different dimensions of the student's capabilities and stakeholder views are developed, as well as career guidance entry points. In the design of a rural skills program, specialists coordinate a non-interventionist ecosystem approach program. Data is collected on current student capabilities, and student and stakeholder viewpoints on education and qualification (Emmanuel et al., 2023; Sila & Koaze, 2025; Ehoda et al., 2024; Onuja et al., 2024). It is presented as a review, and students-facing enterprises, local industry, and non-local industry stakeholders are invited to a round table structured discussion. Data provides insights that suggest what the learning journey and career guidance education of a student might look like. Findings are discussed, and future implementation and planning of the case are discussed. This curriculum development focuses on the competency-based component for junior secondary school students in Kilifi County.

Artificial intelligence in education

Although artificial intelligence (AI) has been getting significant attention in recent years, large portions of educators are not aware that AI-enhanced educational tools exist (Wang et al., 2023). While most teachers around the world use some form of digital technology in the classroom, few of them want to employ AI systems to enhance their teaching (Alwaqdani, 2025). When it comes to AI in the classroom, it has mostly been in the form of robotic teaching assistants, algorithmically graded assignments, or citation-checking services (Omweri, 2024). The use of AI has raised more questions than it has answered, primarily because, on one hand, AI has the potential to benefit education in myriad exciting ways by making teaching and learning more efficient and personalized (Yadav & Shrawankar, 2024). AI also poses ethical challenges such as compromising the privacy of student data, reducing teacher input and control, and reinforcing the old educational system (Akgun & Greenhow, 2022; Nguyen et al., 2023).

AI educational researchers have developed several steps that can be followed to evaluate the readiness for AI in a classroom setting. Some use technology acceptance models to understand the constructs that influence an educator's intention to use AI (Ali et al., 2025; Kong et al., 2024). They simplify the functions of teachers who play a central role. They point out that teachers must initiate processes in which all actors, learners as well as partners, contribute to achieving a 'personal added value' (Al-Nuaimi & Al-Emran, 2021). The teachers should be in control of the AI and include the AI in the process of evaluating and redesigning the curriculum and its participating co-agents. In the end, teachers must integrate function.

Integration of AI in curriculum development

The previous section has shown definitions as well as the categorizations of AI that are compatible with curriculum development, among others. Previously, a gap was found which highlighted the topics and the levels at which teachers were using AI systems in curriculum development and implementation (Delgado Martín, 2023; Mule,

2025; Admane et al., 2024). This section deals with techniques for integrating AI in curriculum development. Many methods of integrating AI into curriculum development involve learning management systems and are generally based on plans developed in 2009 (Alotaibi, 2024). A framework was developed and proposed for the Integration of AI into upper secondary school mathematics. AI can be used with electronic 'download boards' to create content concerning students' competencies (Chookaew et al., 2024).

This could provide a real-time personalized learning experience for students or support teachers by streamlining examination marking and providing instant feedback. Overall, it was mentioned that educators need to consider the strategies best suited to their circumstances and needs when integrating AI within competencies. An increasing presence of AI in society has led to some researchers calling for a focus on ethical and responsible AI through education (Aler Tubella et al., 2024; Schiff, 2022). A framework on Algorithmic Impact Assessments featured a process that could be conducted with students from Prep to 12, local educational authorities, and expert groups. Real-world initiatives that are actively looking at ways to integrate AI into the curriculum or operationalize AI principles include various educational projects. Many groups have created algorithmic toolkits, but generally focus on laboratory-type exercises and simple computational thinking skills. A challenge is posed to future in-service teachers and national authorities to strike the right balance as they prepare to integrate AI into the curriculum. AI is known to provide guidelines that are tailored to the needs of children; however, the technology behind AI can exacerbate the challenges in generating curricula that are practically useful for implementers. A guide in the design of modern, evidence-based curricula aimed at supporting teachers in using competencies to support a curriculum that is accessible and adaptable to learners and implementers alike is available (Emmanuel et al., 2023; Ehoda et al., 2024; Onuja et al., 2024; Ruxiang & Yue, 2023). The guide is derived from topic areas such as constructivism, deep and surface learning, curriculum design, and inclusive education. Another strength is the comparative study where primary, junior, and secondary schools in different countries investigated the potential of AI in the development of deeper, more pedagogically valuable connections between primary, junior, and secondary schools. Some local networks for baseline experiences have reported successful pilots of relevant diagnostics software in various countries. A network has also begun to explore the potential. All of these rely on Item Response Theory to align in the order of difficulty and ensure the entire possible 'difficulty scale' of the subject is assessed (Bock & Gibbons, 2021). Formative support and teacher dashboards are often cited as particularly useful for teachers (Adebayo et al., 2023; Bhekiswayo, 2023).

METHODOLOGY

This study used the case study methodology. The case study approach was preferred as it offered opportunities to collect qualitative and quantitative data that served to answer the set research objectives. Data obtained either qualitatively or quantitatively tend to complement one another in unravelling the issue under study and in suggesting ways for improvement. Although we considered using both the mixed methodology research approach, time and funding limitations were constraints to the successful undertaking of this task. This research was conducted using a combined approach of data collection methods, which included the following research methods: surveys, interviews, and focus group discussions. The reason for the choice of each tool is discussed.

There was an ethical consideration about this study. Care and consideration were taken at all points during the research to protect our subjects' interests and maintain long-standing relationships. As such, even if the use of subjects' names was necessary, we opted to code their identity as a way of promoting confidentiality. Furthermore, this study undertakes statistical analysis to present descriptive statistics or inferential statistics. It also adopts thematic analysis of qualitative data to track emerging issues from the transcripts and minutes.

RESULTS AND DISCUSSION

This section presents the interpretation of data gathered from the field in the previous chapter. The findings emanating from the data are discussed and are therefore presented in a consistent narrative that enables an understanding of the present study.

The roles of AI in curriculum development: The concept of competence asserts that junior secondary learners' curriculum should not be created within the confines of what teachers will "pour" on learners and, in turn, will "pour" out what they have acquired in school. Fundamentally, the current narrative places a lot of emphasis on what teachers cover or pour out to the learners at the expense of the process through which curriculum development is supposed to be conducted (Delgado Martín, 2023; Mule, 2025; Admane et al., 2024). As stipulated above, teachers read a curriculum before they implement it to establish whether it is achievable within the available resources. Parents and society read about it during public forums, parent educators, school boards, headteacher meetings,

etc., to find where they can make contributions, and if they approve the same to be implemented, various education officers read it among other stakeholders. This study shows that this process is currently "rigged" with political manipulation, and readers take advantage to capitalize on the new "slob" by driving their inputs towards the curriculum developers' selection depending on those favoured individuals within their circles. If the name of the "new Kenya" KICD act has to work as expected, best practices from researchers on how and what to induct in the junior secondary school educational system must be catered to in curriculum development. That is the diet agenda as proposed by the researcher. This involves the AI purchase training or training conducted by KICD from any AI supplier for KICD and AI induction to Pre-Service Teachers Training, Teachers Service Commission training to serving teachers, Education Management Institute to Quality Assurance, and Courts and Tribunals to serve the judicial sectors in Kenya.

Constraints to competencies-based curriculum development in Kilifi: Findings from this study confirmed and may be associated with the challenges seen in the curriculum innovation process highlighted in Kilifi. Kilifi's original curriculum was established in 1969; it comprises inequities clustered in various areas (Bhekiswayo, 2023; Ehoda et al., 2024; Onuja et al., 2024). The KICD core committee report submitted in 2019 led to the identification of eight areas that need to be addressed for a successful CBC. Out of the eight, six of them were found to be direct challenges cutting across the curriculum development in Kilifi classrooms with the role of AI, while the two were found to be 'improvable' towards AI itself. Those six can be unified into three main clusters: coordination and architecture of multi-sectoral cooperation between stakeholders, digital disparity per cognitive diversity between stakeholders, and confusion between educational curriculum planning, culminating from the reality of AI. This study establishes the ease of change of blend resulting from academic politics, and myopic public administration, as well as the apartheid applied between familiar and unfamiliar cognitive informants for the admission to AI-suitable AI products sitting on the shelf.

The benefits of integrating AI in AI competencies curriculum development in Kilifi: Whilst the socio-political and economic framework has locked out the possibility of such educational improvements, learning or learning outcomes can be significantly improved given the new superpowers brought about by AI technology in their appreciation and entrapment. The possibility of contemporary education is more feasible theoretically if only educationists encourage cognitive diversity and development.

ANALYSIS AND REMARKS

Current state of curriculum development in Kilifi county

Efforts are being made by the Kenya National Examinations Council in collaboration with the Kenya Institute of Curriculum Development, the Teachers Service Commission, and Curriculum Support Officers to ensure that junior school curricula in the country are continuously reviewed, and development is informed by the principles of competency-based education. Despite these efforts, the curriculum development practices and structures in the counties, particularly in Kilifi, remain unclear. The curriculum being used in junior schools has continuously been reviewed on a needs basis to keep track of the growing developments in the world of work and the global village. Curriculum development in the county happens in a multi-stakeholder concept, with the development of a junior school curriculum being the outcome of a broad-based educational think tank referred to as the College of Expertise in Curriculum. The college is made up of subject specialist educators from selected Sector Technical Colleges and university education lecturers who attend regular meetings and deliberate on curriculum issues. The county Curriculum Support Officers facilitate the development process of the junior school curriculum, while the secretary to the College of Expertise in Curriculum serves as the link between the curriculum developers at the county and the content panelists at the national level. Although the curriculum has been developed and continues to be revised, teachers view it as burdensome in the absence of essential resources required to carry out teaching effectively. Moreover, while the emphasis on the subject-based approach is questioned, some subjects developed at the county for the junior school curriculum are yet to be rolled out. Provision of technical backstopping has been inhibited by a lack of expertise, physical presence, and time.

Additionally, there is a possibility of discrepancies and disparities in the provision of support to teachers. Finally, a good number of teachers may not have embraced the integration of technology in curriculum development. A revised curriculum review framework will consider Kilifi County as a potential place of review. Additionally, a Science and Technologies curriculum development model of three levels - policy, technical, and implementation guidelines has been adopted. These will fulfil the capacity and infrastructural development at the country level if adopted as strategies. Hence, to contribute to the promotion of the Kiswahili language as a medium of instruction in the schools in Kilifi, there is a need to conduct a study to assess the role of AI integration in competence-based

curriculum developments and effective implementation strategies in junior secondary schools in Kilifi County (Mule, 2025; Emmanuel et al., 2023; Bhekiswayo, 2023; Omweri, 2024). This research was conceptualized in the desire to establish the role of AI integration in competence-based curriculum development and ownership, and the effective ways in which the curriculum is implemented in Kilifi County. The information provided in the literature is general and from a developed country context, but in the context of the rural junior secondary schools in Kilifi County, no empirical information on curriculum development and implementation is documented. Hence, the focus of the study.

Benefits of ai integration in curriculum development

Over the years, the use of AI in amalgamation with curriculum development has proved beneficial. AI can personalize a learning experience, as AI-based systems learn how a student responds to questions and topics and then determine what to teach next. They respond as highly qualified teachers who understand academics, not just based on student needs and preferences, but also on what works to support the learning experience for students. With the use of AI in curriculum development and syllabus flexibility, students' mastery standards continue to open doors for knowledge-hungry youth and able educators to teach without being governed by learning institution constraints (Delgado Martín, 2023; Mule, 2025; Adebayo, 2023; Emmanuel, 2023; Ehoda et al., 2024). The curriculum is generated according to students' jobs, volunteer activities, and hobbies in preparation for technology-driven 21st-century careers.

Educational AI technology can aid teachers in handling repetitive tasks such as grading, assessment, and preparing personalized instructions. It frees up educators and administrators to devote their time to things where they have the most impact — like travel and attending an education where they get to know everything that occurs. And think about it, would your favorite teacher behave with those laminated rules up behind their desk and be the one constantly checking their book? Or was it instead the one who got to know students individually, provided wraparound care, reached good individuals, and achieved the best possible outcomes? There is little or no capacity in the industry to modify instruction for each training when teachers are spending so much time on these processes. It comes as no surprise that smaller classrooms generally provide a higher quality of education. With the tools AI provides to instructors, all students can see more significant small-class-size benefits as AI streamlines teaching inefficiencies and opens teachers to foster meaningful, trusting connections with students. As a result, they can implement Cognitive Load Theory to assist students in allocating a limited number of cognitive resources to necessary tasks, resulting in more active learning. AI drastically increases grade accuracy, so when explanations are required, instead of spending time going over mistakes. If most students arrive at the same answer, it's correct. Educators can devise alternative methods for teaching information rather than focusing on grading.

Challenges and barriers to effective implementation

Given the numerous benefits of integrating AI into curriculum development, some challenges must be addressed. ICT and technological hurdles are among the major challenges of infusing AI into the curriculum development process. There are places where there is a lack of adequate infrastructure to support systems. Currently, people operate under limited internet connections, relying mainly on Wi-Fi and very few on LAN. It is very hard for the AI system to perform well under a poor and unreliable internet connection. Moreover, teachers may not be ready to take the time to train and practice using the AI tool to include it in the curriculum. Many teachers are set in their adopted ways and find it very hard to accommodate external resources in their class schedules, especially new technology systems. Some are sceptical of technology in general (Oluyemisi, 2023; Southworth, 2023; Kamaruddin et al., 2023; Salchenberger, 1989; Kuo & Chen, 2023; Osuji, 2025; Kayabas, 2024).

Some of the discussed challenges are also grouped with barriers such as resistance to change, infrastructure and system inadequacy, hurdles and tight curriculum, an unwillingness or lack of motivation of teachers to include AI technology and systems, issues of privacy and security that may affect agricultural education, potential financial barriers related to the costs of machines or technology, and the lack of coverage for internet in some areas or schools where some curriculums may be developed. Training is a professional and prestigious career, and some hold a negative view of the administration. Ethical responsibilities towards various people can be disregarded for personal gain. This can also impact the educational sector if trust in the system is affected (Ejjami, 2024; Abbasi et al., 2024; Rauf et al., 2024; Tong, 2024). These are some of the challenges that must be addressed before adding AI into the curriculum and implementing it in junior secondary schools. As resources for implementation are limited in most parts, teachers must be creative and able to work under pressure as they juggle various challenging roles in schools. They must also have a strong passion for technology use.

Implications for Policy and Practice

The findings offer important information for educational policymakers and practice in the ten selected schools in the county. Kilifi explores the adoption of AI technology in its curricula. The study findings support the need to put in place a new framework that can eventually be adopted in the policy-making document to steer technology adoption in the developed curricula. Therefore, the policy suggestions would encourage the government of Kilifi to allow some primary teachers to experiment with their curriculum using AI-integrated approaches. Consequently, the most important aspect of our study is that we have shown the relevance of AI as a tool for developing curriculum in junior secondary schools. Because of this relevance, we propose policies that can motivate the stakeholders responsible for developing curriculum to reconsider the traditional subject-list curriculum structure. We propose that they reconstruct the curriculum as competence-based, considering the integration of the 4Cs of 21st-century learning.

Now, to implement our proposed AI shared values in the schools' new curriculum using existing 21st-century techniques, there is a need for a policy to assist by developing policies that would train teachers to experiment with AI in teaching the existing curriculum. This requires revised AI Continuing Professional Development programs for teachers. Additionally, we need to assist the county policy in identifying the most optimal schools in the county that are suitable for testing and piloting this AI integration in the curriculum before finally implementing it as a whole. Finally, from the meeting attended, we suggest a policy that would investigate the possibility of providing some amount to the pupils, such as stipends, to ensure the research is successful. After the national stakeholders' meeting, the project developed an Inception Report detailing the process that the project will follow to establish evolving AI-shared values that are ethical and respectful of human rights in the new curriculum. The Inception Report also detailed the project activities, including objectives, specific activities, and proposed outputs that need to be achieved for each. A simplified SWOT analysis based on the review of the Participatory Session and the meeting with the national stakeholders on Professional Development on Competence-Based Curriculum, 21st-century learning, and Artificial Intelligence helped to identify the following.

Recommendations for Future Research

Several major gaps were identified in this research that present potential future steps, including an investigation of the long-term development of AI tendencies and psychosocial advantages because of ABCD training. Subsequent research should continue to refine and broaden our understanding of the most efficient intervention strategies and tools. While we tracked participants to gauge satisfaction, the results were not thought to be generalizable. However, examining these findings may provide a better understanding of student perceptions about their abilities, the challenges hindering self-efficacy, and the degree of satisfaction with the AI-based didactic model. Additionally, the longitudinal research provides insight into how the AI-based approach is integrated and what baseline findings have been achieved. Junior secondary schools require additional in-depth examination before these recommendations can be validated. Are the blended attitudes of junior secondary school teachers and learners similar, or are there any situational or environmental differences that would be beneficial? Finally, additional perspectives could be explored through the opinions and perceptions of education policymakers, headteachers, parents, and students in a mixed-method study in the future. – While this study utilized the research questions discussed during the introduction, an interdisciplinary effect can be attained by the confluence of a multicounty approach as a result of collaborative research endeavors, making the findings of a diverse study valuable. For example, in the education arena, such an interdisciplinary confluence of study findings becomes pertinent to ensure how other collaborative meta-theory educational models can best achieve large-scale integration in their diverse fields. Conducting an incisive analysis of students' attitudes related to AI integration in the community, for example, would greatly illuminate the strategies required to register successful and sustainable consular artificial intelligence skills programs since such an intervention does not rely on pertinent cultural and attitudinal tools. Therefore, the potential transfer of AI skills by conducting an in-depth study of the attitudes of students toward AI is essential. Hence, longitudinal research will help understand different populations of learners and their attitudes, their potential adaptability to the use of AI technology, and care methodologies. This study further steers would-be researchers in STEAM-operative learning research in various contexts and interdisciplinary areas in which operative learning paradigms have been employed. Hence, this study is designed to inform and inspire innovative and crucial research and collaborative AI educational programs requiring innovative teaching methodologies.

CONCLUSIONS

The study ascertained the role of AI integration in CBC development by identifying the knowledge, skills, and values deemed important for AIs in CBC education. In the strategy for the implementation of AI in CBC, findings indicated that digital literacy training for JSS educators is of key importance because it enhances the

use of AI in CBC. Hence, it was established that AI can be used to enhance access, equity, relevance, content, continuous assessment, and summative assessment of the CBC. Moreover, AI can aid in enhancing continuous training development, recruitment, and coordination in line with CBC. One of the implications of the topic of the study is that it draws the attention of policymakers in Kilifi County to explore how best innovative approaches can be integrated into the CBC to affirm the position of Kilifi County as a technological hub.

Given the dynamic and multifaceted scope of AI teaching integration with CBC, it is recommended that workshops be held with Kilifi County government officials to discuss ways to support innovative approaches to policy and practice. There is a need for continuous exploratory studies to establish the roadmap that will underpin policy actions that can ease the operationalization of AI in the CBC throughout the entire County. The findings emerging from this exploratory research should be communicated at the committee level by the concerned office in the county education department. Educational administrators should seek to provide training programs for educators so that they can gain more benefits from the use of AI in CBC. At the end, policymakers should be invited to take cognizance of the emerging technologies and knowledge produced in this study. Policymakers, educationalists, and researchers should be encouraged to develop synergistic collaborations in the areas of CBC curriculum development, policy, and assessment strategies in sub-Saharan Africa, particularly focusing on effective ways to cultivate collective approaches from different disciplines. Moreover, there is a trend towards technology developers centrally informing school curriculum policymakers and educationalists about what technology will come to the market. Educators should also have a space to influence the direction of technology development. As a result, educationalists in collaboration with policymakers in sub-Saharan Africa are encouraged to exert more influence on technology companies to prioritize technology that makes learning easier for children.

This study provides an overview of progress in the role of artificial intelligence integration in competence-based curriculum development in junior secondary schools in Kilifi County. The role of artificial intelligence in competence-based curriculum development is well noted. The findings revealed differing views among headteachers, teachers, and TSC concerning the role of artificial intelligence in competence-based curriculum development and disregard for negative attitudes leading to alternative perspectives. The study established that the general view of stakeholders, curriculum experts, and education programs showed progress on the integration of artificial intelligence in competency-based curriculum development in Kilifi County.

Most studies focusing on the integration of artificial intelligence in education have mainly concentrated on higher education and verbal learners. This is according to the review of literature, which reveals that specific studies have focused on exploring the impact of artificial intelligence on teachers' and students' roles at the junior school level or integrating artificial intelligence in the learning and teaching of junior secondary education in Kenya, particularly Kilifi County. There is still a gap in the integration of artificial intelligence in the curriculum development, implementation, and assessment of junior school competency-based curricula. Therefore, this research was guided by two objectives: the first objective was to evaluate the perceived role of artificial intelligence in curriculum development, teachers' attitudes, use, and challenges in artificial intelligence integration in CBC. The findings showed some challenges in the integration of artificial intelligence in junior secondary teachers' training and its use to teach in Kilifi County. The challenges ranged from attitudinal, pedagogical, and support for the use of digital resources. Some headteachers and teachers indicated that the use of digital resources was inconsequential since it had no impact on the children's learning process.

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