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Effect of integrating 21st Century skills in the curriculum on teachers' pedagogical competence: a study of selected private colleges in Kiambu County.

Kisiang'ani, Gloria
School of Humanities and Social Sciences
Strathmore University

Effect of Integrating 21st Century Skills in the Curriculum on Teachers' Pedagogical Competence: A study of Selected Private Colleges in Kiambu County

By

GLORIA KISIANG'ANI

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Strathmore University
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Declaration

I declare that this work has not been previously submitted and approved for the award of degree by this or any other university. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

Student's Name**: Gloria Kisiangani**

Sign: _____ Date: 21st June 2024

Approval

The thesis of Gloria Kisiangani was reviewed and approved for examination by the following:

Dr. Mukami Njoroge,
School of Humanities and Social Sciences,
Strathmore University.

Dr. Magdalene Dimba,
Dean, School of Humanities and Social Sciences,
Strathmore University.

Prof. Benard Shibwabo,
Director of Graduate Studies,
Strathmore University.

Abstract

Integrating 21st-century abilities into teacher education has become an essential component of preparing educators for modern classrooms. Specifically, incorporating integrating 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. This 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. The study was guided by three objectives: (i) determining how critical thinking skills influence teachers' instructional practices, (ii) assessing the impact of collaboration skills on effective teaching strategies, and (iii) investigating the role of innovation skills in improving teachers' adaptability and instructional effectiveness. The study used a descriptive survey research design with questionnaires and interviews to collect data from 93 pre-service teachers chosen at random from six private colleges in Kiambu County. The data was examined using descriptive and inferential statistics, as well as multiple regression analysis. The study found that 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. The study concludes that incorporating 21st-century skills into teacher training programs is critical to improving pedagogical competence. It 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.

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List of Abbreviations

ANOVA	Analysis of Variances
ASEAN	Association of Southeast Asian Nations
EACEA	European Education and Culture Executive Agency.
ECTS	European Credit Transfer and Accumulation System
EPF	Education Production Function theory
ETUCE	European Trade Union Committee for Education
KNQA	Kenya National Qualifications Authority
OECD	Organization for Economic Cooperation and Development
SCCT	Social Cognitive Career Theory
TALIS	Teaching and Learning International Survey
USA	United States of America

Operational Definition of Terms

21st Century Skills: This term has been used to refer to such skills as critical thinking, collaboration, and innovation, which have been identified as essential for successfully adapting to modern teaching environments.

Collaboration Skills: These are skills that enable an individual to successfully interact with peers in a way to promote cooperation and in this study, it has been denoted by inclusivity, lesson development and class management.

Critical Thinking Skills: This refers to the ability to interpret, evaluate, and analyse facts and information that are available, to form a judgment or decide if something is right or wrong. It has been used in the study to refer to problem identification, analytical skills, and logical reasoning.

Innovation Skills: This has been used in the study to refer to the ability of individuals to approach circumstances with open mindedness and addressing them appropriately. In this study, this has been denoted by technological resources, knowledge, and experience.

Pedagogical Competence: This is the ability of teachers in managing learning that includes the ability to plan a learning program and is comprised of teachers' experience, attitudes, skills and knowledge.

Private Colleges: This term has been used in the study to refer to the independent and privately funded institutions of higher education that do not rely on government funding at all.

Chapter One:
Introduction to the Study

1.1 Introduction

This chapter provides an overview of the study and includes the background information, problem definition, research objectives, research questions, scope, and significance of the study. These are discussed in relation to the main variables in the study, which are 21st Century Skills and teachers' pedagogical competence.

1.2 Background of the Study

Incorporating 21st Century Skills into the curriculum is essential for raising student enthusiasm and engagement, which in turn creates a more dynamic learning environment. Teachers are able to design more engaging and dynamic learning experiences that connect with students' interests and practical applications by integrating abilities such as digital literacy, critical thinking, and teamwork. Innovative teaching strategies that prioritize experiential learning and peer cooperation significantly increase this active involvement, thereby converting conventional classrooms into dynamic spaces for learning. Effectively integrating these skills not only enriches the curriculum but also significantly improves overall educational outcomes. Research has shown that when students find learning meaningful and applicable, intrinsic motivation is heightened, further deepening commitment to academic success (Wolfenden et al., 2018). Additionally, the use of online learning platforms facilitates access to diverse resources and encourages self-directed study, which bolsters engagement.

1.2.1 21st Century Skills in the Curriculum

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). Integration of these skills in the curriculum necessitates an adjustment in teachers' pedagogical competences for the successful attainment of 21st Century Skills among learners (Urbani et al., 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 should provide students with skills such as communication, teamwork, critical thinking, and problem-solving which are crucial to students' 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 et al., 2019). Ideas such as 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).

A wide variety of competences necessary for students to successfully negotiate the intricacies of modern society and its workforce are included in the notion of 21st-century skills. These abilities focus on critical thinking, teamwork, creativity, and communication in addition to traditional academic knowledge, all of which are essential for addressing problems in practical settings. Since educators should modify teaching methods to foster this comprehensive set of skills in learners, incorporating these skills into the curriculum can have a substantial impact on teachers' pedagogical competence. For instance, a study examining mathematics teachers in Uganda highlighted variations in teachers understanding of 21st Century Competences while demonstrating that those who effectively implemented learner-centred methods substantially enhanced their students' skills (Innocent, 2023). Furthermore, in order to better prepare teachers for challenges of modern teaching, professional development debates suggest that teacher training programs concentrate on developing these competences (Albion et al., 2015). Thus, a thorough understanding of 21st Century abilities is essential for both students and the continuous development of instructional methods.

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, Thornhill-Miller et al. (2023) observed that critical thinking, collaboration and innovation is foundational to the success of modern workplace. Specifically, the authors argued that critical thinking is evaluative and focussed 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 et al. (2021) argued that teachers should organize classrooms and resources in a way that enhance attainment of critical thinking, collaboration and innovation skills. In this regard, teachers' pedagogical competence becomes a necessary component in teachers.

As educators strive to foster critical thinking, innovation and collaboration among students, they should also evaluate and enhance pedagogical competence; further, they also need to demonstrate these pertinent skills themselves (Roberto & Madrigal, 2019). Understanding the effects of 21st Century Skills on teacher pedagogy is essential for ensuring that educators can effectively leverage these skills to create dynamic and engaging learning environments. Additionally, educators create brand-new, drastically altered teaching techniques that boost students' interest in what they are studying and deliver instruction using a variety of pedagogical and technical modalities, demonstrating that their role is the most important one in the growth of pupils (Akdemir, 2019).

The definition of 21st Century Skills encompasses a broad range of competencies essential for students to navigate 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 have to adapt their instructional practices to cultivate this holistic set of abilities in their students. Therefore, a comprehensive grasp of 21st Century Skills is fundamental not only for students but also for the ongoing growth of teaching practices.

In the rapidly evolving landscape of education, the significance of 21st Century Skills such as critical thinking, collaboration and innovation has become increasingly apparent. As technology advances and societal demands shift, educators are challenged to adapt their pedagogical approaches to ensure they effectively prepare students for the complexities of the modern world (do Rosário Cabrita, 2020). This necessitates a deeper understanding of how integrating 21st Century Skills impacts teachers' pedagogical competence. By exploring this interaction, insights can be uncovered into how educators can enhance teaching practices to better equip students with the skills necessary for success in the 21st Century.

1.2.2 Teachers' Pedagogical Competence

Ningtiyas (2018) noted that teachers' pedagogical competence hinges around the educator's ability to manage learning, and this includes the skills to design a learning program, manage the learning process, and conduct assessments. Further, pedagogical knowledge has been defined by Damayanti et al. (2023) as teachers' potential and ability to manage learning, management and execution of instruction as well as evaluation of learning outcomes – and this is done with the aim of actualizing learners' potential.

According to Akdemir (2019), a teacher who possesses pedagogical proficiency will be able to apply subject knowledge in a variety of circumstances to create practical, research-based pedagogical activities that prioritize student learning. On a similar note, Siregar et al. (2020) observed that a teacher who possesses pedagogical competence can achieve efficiency and effectiveness in pedagogy by utilizing a coordinated and harmonious combination of intangible resources, technology, together with tangible resources such as case studies, books, and articles, including software, hardware, and technology. In this regard, teachers' experience, their attitude towards the use of technology, and their approach related to inclusivity becomes crucial (Srivastava et al., 2017).

The alignment of teachers' abilities and competence has resulted from the shift from content mastery to learners' proficiency in 21st Century Skills (Bansal & Tanwar, 2021). In order to successfully navigate the problems and aspirations of 21st Century education, educators must be prepared to become proficient in a variety of abilities. In support of this notion, Levine (2006) asserted that the most important component of having highly qualified teachers is teacher education. In essence, teacher education programmes are required to give future educators opportunities, and to place them in specific situations where they can practice the right pedagogy that can make them used to the demands of education in the future (Bedir, 2019). Pedagogy that instils 21st Century Skills is important in this regard.

Research has shown that the intersection between teacher training and the requirements of educational institutions often focuses on the skills of educators (Biesta, 2017; Landmann, 2013). The global landscape, marked by widespread social and technological changes, has drawn stakeholders' attention to the future role of schools and the skills that contemporary educators must possess. Notably, information and communication technology has had a significant impact on 21st Century Skills. For example, it has been established that students do

better in Math and have greater problem-solving abilities when they are taught by teachers with stronger problem-solving abilities in technologically advanced environments (OECD, 2019).

Enhancing pedagogical competence is largely dependent on the professional development options that are accessible to educators, especially when it comes to incorporating 21st Century Skills into the curriculum. Since it gives them the necessary skills in areas such as technology integration, teamwork, and communication, effective professional development is intrinsically linked to teacher preparation. By encouraging educators to be globally competent, professional development programs that incorporate strategic planning and resource allocation can improve student outcomes. Furthermore, as noted by Tondeur et al. (2017), the creation of self-assessment tools is essential for gauging pre-service teachers' competence in incorporating information and communication technology (ICT) into their lesson plans and pedagogical approaches. Educational institutions may therefore enhance instructors' capacities by funding focused professional development, which will eventually improve students' learning experiences and help them adjust to the demands of the contemporary educational environment.

Teachers should possess pedagogical competence among other types of abilities, and this influences learning outcomes (Murkatik et al., 2020). Essentially, the capacity of educators to oversee students' education is known as pedagogical competency, while the term "pedagogical competence" describes the facilitator's ability to utilise the three components of teaching: lesson preparation, carrying out the instructional process, and evaluating the learning of the learner (Hasriani, 2022). Similarly, Ada (2016) defined pedagogical competence as the capacity of educators to oversee students' education. The integration of 21st Century Skills demands a pedagogy that will align to the attainment of these skills. There is therefore need for teachers' pedagogical competence to foster 21st Century Skills among learners in the classroom.

1.2.3 Private Colleges in Kenya

The Kenya National Qualifications Authority (KNQA) maintains records of all credible institutions, qualifications and learners in Kenya. Historically, universities in many countries relied on public funding for their growth and expansion. However, the economic crisis and subsequent financial pressures, along with the structural adjustment programs of the 1980s, generally diminished the public sector's ability to provide sufficient and ongoing financial support for the expanding higher education sector (Newfield, 2018). As a result, countries adopted various approaches to manage the situation, and one common approach among many

countries was to encourage and promote the establishment of private universities (Levy, 2018). Many countries that previously lacked legal frameworks for private higher education institutions introduced laws to facilitate the establishment of private universities or colleges. (Alberta Government, 2016).

The trend today shows the private sector as the most dynamic and rapidly expanding segment of higher education in many countries. For example, according to Altbach et al. (2019), in transition economies, private higher education institutions now outnumber public ones, making the private sector a key player in delivering higher education. This shift has occurred rapidly in a relatively short time. The situation has been replicated in Kenya evidenced by a growth in private universities and colleges over the past years; at the moment, they absorb the largest proportion of students seeking higher education nationally (Kande et al., 2017).

Kiambu County is one of the counties in Kenya which borders Nairobi Capital City, is one of the wealthiest counties in the country. A 2019 report by the Kenya National Bureau of Statistics (KNBS) showed that Kiambu was the second richest county in the country with a contribution of 5.6% of the Gross Domestic Product (Mburu, 2022). The wealth in this County is likely to affect the socio-economic status of its citizens, and this includes education. Notably, Kiambu County has fifty registered private colleges, but only those offering education-related courses were selected for the study. The main focus of the study was to investigate effect of integrating 21st Century Skills in the Competency Based Curriculum, on teachers' pedagogical competence in selected private colleges in Kiambu County with focus being made on critical thinking skills, collaboration, and innovation.

1.3 Problem Statement

In the contemporary world, the attainment of 21st Century Skills has become an integral part of the educational process, replacing the outdated concepts of rote learning and monotony. Critical thinking skills, collaboration and innovation are not just crucial for an individual's success, they also play a major role in the prosperity of society. This implies that there is need for schools and teachers in particular to enhance the attainment of these skills among learners. The integration of 21st Century Skills on the curriculum, however, necessitates a change of pedagogy from the traditional teacher-centred approaches that most teachers are used to, to a more student-cantered approach of teaching and learning. This is because teachers'

pedagogical competence is one avenue that can be used to instil 21st Century Skills such as critical thinking, collaboration, and innovation among learners.

Despite growing recognition of the importance of 21st Century Skills in education, there remains a gap in understanding how integration of these skills impacts teachers' pedagogical competence. While research has explored benefits of incorporating 21st Century Skills such as critical thinking skills, collaboration, and innovation into the curriculum, little attention has been paid to how this integration of 21st Century Skills to teachers in training influences teachers' pedagogy (i.e. their instructional practices and related attitudes) in the Kenyan context. Notably, critical thinking, collaboration and innovation (related to creativity), are part of the seven core competencies of the Competency Based Curriculum in Kenya (CBC), hence should be instilled in learners from an early age. Teachers' pedagogical competence has been earmarked as one of the avenues of driving the attainment of these skills.

Therefore, there is been a pressing need to investigate effect of integrating 21st Century Skills in the curriculum on teachers' pedagogical competence. This will inform the design of targeted interventions and professional development programs that empower educators to meet the evolving needs of their students and society. Although other studies in Kenya have focussed on teachers' pedagogical competence, 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.

Despite this, teachers face difficulties adapting their instructional practices to accommodate the integration of 21st Century Skills. These challenges may stem from inadequate training, limited resources, or a lack of alignment between traditional pedagogical methods and the demands of modern educational goals. As a result, there is a pressing need to examine how integrating 21st Century Skills in the curriculum affects teachers' pedagogical competence and to identify strategies for addressing the barriers that hinder effective implementation. This study seeks to address this gap by exploring the effects of integrating 21st Century Skills into

the curriculum on teachers' pedagogical competence, thereby providing insights into how education systems can better support teachers in fostering these essential skills.

1.4 Research Objectives

1.4.1 Main Objective

This study sought to investigate effect of integrating 21st Century Skills in the Competency Based Curriculum, on teachers' pedagogical competence in selected private colleges in Kiambu County.

1.4.2 Specific Objectives

i. To assess the effect of integrating critical thinking skills in the curriculum on teachers' pedagogical practices in selected private colleges in Kiambu County

ii. To evaluate the impact of integrating collaboration skills into the curriculum on effective teaching strategies in selected private colleges in Kiambu County

iii. To examine the role of integrating innovation skills in the curriculum in enhancing teachers' adaptability and teachers' instructional effectiveness in selected private colleges in Kiambu County

1.4.3 Research Questions

i. What is the influence of integrating critical thinking skills in the curriculum, on teachers' pedagogical practices in selected private colleges in Kiambu County, Kenya?

ii. How does integration of collaboration skills in the curriculum, impact on effective teaching strategies in selected private colleges in Kiambu County, Kenya?

iii. What is the role of integrating innovation skills in the curriculum in enhancing teachers' instructional effectiveness in selected private colleges in Kiambu County, Kenya?

1.5 Scope of the Study

The aim of the research was to investigate the effects of integrating 21st Century Skills on teacher's pedagogical competence in selected private colleges in Kiambu County. The study targeted teachers in various colleges selected within Kiambu County. 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. Other than this, Kiambu County has had tangible advancement with regards to implementing 21st century skills in education students. This made it easier to identify colleges relevant to the current study. The study sought to collect data from colleges offering education-related courses as the topic focused on students studying to be teachers. The study was based on the experiential learning theory and the social cognitive career theory which were used to expound on the interaction between the independent and the dependent variables. The study focused on teacher competence in pedagogy by looking at teachers' experience, attitudes, skills and knowledge in the dispensing of knowledge to students. This was done in the context of 21st Century Skills integration and the skills that were focused on included critical thinking, collaboration and innovation.

1.6 Significance of the Study

The findings of this study may be very essential to all teachers both in Kiambu County and in the whole country. The findings of the study will be used as a basis for understanding the importance of 21st Century Skills in the achievement of pedagogical competence.

The findings from the study may create awareness in on the importance 21st Century Skills, specifically the place of critical thinking, collaboration, and innovation skills among learners in schools. Teachers and other stakeholders will, therefore, learn how to harness and strengthen these skills in learners, aiming to enhance teachers' effectiveness in imparting knowledge. This is essential for supporting the implementation of Kenya's revised Competency-Based Curriculum (CBC).

The study is expected to be a source of reference to all education stakeholders in the country such as teachers, students, parents and the government, as well as policy makers especially when: disseminating their services, making decisions, and formulating policies - aimed at enhancing teachers' effectiveness - related to teachers' pedagogical competence and 21st Century Skills among learners. This may help in charting the way forward on matters related to teachers' pedagogical competence and 21st Century Skills.

The study findings will be very important to future researchers seeking to conduct similar studies and avail the literature required for the completion of these studies. The findings of this

study may also add to the already existing body of knowledge on teachers' pedagogical competence and the attainment of 21st Century Skills among learners.

Generally, the significance of this research extends beyond the theoretical framework; it has profound implications for educational policy and practice. By elucidating the role of 21st Century Competences in enhancing pedagogical effectiveness, this dissertation not only contributes to the academic discourse on teacher education but also offers actionable insights for curriculum developers and educational leaders striving to align teacher preparation programs with the demands of contemporary learning environments.

Chapter Two:
Literature Review

2.1 Introduction

This section delves into the review of global and local literature on the study objectives. It starts by exploring relevant theories to the study, then gives more attention to both empirical and theoretical literature related to the study. Thereafter, the summary of gaps arising from literature, the conceptual framework and chapter summary is provided.

2.2 Theoretical Framework

This section provides a discussion of theories that anchored the study objectives. The study was based on the experiential learning theory which advocates for a student-centred teaching approach, and which calls for a learners' active participation in the teaching and learning process and the social cognitive career theory which advocates for a mutually influencing relationship between people and the environment.

2.2.1 Experiential Learning Theory

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 et al., 2010).

ELT has been widely applied in education and is instrumental in fostering 21st-century skills among learners (Morris, 2020). Research indicates that experiential learning activities—such as simulations, role-playing, and real-world case studies—enhance critical thinking, collaboration, and innovation skills (Obi et al., 2022). Integrating these approaches in teacher training programs ensures that educators can effectively transfer these skills to students.

Kolb's Experiential Learning Theory (1984) emphasizes active learning through experience, which aligns with the focus of the study on critical thinking, collaboration, and innovation in teacher training. The theory suggests that teachers develop pedagogical competence by

engaging in reflective observation, abstract conceptualization, and active experimentation—which are key elements in effective instructional strategies. This theory connects to the 1st objective since it supports the idea that teachers develop critical thinking skills through hands-on problem-solving and reflection. By integrating problem identification and analytical reasoning in the curriculum, teachers can enhance their instructional competence, aligning with the first objective.

In connection to Research Objective 2 (Collaboration Skills), ELT emphasizes social learning, which ties directly to collaboration in teaching. Teachers who engage in group activities, peer interactions, and classroom management exercises develop inclusive teaching strategies, fulfilling the second research objective. Finally, the theory in connection to Research Objective 3 (Innovation Skills) highlights learning through innovation and adaptation. Teachers using technology and creative lesson planning can refine their instructional effectiveness, supporting the third research objective. Thus, integrating ELT principles into teacher training can enhance pedagogical competence, enabling teachers to apply 21st-century skills in their instructional practices.

2.2.2 Social Cognitive Career Theory

Based on Bandura's self-efficacy theory, Social Cognitive Career Theory (SCCT) explores the interactive relationship between individuals and their environments (Bandura, 1977; Lent et al., 2002). SCCT provides three interconnected models of career development that aim to explain: (a) the growth of vocational and academic interests, (b) how people make choices based on education and career, and (c) their performance and stability in these areas- education and career. These models focus on three core variables: personal goals, self-efficacy, and outcome expectations.

SCCT is relevant to this study as it explains how teacher trainees develop confidence and adaptability in integrating 21st Century Skills. According to Capa-Aydin et al. (2018), self-efficacy beliefs are shaped by performance accomplishments, vicarious learning, social persuasion, and emotional states. These factors influence teachers' ability to implement new instructional strategies effectively. The career-related outcomes in SCCT are established by the interactions between an individual and their environment (Clary et al., 2022). SCCT introduced various interconnected models that focus on factors driving individuals' career preferences and

goals (Lent et al., 2002). Central to these factors are self-efficacy beliefs, which influence individuals' actions, persistence, and motivation in their professional development.

In connection to research objective one (Critical Thinking Skills) SCCT suggests that teachers' self-efficacy in problem-solving is enhanced when they are exposed to structured critical thinking exercises. Training programs that integrate problem identification and analytical reasoning improve teachers' instructional confidence. In connection to research objective two (Collaboration Skills) SCCT emphasizes the importance of social learning and peer collaboration. Teachers who participate in cooperative learning environments develop stronger classroom management and teamwork skills, enhancing their pedagogical competence. Finally, in connection to research objective three (Innovation Skills), SCCT highlights that teachers' willingness to adopt innovative teaching methods depends on perceived benefits and prior experiences. If training programs provide exposure to digital tools and technology-driven instruction, teachers develop confidence in using innovative pedagogical approaches.

2.2.3 P21 Framework

The Partnership for 21st Century Learning comprising business leaders and educators created the P21 Framework. The framework lists the abilities, know-how, and proficiency that students must possess in order to thrive in the twenty-first century. It places a strong emphasis on a combination of specialized knowledge, abilities, and literacies, such as media literacy, traditional literacy, and digital literacy. The framework emphasizes college and career readiness while preparing students for the demands of the contemporary workplace. With an emphasis on a combination of subject knowledge, specialized skills, expertise, and literacies, this framework seeks to describe the abilities, knowledge, and expertise students need to thrive in both the workplace and in life.

The P21 framework uses the rainbow arch to represent the 21st century skills and knowledge students need to master, in the context of four components detailed previously: core academics, learning and innovation skills, life and career skills, and information and technology skills (Trilling & Fadel, 2019). The pools below the rainbow, represent the supporting structures that support the development of the skills represented in the rainbow.

In the context of the current study, the P21 Framework is rooted in the idea that education should not only focus on core academic subjects but also equip students with the skills needed

to thrive in a complex and ever-changing world. It highlights how important it is for students to be able to apply critical thinking abilities, integrate knowledge, and work well with others in order to solve challenges. The framework places a strong emphasis on life career skills, information, media, and technology skills, learning and innovation skills, and support networks. The basis of the current study is to find out the effect of 21st century skills on teacher pedagogical competence. The same way, the emphasis of the p21 framework, which is also the basis of 21st century learning is the acquisition of key academic subject knowledge, and the inclusion of additional skills including Learning Skills (critical thinking, communication, collaboration and creativity), Life Skills (flexibility, initiative, social skills, productivity and leadership), and Literacy Skills (information literacy, media literacy, and technology literacy).

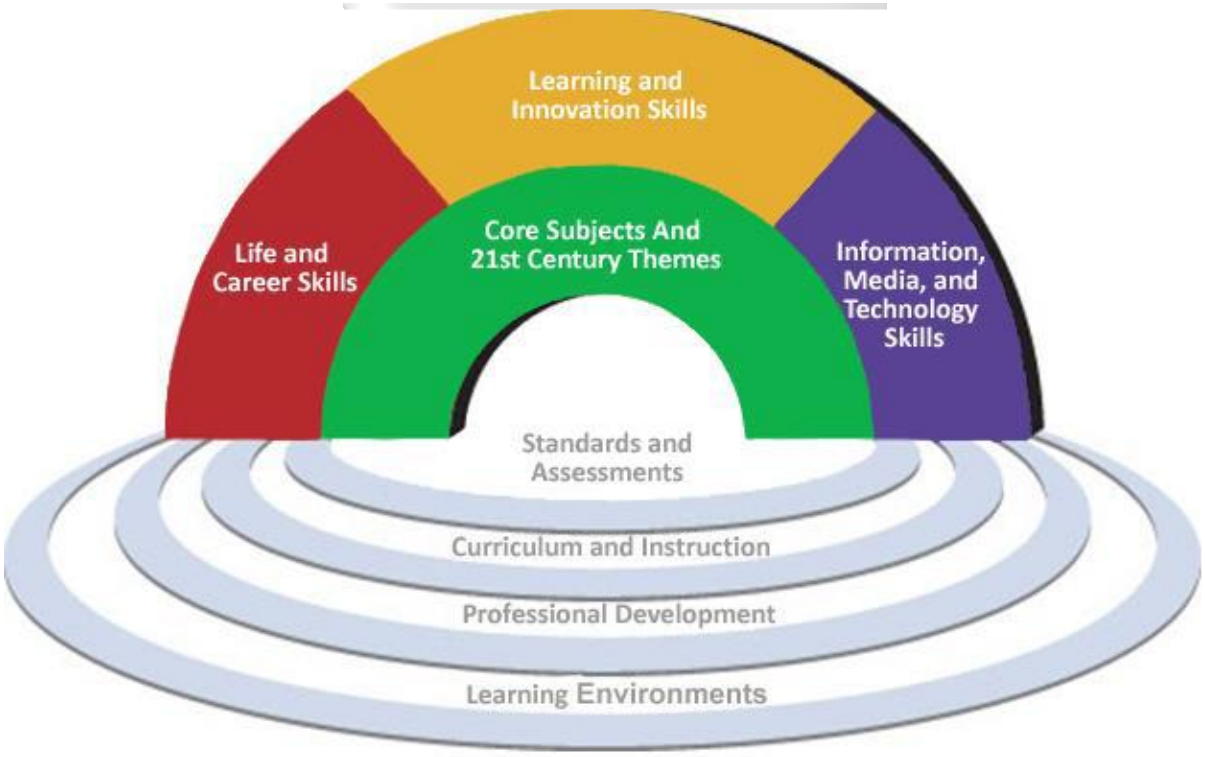

Figure 2.1: Components of the P21 Framework
Source: www.p21.org

The significance of emphasizing the four Cs—creativity, critical thinking, communication, and collaboration—is acknowledged by literature reviews (Brusic & Shearer, 2014; Demski, 2013; Harris & Rodriguez, 2012; Partnership for 21st Century Learning, 2011; Soulé & Warrick, 2015). According to one evaluation, creativity is the most crucial 21st century skill, even though the majority of reviews do not highlight any one skill over another (Soulé & Warrick, 2015). The P21 framework incorporates creativity, which is necessary for both brainstorming

and innovation as well as for effectively expressing ideas and concepts (Soulé & Warrick, 2015).

2.3 Review of Literature

2.3.1 Teachers' Pedagogical Competence

Teachers' pedagogical competence is central to the teaching and learning processes and contributes greatly to the success of learning (Ningtiyas, 2018). According to Liakopoulou (2020), teachers' pedagogical competence is composed of the skills, attitudes, training, specialised body of knowledge and even trainable traits in teachers which enable them to be effective in their work. This implies that teachers' pedagogical competence can be improved over time with training and experience in the field.

A qualitative study by Jacobson-Lundeberg (2016) examined students' perceptions of the teaching and implementation of 21st Century Skills, and the role that pedagogical competence played in this. In this study, pedagogical competence was measured using teachers' experience, skills and knowledge base. Data was gathered through 24 informal interviews and four focus group discussions among grade 9 to 12 students. The study emphasised communication, collaboration and credibility as part of the21st Century Skills needed for success in life. On the relevant pedagogical competence to attain these skills, the author noted that 'Techniques employed to transfer the 21st Century Skills included lecturing, collaboration or cooperation, demonstration, observational learning, discussion, experiential instruction, journal writing, reflective learning, inquiry- based, interviewing, and project-based learning' (p. 93). This implies that pedagogical competence plays a significant role in the attainment of 21st Century Skills. This study however focused on critical thinking, collaboration and innovation, and link them to pre-service teachers' pedagogical competence.

Some studies have focussed on aspects related to instructional competence. Liakopoulou (2020) explored the role of instructional knowledge as a prerequisite for being admitted to teaching as a profession in Greece. The study aimed to examine various types of instructional knowledge tested in educators' assessment and identify the merit needed by future educators. It was found that nearly all assessment areas of concern were connected to the practices in teaching methods, with focus on lesson guides, choosing appropriate teaching resources and expertise, and assessment. However, the present study aimed at adding to the existing

knowledge by looking into the effects of 21st Century Skills on pre-service teachers' pedagogical competence.

In another study, Amosun and Kolawole (2015) carried out research to explore the extent of Instructional skills and knowledge competences among Nigerian kindergarten educators. This research involved 58 preschool teachers selected at random from public schools in Ibadan city and utilized a descriptive survey research approach. The findings of the research indicated that instructional skills and knowledge abilities of preschool teachers in Ibadan, Oyo state, Nigeria were relatively minimal. Basing on the scope of this study, which was Nigeria, it may be hard to replicate the findings in Kenya hence the present study was done in Kiambu County, Kenya where 21st Century Skills were linked to pre-service teachers' pedagogical competence.

2.3.2 Critical Thinking Skills on Pedagogical Competence

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 should 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.

A mixed-method study by Huang and Chang (2023) focussed on 78 international Chinese students and their views on integration of critical thinking instruction. This is against a backdrop of education that is exam-oriented and focusses on survival and competitiveness. 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). 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 current study sought to connect critical thinking in the curriculum and pre-service teachers' pedagogical competence but in the Kenyan context which is different from China.

A qualitative case study by Siregar et al. (2020) sought the perceptions of English as a Foreign Language (EFL) teachers' pedagogical competence and 21st Century Skills. Data for the study was collected from purposively selected participants who had 7-30 years of teaching experience through questionnaire and semi-structured interviews. Findings from the study revealed that study participants had positive views regarding 21st Century Skills. The participants also highlighted the important role that digital media played in the teaching and learning of 21st Century Skills, while also emphasizing the importance of logical reasoning. Specifically, the participants noted that 21st Century Skills are hinged on pedagogical competences among teachers, implying that there was need to be media literate. Although critical thinking was mentioned, it was not given much emphasis as is the case in this study which involved pre-service teachers in colleges in Kiambu.

The role of technology with respect to pedagogical competence and critical thinking has also been examined in literature. A descriptive study by Yildiz (2018) focussed on pre-service teachers, and investigated the factors related to techno-pedagogical competencies. Data for the study was collected using surveys through established tools, which were "TPACK Self-Efficacy Scale" and "Critical Thinking Scale". Descriptive and inferential statistics (ANOVA) were used to analyse the data. Results from the study showed that both critical thinking skills and techno-pedagogical skills were partially evident in the study respondents. The study thus concluded the need to train teachers in techno-pedagogical competence. This study, however, focused on critical thinking and its relation to pre-service teachers' pedagogical competence in Kiambu Kenya.

In the Global South context, a qualitative study by Okolie, et al. (2022) studied how critical thinking skills among business and vocational studies teachers could be enhanced through innovative pedagogical practices. Data for the study was collected first with online questionnaires with 86 teachers, then followed up by interviews (through phone and Skype) with 55 teacher participants spread out in 26 countries in the Global South. Thematic analysis was used for the resultant data. From the study, it emerged that some of the themes from the study included problem setting, active learning and focus on teaching strategies where analytical thinking, among others were used to enhance critical thinking among learners. Even then, teachers in the study showed the need for further training so as to enhance critical thinking skills in their learners. Although the study was carried out in the higher education space, it is different from colleges in Kiambu which are middle level. This study was also carried out using questionnaires.

2.3.3 Collaboration on Pedagogical Competence

According to Bottia et al. (2021), collaboration in education is about teachers, along with their colleagues, working together to create or enhance lessons, prevent repetition in teaching concepts and materials, and enhance the coherence across different subjects. In the educator context, collaboration refers to the professional relationships formed among educators in both structured and informal environments (Hargreaves, 2021). Educators who collaborate are open to sharing the accountability for their learners' learning and can support each other in adopting effective teaching strategies.

In reality, the best form of collaboration for teachers involves deep and active engagement, aiming to improve their teaching skills while also elevating their professionalism (Stevenson et al., 2016). Empirical evidence supports the argument that teacher collaboration serves as a means to improve instructional practices and student achievement by shifting the focus from individual teaching to collective learning, while emphasizing on classroom management. The current study, despite looking at collaboration in relation to pedagogical competence, focused on lesson development and inclusivity as the other forms of collaboration among pre-service teachers.

Inclusivity is one component of collaboration that when well utilised, cannot only enhance interactivity among learners, but also the attainment of learning goals. A study by Zubiri-Esnaola et al. (2020) examined inclusivity, interactivity among learners in foreign language learning. The study was carried out in Spain where a total of three teachers, 58 learners and 14 volunteers participated in the study. Data for the study was collected via observations and interviews, and thematic analysis adopted to analyse the data emerging from the study. Findings revealed that interactive groups were inclusive and enhanced the attainment of second language qualities. Even then, the connection to teachers' pedagogical competence was not given attention. This study investigated the role of collaboration with respect to pre-service teachers' pedagogical competence.

The link between collaboration among teachers and their pedagogy has also been given attention, with some studies such as that by Stockless et al. (2022) linking it with ICT skills. The main focus of the study was how pre-service teachers utilise ICT to enhance collaborative learning in their classrooms, and this too related to their pedagogical competence. Data was collected in Quebec Canada among 266 pre-service teachers, and Spearman correlation use to

analyse the data. Results from the study indicated that most pre-service teachers were notably deficient in ICT competence, much as it was included in their curriculum. The study suggested that 'training institutions need to engage teachers in authentic tasks where they are encouraged to communicate, share knowledge, and solve problems' (p.215). This collaborative approach enhances their competence and collaboration even in classrooms. This study however focused on the specific link between collaboration and pre-service teachers' pedagogical competence.

In Norway, Liebech-Lien and Sjølie (2021) examined teachers' pedagogical reasons for using collaboration in their classrooms, arguing that collaboration was one of the key 21st Century Skill. The study was qualitative in nature and data was collected through semi-structured interviews from four teachers handling lower classes. Data was analysed using content analysis, and emerging themes included the view of collaboration as a tool, key ingredient and even a skill taken for granted. Hence, although collaboration in the classroom was hailed as important and even needful, it appeared demanding and competing with exam demands, and would sometimes be taken for granted. Teachers' pedagogies therefore played an important role on when and how collaboration was used. The current study focused on collaboration, not on its own, but alongside critical thinking and innovation, and linked it to teachers' pedagogical competence. This study was also quantitative, and not qualitative.

2.3.4 Innovation on Pedagogical Competence

The influence of innovation is astonishing when it comes to skills needed in the 21st Century. In situations where educators possess improved problem-solving abilities in the presence of efficient technological tools, students are likely to exhibit enhanced problem-solving abilities and performance in Mathematics (OECD, 2019). The proficient application of new technology by educators impacts the development of students' skills and transforms disadvantages into opportunities by offering solutions for students with extreme learning challenges (Gess-Newsome, et al., 2019).

A study in Denmark by Weitze (2017) examined innovation in relation to teachers' pedagogy, hence pedagogical innovation. Specifically, the study teachers in upper secondary in Denmark participated in a design-based research project aimed at examining the processes, elements and practices in teachers which could enhance innovation, reflection among other components in learners. Teachers handling 16–30-year-old students participated in the study in a synchronous session. Data was later collected via interviews and observations from the study respondents.

Results from the study showed that teachers used the platform and the session to create novel ideas and projects that enhanced their teaching and learning. Collaboration was highlighted as an important component in the innovation by teachers. The current study however focused on critical thinking, collaboration and innovation as core components of critical thinking, and these were related to pre-service teachers' pedagogical competence in Kiambu, Kenya.

In Jakarta, Indonesia, Prapantja (2023) examined how learning innovation mediated the relationship between lecturer's pedagogical competence and learning management. The study was quantitative in nature and questionnaires were used to gather data among 95 University students in Jakarta. Both descriptive and inferential statistics were used to analyse the resultant data. Results revealed that pedagogical competence among lecturers was significantly associated with learning management, and learning innovation played a mediating role. This was achieved by availability and utilization of technological resources. The present study however focused on the association between innovation and teachers' pedagogical competence and was carried out among college teachers.

A quantitative study by Fernández-Cruz and Rodríguez-Legendre (2022) focussed on innovative competence among lecturers in the European higher education space and their possible link to 21st Century Skills. Data for the study was collected through a survey of 1404 higher education teachers in Bosnia, Bolivia, and Spain. An important finding from the study was that the innovation competence of the lecturers studied was below expectation, implying that most of them did not use innovative approaches in their teaching. In measuring innovation, application of technology was used as an indicator. This was bound to affect negatively their teaching and learners' acquisition of 21st Century Skills. Even then, the aspect of pedagogical competencies was not given attention. This study sought to link innovation to pedagogical competences of pre-service teachers in Kiambu County in Kenya.

2.4 Summary and Gaps in Literature

One of the most crucial elements of pedagogical competence is having a deep and comprehensive understanding of the subject matter being taught. This includes not only knowing the content but also understanding its underlying concepts, theories, and applications. A competent educator should be able to explain complex ideas in a clear and engaging manner, adapt the content to different learning styles, and provide relevant examples to enhance understanding, which refer to their pedagogical competence. Another essential element is the

ability to employ effective teaching methods that cater to diverse learners. Pedagogical competence involves knowing how to design engaging lesson plans, create interactive learning activities, utilize technology appropriately, and assess student progress effectively.

A number of studies have been done on related topics. However, despite these studies being done, their findings have left a gap which the present study sought to fill. A number of the studies have been done outside Kenya with even those done in Kenya being based in other areas that are not similar in any way to the area of current research. The present study, however, was done in Kiambu County. According to the findings from studies, some researchers have looked at teachers at various levels while the present study concentrated on pre-service teachers who are still in colleges.

In view of the methodologies used, a large number of the studies have made use of varying research designs and have used qualitative data exclusively, leading to the need for the present study which made use of a descriptive survey research design. Although studies have acknowledged the need for pedagogical competence among teachers, they have not prescribed ways in which this can be achieved, creating room for the present study which seeks to find out the effect of integrating 21st Century Skills in the curriculum, on teachers' pedagogical competence with the focus being on pre-service teachers drawn from private colleges in Kiambu County, Kenya.

2.5 Conceptual Framework

Independent Variable **Dependent Variable**

21st Century Skills Teacher Pedagogical Competence

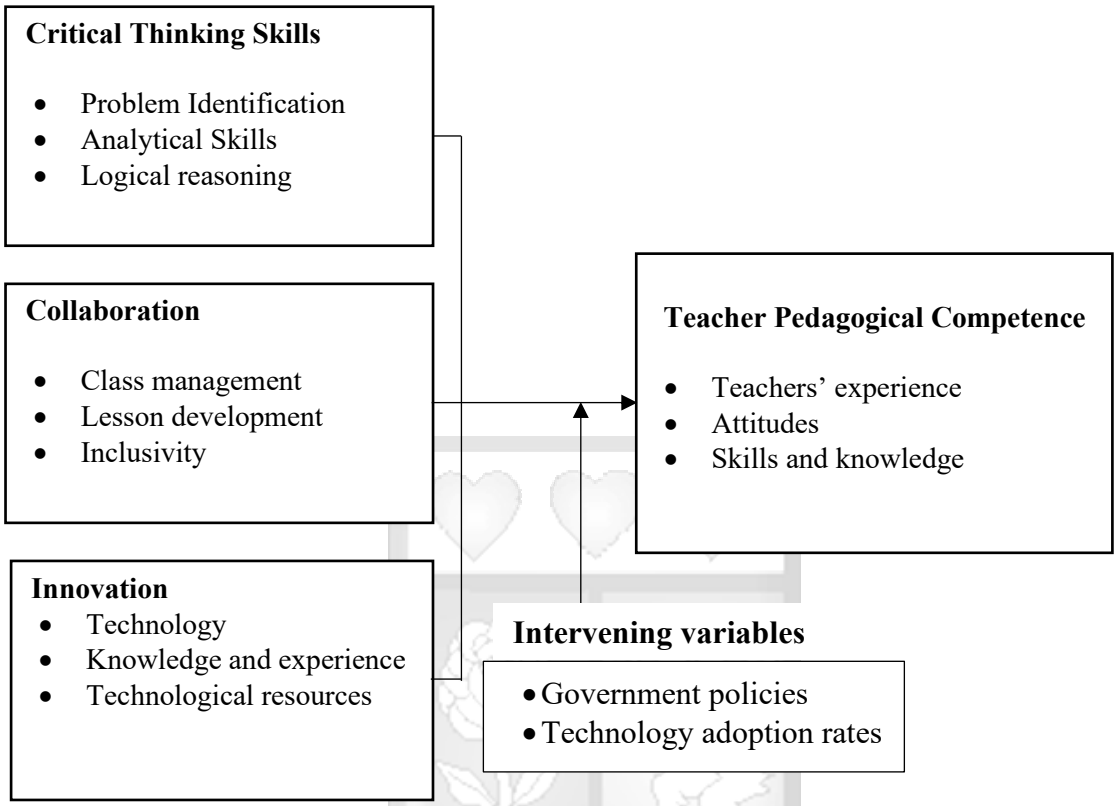

Figure 2.2: Conceptual Framework

The conceptual framework outlines the sub-variables used in the study for both the independent and dependent variables. According to the framework, teacher pedagogical competence has been represented by teachers' experience, attitudes, together with skills and knowledge. The framework also shows that critical thinking skills are shown by problem identification, analytical skills and logical reasoning. Similarly, Siregar et al. (2020) sought the perceptions of English as a Foreign Language (EFL) teachers' pedagogical competence and 21st Century Skills, while also emphasizing the importance of logical reasoning. 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).

The framework also indicates that collaboration in the classroom environment is important and is signified by class management, lesson development and inclusivity. According to Bottia et al. (2021), collaboration in education is about teachers, along with their colleagues, working together to create or enhance lessons, prevent repetition in teaching concepts and materials, and enhance the coherence across different subjects. This is achieved by shifting the focus from individual teaching to collective learning, while emphasizing on classroom management. The current study, despite looking at collaboration in relation to pedagogical competence, focused on lesson development and inclusivity as the other forms of collaboration among pre-service teachers.

The framework further shows that another indicator of 21st century skills is innovation which is represented by technology, knowledge, experience and technological resources. Prapantja (2023) examined how learning innovation mediated the relationship between lecturer's pedagogical competence and learning management. Results revealed that pedagogical competence among lecturers was significantly associated with learning management, and learning innovation played a mediating role. This was achieved by availability and utilization of technological resources. Fernández-Cruz and Rodríguez-Legendre (2022) in their study, focussed on innovative competence among lecturers. In measuring innovation, application of technology was used as an indicator.

The framework has also shown that the interaction between the independent and dependent variables is dependent on the action of intervening variables which in this case are government policies and technological adoption rates which are the two factors most likely to impact on the adoption of 21st century skills and teacher competence.

Table 2.1: Operationalization of Study Variables

Variable	Variable Type	Indicators	Relevant Literature	Measurement	Item Questionnaire
Critical Thinking Skills	Independent	• Problem Identification • Analytical Skills • Logical reasoning	Adesanya, 2017; Huang & Chang, 2023; Okolie, et al., 2022; Stronge, 2018)	Interval	Section B (4-6)
Collaboration	Independent	• Class management • Lesson development • Inclusivity	Bottia et al.,2021; Hargreaves, 2019; Zubiri-Esnaola, et al., 2020)	Interval	Section C (7-10)
Innovation	Independent	• Technology • Knowledge and experience • Technological resources	OECD, 2019; Prapantja, 2023; Weitze, 2017)	Interval	Section D (11-14)
Teacher Pedagogical Competence	Dependent	• Teachers' experience • Attitudes • Skills and knowledge	(Amosun & Kolawole, 2015; Jacobson-Lundeberg, 2016; Liakopoulou, 2020)	Interval	Section E (15-17)

2.6 Conclusion

The chapter has discussed literature that was used in the study and has therefore highlighted experiential learning theory and social cognitive career theory as the theories guiding the study. Further, the chapter has provided a review of literature according to the study objectives, a summary of gaps and a conceptual framework. Based on the findings, having a thorough comprehension of the material being taught is one of the most important components of pedagogical competence. In order to demonstrate pedagogical expertise, a skilled teacher should be able to explain difficult concepts in an interesting way, modify the material to accommodate various learning preferences, and offer pertinent examples to improve comprehension. The capacity to use efficient teaching strategies that accommodate a variety of learners is another crucial component. Effective class planning, interactive learning activities, technology use, and student progress evaluation are all components of pedagogical competency.

Chapter Three:
Research Methodology

3.1 Introduction

This chapter outlines the research methodology that was employed to address the objectives of the study, which focus on effect of integrating critical thinking skills, collaboration skills, and innovation skills on teachers' pedagogical practices and instructional competence in selected private colleges in Kiambu County, Kenya. The chapter discusses the research design, population and sampling, data collection methods, data analysis techniques, and ethical considerations. The methodology was designed to ensure the validity, reliability, and alignment of the study with the research objectives.

3.2 Research Design

The study adopted a descriptive survey research design, which is appropriate for investigating the relationships between variables in their natural setting without manipulating the environment (Cohen et al., 2018). This design was chosen because it allows for 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 analysed quantitatively to address the research objectives.

3.3 Population and Sampling

3.3.1 Target Population

A population consists of a collection of distinct cases, individuals, or objects that share similar visible traits (Cohen *et al.,* 2018). It represents a group of entities for which statistical conclusions are to be made. The Target population is the people a researcher selects as respondents in the study and who are vital in achieving the set objectives (Cooper & Schindler, 2017). The target population for this study consisted of pre-service teachers from 15 private

colleges in Kiambu County, Kenya. Private colleges were chosen for the study because, unlike the public institutions, private colleges have incorporated several strategies to ensure that teachers in training gain 21st century skills as a competitive edge. Further, 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 3.1.

Table 3.1: Population Distribution

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)

3.3.2 Sampling Technique

According to Sekaran and Bougie (2016), a sample is a proportion of population to be researched, while Kothari (2017) defined a sample as the selected respondent representing the population. The choice of the sample size for a research project relies on the extent of data gathering and the need for sufficient statistical strength (Cohen et al., 2018). A multistage sampling technique was used to select a representative sample from the target population. The sampling process involved the following steps: purposive Sampling: Six colleges were purposively selected from the 15 colleges because they offered pre-service teacher training programs. This ensured that the sample was relevant to the focus of the study on pedagogical practices; simple random sampling where a sample of 93 respondents was randomly selected from the six colleges using the formula proposed by (Nassiuma, 2000):

$$n = \frac{(NCv^2)}{(Cv^2 + N - 1e^2)}$$

Where:

\(n \) = sample size

\(N \) = accessible population (1,386 students from the six colleges)

\(Cv \) = Coefficient of Variance (0.5)

\(e \) = standard error (0.05)

Hence:

$$n = \frac{1386(0.5)^2)}{(0.5^2) + (1386 - 1)\ 0.05^2}$$

$$n = \frac{1386x0.25}{0.25 + (1385\ x\ 0.0025)}$$

$$n = \frac{346.5}{0.25 + 3.4625}$$

$$n = \frac{346.5}{3.7125}$$

$$n = 93.3$$

n=93

The calculated sample size was 93 respondents, as shown in Table 3.2.

Table 3.2: Sample Distribution

College Name	Population	Sample Size
Thogoto Teacher College	117	8
Gatundu South Technical and Professional College	360	24
Brilliant Institute of Professional Studies	219	15
Kilimambogo Teachers' Training College	236	16
Kiambu National Polytechnic (KINAP)	239	16
Jodan College of Technology	215	14
Total	**1,386**	**93**

3.4 Data Collection Methods

The study relied on primary data collected through structured surveys. The survey instrument included closed-ended questions based on 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. Two research assistants were trained to administer the surveys, ensuring consistency in data collection. The use of surveys allowed for the efficient collection of data from a large sample while minimizing respondent fatigue (Cohen et al., 2018). The surveys were researcher administered, meaning that the respondents were approached individually by the researcher, with the help of research assistants, then the instruments were administered to them. They were given time to respond before the instruments were collected back for purposes of data analysis.

3.5 Data Analysis

The collected data were analyzed using descriptive and inferential statistics. The following steps were taken; for 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. For inferential statistics, 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:

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

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.

3.6 Research Quality

3.6.1 Validity

To ensure the validity of the research instrument, a number of steps were taken. For face validity, the survey was reviewed by the researcher's supervisor and other experts in the field

of education to ensure that the questions measured the intended constructs. For content validity, the survey items were developed based on existing literature and aligned with the research objectives. Only relevant questions were included to measure the variables of interest.

3.6.2 Reliability

The reliability of the survey instrument was assessed using **Cronbach's Alpha**, which measures internal consistency. A pilot study was conducted with nine respondents (10% of the sample size), and the results showed that all constructs had a Cronbach's Alpha value above 0.7, indicating acceptable reliability (see Table 3.3).

Table 3.3: Reliability Analysis

	Reliability Cronbach's Alpha
Critical thinking skills	.807
Collaboration skills	.801
Innovation skills	.815
Pedagogical competence	.789

Source: Survey Data (2024).

3.7 Ethical Considerations

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.

3.8 Conclusion

This chapter has outlined the research methodology used to address the objectives. The descriptive survey design, multistage sampling technique, and use of structured surveys ensured the collection of reliable and valid data. The data analysis methods, including

descriptive and inferential statistics, were appropriate for examining the relationships between the variables of interest. The next chapter presents the findings and discusses their implications for teacher training and curriculum development in Kenya.

Chapter Four:
Findings, Interpretation and Discussion

4.1 Introduction

This chapter presents the findings of the study, which aimed to explore effect of integrating critical thinking skills, collaboration skills, and innovation skills on teachers' pedagogical competence in selected private colleges in Kiambu County, Kenya. The chapter is structured to address each of the three research objectives, followed by a discussion of the findings in relation to existing literature. Finally, the chapter concludes with practical implications, limitations, and suggestions for future research.

4.1.1 Response rate/Descriptive Statistics

As indicated in Table 4.1, out of the 93 questionnaires distributed, 74 were fully completed and returned, yielding a response rate of 79.6%. This high response rate indicates the reliability of the data collected and the respondents' interest in the study. The remaining 19 questionnaires (20.4%) were not returned, which may be attributed to time constraints or lack of interest from some participants.

Table 4.1: Response Rate

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

Source: *Research Data (2024)*

4.2 Demographic Information

The demographic profile of the respondents is summarised in the following sub-sections.

4.2.1 Gender of Respondents

As shown in Table 4.2, the majority of respondents were male (55.4%) (n=41), while females accounted for 44.6% (n=33).

Table 4.2: Gender of Respondents

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

Source: *Research Data (2024)*

Figure 4.1 illustrates the year of study for the respondents. Most respondents were in their third year of study (43.2% n=32), followed by second-year (31.1% n=23), and first-year students (25.7% n=19). This suggests that the majority of the respondents had substantial experience and awareness of the issues explored in the study.

4.2.2 Year of Study

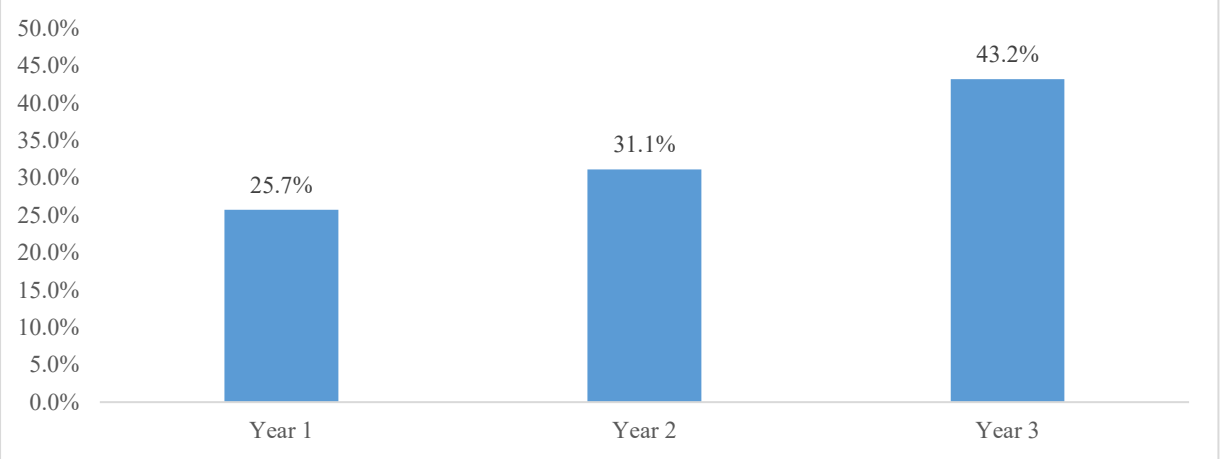

Figure 4.1: Year of Study

Source: *Research Data (2024)*

4.2.3 Respondents' Age

As depicted in Figure 4.2, the majority of respondents (71.6%, n=53) were between 18 and 35 years old, 17.6% (n=13) were in the 36-45 age range, and the remaining 10.8% (n=8) were between 46 and 55 years old. These findings indicate a predominantly young sample. These demographic details provide context for interpreting the findings, as the respondents' year of study and age may influence their perceptions of pedagogical practices and the integration of 21st Century Skills.

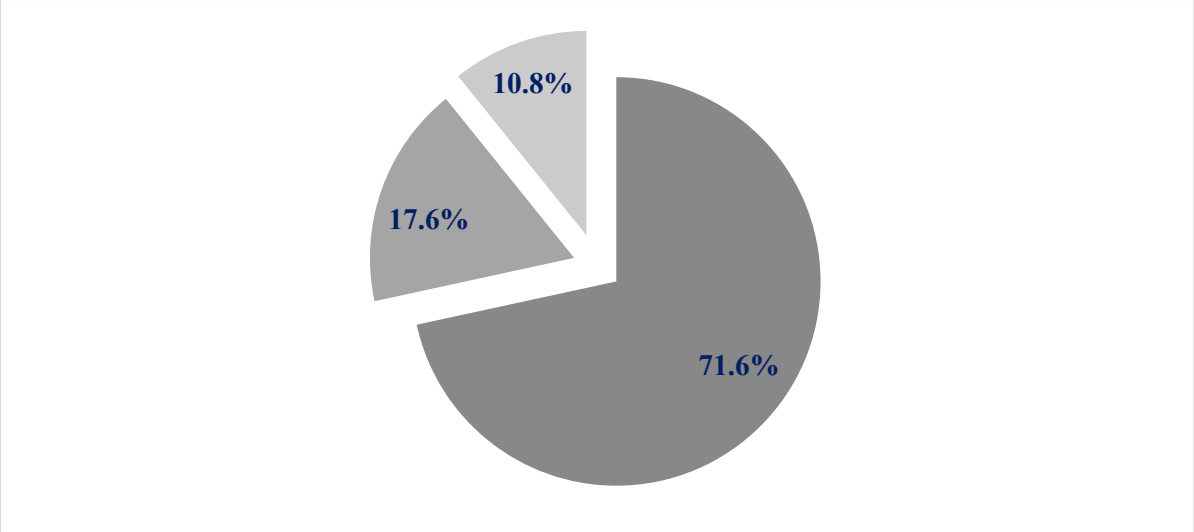

Figure 4.2: Age of Respondents

Source: *Research Data (2024)*

4.3 Findings by Research Objective

The study employed a 5-point Likert scale to collect primary data on the variables. Standard deviation was used to measure dispersion for each variable and mean was used to measure central tendency in the data analysis.

4.3.1 Influence of Critical Thinking Skills on Pedagogical Competence

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

4.3.1.1 Problem Identification

In the study, it was necessary to establish the elements that characterise problem identification in learning. The findings are summarised in Table 4.3.

Table 4.3: Problem Identification in Learning

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)

Respondents indicated that clear problem identification (M=3.88, SD=1.170) and the ability to determine a problem's effect (M=3.82, SD=1.264) were key components of critical thinking. These skills enable teachers to design lessons that address students' learning challenges effectively.

4.3.1.2 Analytical Skills

Table 4.4: Characteristics of Analytical Skills in Learning

		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)

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

4.3.1.3 The Logical Reasoning in Learning

Logical reasoning was assessed through three approaches: inductive, deductive, and abductive approaches. The findings, summarized in Table 4.5, reveal that the inductive approach (M=4.22, SD=0.955) is the most prominent form of logical reasoning among teachers, followed by the abductive (M=3.69, SD=1.384) and deductive (M=3.61, SD=1.312) approaches. This suggests that teachers who employ inductive methods can more effectively guide students in drawing conclusions from specific examples.

Table 4.5: Logical Reasoning in Learning

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Inductive approach	F	33	33	0	7	1	74	4.22	0.955
	%	**44.6**	**44.6**	**0.0**	**9.5**	**1.4**	**100**		
Deductive approach	F	24	24	2	21	3	74	3.61	1.312
	%	**32.4**	**32.4**	**2.7**	**28.4**	**4.1**	**100**		
Abductive approach	F	29	21	1	18	5	74	3.69	1.384
	%	**39.2**	**28.4**	**1.4**	**24.3**	**6.8**	**100**		

Source: Field Data (2024)

In objective one, results revealed that clear problem identification and analytical skills significantly enhanced teachers' pedagogical competence. 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, findings from this study seem to suggest 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.

The findings, showed that the inductive approach was the most prominent form of logical reasoning among teachers, followed by the abductive and deductive approaches. 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.

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. 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.

4.3.2 Impact of Collaboration Skills on Pedagogical Competence

The second objective of the study examined collaboration skills in relation to teachers' pedagogical competence. As a component of collaboration, class management was looked at and the study sought to find out what characterizes class management in learning. The findings are presented in the next sections.

4.3.2.1 Class Management

Table 4.6: Class Management in Learning

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Model behaviour	F	26	23	5	16	4	74	3.69	1.303
	%	**35.1**	**31.1**	**6.8**	**21.6**	**5.4**	**100**		
Positive reinforcement	F	24	23	7	15	5	74	3.62	1.311
	%	**32.4**	**31.1**	**9.5**	**20.3**	**6.8**	**100**		
Understandable rules	F	24	22	6	17	5	74	3.58	1.335
	%	**32.4**	**29.7**	**8.1**	**23.0**	**6.8**	**100**		

Source: Field Data (2024)

To evaluate classroom management practices, respondents assessed various dimensions using a Likert scale. The results, summarized in Table 4.6, indicate that model behaviour (M=3.69, SD=1.303), positive reinforcement (M=3.62, SD=1.311), and understandable rules (M=3.58, SD=1.335) were identified as key contributors to effective classroom management. These practices foster a conducive learning environment, promoting student motivation and engagement.

4.3.2.2 Successful Lesson Development

Successful lesson development was examined to identify strategies that enhance pedagogical competence. As shown in Table 4.7, interest stimulation (M=3.93, SD=1.174), creative topic introduction (M=3.96, SD=1.140), student engagement (M=4.04, SD=1.152), and encouragement of full involvement (M=3.86, SD=1.220) were identified as critical elements. Teachers who integrate these strategies into their lessons are more likely to design instruction that resonates with students, fostering deeper understanding and participation.

Table 4.7: Successful Lesson Development in Learning

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Interest stimulation	F	28	30	2	11	3	74	3.93	1.174
	%	**37.8**	**40.5**	**2.7**	**14.9**	**4.1**	**100**		
Creative topic introduction	F	31	24	4	15	0	74	3.96	1.140
	%	**41.9**	**32.4**	**5.4**	**20.3**	**0.0**	**100**		
Student engagement	F	33	26	2	11	2	74	4.04	1.152
	%	**44.6**	**35.1**	**2.7**	**14.9**	**2.7**	**100**		
Encouragement of full involvement	F	28	27	3	13	3	74	3.86	1.220
	%	**37.8**	**36.5**	**4.1**	**17.6**	**4.1**	**100**		

Source: Field Data (2024)

3.2.2.3 Inclusivity in Learning

The study further explored the indicators of inclusivity in learning, with findings presented in Table 4.8. Culturally responsive teaching (M=3.53, SD=1.436), equitable treatment (M=3.46, SD=1.482), promotion of positive learning (M=3.85, SD=1.213), and recognition of diversity (M=3.61, SD=1.383) emerged as essential practices for fostering inclusivity. These strategies ensure that all students, regardless of their backgrounds, feel valued and included in the learning process.

Table 4.8: Inclusivity in Learning

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Culturally responsive teaching	F	25	22	2	17	8	74	3.53	1.436
	%	**33.8**	**29.7**	**2.7**	**23.0**	**10.8**	**100**		
Promotion of equitable treatment	F	26	18	3	18	9	74	3.46	1.482
	%	**35.1**	**24.3**	**4.1**	**24.3**	**12.2**	**100**		
Promotion of positive learning	F	27	28	3	13	3	74	3.85	1.213
	%	**36.5**	**37.8**	**4.1**	**17.6**	**4.1**	**100**		
Recognition of diversity	F	23	28	3	11	9	74	3.61	1.383
	%	**31.1**	**37.8**	**4.1**	**14.9**	**12.2**	**100**		

Source: Field Data (2024)

The results highlight the significance of collaborative abilities in improving teaching effectiveness. Effective classroom management is attained by exemplary behaviour, positive reinforcement, and explicit regulations, which promote constructive teacher-student relationships. Successful lesson development also depends on stimulating interest, introducing topics creatively, and fostering active student interaction, thereby ensuring lessons are pertinent and captivating for students. Inclusivity, a vital component of collaboration, is fostered through culturally responsive pedagogy, equal treatment, and acknowledgment of difference. These behaviours foster an inclusive educational atmosphere in which all students feel valued and encouraged, regardless of their ethnic or socio-economic backgrounds. These findings collectively underscore the relationship between cooperation skills and educational ability.

Results from objective two found that effective class management, lesson development, and inclusivity significantly impact teachers' pedagogical competence. A majority of respondents agreed that collaborative approaches in lesson planning and student engagement improve teaching effectiveness. These findings align with Bottia et al. (2021), who emphasized that collaboration in education enhances lesson coherence, reduces redundancy in content delivery, and improves teaching strategies. Similarly, Zubiri-Esnaola et al. (2020) observed that

inclusivity in group work fosters higher student engagement and comprehension, which directly impacts instructional effectiveness.

However, the results contrast with Liebech-Lien and Sjølie (2021), who found that many teachers struggle to implement collaborative teaching methods due to exam-oriented curricula and time constraints. While their study suggested that collaboration was often undervalued, the current study indicates that when collaboration is well-structured in teacher training, it enhances pedagogical skills rather than being an additional burden.

Similarly, creative topic introduction, student engagement, and encouragement of full involvement were identified as critical elements. Also, culturally responsive teaching, equitable treatment, promotion of positive learning, and recognition of diversity, emerged as essential practices for fostering inclusivity. These findings correspond with previous studies highlighting the importance of collaboration in education. Bottia et al. (2021) characterize collaboration within the educational context as the professional ties established among educators in both official and informal environments. Stevenson et al. (2016) contend that substantive collaboration necessitates profound and active involvement, allowing educators to enhance their pedagogical methods and advance their professionalism. Zubiri-Esnaola et al. (2020) discovered that interactive groups in foreign language education foster inclusivity and improve second-language acquisition by facilitating
active idea exchange among learners.

The results align with previous research emphasizing the relationship between contemporary learner requirements and effective teaching methodologies (Lopes, 2024). The association between teachers' self-efficacy and professional development focused on 21st-century skills substantiates the assertion that heightened teacher confidence enhances student achievements (Jamali Kivi et al., 2021). This study enhances the current literature by highlighting the necessity of integrating collaboration skills into teacher preparation programs. In doing so, educational institutions can more effectively prepare instructors to address the varied requirements of contemporary learners while promoting inclusive and engaging educational environments.

4.3.3 Role of Innovation Skills in Enhancing Pedagogical Competence

The third objective of the study investigated the role of innovation skills in relation to pedagogical competence. To measure innovation skills, application of technology, technological knowledge and experience, together with technological resources were investigated.

4.3.3.1 Application of Technology

Table 4.9 shows how application of technology affected teachers' pedagogical competence.

Table 4.9: Application of Technology in Learning

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Virtual manipulatives	F	21	15	5	21	12	74	3.16	1.508
	%	**28.4**	**20.3**	**6.8**	**28.4**	**16.2**	**100**		
Augmented reality	F	21	13	9	20	11	74	3.18	1.475
	%	**28.4**	**17.6**	**12.2**	**27.0**	**14.9**	**100**		
Multimedia	F	25	27	3	12	7	74	3.69	1.344
	%	**33.8**	**36.5**	**4.1**	**16.2**	**9.5**	**100**		
Digital content	F	22	36	3	6	7	74	3.81	1.224
	%	**29.7**	**48.6**	**4.1**	**8.1**	**9.5**	**100**		

Source: Field Data (2024)

The analysis of the data reveals that the application of technology in learning is significantly reflected through the use of digital content (M=3.81, SD=1.224), multimedia (M=3.69, SD=1.344), augmented reality (M=3.18, SD=1.475), and virtual manipulatives (M=3.16, SD=1.508). These technological tools empower educators to design dynamic and interactive lessons that engage students effectively.

4.3.3.2 Technological Knowledge

Table 4.10 following shows findings on the aspects that characterize technological knowledge and experience.

Table 4.10: Technological Knowledge and Experience in Learning

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Training in technology	F	25	26	3	15	5	74	3.69	1.313
	%	**33.8**	**35.1**	**4.1**	**20.3**	**6.8**	**100**		
Expertise in using technology	F	20	21	6	17	10	74	3.32	1.434
	%	**27.0**	**28.4**	**8.1**	**23.0**	**13.5**	**100**		
Ability to impart technological knowledge	F	22	26	5	16	5	74	3.59	1.302
	%	**29.7**	**35.1**	**6.8**	**21.6**	**6.8**	**100**		

Source: Field Data (2024)

The findings suggest that technological knowledge and experience are characterized by training in technology (M=3.69, SD=1.313), ability to impart technological knowledge (M=3.59, SD=1.302), and expertise in using technology (M=3.32, SD=1.434). Educators proficient in technology are better positioned to incorporate innovative tools into their instructional practices.

4.3.3.3 Technological Resources in Learning

As seen in Table 4.11, the availability of technological resources is underscored by the presence of technological gadgets (M=4.05, SD=1.032), online resources (M=4.00, SD=1.110), computer labs (M=3.91, SD=1.262), and internet connectivity (M=3.81, SD=1.321). These resources are pivotal in fostering innovation skills within educational contexts.

Table 4.11: Technological Resources in Learning

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Having a computer lab	F	33	20	5	13	3	74	3.91	1.262
	%	**44.6**	**27.0**	**6.8**	**17.6**	**4.1**	**100**		
Connected to the Internet	F	33	16	6	16	3	74	3.81	1.321
	%	**44.6**	**21.6**	**8.1**	**21.6**	**4.1**	**100**		
Having technological gadgets such as phones, tablets, screen, etc.	F	30	21	4	11	0	74	4.05	1.032
	%	**40.5**	**39.2**	**5.4**	**14.9**	**0.0**	**100**		
Online resources	F	30	27	6	9	2	74	4.00	1.110
	%	**40.5**	**36.5**	**8.1**	**12.2**	**2.7**	**100**		

Source: Field Data (2024)

The third objective of the study investigated the role of innovation skills in relation to pedagogical competence. To measure innovation skills, application of technology, technological knowledge and experience, together with technological resources were investigated. The application of technology in learning is significantly reflected through the use of digital content, multimedia, augmented reality, and virtual manipulatives.

The findings align with recent literature emphasizing the role of digital tools in enhancing pedagogical practices. For instance, Hwang et al. (2023) argued that the integration of augmented reality in education can significantly enhance student engagement and learning outcomes. In addition, the finding aligns with Weitze (2017), who found that teachers who

actively integrate technology into their teaching develop stronger innovation competencies and improve student engagement. Similarly, Prapantja (2023) noted that learning innovation mediates the relationship between pedagogical competence and instructional effectiveness, meaning that teachers who embrace technological innovation enhance their adaptability and classroom impact.

In contrast, Fernández-Cruz and Rodríguez-Legendre (2022) reported that many lecturers in higher education struggle with innovative teaching due to low digital literacy and resistance to change. While their study indicated that technology use was below expectations, the current study suggests that pre-service teachers are more willing to adopt innovative practices when given adequate training and resources. These findings highlight the need for continuous professional development in technology integration.

On technological knowledge and experience, results showed that this was characterized by training in technology, ability to impart technological knowledge, and expertise in using technology. This observation is consistent with Ertmer and Ottenbreit-Leftwich (2010), who assert that teachers' technological pedagogical knowledge significantly influences their ability to integrate technology into their teaching effectively. Furthermore, Harris and Hofer (2017) emphasized the importance of professional development in enhancing educators' technological competencies, thereby facilitating the effective use of innovative teaching strategies

Findings also showed that the availability of technological resources was characterised by the presence of technological gadgets, online resources, computer labs, and internet connectivity. The significance of technological resources is corroborated by Higgins et al. (2012), who illustrate that access to technology plays a crucial role in enhancing teaching and learning experiences. Moreover, Zheng et al. (2020) highlight that the availability of diverse technological resources can significantly impact students' engagement and learning outcomes. The findings of this study elucidate the intricate relationship between innovation skills and the application of technology in learning. The effective utilization of digital content, multimedia, augmented reality, and virtual manipulatives emerges as a critical component in fostering innovative teaching practices. Furthermore, the role of technological knowledge and experience, alongside the availability of essential resources, underscores the necessity for educators to be well-equipped in their technological competencies.

These resources are pivotal in fostering innovation skills within educational contexts. Based on these findings, a similarity can be drawn to the findings of Weitze (2017) which examined innovation in relation to teachers' pedagogy. Results from the study showed that teachers used the platform and the session to create novel ideas and projects that enhanced their teaching and learning. A quantitative study by Fernández-Cruz and Rodríguez-Legendre (2022) focussed on innovative competence among lecturers. An important finding from the study was that the innovation competence of the lecturers studied was below expectation, implying that most of them did not use innovative approaches in their teaching. This was bound to affect negatively their teaching and learners' acquisition of 21st Century Skills.

4.3.4 Pedagogical Competence

In view of the dependent variable in this study pedagogical competence, the focus was to delve into the various dimensions that define this crucial aspect of teaching. The data presented in Table 4.12 sheds light on key factors influencing pedagogical competence, such as teachers' experience, attitudes, skills, and knowledge.

Table 4.12: Pedagogical Competence

		V.G.E	G. E	M.E	S. E	N. A	Total	Mean	Std Dev
Teachers' experience	F	32	28	3	7	4	74	4.04	1.164
	%	**43.2**	**37.8**	**4.1**	**9.5**	**5.4**	**100**		
Teachers' attitudes	F	16	28	16	10	4	74	3.57	1.136
	%	**21.6**	**37.8**	**21.6**	**13.5**	**5.4**	**100**		
Teachers' Skills and knowledge	F	31	33	3	5	2	74	4.16	0.980
	%	**41.9**	**44.6**	**4.1**	**6.8**	**2.7**	**100**		

Source: Field Data (2024)

Findings The results indicate that teachers' skills and knowledge are the main indicators of pedagogical competence as represented by a mean of 4.16, closely followed by teachers' experience which with a mean score of 4.04. The findings further pit teachers' attitudes as the least cited with a mean of 3.57. These responses can be summarized as follows; teachers' skills and knowledge, *(M = 4.16, SD = 0.980)*; teachers' experience, *(M = 4.04, SD = 1.164)*; and teachers' attitude, *(M = 3.57, SD = 1.136)*.

Based on the study findings, it is evident that pedagogical competence is highly dependent on both teachers' skills and knowledge, together with teachers' experience. Even though teachers' attitudes also play a role in determining competence, the role is less pronounced compared to

the other factors. These findings are in agreement with the findings of Liakopoulou (2011) who explored the role of instructional knowledge as a prerequisite for being admitted to teaching as a profession in Greece. The study aimed to examine the various types of instructional knowledge tested in educators' assessment and identify the merit needed by future educators. It was found that nearly all assessment areas of concern were connected to the practices in teaching methods, with focus on lesson guides, choosing appropriate teaching resources and expertise, and assessment.

The findings revealed that integrating innovation skills, such as the application of digital content and multimedia, had a significant positive impact on teachers' pedagogical competence. This aligns with the experiential learning theory, which emphasizes the importance of providing learners with opportunities to actively engage with and experiment with new tools and technologies (Kolb, 1984). When teachers are equipped with the knowledge and skills to effectively integrate innovative digital resources into their instruction, they are better able to create dynamic and immersive learning experiences for their students.

These results also add to the body of literature that has already been written about the critical role that technology innovation plays in improving education in the twenty-first century. For example, research by Prapantja (2023) discovered that the association between lecturers' pedagogical competency and successful learning management was mediated by the incorporation of learning innovation. Likewise, Fernández-Cruz and Rodríguez-Legendre (2022) pointed out that a key component of higher education instructors' capacity to support their students' acquisition of 21st-century skills was their capacity for innovation.

Overall, the findings suggest that the development of critical thinking, collaboration, and innovation skills are crucial for enhancing pedagogical competence among educators. The study provides valuable insights into the specific elements that characterize these skills and can inform the design of teacher training programs and professional development initiatives. The findings from this study align with the existing body of research on the importance of critical thinking, collaboration, and innovation skills for enhancing pedagogical competence among educators.

Regarding critical thinking skills, the study findings echo the work of Huang and Chang (2023), who found that while international students recognized the value of critical thinking, they had

not fully developed these skills through their educational experiences. Similarly, Okolie et al. (2022) emphasized the need for innovative pedagogical practices to foster critical thinking among business and vocational studies teachers. The identification of problem identification, analytical skills, and logical reasoning as key indicators of critical thinking aligns with these previous findings.

In the domain of collaboration skills, the insights on class management, successful lesson development, and inclusivity resonate with the work of Bottia et al. (2021) and Stevenson et al. (2016), who highlighted the importance of professional relationships and deep engagement among educators for improving teaching skills and elevating their professionalism. Additionally, the findings on the role of inclusivity in learning align with the study by Zubiri-Esnaola et al. (2020), which demonstrated the benefits of interactive and inclusive approaches in foreign language learning.

Regarding innovation skills, the emphasis on the application of technology, technological knowledge and experience, and the availability of technological resources corroborates the findings of Weitze (2017), who observed that teachers used innovative platforms and approaches to enhance their teaching and learning. However, the study by Fernández-Cruz and Rodríguez-Legendre (2022) suggests that the innovation competence of some lecturers may be below expectations, underscoring the need for continued efforts to promote innovative practices in education

4.4 Diagnostic Tests

4.4.1 Tests of Normality

Hair et al. (2010) defined normalcy as the shape of the data distribution for a particular metric variable and the degree to which it resembles the normal distribution, the benchmark for statistical methods.

Table 4.13: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Critical thinking skills	.323	111	.000	.776	111	.000
Collaboration skills	.327	111	.000	.744	111	.000
Innovation skills	.268	111	.000	.781	111	.000
Teacher pedagogical competence	.309	111	.000	.734	111	.000

Source: Field Data (2024)

According to the Kolmogorov-Smirnov test (reported as p. 001) and the Shapiro-Wilk test (p is less than 0.05), the significance level (P-value collinea) of the Shapiro-Wilk test for all the variables was 0.000, indicating that the data significantly deviates from a normal distribution at a 95% confidence level. As a result, the inquiry led to the conclusion that data for all of the variables somewhat deviated from the normal distribution.

4.4.2 Multicollinearity

Problems could arise when two or more predictor variables are linked. Heteroscedasticity, which implies that some error terms are influencing others, undermines the statistical presupposition that error terms have a constant variance. Greene (2013) claims that the multicollinearity may have confusing effects, making it challenging to comprehend and draw reliable inferences from the size of the regression coefficients, their standard errors, or the associated z-tests. To detect multicollinearity, the VIF assesses how much the variance has been exaggerated. Baum (2006) asserts that a VIF greater than 10 indicates potentially dangerous multicollinearity.

Table 4.14: Coefficients

Model	Collinearity Statistics	
	Tolerance	**VIF**
Critical thinking skills	.985	1.016
Collaboration skills	.929	1.076
Innovation skills	.926	1.080

Source: Field Data (2024)

Baum (2006) asserted that a VIF greater than 10 is grounds for alarm, despite the fact that the Variance inflation factor (VIF) was looked at in all investigations and was shown to be unimportant. The key premise is that the error components for various observations do not exhibit autocorrelation. The findings showed that collaboration skills had a VIF of 1.076, innovation skills hours had a VIF of 1.080, and critical thinking skills had a VIF of 1.016. According to the results, all independent variables can be employed in regression analysis because there is no collinearity that could reduce their ability to predict the future.

4.4.3 Heteroscedasticity Test

One of the cornerstones of the conventional linear regression model is the hypothesis of homoscedasticity, which states that the probability distribution of the disturbance component stays the same for all observations (Bedru & Seid, 2005). The heteroscedasticity issues were therefore found using the Glesjer Test, as illustrated in Table 4.15.

Table 4.15: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	75.939	6.215		11.352	0.000
Critical thinking skills	0.691	.029	.415	5.057	0.109
Collaboration skills	0.541	.083	-.218	1.561	0.275
Innovation skills	0.813	.059	-.091	0.992	0.167

Source: Field Data (2024)

The derived values of Sig. 0.109, 0.275, and 0.167 indicating critical thinking skills, collaboration skills and innovation skills are all greater than 0.05, hence it can be concluded from the output coefficients that there is no heteroscedasticity issue.

4.5 Regression Analysis

A 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 results are shown in the model summary in Table 4.16.

Table 4.16: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.394[a]	.168	-110	.730

a. Predictors: (Constant), Critical thinking skills, Collaboration skills, Innovation skills

Source: Field Data (2024)

The regression analysis model summary displays the results of goodness of fit. R squared is the coefficient of determination. For this research, the coefficient of determination was 0.168. This 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.

Table 4.17: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.775	3	.925	.709	.550[b]
	Residual	91.387	70	1.306		
	Total	94.162	73			

a. **Dependent Variable:** Teachers' Pedagogical Competence

b. **Predictors: (Constant),** Critical thinking skills, Collaboration skills, Innovation skills

Source: Field Data (2024)

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. As a result of this therefore, the null hypothesis cannot be rejected fully.

4.5.1 Regression Coefficients

Regression coefficients illustrate the relationship by estimating the characteristics of the unknown population. In a linear regression, the values that represent the predictor variables' contributions are referred to as coefficients.

Table 4.18: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.768	.749		3.695	.000
	Critical thinking skills	.148	.104	.172	1.427	.158
	Collaboration skills	.079	.091	.286	.044	.004
	Innovation skills	.063	.123	.611	.510	.021

a. Dependent Variable: Teachers' Pedagogical Competence

Source: Field Data (2024)

A 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 results showed that: Collaboration skills ($\beta=0.286$, $p<0.05$) and

innovation skills (β=0.611, p<0.05) had a significant positive impact on pedagogical competence, critical thinking skills (β=0.172, p>0.05) were not statistically significant, suggesting that while they are important, their impact on pedagogical competence may be indirect or mediated by other factors.

These findings suggest that collaboration and innovation skills are critical for enhancing teachers' pedagogical competence. The lack of significance for critical thinking skills may indicate that these skills require more targeted training or integration into the curriculum to have a measurable impact. Based on the findings relayed on the table therefore, the equation ($\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon}$) becomes:

$$\mathbf{Y = 2.768 + 0.148X_1 + 0.079X_2 + 0.063X_3}$$

Where: X_1= Critical thinking skills

X_2= Collaboration skills

X_3= Innovation skills

The results showed that instructors' pedagogical competency was significantly improved by incorporating innovative skills, such as the use of digital content and multimedia. This is in line with the experiential learning theory, which highlights how crucial it is to provide students the chance to actively interact with and test out new resources and technology (Kolb, 1984). Teachers are better able to provide their students with engaging and dynamic learning experiences when they possess the information and abilities necessary to successfully incorporate cutting-edge digital resources into their lessons.

These results also add to the body of literature that has already been written about the critical role that technology innovation plays in improving education in the twenty-first century. For example, research by Prapantja (2023) discovered that the association between lecturers' pedagogical competency and successful learning management was mediated by the incorporation of learning innovation. Likewise, Fernández-Cruz and Rodríguez-Legendre (2022) pointed out that a key component of higher education instructors' capacity to support their students' acquisition of 21st-century skills was their capacity for innovation.

Additionally, based on these findings which point to an association between 21st century skills and teacher pedagogical competency, it is clear that the achievement of pedagogical

competence cannot be fully achieved without application of critical thinking, innovation and collaboration. As a general principle, not all information can be easily obtained through the power of thought alone, and it must go through certain phases in forming the ability to think (Kozikoglu, 2019). The theoretical framework introduced in the Swartz and Parks Model focuses on the ability and tendency of teachers to think critically. According to Swartz and Parks (1994) several factors will affect the ability of teachers to master the CTS method and the content of a subject.

Furthermore, unquestionably, the application of 21st century skills require educators to foster innovation and creativity in order to make teaching and learning a desired activity. Sulaiman et al. (2021) claimed that 21st century skills are highly beneficial in the classroom by encouraging students to act consciously in their everyday lives. Additionally, the application of 21st century skills by teachers can strike a balance between the idea of classroom instruction and the difficulties that students will encounter later in life (Choy et al., 2019).

4.6 Chapter Summary

This chapter has presented the findings of the study, which highlight the importance of integrating critical thinking, collaboration, and innovation skills into the curriculum to enhance teachers' pedagogical competence. The findings suggest that collaboration and innovation skills have a significant impact on instructional effectiveness, while critical thinking skills may require further development. The study contributes to the growing body of literature on 21st-century skills and provides practical recommendations for improving teacher training and curriculum development in Kenya.

Chapter Five:
Summary, Conclusions and Recommendations

5.1 Introduction

This chapter provides a summary of findings, recommendations, and conclusions in relation to the research findings. The presentation of the chapter is completely based on the study objectives, with specific attention paid to the sequence of the objectives.

The study was based on the following specific objectives:

i. To assess the effect of integrating critical thinking skills in the curriculum, on teachers' pedagogical competence
ii. To evaluate the effect of integrating collaboration skills in the curriculum, on teachers' pedagogical competence, and
iii. To examine the effect of integrating innovation skills in the curriculum, on teachers' pedagogical competence in selected private colleges in Kiambu County, Kenya.

The research data obtained from field work was analysed and presented using descriptive statistics.

5.2 Summary of Findings

5.2.1 Effect of Critical Thinking Skills on Teachers' Pedagogical Competence

The findings showed that clear problem identification was 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 the effect of problem-solving, 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 indicated a situation whereby communication was 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 was 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 showed that teachers who actively practised these abilities would 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 Competences 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 (Obi et al., 2022).

Moreover, based on past research, it is evident that critical thinking is not new to teacher education. Specifically, 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 (Wang & Jia, 2023; Yuan et al., 2022). The vast body of literature on this topic converges on a common understanding that a critical thinking-oriented teacher should possess three essential attributes: 1) a strong CT mind-set, 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.

5.2.2 Effect of Collaboration Skills on Teachers' Pedagogical Competence

From the findings, the responses showed that 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).

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.

5.2.3 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.

5.3 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.

5.4 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.

5.5 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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Appendices

Appendix I: Informed Consent

TITLE: Effects of Integrating 21st Century Skills in the Curriculum on Teachers' Pedagogical Competence: A study of Selected Private Colleges in Kiambu County

Introduction

My name is **Gloria Kisiang'ani**, a student at Strathmore University pursuing Master of Science in Education Management. I am conducting a study on Effects of Integrating 21st Century Skills in the Curriculum on Teachers' Pedagogical Competence: A study of Selected Private Colleges in Kiambu County.

Purpose of the study

The purpose of this study is to determine how integration of 21st Century Skills into the curriculum affects teachers' pedagogical competence. This will take about 15 minutes of your time.

Benefits of the study

The findings from the study will create awareness in on the importance 21st Century Skills, specifically the place of critical thinking, collaboration, and innovation skills among learners in schools. Teachers and other stakeholders will therefore learn how to harness and strengthen these skills in learners with the aim of ensuring that teachers become more effective as they dispense knowledge to learners. The study is also expected to be a source of reference to all education stakeholders in the country as well as policy makers especially when: disseminating their services, making decisions, and formulating policies related to teachers' pedagogical competence and 21st Century Skills among learners. This will help in charting the way forward on matters related to teachers' pedagogical competence and 21st Century Skills.

Risk and discomforts

I don't foresee any potential risk and discomforts from my participation in the research. I have explained to the participants about the study, and I have answered all their questions.

Voluntary participation

Your participation in the study is voluntary and you may choose to stop participating. Your decision will not be influenced by anyone, and it will be respected.

Confidentiality

Confidentiality of participants will be maintained during data collection process and after the study. To ensure anonymity, participants will not write their names anywhere in the questionnaire. Instead, codes will be used.

Contact the following for further enquiry

Gloria Kisiang'ani on **07409 772 89** **gloria.kisiangani@strathmore.edu**

Legal Rights and signatures

I consent to participate in the above-mentioned study conducted by Gloria Kisiang'ani. I have understood everything and about this project and wish to participate voluntarily in the study.

Signature of interviewee ……Date……

Signature of the researcher……Date……

Appendix II: Questionnaire

Dear Respondent,

The current study aims at collecting data relevant to 21st Century Skills and teachers' pedagogical skills. You are kindly requested to fill in the questions given as instructed.

Your participation in this study is voluntary; you are therefore free to withdraw at any point and time during the study. Kindly note that your feedback will be treated with utmost confidentiality.

Thanks in advance for participating in the study.

Instructions:
NB: Please tick (✓) in the boxes given

SECTION A: Demographic Data
1. What is your gender? Male ☐ Female ☐

2. Which year of study are you in? Year 1 ☐ Year 2 ☐ Year 3 ☐

3. Kindy indicate your age bracket: 18-35 ☐ 36-45 ☐ 46-55 ☐ Above 55 ☐

SECTION B: Critical Thinking (*Tick in the appropriate box***)**

To what extent do the following characterise problem identification in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
4	Clear problem identification					
5	Determination of a problem's effect					
6	Definition of problem-solving criteria					
7	Establishment of suitable solutions for the problem					

To what extent do the following characterise analytical skills in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
8	Communication					
9	Creativity					
10	Data analysis					
11	Research					

To what extent do the following characterise logical reasoning in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
12	Inductive approach					
13	Deductive approach					
14	Abductive approach					

SECTION C: Collaboration (*Tick in the appropriate box***)**

To what extent do the following characterise class management in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
15	Model behaviour					
16	Positive reinforcement					
17	Understandable rules					

To what extent do the following characterise successful lesson development in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
18	Interest stimulation					
19	Creative topic introduction					
20	Student engagement					
21	Encouragement of full involvement					

To what extent do the following characterise inclusivity in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
22	Culturally responsive teaching					
23	Promotion of equitable treatment					
24	Promotion of positive learning					
25	Recognition of diversity					

SECTION D: Innovation (*Tick in the appropriate box***)**

To what extent do the following characterize application of technology in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
26	Virtual manipulatives					
27	Augmented reality					
28	Multimedia					
29	Digital content					

To what extent do the following characterize technological knowledge and experience in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
30	Training in technology					
31	Expertise in using technology					
32	Ability to impart technological knowledge					

To what extent do the following characterize technological resources in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
33	Having a computer lab					
34	Connected to the Internet					
35	Having technological gadgets such as phones, tablets, screen, etc.					
36	Online resources					

SECTION E: Pedagogical Content (*Tick in the appropriate box***)**

To what extent do the following characterize pedagogical content in learning?						
	Statement	*Very Great Extent*	*A Great Extent*	*Moderate Extent*	*Small Extent*	*Not at All*
37	Teachers' experience					
38	Teachers' attitudes					
39	Teachers' Skills and knowledge					

The End

Appendix III: Ethical Approval

Strathmore UNIVERSITY

6th January 2025

Ms Kisiangani Gloria,
gloria.kisiangani@strathmore.edu

Dear Ms Kisiangani,

RE: Effects of Integrating 21st Century Skills in the Curriculum on Teachers' Pedagogical Competence: A study of Selected Private Colleges in Kiambu County

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2389/24.** The approval period is from **6th January 2025 to 5th January 2026.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix IV: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **618708**

Date of Issue: **11/October/2024**

RESEARCH LICENSE

This is to Certify that Ms., Gloria Kisiangani Nekesa of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: Effects of Integrating 21st Century Skills in the Curriculum on Teachers' Pedagogical Competence: A study of Selected Private Colleges in Kiambu County for the period ending : 11/October/2025.

License No: **NACOSTI/P/24/40735**

618708

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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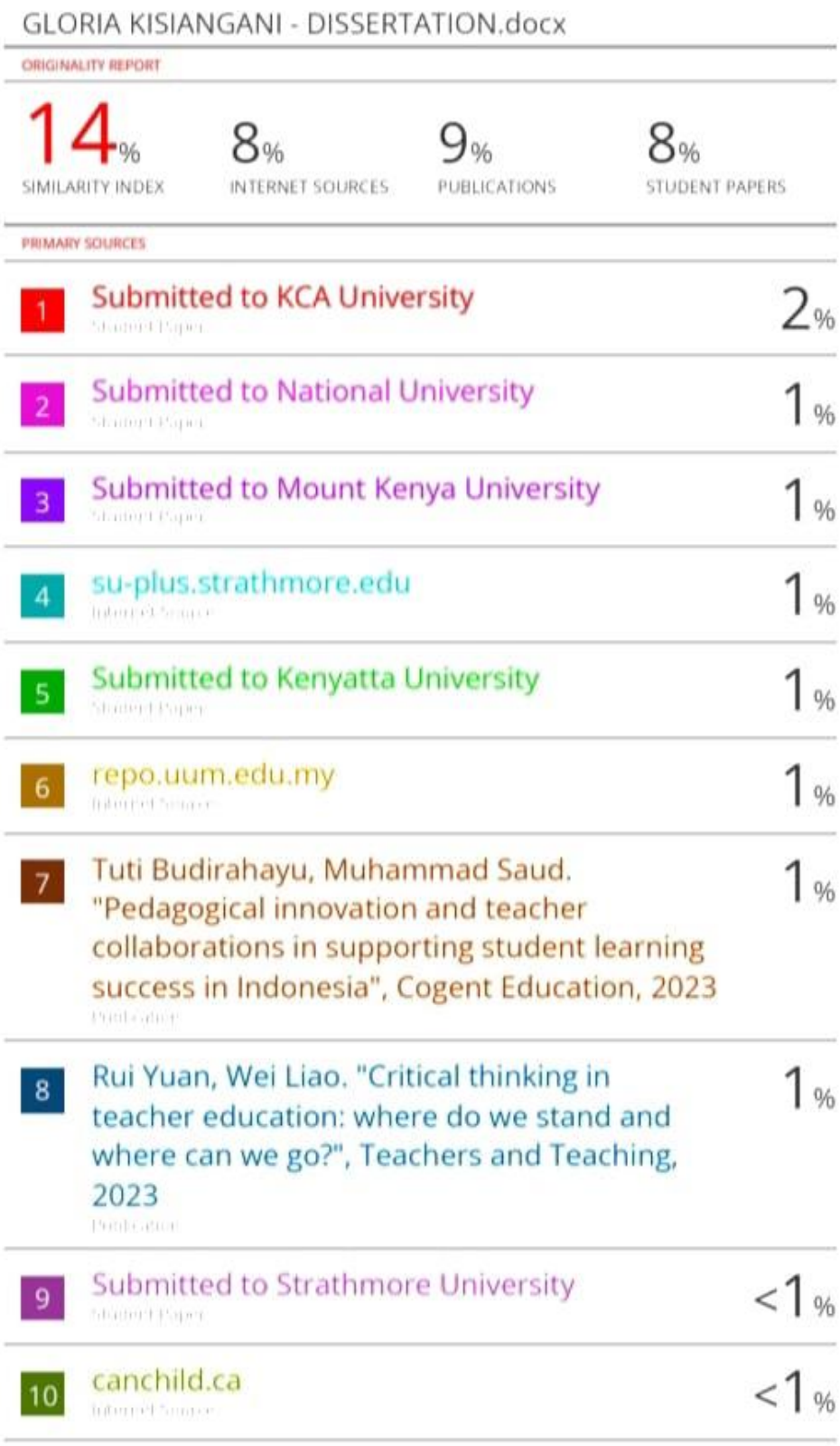
See overleaf for conditions

Appendix IV: Originality Report



GLORIA KISIANGANI - DISSERTATION.docx

ORIGINALITY REPORT

14%	8%	9%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to KCA University Student Paper	2%
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8	Rui Yuan, Wei Liao. "Critical thinking in teacher education: where do we stand and where can we go?", Teachers and Teaching, 2023 Publication	1%
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