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Effects of Integrating 21st Century Skills in the Curriculum on Teachers' Pedagogical Competence in Kenya

Dr. Mukami Njoroge, Ph.D. (corresponding author)

Professor Strathmore University, Education Department

Gloria Kisiangani

School of Education, Strathmore University

E-mail: glokisiangani@gmail.com

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Abstract

Integrating 21st-century abilities into teacher education has become an essential component of preparing educators for modern classrooms. Specifically, incorporating integration of the 21st Century Skills such as communication, critical thinking, collaboration, problem-solving is crucial to the teaching and learning processes, hence need to be part of teachers' pedagogical competence. The study looks into the effect of incorporating 21st-century abilities, notably critical thinking, collaboration, and innovation, on teachers' pedagogical competency in selected private colleges in Kiambu County, Kenya. From the study, critical thinking abilities, particularly problem identification and logical reasoning, greatly improve instructors' capacity to create learner-centred instructional techniques. Collaboration skills, such as classroom management and course development, also help teachers increase their efficacy by creating inclusive and engaging learning environments. Furthermore, innovative skills, such as technology integration and digital resource usage, have been shown to improve instructional adaptability, making learning more engaging and efficient. Incorporating 21st-century skills into teacher training programs is critical to improving pedagogical competence. The study suggests that teacher education institutions should improve experiential learning methodologies, enhance digital literacy, and implement organized cooperation frameworks to better educate pre-service teachers. These findings add to the continuing debate on teacher education reforms and provide practical insights for curriculum

authors, legislators, and educational stakeholders trying to improve teaching standards in Kenya and worldwide.

Keywords: Pedagogical Competence; 21st Century Skills; Collaboration; Critical Thinking; Innovation; Private Colleges

1. Introduction

In an era characterized by rapid technological advancements and global interconnectedness, the traditional paradigms of education are undergoing a profound transformation. Central to this transformation is the emphasis on developing and integrating the 21st Century Skills, such as communication, critical thinking, problem-solving, and adaptability into the curriculum (Bedir, 2019). When these skills are integrated in the curriculum, it necessitates an adjustment in teachers' pedagogical competences for the successful attainment of 21st Century Skills among learners (Urbani, Roshandel, Michaels, & Truesdell, 2017). As educators navigate this evolving landscape, it is crucial to explore how the integration of 21st Century Skills into the curriculum influences their pedagogical competence.

The change in education relates to the realization that educational institutions must provide students with skills like communication, teamwork, critical thinking, and problem-solving which are crucial to their current and future lives (Matthee & Turpin, 2019). A worldwide conversation about shifting labour and societal demands has fuelled the emphasis on these "21st Century goals," which are evident in curriculum reform and education (Care, Kim, Vista, & Anderson, 2019). Ideas like data processing, logical reasoning, inquiry, critical thinking, and problem-solving are integral to 21st Century Skills and encompass many well-established abilities that have long been central to school education. The evolving nature of society, the economy, and educational settings drive the need to reassess the qualifications that teachers should possess (Alberta Government, 2016).

1.1 The Importance of the Problem

Although there are a number of 21st Century Skills, critical thinking, collaboration, and innovation stand out as crucial in readying the learner for the current and future world. In discussing the future of work, Miller *et al.,* (2023) observed that critical thinking, collaboration and innovation is foundational to the success of the modern workplace. Specifically, the authors argued that critical thinking is evaluative and focused on getting the right information in the world of mixed confusing and misleading information; innovation is geared towards producing novel and original ideas; while collaboration aims at mutual engagement whose end-result is a common goal. From the foregoing, there is need for these skills to be emphasized among learners in schools. In line with this, Haryani, Coben, Pleasants, and Fetters (2021) argued that teachers should organize their classrooms and resources in a way that enhance the attainment of critical thinking, collaboration and innovation skills. In this regard, teachers' pedagogical competence becomes a necessary component in teachers.

The definition of 21st-century skills encompasses a broad range of competencies essential for students to navigate the complexities of contemporary society and its workforce. These skills not only include traditional academic knowledge but also emphasize critical thinking, collaboration, creativity, and communication, which are vital for problem-solving in real-world contexts. Integrating these skills into the curriculum can significantly affect teachers' pedagogical competence, as educators must adapt their instructional practices to cultivate this holistic set of abilities in their students. For instance, a study examining mathematics teachers in Uganda highlighted variations in teachers understanding of 21st-century competencies while demonstrating that those who effectively implemented learner-cantered methods substantially enhanced their students' skills (Innocent et al., 2023). Moreover, discussions surrounding professional development recommend that teacher training programs focus on fostering these competencies to better equip educators for modern teaching challenges ((Albion et al., 2011)). Therefore, a comprehensive grasp of 21st-century skills is fundamental not only for students but also for the ongoing growth of teaching practices.

1.2 Relevant Literature

Although other studies in Kenya have focussed on teachers' pedagogical competence (Amimo, 2021; Teygong, Moses, & Daniel, 2018), and others on 21st Century Skills (Kafwa, Gaudience, & Kisaka, 2015; Ongesa, 2020), few, if any have connected the two aspects among teachers in colleges in Kenya. The rapid advancements in technology and globalization have reshaped the demands of the 21st-century workforce, emphasizing skills such as critical thinking, collaboration, communication, creativity, and digital literacy. In response, educational systems worldwide are integrating 21st-century skills into curricula to prepare students for future challenges. However, the effectiveness of these efforts heavily relies on teachers' pedagogical competence to implement such skills meaningfully in the classroom. The ability of teachers to think critically, form relationships with knowledge, solve problems, and innovate is considered essential for them to create effective strategies that meet the needs of students, the learning setting, and promote deep learning (Adesanya, 2017). Teachers must possess flexible expertise, including the skill to modify their approaches and methods to meet the educational needs of students (Stronge, 2018). Critical thinking skills in the curriculum focus on problem identification, analytical thinking and logical reasoning, among others, and these are instrumental to the teaching and learning processes Okolie, et al. (2022). Pre-service teachers' pedagogical competences therefore needed to be related with critical thinking skills in the curriculum.

1.3 Hypotheses and Theories

This study sought to investigate the effect of integrating 21st Century Skills in the Competency Based Curriculum, on teachers' pedagogical competence in selected private colleges in Kiambu County. The specific objectives of the study focused on critical thinking, collaboration and innovation skills, which are best attained through experiential learning. These were in relation to pedagogical practices and instructional competence, teaching strategies and adaptability and instructional effectiveness. The study targeted teachers in

various colleges selected within the area. Kiambu County was chosen for the study due to its large number of colleges offering education and its ranking as the second highest county with the most colleges. This made it easier to identify colleges relevant to the current study.

Experiential learning theory is associated with David Kolb, and its main emphasis is a learners' active participation in the teaching and learning process (Kolb, 1984). This theory argues that learning which is experiential has four cycles: concrete experience (where the learner encounters a new learning experience); reflective observation (where the learner thinks about the new experience they have just encountered); abstract conceptualization (where abstract ideas and connections related to the new experience are formed); and active experimentation (where the learner tests the new knowledge in another set-up (Bergsteiner, Avery, & Neumann, 2010).

2. Method

Data for the study was gathered from 78 college freshmen using an established semi-structured interview tool (known as 'Short Form-Critical Thinking Disposition Inventory' - SF-CTDI). The study adopted a descriptive research design survey, which is appropriate for investigating the relationships between variables in their natural setting without manipulating the environment (Cohen, Manion, & Morrison, 2018). This design was chosen because it allows for the collection of quantitative data from a large sample, enabling the researcher to generalize findings to the target population. The descriptive survey design was particularly suitable for this study because it aimed to: Examine the influence of critical thinking, collaboration, and innovation skills on teachers' pedagogical practices; Gather data on teachers' perceptions and experiences regarding the integration of these skills into the curriculum; and provide insights into how these skills can be enhanced to improve instructional competence. The use of surveys, which included closed-ended questions on a 5-point Likert scale, allowed for the systematic collection of data on the variables of interest. This approach ensured that the data could be analyzed quantitatively to address the research objectives.

The target population for this study consisted of pre-service teachers from 15 private colleges in Kiambu County, Kenya. These colleges were selected because they offer teacher training programs and are located in close proximity to Nairobi, making them accessible for data collection. The total population of pre-service teachers in these colleges was 3,559 students, as shown in Table 1.

Table 1. The target population for this study

College Name	Population Targeted
Garrison Teachers College	219
St. John's Teacher Training College	322
Thogoto Teacher College	117
Kenya Technical Trainers College (KTTC)	109
Gatundu South Technical and Professional College	360
Murang'a Teachers College	106
Brilliant Institute of Professional Studies	219
Kilimambogo Teachers' Training College	236
Thika College of Excellence	193
Kiambu National Polytechnic (KINAP)	239
Kiriri Women's University of Science & Technology	391
Kiambu County Institute of Management	261
Jodan College of Technology	215
St. Paul's University	274
Zetech University	298
Total	**3,559**

Source: Kiambu County (2024*: Population Distribution.*

Primary data gathered via structured surveys was used in the study. There were closed-ended questions on the survey that used a 5-point Likert scale, ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The survey was divided into sections corresponding to the research objectives: Critical Thinking Skills: Questions focused on problem identification, analytical skills, and logical reasoning. Collaboration Skills: Questions addressed class management, lesson development, and inclusivity. Innovation Skills: Questions explored the application of technology, technological knowledge, and availability of resources. Consistency in data collection was ensured by training two research assistants to deliver the surveys. By using surveys, it was possible to minimize respondent fatigue and efficiently gather data from a large sample (Cohen et al., 2017).

2.1 Data Analysis

The data collected were analyzed using descriptive and inferential statistics. The following steps were taken: Descriptive Statistics: Measures of central tendency (mean) and dispersion (standard deviation) were used to summarize the data. Frequency tables, bar graphs, and pie charts were used to present the findings. Inferential Statistics: A multiple regression analysis was conducted to examine the relationship between the independent variables (critical thinking, collaboration, and innovation skills) and the dependent variable (pedagogical competence). The regression model used was:

$$Y = a + \beta eta1\ X_1 + \beta eta_2\ X_2 + \beta eta_3\ X_3 + \varepsilon$$

Where.

y= Pedagogical competence

X_1; Critical thinking skills

X_2; Collaboration skills

X_3; Innovation skills

ε is the error term.

The analysis was conducted using Microsoft Excel and SPSS Version 23

2.2 Ethical Consideration

The study went through an ethical review by the school after which an ethical approval was granted, (Ref No. SU-ISERC2389/24). Further, in line with requirements for ethical research, a research permit was granted by the National Commission for Sciences, Technology, and Innovation (NACOSTI) (Ref No. 618708). Further, study adhered to ethical research practices, including informed consent where respondents were informed about the purpose of the study and their right to participate voluntarily. On anonymity, respondents' identities were kept confidential, and no personally identifiable information was collected. On data integrity, the data were handled with care to ensure accuracy and confidentiality. The respondents were informed that they could withdraw from the study at any time without consequences

3. Results and Discussion

Of the 93 respondents included in the study, 74 fully completed the research instruments, yielding a response rate of 79.6%. The remaining 19 respondents (20.4%) did not return the questionnaires (see Table 2).

Table 2. Distribution of Non-respondents and Respondents in the Study

	Issued	**Returned**	**Not returned**
No. of questionnaires	93	74	19
Percentage	100	79.6	20.4

Source: Research Data (2024): Response Rate.

3.2 Demographic Information

The demographic profile of the respondents is outlined in the following subsections.

3.3 Gender of Respondents

As shown in Table 3, the majority of the respondents were male, comprising 55.4% (n=41), while females accounted for 44.6% (n=33) of the sample

Table 3. Gender Distribution Among Respondents

Gender	Frequency	Percent
Male	41	55.4
Female	33	44.6
N	74	100

Source: Research Data (2024): Gender of Respondents.

The first objective sought to determine the influence of integrating critical thinking skills in the curriculum on teachers' pedagogical practices. The findings revealed that critical thinking skills, such as problem identification, analytical skills, and logical reasoning, play a significant role in enhancing teachers' instructional competence.

For the completion of the study, it was necessary to establish the elements that characterise problem identification in learning. The findings were as relayed on Table 4.

Table 4. **VGE**= Very Great Extent, **GE**= A Great Extent, **ME**= Moderate Extent, **SE**= Small Extent, **NA**=Not at All

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Clear problem identification	F	26	30	4	11	3	74	3.88	1.170
	%	**35.1**	**40.5**	**5.4**	**14.9**	**4.1**	**100**		
Determination of a problem's effect	F	29	24	3	15	3	74	3.82	1.264
	%	**39.2**	**32.4**	**4.1**	**20.3**	**4.1**	**100**		
Definition of problem-solving criteria	F	26	29	2	16	1	74	3.85	1.167
	%	**35.1**	**39.2**	**2.7**	**21.6**	**1.4**	**100**		
Establishment of suitable solutions for the problem	F	28	24	3	17	2	74	3.80	1.249
	%	**37.8**	**32.4**	**4.1**	**23.0**	**2.7**	**100**		

Source: Field Data (2024): Problem Identification in Learning.

The findings revealed that clear problem identification (M=3.88, SD=1.170), determination of a problem's effect (M=3.82, SD=1.264), definition of problem-solving criteria (M=3.85, SD=1.167), and establishment of suitable solutions (M=3.80, SD=1.249) were all important.

Respondents also evaluated the characteristics of analytical skills in learning, which include communication, creativity, data analysis, and research capabilities. As illustrated in Table 5, communication emerged as the most highly rated skill (M=4.07, SD=1.051), followed by creativity (M=3.78, SD=1.197), research (M=3.80, SD=1.282), and data analysis (M=3.66, SD=1.306). Teachers who possess strong analytical skills are better positioned to engage students in meaningful ways, encouraging them to think critically about complex issues.

Table 5.

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Communication	F	30	31	2	10	1	74	4.07	1.051
	%	**40.5**	**41.9**	**2.7**	**13.5**	**1.4**	**100**		
Creativity	F	25	27	5	15	2	74	3.78	1.197
	%	**33.8**	**36.5**	**6.8**	**20.3**	**2.7**	**100**		
Data analysis	F	25	24	4	17	4	74	3.66	1.306
	%	**33.8**	**32.4**	**5.4**	**23.0**	**5.4**	**100**		
Research	F	32	16	6	19	1	74	3.80	1.282
	%	**43.2**	**21.6**	**8.1**	**25.7**	**1.4**	**100**		

Source: Field Data (2024): Characteristics of Analytical Skills in Learning.

The study found that **clear problem identification and analytical skills** significantly enhance teachers' pedagogical competence. A majority of respondents (Mean = 3.88, SD = 1.170) agreed that defining **problem-solving criteria** and determining a **problem's effect** are key factors in fostering critical thinking among teachers in training.

These findings align with **Adesanya (2017)**, who argued that **teachers who develop critical thinking skills** are better equipped to implement adaptive teaching strategies and foster deeper learning among students. Similarly, **Huang and Chang (2023)** found that critical thinking instruction was essential for effective pedagogical practices, but many pre-service

teachers lacked structured training in this area.

However, unlike **Okolie et al. (2022)**, who found that teachers often struggle to incorporate critical thinking into their instructional methods due to **curriculum constraints**, this study suggests that integrating structured **problem-solving exercises** within teacher training programs significantly enhances pedagogical competence. This contrast highlights the **importance of curriculum design** in fostering critical thinking skills among pre-service teachers.

These results suggest that **teacher training programs should emphasize problem identification, logical reasoning, and analytical skills** as core components of pedagogical competence. Future research should explore how integrating **experiential learning approaches** can further strengthen these competencies in pre-service teachers.

The integration of critical thinking skills into the curriculum has been shown to significantly enhance teachers' instructional practices. Clear problem identification, analytical skills such as communication and creativity, and logical reasoning through inductive approaches are key contributors to this improvement. Analytical skills are characterized by communication, creativity, data analysis and research, while logical reasoning can take the form of inductive approach deductive approach or abductive approach. Furthermore, these findings show that critical thinking skills, when put into proper use, can result in increased competence for the teacher. These findings align with studies by Huang and Chang (2023), who found that critical thinking skills are essential for effective teaching but are often underdeveloped in teacher training programs. Similarly, Okolie et al. (2022) emphasized the need for innovative pedagogical practices to enhance critical thinking among teachers. The current study suggests that integrating critical thinking skills into the curriculum can significantly improve teachers' ability to design and deliver effective lessons

As can further be seen in the study of Okolie, et al. (2022), critical thinking skills among business and vocational studies teachers could be enhanced through innovative pedagogical practices. In a similar study, Huang and Chang (2023) focussed on 78 international Chinese students and their views on integration of critical thinking instruction. Findings revealed that much as the students were aware of critical thinking skills, they had not attained through teaching and training, and the possible reason lay in the pedagogical instruction utilised. This suggests a shortcoming in teachers' pedagogy with respect to critical thinking. The incorporation of 21st-century skills into curricula is a significant step toward improving teachers' pedagogical competence in response to the changing demands of modern education. This study found that teachers who actively practiced these skills reported significant improvements in their instructional techniques and confidence levels, and that the use of collaborative learning and critical thinking strategies that were facilitated by teacher training programs led to a significant improvement in pedagogical practices and student engagement. These important findings are consistent with other research that highlights the transformative impact of these skills on educators' practices, highlighting the need for initiatives that foster their development in formal educational settings (Cícero Rodrigues AD et. al., 2024)

4. Discussion

4.1 Critical Thinking Skills in The Curriculum, On Teachers' Pedagogical Competence

The findings showed that clear problem identification is a pointer to successful problem identification as shown by a majority of the respondents who acknowledged that this would increase the ability of the teacher to exercise critical thinking skills. On problem effect determination, the study showed that most of the respondents agreed that it would enhance the ability of the teachers to properly deal with problems as they arise. Further, the study established that definition of problem-solving criteria characterizes problem identification in learning. The findings further indicate a situation whereby communication is viewed as a factor characterizing analytical skills in learning as shown by a mean of 4.07. Data analysis and research were also cited by the respondents as indicators of analytical skills in learning. Logical reasoning in learning is characterized largely by inductive approach as shown by the responses which indicate a high level of acceptance of this position.

Building up on these findings, incorporating 21st-century skills into school curricula is not only a recent trend; rather, it is a required development to meet the needs of a world that is changing quickly. The results of this study show that teachers who actively practice these abilities see significant improvements in their pedagogical proficiency, which in turn creates a more engaging learning environment for students. The study specifically emphasizes gains in educators' capacity to support students' creativity, critical thinking, and teamwork. The need for educational reform to include 21st-century competencies especially critical thinking as essential components of teacher education is reiterated by this study, which is consistent with earlier research that highlights the positive relationship between skill integration and pedagogical effectiveness (Cícero Rodrigues AD et al., 2024).

Moreover, based on past research, it is evident that critical thinking is not new to teacher education, and from either the perspective of teacher learning or classroom pedagogy, there has been a history of ongoing research and dialogue on how to incorporate critical thinking into teachers' cognitions and practices in specific disciplinary and socio-cultural settings as put forward by Wang & Jia (2023); Yuan et al., (2022). The vast body of literature on this topic converges on a common understanding, as encapsulated in Yuan's (2023) tripartite model for conceptualising a critical thinking-oriented teacher, who should possess three essential attributes: 1) a strong CT mindset, 2) a solid understanding of the relationship between CT and the subject matter, and 3) the development of CT-focused pedagogical competence (in terms of teaching knowledge and strategies) to facilitate their students' CT growth in subject classrooms.

4.2 Effect of Collaboration Skills on Teachers' Pedagogical Competence

From the findings, the responses showed that model behaviour positive reinforcement and understandable rules were all characteristics of class management in learning. Model behaviour received responses adding up to the highest mean, implying that it is the greatest determinant of class management. Further, positive reinforcement and understandable rules were also cited as indicators of class management. Lesson development as achieved through

interest stimulation is a characteristic of successful lesson development in learning as shown by a majority of the respondents. In the same vein, Goddard et al. (2015) stressed that teacher collaboration through lesson development can serve as a means to improve instructional practices and student achievement by shifting the focus from individual teaching to collective learning and understanding of concepts, thereby ensuring better student comprehension. "Through collaboration, teachers can learn from each other, ask relevant questions, and hold one another accountable for their teaching activities, leveraging student data to provide effective learning opportunities (Goddard et al., 2015)." ("The Influence of Teacher Ollaboration on the Teaching Effectiveness in ...")

In addition to collaboration in lesson development, the findings also indicated that creative topic introduction also played a prominent role in lesson development and the same applied to student engagement which is also a factor characterising successful lesson development. The study also showed that to a large extent, culturally responsive teaching characterized inclusivity in learning as shown by the large number of respondents who cited very great extent. This shows that for inclusivity to be achieved in the learning process, the process of teaching should be culturally responsive to ensure that all students are catered for by the teacher. Similarly, cooperation between teachers is an important element for the development of a school because it works as a platform that helps solve problems and determine decisions. These results imply that the communication and collaboration skills of the graduates, if well-developed and used excellently in their day-to-day activities as teachers, then they can achieve efficiency in the facilitation of students to achieve good professional goals (Khan et al., 2017).

In furtherance of these findings, a study conducted by De Jong et al. (2022) showed that teacher collaboration in secondary schools is advantageous to the learning settings. The study also discovered that collaborative initiatives carried out by teachers appeared to be dependent on the collaborative culture that had previously been developed. This adds to the findings of the present study, by showing that schools with teachers who do not yet have a culture of working collaboratively to improve the quality of education require more support.

4.3 Effect of Innovation Skills on Teachers' Pedagogical Competence

Virtual manipulatives are used as a characteristic of technological learning as well as augmented reality which enhances application of technology in learning. Other than the two, multimedia also characterizes application of technology in learning as shown by the mean of 3.69. However, the highest indicator of application of technology in learning is digital content which likely enhances the application of technology in learning, leading to a more innovative learning experience. A similar argument has been made by Tatarinova et al. (2019) who noted that pedagogical innovations, which are seen as a critical component in the development of teaching techniques, are a highly expected part of teachers' jobs in the modern period. These consist of using digital information, manipulatives, and technology to learn. Teachers must thus have the necessary tools and professional assistance if they wish to create pedagogical innovations within the context of learning growth through IT.

Similarly, according to Anton et al. (2025) instructors' use of advanced teaching methodology is important since it enhances the teaching and learning process. She adds that the hybrid teaching model, which blends e-learning techniques with in-person instruction, is one of the cutting-edge learning tactics in times of crisis when in-person instruction is becoming less prevalent. As an intervention, Shuhratovich (2020) emphasized that in order to change the structure and goal of high-quality education, pedagogical innovation through the integration of new technologies into the educational process requires training.

Additionally, technological knowledge and experience are best achieved through training in technology as shown by the high response levels. Expertise in using technology, although weakly supported by the respondents, also points to technological experience and knowledge. The findings further showed that a large proportion of the respondents cited having technological gadgets such as phones, tablets and screens as the largest pointer to technological resources in learning. By having the necessary gadgets, the application of innovation becomes possible. Other than these, it has been ascertained that teachers today must be up to date on the latest teaching and learning best practices (Akgül & İzmirli, 2021), and they must be innovative in this regard. Notably, innovative practices also require a passion for education because teachers can build on their prior experiences and gradually improve their educational concepts and practices.

Further findings from the regression analysis model summary, R squared was 0.168 which demonstrates that 16.8% of the variation in pre-service teacher's pedagogical competence may be attributed to the independent factors included in this study. The remaining percentage which constitutes the difference is attributable to characteristics that this specific research did not include. Analysis of variance is used to describe the level of significance of the model as a whole without omitting any sections of it. According to the outcomes, the F .709. *P value* was .550 which is larger than the critical p value 0.05. This has the meaning that the model was not significant at 95% confidence level. The findings showed that if all factors (critical thinking skills, collaboration skills, and innovation skills) were held constant at zero, then teacher pedagogical competence would be at 2.768. It is evident from the findings that a unit increase in critical thinking skills would result in a 0.172 increase in teachers' pedagogical competence. This variable was insignificant since .158 > 0.05.

5. Conclusions

Based on the findings relayed above, it was ascertained that the application of critical thinking skills in learning is done by clear problem identification, determination of a problems effect, problem solving criteria and identification of suitable solutions for problems. In the same way, analytical skills are important components of critical thinking skills and are characterized by communication, creativity, data analysis and research, and all these are important for the achievement of improved pedagogical competence in the school context. Logical reasoning as an aspect can take the form of inductive, deductive or abductive approach.

According to the findings, when these approaches are utilized properly, teaching and learning can be conducted with increased efficiency. These findings show that critical thinking skills, when put into proper use, can result in increased competence for the teacher. Overall, the results of this research highlight the crucial need for efficient professional development that focuses on both pedagogical skills and topic knowledge, adding to the body of current literature while also providing educators with practical techniques (Turlybekov et al., 2024). In the end, this study promotes a thorough review of existing teaching approaches in order to better match them with the skills required for contemporary learning contexts.

Based on the latest developments, the education system is moving towards the implementation of 21st Century learning. Therefore, the application of critical thinking skills practice should have continuity towards that goal with the implementation of the vision and mission of a national education focused on the development of culture and human beings with critical thinking (Ab Kadir, 2017). The common practice of critical thinking skills among teachers will be a catalyst for students to gradually accept this concept in their learning and to eventually produce high quality academic achievement.

Importantly, teacher collaboration emerges as a promising practice for enhancing teaching effectiveness, as it promotes knowledge exchange, accountability, and improved instructional practices. This is achieved through class management in learning is enhanced through model behaviour, positive reinforcement, and understandable rules which ensure that the teacher and students are able to properly communicate. Further, successful lesson development is achieved largely through student engagement, creative topic production and interest stimulation. These ensure that the lesson that the teacher comes up with is one that the students can easily relate with. This ultimately points to pedagogical competence on the part of the educator.

As an essential component, inclusive learning on the other hand is largely realized through promotion of positive learning, and recognition of diversity. By doing these, it would be much easier for the educator to properly communicate to students from all walks of life, irrespective of their backgrounds. This study has empirically demonstrated the significant influence of formative constructs on teaching effectiveness through the examination of topics such as subject matter knowledge, learning environment, instructional planning and strategies, effective communication, assessment, attributes of teacher collaboration, decision making, dialogue, and evaluation. This study validates the importance of teacher cooperation in improving instructional results, which is in line with other studies carried out in the Maldives and other educational environments (Nasir et al., 2023).

In addition to being actively involved, instructors who possess strong pedagogical innovation abilities can work together in groups to create more sophisticated teaching strategies. The expectation is that students will still be able to learn and succeed in spite of the limited direct interaction between teachers and students. They are also able to effectively manage classes and engage with students (Cameron & Rideout, 2022). Additionally, virtual manipulatives, even though not largely used, is also used in the application of technology. Further, innovation is promoted through technological knowledge and experience. This is denoted by

training in technology, ability to impart technological knowledge and expertise in using technology. When an educator has the requisite knowledge and experience on technology, it becomes much easier to pass this knowledge and experience to the learners. Another component of innovation would be technological resources that are used in learning such as having technological gadgets as well as online resources. These resources are the tools that are used to facilitate the application of technology at the school level.

6. Recommendations

The government through the concerned departments should focus more on the improvement of the curriculum so that teachers are more exposed to the 21st century skills during their training, to ensure that their output is improved. This should be done with consideration to the massive influence that teacher competence has in ensuring that 21st century skills practices are implemented successfully in education. This should be done by increasing the robustness of the teacher training curriculum to incorporate the major components of 21st century skills such as critical thinking, collaboration and innovation. This would ensure that these skills are further passed down to the students when these teachers finally start to practice.

Teachers should be given enough space so that they can hone their talents and polish their potential to embody superior personal competencies. This would lead to a superior quality of work output by ensuring that the 21st Century Skills that educationists often acquire are realized through a more inclusive and real-world approach by competent and highly motivated teachers. Teacher training institutions should provide hands-on digital literacy programs and encourage pre-service teachers to experiment with interactive learning technologies. This can be done by ensuring that teacher training is made to cover more of hands-on applications in addition to the theoretical aspects of the programs.

Schools should acknowledge the role played by digital devices in teaching and learning in the 21st Century and as a way of encouraging innovation among the educators, more digital equipment should be made available for them. Schools should therefore invest more on the acquisition of digital devices to make it possible for teachers to interact with these devices during their training as well as during their practice. This would ensure that the kind of output from the teachers is relevant to the 21st century landscape.

7. Suggested Areas for Future Research

Further research should be done on the impact of teacher pedagogical competence on implementation of the competency-based curriculum in schools in Kenya. Similarly, further research should be done on the same topic with focus being made on students themselves instead of focusing on teachers in training. Future studies should assess how institutional support influences the adoption of innovative teaching methods among educators.

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The data that support the findings of this study are available on request.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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