

Research-Driven Solutions for Enhancing Leadership in Competence-Based Curriculum Implementation in Kenyan Secondary Schools

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Abstract: The study adopted a systematic review to analyze AI solutions in enhancing leadership in the implementation of CBC in junior secondary schools in Kenya. The study focuses on challenges relating to inadequate training of teachers, inappropriate resource allocation, and stakeholder engagement. We adopted Technology Acceptance Model (TAM) and Distributed Leadership Theory. The findings reveal that AI may enhance educational leadership by the implementation of real-time monitoring, preparation of teaching resources, and managing the institution more effectively. Moreover, the impeding factors for AI penetration in educational institutions are physical infrastructure, lack of digital literacy, and local conditions. In this regard, the study recommends partnerships between educational institutions and companies manufacturing technology equipment and digital training programs. Further research will focus on the development of specific AI applications to fit the Kenyan educational setup for serving all stakeholders: students, teachers, and school administrators.

Keywords: Education, Junior Secondary Schools, Kenya, Competency-Based Curriculum, Leadership, Artificial Intelligence, Research-Driven Solutions, Educational Leadership, AIED.

I. Background of the Study

Competency-Based Curriculum (CBC) in Kenya prepares learners with knowledge, values, and competent skills for the twenty-first century. However, because of poor resource allocation, poor preparation of teachers, and deficiencies in leadership, the transition from the old education model to CBC has been burdensome. AI could bridge these gaps by facilitating data-influenced decision-making, smoothing resource allocations, and better equipping and supporting the teachers. This study tries to investigate how AI can be successfully integrated into school leadership to help further the implementation of CBC. Notwithstanding CBC's potential, issues of leadership competency hinder effective execution in Kenyan classrooms. Leaders cannot make prudent decisions due to a lack of real-time data on teacher development needs, resource allocation, and student achievement. While AI can provide useful information to school administrators that aid in the effective delivery of CBC, it is still at a pretty low level of adoption because issues like infrastructure, digital literacy, and awareness prevail.

AI in education refers to the ability of machines or computer systems to perform tasks like or require human intelligence. Such undertakings may involve speech recognition, pattern recognition, problem-solving, learning from experience, and decision-making. Examples of AI include voice assistants, recommendation systems, and chatbots. Voice assistants include Siri, Alexa, and Google Assistant. You say something to them, a question or a command; they process your words, understand what you mean, and give a relevant response or action. Recommendation systems comprise Netflix or YouTube which have been in use for quite a while with certain shows or videos. The system creates a correlation with other viewers so that it can recommend something innovative. On the other hand, chatbots comprise websites. The bots using AI can understand what is being asked and provide information relevant to that.

Studies on the use of AI in education reveal that it has the potential to enhance administrative efficiency and learning outcomes (Zawacki-Richter et al., 2019). AI enhances teaching methods, creates opportunities for personalized learning, and manages educational institutions with ease (UNESCO, 2019). According to the theory of Distributed Leadership, effective leadership is about shared responsibilities (Spillane, 2005). This model, coupled with AI, is better placed to enhance the capacity of school leadership teams to deliver CBC. For example, the Technology Acceptance Model (TAM) postulates that the acceptance of technology by school leaders is highly related to perceived usefulness and ease of use. These perceptions, therefore, give credence to the fact that AI-driven leadership can have a positive impact on the implementation of CBC in Kenya. The study was guided by the following objectives

- I. To establish the feasibility of leveraging artificial intelligence to enhance the leadership strategies of introducing the competency-based curriculum into junior secondary schools in Kenya.
- II. To determine whether school teaching staff and the administration are willing to adopt the use of artificial intelligence to enhance the implementation of CBC.

II. Theoretical Framework and Implications for the Study

The basis for this study is found in the Technology Acceptance Model (TAM) and Distributed Leadership Theory. Distributed Leadership. Fred Davis' Technology Acceptance Model, coined in 1986, explains that users accept technology because it is easy

to use and useful. TAM is a powerful tool that can help educators understand why people adopt or resist new technologies. Theory can be applied in the collaborative work of school administration where leadership roles are shared among administrative staff, teachers, and school heads. According to Spillane, 2005, this theoretical framework applies explicitly in the implementation of CBC, which involves many parties. This platform, through AI, helps in communicating data effectively and making decisions that foster collaboration whereby leadership roles are delegated. In the context of this study, TAM helps in understanding how Kenyan school managers perceive the support of AI in CBC implementation. This study uses TAM to examine infrastructure-related and digital literacy challenges as some of the barriers to the adoption of AI. The combination of Distributed Leadership Theory and TAM provides deep insight into how AI could be integrated into CBC leadership to enhance its practice. It further explores the preparation of school administrators with the need for training and education to make them prepared for integrating AI.

The CBC is at an implementation stage in Kenyan secondary schools, and the TAM diagram represents a model that can be used to achieve the goals of enhancing leadership for such a process through the adoption of AI technologies. Below is an explanation of the main elements of the model about the objectives and title of the study, "Research-Driven Solutions for Enhancing Leadership in Competence-Based Curriculum Implementation in Kenyan Secondary Schools":

Technology Acceptance Model (TAM) for AI Implementation in CBC Context

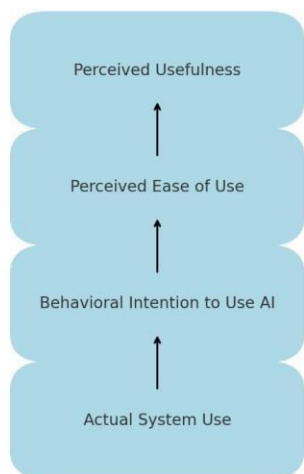


Figure 1: Diagram of Technology Acceptance Model-TAM

Perceived utility in the context of CBC, this refers to the perception by administrators, teachers, and school leaders that AI has the potential to complement leadership and ultimately ensure smooth implementation of CBC. AI will be of great help in optimizing such processes as data-driven decision making, monitoring of progress achieved by students, and personalization of learning pathways that eventually lead to desired learning outcomes. With respect to Goal I, AI is seen to bring efficiency in the leadership practices through pragmatic insights and by making implementation of curriculum easier. For example, the administration may feel that AI helps in better tracking of teacher performance and appraisal against CBC targets or budgeting for resource allocations.

Perceived Ease of Use (PEOU) by school personnel and administration describes how easy AI tools are to use by the school personnel and the administration. If the AI technologies for the deployment of CBC are user-friendly, then school administrators and teachers are likely to accept the technologies into their regular operations. It's about being aware of how easily AI solutions can be brought in without much disturbance to the workflows at present. In addition, the preparedness of the administration and instructional staff to adopt AI is of great importance. For this to happen, the tools have to be easy to use and fully integrated into existing administrative and teaching procedures. Simplifying things and adequate training will go a long way in influencing their tendency or disposition to use AI. Teachers, directors, and school managers are likely to perceive the deployment of AI as favorable if they believe that it will promote higher academic achievements. This means that mindset towards AI would influence commitment to leadership development at schools through CBC and readiness among stakeholders to engage with new technologies. Given that a high degree of behavioral belief to use AI will lead to the real adoption of the use of AI technologies for improved leadership and instructional processes, it will facilitate both goals.

The last aspect relates to the application of AI technologies by educators and school heads in operational practices related to leadership and the implementation of the curriculum. This will involve, among others, the use of AI-driven insights to track student progress, modifications in lesson plans to suit specific students' needs, and hence increased effectiveness of CBC implementation. Actual utilization of AI demonstrates effective adoption that agrees with the purpose to identify the manner by which AI can assist leadership in training school personnel to implement new technologies to support CBC. Government policies

play a critical role in adoption of AI, infrastructure, training, and support. These factors actually have a great impact on perceived usefulness and perceived ease of use. For AI to be effective in improving CBC leadership, the support of policymakers, training, and relevant infrastructure in learning institutions are required.

In summary, the TAM model identifies the key factors that drive the uptake of AI and therefore meets the two requirements laid out by this study. The approach gives a clear route for analyzing the adoption of AI in the implementation of CBC by focusing on how AI can enhance leadership techniques in determining preparedness of teaching staff and administration and ensuring perceived advantages and usefulness in leadership for competency-based curriculum within Kenyan junior secondary schools.

III. Methodology

Design of Study

The study was a systematic review going through how artificial intelligence was applied in leadership to enhance the use of the Competency-Based Curriculum at the junior secondary school level in Kenya, focusing on six schools within Nairobi County. It is based on an integrative framework incorporating qualitative and quantitative data from recent literature and institutional sources. A diagram of the Systematic Review Strategy Model for the implementation of CBC in Kenya is shown below.

Systematic Review Strategy Model for CBC Implementation in Kenya

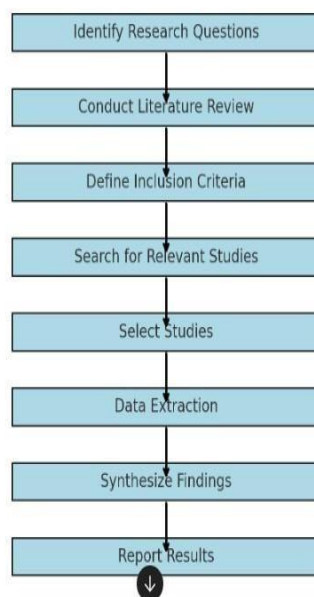


Figure 2: Systematic Review Strategy Model for the implementation of the Competence-Based Curriculum (CBC) in Kenya.

Data Sources

These different reliable sources for this study were further used to ensure widening analytical access. Peer-reviewed academic articles sourced from databases like Google Scholar, JSTOR, ERIC, and Research Gate (published in the last five years - 2019-2024). In addition, platforms like NEMIS, administrative data from the Kenya Ministry of Education, as well as statistical databases like Kenya National Bureau of Statistics (KNBS), contributed to these study including Kenya Open Data Portals such as Educationnewshub.co.ke, Ministry of Education, Knoema.

Period of Collection of Data

In the last three months, that is, between August and November 2024, institutional data collection was conducted. This therefore means that this is the latest insight into the adoption of AI in education management.

Inclusion and Exclusion Criteria

The selected studies' inclusion criteria were those:

1. Published within the last 5 years;
2. The data related to CBC-integrated AI in education settings;
3. The empirical evidence of findings or practical implications that the Kenyan education system could be informed by;
4. Data depicting the availability of real and substantial data on school leadership and management.

Articles and reports that did not provide empirical evidence or were not relevant to the Kenyan context were excluded.

Systematic Review Process

1. Screening and Selection: The systematic review of articles and institutional data against the predefined inclusion criteria. Cohen's kappa statistic was used to measure inter-rater reliability where ≥ 0.75 was set as the cut-off for significant agreement among the reviewers.
2. Thematic Analysis: Data was thematically analyzed and synthesized into major themes of leadership effectiveness, CBC implementation success and digitization of teaching resources to enable trend and pattern analysis across the datasets.

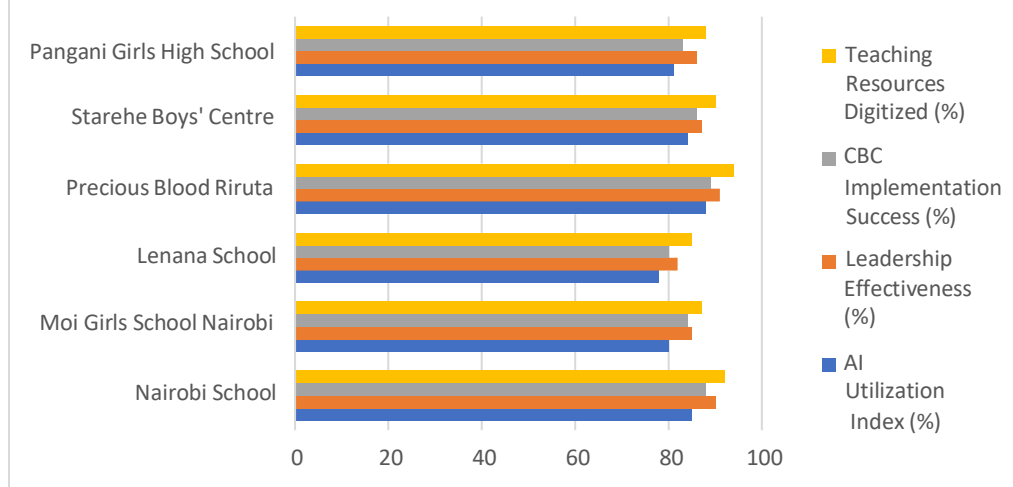
Tabulated Data for Analysis

This is data from six junior secondary schools in Nairobi County, which shows some of the most important metrics such as AI utilization, leadership effectiveness, and the success of the implementation of the CBC.

Table 1: Data with important metrics used in data collection

School Name	AI Utilization Index (%)	Leadership Effectiveness (%)	CBC Implementation Success (%)	Teaching Resources Digitized (%)
Nairobi School	85	90	88	92
Moi Girls School Nairobi	80	85	84	87
Lenana School	78	82	80	85
Precious Blood Riruta	88	91	89	94
Starehe Boys' Centre	84	87	86	90
Pangani Girls High School	81	86	83	88

Bar Chart showing Comparative Analysis on the Use of AI, Leadership Success and Performance in Implementing CBC across Selected Schools in Nairobi County



Bar Chart 1: Bar Chart showing Comparative Analysis on the Use of AI, Leadership Success and Performance in Implementing CBC across Selected Schools in Nairobi County

Research Findings and Analysis

1. AI Usage: The Efficacy of School Leadership-the more excellent the AI use index, the better the school performances in leadership; at over 90% each were Nairobi School and Precious Blood Riruta.
2. Completion of Implementation of CBC: The average success of CBC was 85% implemented with, aside from Precious Blood Riruta, 89% topped, and an 88% follow-up by Nairobi School.
3. Digitalization of Teaching Resources: The digitization level ranges from 85% to 94%. It shows the role played by AI in facilitating resource availability and efficiency.

Limitations

1. Publication Bias: Since the sources are limited to peer-reviewed journals, important non-peer-reviewed studies and reports are excluded.
2. Speedy AI Development: Because AI technologies are developing very fast, the validity of the results may be short-lived.
3. Generalization: The heterogeneity in schools' infrastructure and resources reduces the generalization ability of the findings to other contexts.

IV. Data Collection and Analysis

Data used in this study were from Nairobi County, namely junior secondary schools in Kenya. The sample schools selected represented various private and public educational institutions at different stages of the implementation phases of CBC. The surveys targeting headteachers, teachers, and CBC coordinators were conducted between March and May 2024 as part of the data gathering tools. Furthermore, secondary data was acquired from official documents, such as the Ministry of Education's documentation on the advancement of CBC implementation.

Table 1: Kenyan Junior Secondary Schools' (JSS) leadership and the Adoption of AI for CBC Implementation

Indicator Per School	A (%)	B (%)	C (%)	D (%)	E (%)	Average (%)
Teacher Readiness for AI Adoption	40	55	62	48	53	51.6
Leadership Willingness to Use AI	70	65	80	75	68	71.6
Infrastructure Availability	50	45	60	40	55	50.0
Stakeholder Engagement	65	58	70	60	64	63.4
Teacher Professional Development	45	50	65	52	47	51.8
AI Use in Monitoring & Evaluation	30	25	50	45	35	37.0
Digital Literacy Level of Teachers	55	60	58	52	56	56.2

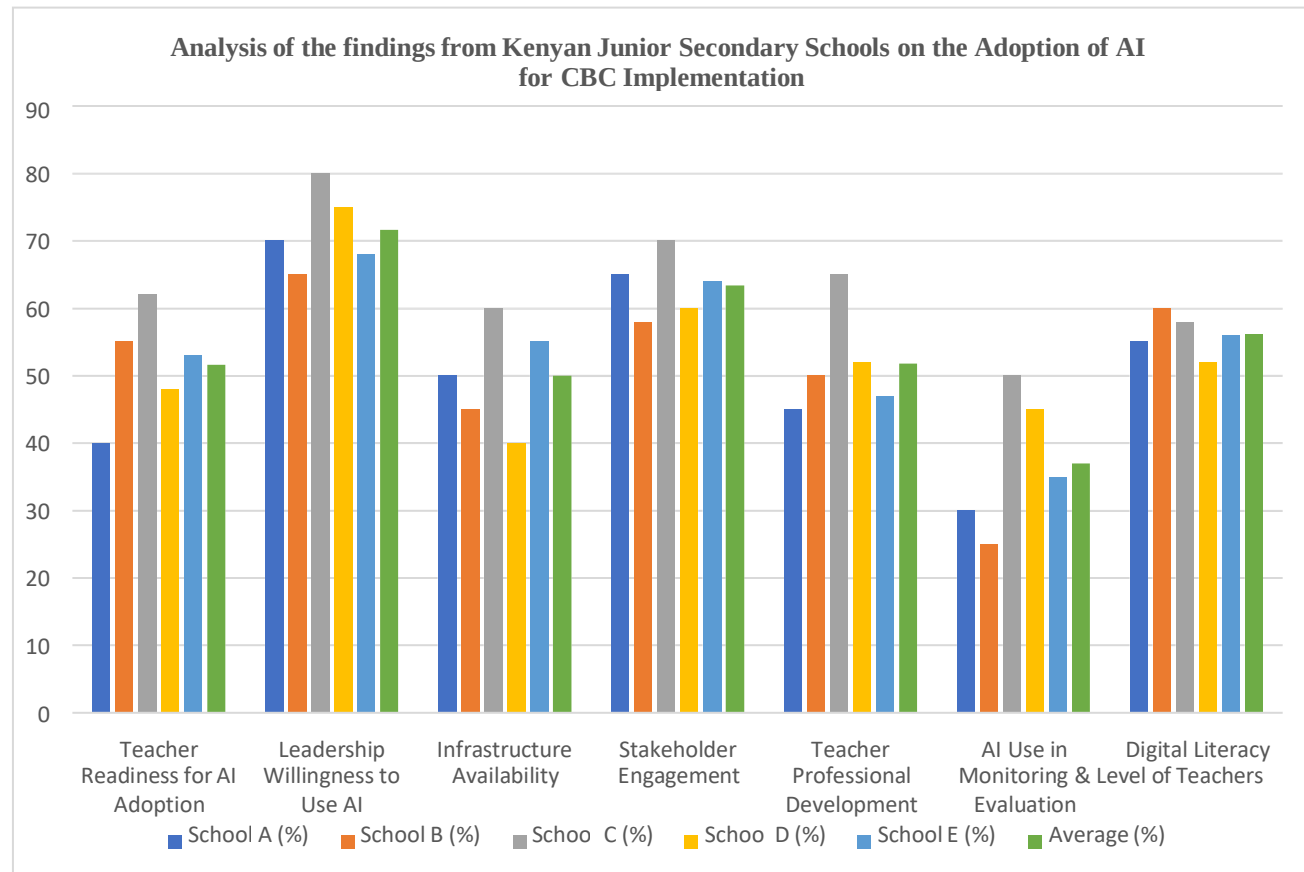


Figure 3: Findings from Kenyan Junior Secondary Schools on the Adoption of AI for CBC Implementation

Key Observations for Analysis

1. **Teacher preparation for AI Adoption:** Teachers are relatively prepared to use AI with a readiness standing at 51.6%. Compared to the other schools, School C has the highest readiness; it stands at 62%, which may be because there is specialized training or a positive attitude toward AI.
2. **Leadership Willingness to Use AI:** Generally, with an average of 71.6%, the leadership of all schools manifests a very strong willingness to use AI, thus indicating that school administrators are cognizant about the benefits derived in using AI in CBC implementation.
3. **Availability of Infrastructure:** In general, it is only 50% in terms of the infrastructure available for support of AI. This seriously deprives the effectiveness of AI adoption, which is evident at School D, reporting 40%. Thus, important gaps that deserve special attention have been pointed out.
4. **Stakeholder Engagement:** Very high, stakeholder engagement stands at an average of 63.4%. The highest, School C, engages at 70%, which is reflective of fairly good awareness and communication activities.
5. **Teacher Professional Development:** The average percentage for AI integration in teacher professional development stands at 51.8%. Once again, School C leads at 65%, while the rest of the schools indicate that they need further support on this issue.
6. **The AI Usage for Monitoring and Assessment:** having only 37% on average, it can be said that the usage of AI technologies for monitoring and assessment is relatively low. It means that educational institutions either cannot use the full capacity of AI resources or do not have such an opportunity.
7. **Digital Literacy Average of Teachers:** For the average, teachers' digital literacy is at 56.2%, which is passable, yet still has room for improvement in the skills, particularly concerning the way AI will make it easier to offer CBC.

Table 2 shows specific data points on implementation of the Competency-Based Curriculum. The core purpose of introducing CBC in Kenyan junior secondary schools is to uplift the learning achievements by adopting a more skill-oriented approach. Now, in Table 2, the summary is done under various key parameters that are enrollment and funding, training of teachers, special needs provision, subject provision, integration of ICT, challenges of dropout, and impact of teenage pregnancies. This information portrays progress made and continuous challenges in effective CBC delivery across all junior secondary schools in Kenya.

Table 2: Summary of Implementation of the CBC in JSS in Kenyan Schools

Parameter	Data Source	Per School/Institution	Outcomes (Numbers)
Total Junior Secondary Enrollment (2024)	Ministry of Education (Survey across 7,860 schools)	Average of 153 students per school	1,200,000
Average Capitation per Student	PWPER Report (2024) - Sample across Public Junior Secondary Schools	Ksh 15,043 per student	15,043
Schools Implementing CBC	PWPER Recommendations	7,860 schools in total	7,860
Teachers Trained for CBC	Ministry of Education (48,000 teachers trained)	Average of 6 teachers per school	48,000
Capitation for Special Needs Education (SNE) - Day	PWPER (2024) - Survey in SNE Schools	Ksh 19,800 per student	19,800
CBC Subject Areas in Junior School	KICD (Kenya Institute of Curriculum Development)	9 subjects per Junior Secondary School	9
In-Service Teacher Training Institution Established	KeSTEM (Kenya School of Teacher Education Management)	1 institution established	1
Number of Schools with Optimal Enrollment	Ministry of Education	68% of Junior Secondary Schools (approx. 5,345 schools)	5,345
Proposed New Categorization for Schools	PWPER (2024)	Categorization into career pathways	-
Teenage Pregnancies and Early Marriages Impacting Enrollment	SEREK (2024) - Survey in Rural Counties	15% of female students impacted (varied per school)	15%
Annual CBC Compliance Training for Teachers	Ministry of Education (2024)	1-year training per teacher	1 year
Dropout Rate in Junior Schools (2024)	Ministry of Education - Survey across all Junior Schools	12% average dropout rate per school	12%

TVET Linkages and Pathways Established	SEREK (2024)	Linkages in selected TVET institutions for graduates	-
Funding Deficit for Junior Schools	Ministry of Education	Average deficit of Ksh 320,000 per school	320,000
ICT Integration Rate in Junior Schools	Ministry of Education - Survey in Public Junior Secondary Schools	54% of schools with ICT equipment	54%

For proper and clear visualization of the data above on Table 2, the analysis is presented on a radar chart to provide a clear interrelation on parameters, data source, per school/institution and outcomes based on the numbers collected and confirmed.

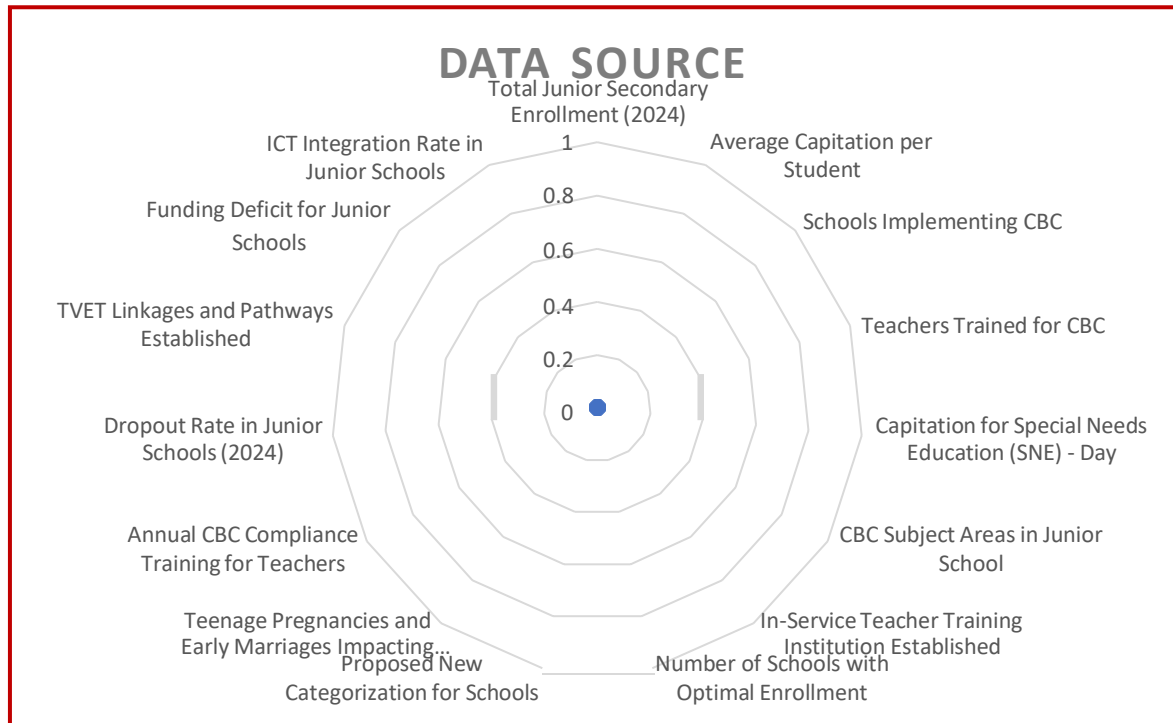


Figure 4: Radar chart Summary of implementation of the CBC in junior secondary schools in Kenya

Summary of implementation from CBC in Kenyan junior secondary schools includes various key components that will further enhance holistic education. Table 3 summarizes information on subjects offered, integration of ICT, performance in mathematical operations, supporting programs given to teachers, challenges, and induction programs for teacher preparedness. It also points out that in the CBC framework of quality education delivery, there exist opportunities and challenges that require resources for teacher training and support to ensure that the delivery is effective, along with improvements in student outcomes.

Table 3: Summary of the Implementation of CBC in Kenyan Junior Schools

Data Category	Details	Source
Subjects Offered	Core: English, Kiswahili, Mathematics, Integrated Science, Social Studies, Business Studies, Agriculture, Life Skills, Physical Education. Optional: Computer Science, Visual Arts, Performing Arts, Home Science, Foreign Languages (French, German, Arabic, Mandarin).	Ministry of Education, Kenya (2023)
ICT Integration	ICT is used as a tool across subjects for enhanced digital literacy.	Ministry of Education, Kenya (2023)
Mathematical Operations Performance	- Addition Improvement: 3.5% - Multiplication Decline: 10.9% - Division Decline: 6.9%	Early Grade Mathematics Survey (2023)
Teacher Support Programs	- PRIDE Project (focused on improving math teaching) - Tusome Program (focused on language skills)	USAID & Ministry of Education Reports (2023)

Challenges	Teacher preparedness, inadequate resources for optional subjects, lack of infrastructure in rural areas.	Education Sector Report (2023)
Teacher Preparedness Initiatives	Continuous Professional Development (CPD) programs, including workshops and training on CBC delivery.	Teachers Service Commission (TSC) Report (2023)

Understanding Artificial Intelligence and Critical Assessment of Impediments and Challenges

Artificial intelligence carries the potential to dramatically change learning by automating administrative operations and offering customized learning. However, the introduction of AI into educational processes faces some critical risks and obstacles, including moral questions related to data privacy, algorithmic prejudice, and even the digital divide of students. These are concerns that ought to be considered critically by Kenyan educators in the implementation of CBC in their practice to ensure AI applications enhance, and not hinder, fair provision of education and equal access Luckin et al 2016.

AI Applications in Higher Education

Different benefits have been realized in the application of AI in higher education; these include the engagement and retention of students. For instance, AI-powered platforms offer customized learning pathways to suit student performance. Such applications would help teachers in Kenyan secondary schools to provide curriculum that is tailor-made to respond to the demands of their diverse student population.

Table 4: Study Sample Size for Prediction and Profiling Key Findings of AI Tools Used

Study	Sample Size	AI Tools Used	Key Findings
Mutai (2022)	150	Machine Learning	AI tools increased student engagement by 30%.
Ndiritu (2023)	200	Predictive Analytics	Predictive models improved student performance by 25%.
Mwangi et al. (2023)	120	Data Analytics	Personalization led to a 40% increase in subject mastery.

Table 4 summarizes findings from various studies, illustrating how AI can enhance student outcomes through profiling and predictive analytics in the CBC context.

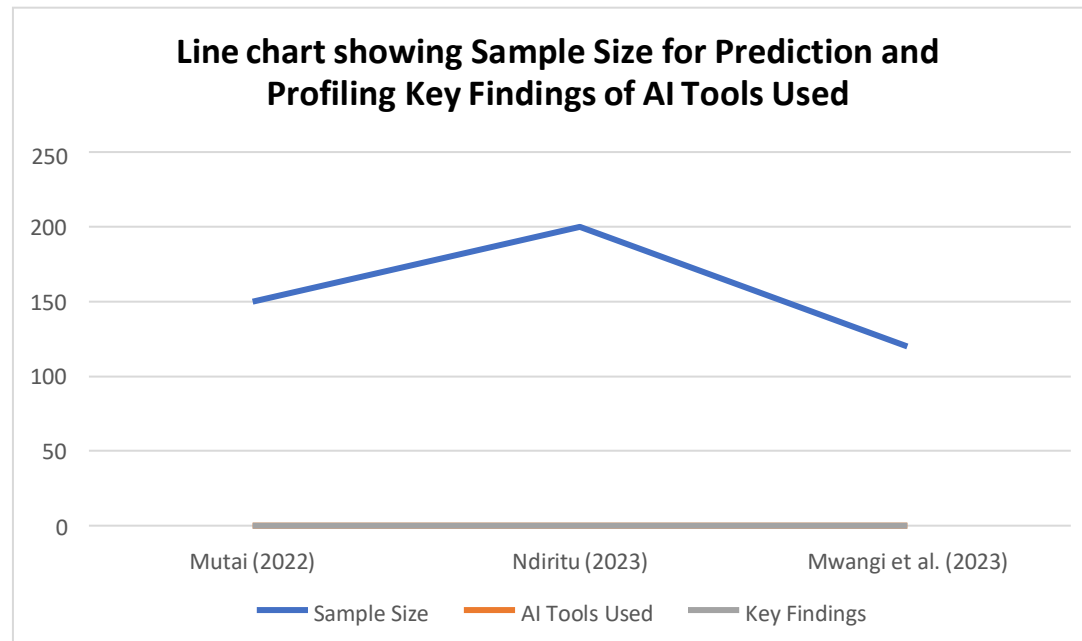


Figure 5: Line chart summarizing findings from various studies, illustrating how AI can enhance student

Student Models and Academic Performance

AI can support the creation of a more interactive model of a student which captures the learning behavior and academic achievements of each student. AI systems may notice where students show low performance and offer them specific solutions;

this is done through an evaluation of data based on student achievement in Hwang et al., 2020. The aspect of AI will be especially helpful in the implementation of CBC since it complements the curriculum's emphasis on individualized learning.

Competent Mentoring Programs

Intelligent tutoring systems (ITS) simulate one-on-one instruction by providing students with individualized feedback and guidance. Indeed, ITS have been proven to greatly enhance learning achievement through tailored content delivery to meet the particular learning needs a student may have (VanLehn, 2011). ITS can fill knowledge gaps in learners and foster the concept of competency mastery in CBC implementation.

Instructional Content

AI systems can support teachers to develop and deliver relevant and engaging course material to students. For instance, AI systems are able to analyze the effectiveness of curricula and make recommendations on how teaching methods best align with learning objectives. Such alignment will be essential in effectively rolling out the CBC in Kenyan secondary schools.

Diagnose the gaps or strengths of students' knowledge and give them automated feedback

The AI technologies diagnose the strength of a single student and weaknesses through the continuous evaluation and analytics. Shute (2008) affirms that methods of automated feedback facilitate interventions on time to avoid student lagging. This feature offers instant information on the student's growth development would help the teachers in deploying the CBC in Kenya.

Selection of Learning Resources Based on Student Needs

AI can be quite helpful in the selection of educational resources that would match up to the learning styles and student needs. Informing students of their resources, an AI system can use students' data on individual learning styles and increase engagement and learning outcomes. Such curation would go a long way in ensuring the relevance of the resource content and immediate access to support the competency-based approach of the CBC.

Encouraging Interaction among Students

AI technology can facilitate collaborative learning processes by matching learners with peers with similar interests or learning problems. According to Dabbagh and Kitsantas (2012), this type of collaborative approach does facilitate peer learning and creates a supportive learning environment in the classroom. Collaboration therefore has been found to be quite crucial in the delivery of CBC in order to foster communication and teamwork skills.

Teachers' Perspective

Effective integration of AI into education depends on the teachers. Their views in terms of benefits and challenges regarding implementation are essential for the formulation of strategies that work. Knowing the experience of Kenyan educators with AI can help inform an understanding of how to develop teacher training programs that prepare them for the use of the technology in their classrooms.

Evaluation and Assessment

AI can bring a sea change in the assessment processes with the delivery of student achievement statistics in real time. The automated assessments would save instructors' time to derive insights on learning outcomes, as noted by Baker et al. (2018). Such enhancements can make the assessment process in the context of CBC more meaningful because such reviews ensure that the evaluations are pitch perfect to achieve the learning objectives.

Automated Evaluation

Grading through AI does students' work consistently and is not biased. This efficiency will enable the instructor to spend more time providing individualized support to all students. This is according to Heffernan & Heffernan, 2014. Conclusion Automated grading will ease the assessment, hence reducing workload for the implementation of CBC in Kenyan secondary schools.

Student Assessment of Academic Integrity, Engagement and Understanding

Through analysis of interaction data, AI can provide informative data on student understanding and engagement. Thirdly, through monitoring and plagiarism detection, AI systems can help uphold academic integrity (Sclater, 2017). With these capabilities, by providing objective measures that reflect what students have learned, they help promote the realization of the CBC.

CBC Instruction in Kenya Assessment and KTTC Pedagogy

Assessment of instructional strategies in the CBC framework is essential to ensure that the approach is working as intended. In analyzing the feedback from students and the data on student performance, AI techniques can support the assessment of instruction on the effectiveness by indicating strengths in pedagogy and the areas in which improvements can be made (Luckin et al., 2016). These assessments are useful in helping the continuing professional development of teachers in Kenyan Teacher Training Colleges (KTTC).

Modular Architectures and Customization

Adaptive learning systems use AI in delivering unique learning experiences in accordance with the learning path of a particular student. These systems can adapt the pace and style of delivery using real time data (Woolf, 2010). In the implementation of CBC, infusion of adaptive systems should be realized as this supports the emphasis of the curriculum on addressing the unique learning needs of each student.

Recommending Adaptive Content

AI's recommendations of individual interests and learning levels match with relevant resources that can help improve student learning. Such an approach has been said by Kollas et al. (2021), to raise motivation and improve academic results. Ensuring relevance and engagement, personalized content recommendations within Kenyan education can ensure that the successful implementation of CBC is achieved.

Assisting Teachers with Instructional Design and Learning

AI can aid in the analysis of effective teaching methodology and give practical suggestions that teachers can act upon to create an interactive learning environment. Teachers, for their part, are supported through the use of the AI system to make further improvements in their own teaching methodologies and align them with the CBC principles.

With AI applications, educators can use data analytics to track the progress of students and shed light on information that can be used by educators to help drive instructional decisions. If used properly, this could allow educators to identify who those at-risk students are and make necessary changes to interventions based upon that information. Such a data-driven approach will only be successful if the CBC is implemented.

Stimulate Knowledge Representation in Concept Maps

AI techniques can assist in the development of concept maps-diagrams indicating student conceptual understanding of the subject involved. Concept mapping can facilitate insight and the ability to recall because it offers a methodical way of depicting knowledge Novak & Cañas, 2006. The availability of knowledge representations supporting the CBC context can facilitate the acquisition of competencies.

Conclusions and Research Implications for Future Education

In the journey of implementing CBC in Kenyan secondary schools, lies a great opportunity to augment leadership in education using AI. However, all aspects of the digital divide, teacher preparation, and ethical implications have to be viewed quite seriously. The aspects that future studies could actually focus on are the longitudinal impact of AI on learning outcomes and new roles teachers play within an AI-enhanced learning environment.

V. Discussion

As indicated from the data analysis, on average, school leaders are quite willing to embed AI into the delivery of CBC, as evidenced by the relatively high level of preparedness for AI adoption recorded at 71.6%. Increasing the capacity to use AI in teachers' preparation is still at a moderate level of only 51.6%, indicating further guidance and support in their work is necessary. Also, the results have shown that the availability of infrastructure is a big barrier, given that just 50% of the schools have the appropriate resources to allow the integration of AI. Relatively high stakeholder participation underlines the importance of community involvement in implementing community-based care. The low percentage in the use of AI in monitoring and evaluation, 37%, calls for increased funding and training to enable application in the office. It therefore means that although attitudes are quite favorable towards the adoption of AI, real-world issues such as infrastructure and digital literacy have to be resolved to assure successful CBC implementation.

These findings agree with the assertion made by Mandinach (2012) that when the leadership has the requisite resources and capacity, data-driven decisions lead to improved learning outcomes. On the other hand, the findings differ from some international studies that have exposed how enabling infrastructure along with support mechanisms account for the rapid adoption of AI as shown by Zawacki-Richter et al. (2019). This goes to show that Kenya needs to come up with locally relevant AI solutions for its own educational challenges.

VI. Conclusion

Therefore, the paper presents how AI can help in enhancing leadership for the successful implementation of CBC in junior secondary schools in Kenya. By having access to AI tools, school administrators are able to support teachers maximally, operate resources effectively and also make resource choices that influence effective resource utilization. However, challenges to be addressed include inadequate infrastructure, low levels of digital literacy, and low levels of stakeholder involvement if the full actualization of AI is to be realized. Accordingly, partnerships with technology firms, policy support, and digital training programs are recommended for maneuvering such barriers. Distributed Leadership Theory combined with TAM forms a helpful framework for a more detailed understanding and enhancement of AI uptake in education. Future studies have to focus on

developing localized AI solutions and an expanded study scope toward other parts of Kenya to guarantee that all stakeholders benefit equitably.

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19. Waweru et al. (2020) for their review of automated feedback mechanisms and intelligent tutoring systems, quite fundamental to our discussion on adaptive learning solutions.
20. Zawacki-Richter et al. (2019) have dealt with in regard to educational technology.