

**RELATIONSHIP BETWEEN LEADERSHIP PRACTICES AND IMPLEMENTATION
OF INTEGRATED SCIENCE IN COMPETENCY BASED CURRICULUM IN JUNIOR
SECONDARY SCHOOLS IN WESTLANDS SUBCOUNTY KENYA.**

By

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**MASTER OF EDUCATION DEGREE IN EDUCATION LEADERSHIP AND
MANAGEMENT.**

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LEADERSHIP AND MANAGEMENT IN THE SCHOOL OF EDUCATION, ARTS AND
SOCIAL SCIENCES AT KCA UNIVERSITY**

JUNE 2024

DECLARATION

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for the award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and the author duly acknowledged.

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ABSTRACT

The implementation of integrated science as a learning area in the Competency-based curriculum (CBC) has generated significant interest among scholars in Kenya due to its novel approach to education. Despite its potential benefits, the implementation of integrated science as a learning area in the CBC in junior secondary schools has faced challenges and criticism since its introduction. The purpose of this study is to assess the relationship between leadership practices and implementation of integrated science in the competence-based curriculum in junior secondary schools in Westlands Subcounty. The objectives of the study were to examine the relationship between teacher knowledge; teacher professional development and provision of resources by school leaders for instructional support in the implementation of Integrated Science in junior secondary schools in Westlands Subcounty. The social development theory and participative leadership theory grounded the study. A correlational research design was used. The target population were teachers, heads of departments and principals in the 30 junior secondary schools in Westlands Subcounty. A census was conducted for the integrated science teachers while 30% of heads of departments and principals were purposively selected. Data was collected through mixed methods. A structured questionnaire was distributed to all the teachers of integrated science in JSS schools. Interviews were conducted with heads of departments and principals. A pilot study was conducted in at Moi Educational Centre and PC Kinyanjui Road Primary School to establish the validity and reliability of the data collection tools. Quantitative data was analyzed using the Statistical Package for Social Sciences version 29, employing correlation and regression analysis techniques. Qualitative data was analysed thematically. Results showed that teacher knowledge positively correlated with implementation of integrated science in the CBC in JSS($r=0.926$ $p=0.000$). teacher professional development opportunities positively and significantly correlated with implementation of integrated science in the CBC in JSS($r=0.923$, $p=0.000$). It was established that provision of resources by school leaders for instructional support significantly and positively correlated with implementation of integrated science in the CBC in JSS($r=0.855$, $p=0.000$). This study concludes that, despite teachers' strong understanding of integrated science, they face challenges due to a lack of resources, such as teaching materials and laboratory equipment. There was an increase in teacher workload, yet few received sufficient job training or continuous education opportunities in integrated science. The study concludes that, while the types of resources provided are relevant for instructional teaching, there is inadequacy in the provision of teaching resources. The study recommends that JSS should prioritize the development and procurement of comprehensive teaching materials and laboratory equipment to support integrated science instruction. The study suggests that JSS should encourage greater involvement in research activities and professional organizations to promote continuous professional growth. Principals should receive further support and resources to overcome challenges encountered with educational software and multimedia resources, ensuring seamless integration into integrated science teaching practices.

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ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of Variance
CBC	Competency Based Curriculum
CPD	Continual professional Development
HoD	Head of department
JSS	Junior Secondary School
KICD	Kenya Institute of Curriculum Development
NACOSTI	National Council of Science and Technology
SPSS	Statistical Package for Social Sciences
USA	United States of America

OPERATIONALIZATION OF TERMS

Competency-based Curriculum:	A curriculum that prioritizes learners' practical skills and abilities over rote knowledge. It focuses on hands-on experiences, problem-solving, critical thinking, and real-world applications.
Integrated Science:	Interdisciplinary field of inquiry that amalgamates various scientific domains to offer a thorough and interconnected comprehension of natural occurrences. It encompasses principles from physics, chemistry, environmental and biology.
Junior secondary school:	Post-primary education stage situated within the second tier of the 2-6-3-3-3 education framework.
Leadership practices:	Practices that establish a roadmap for decision-making, resource allocation and long-term success.
Provision of resources:	Allocation of essential resources for a task based on the user's specific requirements for executing an application. Ensures that the right tools and expertise are available for successful application execution.
Teacher knowledge:	Amalgamation of knowledge and skills that a teacher brings into the classroom, derived from both pre-service education and continuous on-the-job learning experiences.
Teacher professional development:	Set of resources, training programs and support mechanisms for educators aimed at enhancing their teaching proficiency and effect.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter contains the background of the study about the role of leadership practices on the implementation of integrated science in Junior Secondary Schools. The statement of the problem is highlighted. The study purpose, objectives of the study, and the research questions are highlighted. Study assumptions and the significance of the study are presented. The scope of the study and the delimitation of the study is also explained.

1.2 Background of Study

The Competency Based Curriculum (CBC) reflects a paradigm shift in teaching methodologies, shifting away from conventional approaches that are teacher-centered to learner-centered approaches. According to Delbert and Jacobs (2021), the primary focus of the CBC is on developing learners' competencies rather than merely imparting content knowledge. In this context, competencies are considered more crucial than the accumulation of information. The evaluation process within CBC is formative and summative. This means that the emphasis is placed on continuous feedback and improvement, fostering the development of learners' skills and abilities throughout the learning journey. The ultimate goal is to prepare students holistically for future challenges. Fitria et al, (2022) define CBC as a curriculum that outlines specific learning outcomes and competencies to be achieved by the learners.

Competency is the proven capacity to use one's knowledge, skills, and abilities in a way that advances their profession. In response to the rapidly changing global landscape, educational reforms have become necessary. CBC emerges as a promising approach to address the evolving needs of learners (Uzule, 2020). This curriculum prioritizes competencies over content, recognizing the importance of practical skills and abilities. It also emphasizes formative evaluation, providing continuous feedback to enhance the learning process. The implementation of the CBC is designed to empower students by equipping them with the vital skills and knowledge required to thrive in a rapidly evolving world. Unlike traditional education systems that often focus on rote memorization and standardized testing, the CBC places a strong emphasis on practical skills, critical thinking, problem-solving, and adaptability. In CBC, students are encouraged to

actively engage with the learning process, fostering a deeper understanding of subjects and the ability to apply their knowledge in real-life situations. This learner-centric approach not only prepares students for academic success but also equips them with the skills necessary to navigate complex challenges in their personal and professional lives.

Leadership plays a pivotal role in shaping students' educational journeys and eventual school completion rates (Maduga, 2020). In their capacity as leaders, principals establish ambitious objectives for students' holistic development, that entail both social and academic growth. Effective leadership, therefore, is a critical factor in the realization of a CBC's objectives. Leadership in curriculum implementation enhances collaboration and shared decision-making among stakeholders in the educational ecosystem. To ensure the CBC's effective implementation and enhance overall educational outcomes, school principals must adopt and practice appropriate leadership practices, thereby facilitating the curriculum's successful execution and promoting the holistic development of learners (Kanyonga, Mtana & Wendt, 2019).

Teacher Knowledge, Teachers' knowledge and abilities can be greatly improved by leadership practices that place a high priority on chances for collaborative learning and ongoing professional development. Teachers are better able to apply Integrated Science when they have access to pertinent training and are actively involved in decision-making processes within their schools. By working together, leaders can make sure that integrated science teachers are better equipped to teach the curriculum, which will improve student results.

Opportunities for Professional Development, School leaders who stress the value of professional development foster an environment where learning never stops. Leaders may assist teachers in staying current with the most recent scientific research and pedagogical practices by offering frequent training sessions, workshops, and access to educational materials. As it enables instructors to adapt cutting-edge teaching strategies and incorporate new scientific concepts into their classes, this continual professional growth is crucial for the successful implementation of Integrated Science in JSS.

Resource Provision, an essential component of an integrated science program's effectiveness is the availability of sufficient teaching resources. The quality of science education can be greatly

improved by school administrators who place a high priority on allocating resources and making sure that instructors have access to the tools they need, including digital tools, textbooks, and laboratory equipment. Teachers may help leaders make sure that resources are allocated to fulfill the needs of both the curriculum and the students by participating in the decision-making process

CBC curriculum prepares learners to adapt and thrive in diverse and unpredictable environments. The aim is to equip students with the tools they need for personal and professional growth, ensuring they are well-prepared for the challenges and opportunities that lie ahead (Morrish & Neesam, 2021). In Australia, competence is the explicit description of knowledge, skills, and their practical application to meet the expected performance standards within a professional environment. These essential competencies encompass digital learning, effective communication, and critical thinking (Beneitone & Yarosh, 2022).

As explained by Tolliver, Martin, and Salome (2018), the adoption of CBC in the United States was catalyzed by a confluence of critical concerns plaguing the nation's education system. These concerns encompassed multifaceted issues, ranging from economic ramifications to subpar student performance and deficiencies in teacher training quality. One of the primary driving forces behind implementing the CBC was a growing apprehension regarding the state of economic research within the United States. Policymakers and educators alike recognized that a robust, globally competitive economy necessitated a well-prepared, adaptable workforce. The prevailing conventional education system was deemed inadequate in equipping students with the essential competencies required to meet the evolving demands of the modern workforce.

As such, the introduction of the CBC aimed to rectify this inadequacy by aligning educational outcomes with the skill sets demanded by the contemporary job market (Amutabi in 2019). Simultaneously, the adoption of the CBC was motivated by mounting concerns over persistently low levels of student achievement. The traditional educational framework, characterized by rigid, content-centric curricula, was perceived as ineffective in engaging and nurturing students' academic growth. The CBC's fundamental premise was to shift the paradigm by focusing on learning outcomes tied to observable student behaviors. By doing so, educators would be encouraged to tailor their teaching objectives to the unique needs and aptitudes of their students, thus fostering a more personalized and effective learning experience. This student-centered

approach was envisaged as a means to elevate overall educational attainment levels and bolster the quality of the nation's future workforce (Connolly et al., 2022).

The CBC has been adopted in several Sub-Saharan African nations. In 2002, following a National Education seminar held in Yaoundé, Cameroon adopted the CBC. The seminar brought attention to a sharp rise in elementary school students repeating grades, which reached 41% in just one academic year. Ambei et al. (2018) claimed that this worrying situation was brought about by insufficient teaching strategies, untrained teachers and inadequate resources. Both the USA and Cameroon implemented the CBC in response to educational challenges they were facing. Cameroon sought to tackle issues related to high repetition rates and the shortcomings of the existing education system. East African nations have employed content-based curricula, a practice that has faced criticism for producing graduates ill-equipped to meet the evolving demands of the job market, employability trends, and the essential skills required in the 21st century.

Many nations in Africa have transitioned towards the adoption of a CBC as their preferred educational framework. This shift is driven by the need to address the population's competencies and align them with the dynamic requirements of the job market (Ambei, Kum & Ambei, 2018). The CBC places a significant emphasis on nurturing competence and proficiency among learners, aiming to bridge the gap between educational outcomes and market needs. It is essential to recognize that the successful implementation of a CBC relies heavily on effective leadership within the educational system. Various leadership practices wield distinct effects on the curriculum's successful execution within educational institutions.

The successful execution of the CBC necessitates proficient and well-informed facilitators, sufficient resources, and appropriately equipped educational institutions. Okoth (2018) underscores the importance of teachers' disposition, preparedness and CBC-focused training. To successfully implement the CBC, instructors must be well-informed and prepared to adopt coaching and facilitation roles instead of merely transmitting knowledge to students. Awili and Begi (2021) acknowledge that a teacher's value and quality are unparalleled, making teacher training a crucial factor in the success of the curriculum. Leadership within educational institutions also assumes a pivotal role in the effective execution of the curriculum, exerting a direct influence on the quality of educators and their efficacy in the classroom.

The preparedness, professionalism and access to resources among teachers relates with students' achievements (Wambua & Samuel, 2019). This link between instructors' competencies and students' success surpasses the effect of various other factors, including financial investments such as salaries. The correlation between teachers' capabilities and students' accomplishments carries greater significance than other variables, underscoring the imperative nature of investing in the professional development and support of educators.

Kenya ushered in the CBC in 2017, as its third educational system, crafted by the Kenya Institute of Curriculum Development (KICD). The implementation of the CBC marked the introduction of novel subjects that educators were tasked with instructing. Nevertheless, findings by Kanyonga et al., 2019 revealed that the pilot phase of the CBC was executed hastily and on a constrained scale, spanning just ten weeks during the same year. As a result, the Kenya National Union of Teachers (KNUT) believes that several factors, such as teacher training, availability of resources, and teachers' attitudes and knowledge, have complicated the successful implementation of the curriculum. This study sought to answer the question: What is the relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands sub county?

1.3 Statement of the Problem

The implementation of CBC has generated significant interest among scholars in Kenya due to its novel approach to education. When properly implemented, CBC aims to produce well-rounded learners, with teachers playing a pivotal role in ensuring active and participative learning to make the curriculum successful. Despite its potential benefits, the implementation of integrated science in CBC in junior secondary schools has faced challenges and criticism since its introduction. This is because integrated has three learning subjects in one learning area and the teacher is trained in teaching two subjects. Many education stakeholders have expressed concerns about the lack of teaching experience, poor leadership practices, inadequate training, and insufficient resources. Instructional leadership and teacher knowledge are lacking in integrated science as a learning area for effective implementation of the curriculum. The 8.4.4 system of education teaches two science subjects to graduate teachers, while the CBC curriculum requires that these teachers have knowledge and teach three science subjects. The challenge is that the curriculum is being implemented despite the recommendations from the task force on the retooling process. Thus,

there is a gap in knowledge of the third science subject. Additionally, junior secondary schools may not have adequate teachers, resources, and personnel to offer integrated science (Okoth, 2018).

Previous studies have not extensively assessed leadership practices in the implementation of integrated science in CBC. Mugambi (2022) conducted a study on the effect of pragmatism in CBC implementation, while M'mboga (2021) evaluated education reforms in Kenya. Isaboke, Mweru, and Wambiri (2021) investigated preparedness of teachers and CBC implementation. The introduction of the CBC in Kenya has generated considerable interest among scholars and education stakeholders. While the curriculum has the potential to develop well-rounded learners, its successful implementation requires addressing issues related to leadership, teacher knowledge and beliefs, teacher professional development, and provision of resources. Sensitization efforts and further research are essential to improve the implementation of integrated science in CBC and ensure its effectiveness in enhancing the education system in Kenya. Previous studies present various knowledge gaps. This study, therefore assesses the relationship between leadership practices and implementation of integrated science in the CBC in junior secondary schools in the Westlands sub-county Nairobi County.

1.4 Purpose of the Study

This study assessed the relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands Subcounty Nairobi City county.

1.5 Objectives of the Study

This study sought: -

- i. To examine the relationship between teacher knowledge and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.
- ii. To evaluate the relationship between teacher professional development opportunities provided by school leaders and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.

- iii. To assess the relationship between provision of resources by school leaders for instructional support and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.

1.6 Research Questions

- i. What is the relationship between teacher knowledge and implementation of Integrated Science in junior secondary schools in Westlands Subcounty?
- ii. What is the relationship between teacher professional development opportunities provided by school leaders and implementation of Integrated Science in junior secondary schools in Westlands Subcounty?
- iii. How does provision of resources by school leaders for instructional support relate with implementation of Integrated Science in junior secondary schools in Westlands Subcounty?

1.7 Research hypothesis

H₀₁: There is no significant relationship between teacher knowledge and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.

H₀₂: There is no significant relationship between teacher professional development opportunities provided by school leaders and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.

H₀₃: There is no significant relationship between provision of resources by school leaders for instructional support and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.

1.8 Assumptions of the Study

The study assumed that the respondents possessed a requisite level of awareness regarding the concept of the implementation of integrated science. Thus, the respondents were expected to be adequately informed and knowledgeable about the intricacies and principles underpinning the incorporation of integrated science into CBC. It was presupposed that respondents were not only aware of the concept but also possessed the necessary qualifications and expertise to provide this study with accurate and insightful data, thereby facilitating a better examination of the phenomenon under investigation.

The study operated under the assumption that the variables had an effect on the implementation of integrated science as a learning area in CBC in junior secondary schools. It presupposed a causal relationship between the selected variables and the effective integration of science education, thus forming the basis for the research's inquiry into these elements. This assumption underscored the pivotal role that variables played in influencing the dynamics of integrated science education within the targeted educational context.

It was assumed that the sampled population possessed a clear and comprehensive understanding of leadership practices and the implementation of integrated science. Furthermore, it was assumed that respondents could distinguish these leadership practices within the specific domain of integrated science from those observed in other educational areas. The sampled individuals were expected to possess a level of expertise, enabling them to provide perspectives on the relationship between leadership practices and the implementation of integrated science as a learning area in CBC in junior secondary schools.

1.9 Significance of the Study

The study examined the relationship between leadership practices in the implementation of integrated science as a learning area in CBC in junior secondary schools. The study will raise awareness among education stakeholders on leadership practices on teachers' understanding and commitment in the implementation of Integrated Science CBC in junior secondary schools. The findings of this research will be important to policy makers involved in curriculum development. It will offer insights into the complexities and hurdles associated with implementation of Integrated Science in CBC, enabling them to make informed decisions in managing the curriculum's implementation effectively in Junior Secondary Schools.

The findings of this study will be important to the KICD. The study will provide crucial information on how to address the challenges related to the implementation of Integrated Science in CBC. The findings will guide KICD in making informed decisions on leadership practices in the implementation of integrated science in CBC. Consequently, the KICD, CUE and the universities might develop a curriculum that enables teachers of integrated science to be trained on three science subjects, so as to enhance the implementation of integrated science in CBC. Recommendations of the study will form a basis upon which policy on teacher professional

development opportunities provided by school leaders to facilitate the implementation of Integrated Science may be instituted.

This study will be important to scholars in the field of education administration, curriculum development and related disciplines. The study will provide a robust framework against which future investigations on the implementation of CBC can be conducted. It will serve as a valuable resource for researchers, offering a deeper understanding the relationship between leadership practices in the implementation of integrated science as a learning area in CBC. Recommendations for further research will form a basis for future scholars to develop their theses and add to the theory on leadership practices and implementation of CBC.

1.10 Scope and Limitations of the Study

This study was limited to assessing the relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands Subcounty Nairobi City County. It was carried out within a specified time frame and scope, targeting junior secondary schools in the Westlands Subcounty. The study only issued questionnaires and conducted interviews with the respondents who were involved in the study. This approach was geared towards achieving credibility and confidentiality.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on the relationship between leadership practices and implementation of integrated science in the CBC. The study examined the relationship between teacher knowledge, leadership practices, teacher professional development opportunities and provision of resources in the implementation of Integrated Science in junior secondary schools. Theories are discussed and justified. A conceptual framework is then illustrated. This chapter is important as it places the study within academic literature, hence enhancing its credibility.

2.2 Empirical Literature Review

The implementation of CBC in Kenya marked an important milestone towards improving the quality of education in the country (Andiema, 2020). This transition was designed to overcome the weaknesses of the previous education system and adapt to the changing demands of 21st-century. A significant aspect of the CBC is its strong focus on practical application and the attainment of a deep understanding of subjects. Unlike traditional 8.4.4 that emphasized on rote learning, the CBC emphasizes the development of competencies and skills, encouraging students to not just memorize information but also apply it effectively. This shift in educational approach aligns with the requirements of a rapidly evolving world where problem-solving, critical thinking, and adaptability are highly valued. Unlike traditional curricula that rely heavily on rote memorization and standardized testing, the CBC requires students to demonstrate their understanding of the material through real-life situations and examinations that assess their competencies (Scheopner et al., 2018). The CBC also recognizes the diversity of learners and the need for individualized teaching to ensure that all students can grasp the concepts effectively. Students with special needs require personalized approaches that cater to their unique learning styles and abilities. By tailoring the teaching methods to meet individual needs, the CBC aims to create an inclusive and supportive learning environment for the learners.

2.2.1 Relationship between Teacher Knowledge and Implementation of Integrated Science in Junior secondary schools

Research indicates that in integrated scientific classes, teacher knowledge is critical in determining the caliber of instruction and learning outcomes for students. Proficiency in content knowledge enables teachers to create meaningful links between disparate scientific concepts, improving students' understanding and retention. Furthermore, by effectively involving students in practical exercises, inquiry-based learning, and real-world applications, teachers who possess a thorough understanding of pedagogical methodologies specifically designed for integrated science can help students develop a deeper understanding of the subject.

Sakib and Obra (2019) investigated teachers' knowledge of teaching secondary science curricula in the city of Isabela, Philippines. They evaluated educators' understanding of the secondary science curriculum, which encompassed not only the subject matter but also the incorporation of scientific process skills, curriculum planning, and various teaching and learning methods. Furthermore, they investigated the obstacles encountered by teachers to the curriculum, teaching techniques, educational resources, classroom atmosphere, and evaluation methods. The study also examined the level of support provided by school principals to teachers in teaching secondary science curriculum, covering aspects such as supervision, professional training, monitoring, and evaluation. A researcher-designed Science Teachers Preparedness Survey questionnaire that was given to 62 respondents in a school division was used to collect the data. The research showed that, on the whole, teachers were well-prepared and knowledgeable of the instructional material combined with science process competencies, curriculum design, and teaching and learning methodologies. However, they had more difficulty with abstract concepts, mathematical calculations and some instructional techniques. Despite the endorsement of school principals, the availability and accessibility of educational technologies were seen as possible concerns in relation to instructional materials. The study recommended continuous training for teachers in areas where understanding was weaker and assistance with obtaining instructional materials. The study presents a contextual gap as it was conducted in Indonesia, with different social, economic and legal regimes from Kenya.

Mutale and Ng'andu (2022) assessed teaching resources and teacher readiness for civic education in secondary schools under Zambia's CBC. Their research adopted a qualitative method approach, utilizing an embedded research design. The study included the participation of 120 secondary school students and 40 teachers, who were chosen through stratified random sampling. Qualitative data were collected from teachers and school leaders using semi-structured interview guides, while learners provided information through questionnaires. The findings revealed that, despite having received in-service training on CBC, civic education teachers were not effectively implementing recommended teaching methods. Moreover, teaching resources were deficient, and educators demonstrated an incomplete grasp of how to employ these materials effectively within the context of CBC. As a result, the study put forth several recommendations. Firstly, it proposed that the Ministry of Education should prioritize the retraining of teachers to equip them with the essential competencies needed for the successful implementation of CBC. Secondly, it suggested that teachers should undergo training in learner-centered approaches to enhance students' acquisition of skills. A methodological gap emerges as the study was purely qualitative, while the current study used mixed, methods in data collection and analysis.

Chemagosi (2020) underscored the critical importance of teachers' knowledge in the successful implementation of CBC in a study carried out in Kilifi and Nandi counties. This focus on teacher readiness aligns with the idea that the effectiveness of any educational reform or curriculum change largely depends on the teachers who are tasked with delivering it. When teachers are well-prepared and equipped with the necessary knowledge and skills, they are more likely to effectively implement the new curriculum, leading to positive outcomes for students. Moreover, the study's emphasis on leadership's role in the CBC implementation process aligns with the broader understanding that effective school leadership is crucial for educational reforms to succeed. Leadership within schools plays a pivotal role in creating an environment conducive to change and innovation. Leaders can set the tone for collaboration, instructional improvement, and pedagogical innovation among their teaching staff.

Huber et al. (2017) highlighted the international dimension of the discussion. It demonstrates that the significance of leadership in curriculum implementation is not limited to a specific context but is a recurring theme in educational research worldwide. Accordingly, school leaders who prioritize a collaborative culture and emphasize instructional quality contribute to the successful

implementation of educational reforms. Mulandi (2019) noted that leadership is not only about administrative functions but also involves providing mentorship and effective planning. This implies that educational leaders need to guide and support teachers in understanding and adapting to new educational paradigms like CBC. Effective planning is crucial to ensure a smooth and well-organized transition Awili and Begi (2021) highlighted the effect of a principal's leadership style on teachers' exploration and performance. This underscores the notion that leadership is not a one-size-fits-all concept. Different leadership styles can have varying effects on teachers' willingness to explore new teaching methods and their overall performance in implementing educational reforms like CBC.

Isaboke et al. (2021) examined the challenges hindering successful CBC implementation in Machakos County, Kenya. The study revealed that teachers were not adequately prepared, and school infrastructures were lacking. The rushed implementation of CBC without addressing issues like understaffing and resource shortages significantly affected the process. The study presents conceptual and contextual gaps as the study focused on challenges in CBC implementation and was carried out in Machakos County. Awili and Begi (2021) assessed instructional leadership and CBC implementation. While there was no significant difference in implementation between private and public schools, headteachers tended to prioritize administrative roles over supporting curriculum implementation. Their study, however, focused on early years education, hence a conceptual gap. Okoth (2018) investigated the link between headteachers' instructional leadership and CBC implementation. The study found that instructional leadership was moderate and not significantly influenced by headteachers' characteristics or teaching experience but was dependent on headteachers' qualifications. The study's unit of observation was teachers only, hence a limitation scope in population.

Nsengimana et al. (2021) examined the correlation between a school's adoption of CBC for science education and its ability to foster innovation in Rwanda. Their research encompassed 12 teacher interviews, the observation and documentation of 23 science lessons, and an evaluation of school facilities within three different educational institutions. The investigation uncovered disparities in CBC implementation among teachers and schools, primarily stemming from variations in individual professional development and the school's readiness to embrace innovation. The study identified robust CBC execution in schools. However, it revealed a lower

level of implementation in the domain of science in society. The results showed a clear relationship between a school's capacity for innovation and its science CBC implementation profile, placing particular emphasis on elements like teachers' individual experience, readiness for CBC integration, and accessibility to science teaching and learning resources. The study thus advocated for the development of strong, ongoing training programs that emphasize the implementation of the practical CBC and emphasized the requirement for the availability of suitable resources to support the successful completion of the science CBC. The study used interviews and observations guide to collect data while the current study employed questionnaires and interviews, in data collection.

2.2.2 Relationship between Teacher Professional Development Opportunities Provided by School Leaders and Implementation of Integrated Science in Junior Secondary Schools

Studies indicate that specialized teacher professional development programs in integrated science can improve the caliber of instruction and the learning results of students. Teachers can better understand the interdisciplinary connections within science, investigate cutting-edge teaching techniques, and create curriculum materials that are in line with integrated science objectives by taking part in workshops, seminars, collaborative planning sessions, and other professional development activities.

Additionally, school administrators can assist in resolving issues and facilitating the integration of integrated science into the school's instructional methods and culture by offering teachers continuous assistance and mentoring throughout the implementation process. School administrators can enable instructors to adopt innovative pedagogical approaches and modify their teaching strategies to cater to the varied requirements of their learners by cultivating an environment that values ongoing education and teamwork. various studies on TPD and gaps identified as described below.

Dolfing et al. (2021) examined strategies supporting teachers' professional development in the context of simultaneous pedagogical and content changes in curriculum innovations in America. They took an existing framework designed for professional development and adapted it to evaluate how teachers perceived it in the context of teaching science curricula that emphasize real-world applications. This modified framework served as the basis for creating activities aimed at

improving teachers' competence in three specific areas related to teaching these science units: creating a relevant classroom environment, adopting new teaching roles, and delivering new subject matter. Six secondary school teachers participated in a professional development program that followed this framework, and a qualitative inner-case analysis was used to gain insight into how they made sense of the program. The results indicated that teachers effectively integrated all three aspects into their teaching, although the process of incorporating new subject matter differed from the pathways followed for the other aspects. The study explores the relationship between these findings and the adapted framework, with the goal of deriving strategies for designing professional development initiatives that assist teachers in implementing curriculum innovations. The study was limited in sample, as only 6 teachers were involved in the study.

Looi et al. (2018) formulated a teacher professional development model for a science curriculum, leveraging mobile technology in Singapore. The study centered on establishing this model and investigating its influence on teacher behaviors within curriculum implementation. The research featured two science teachers' implementations of the curriculum, along with in-depth exploration of the teacher professional development sessions. Data encompassed teacher-led professional development sessions, classroom observations, and teacher interviews. A mixed methods and case study approach was employed to analyze teacher performance during professional development sessions and curriculum implementation. Findings indicated that the structured professional development benefited teachers through sharing, extensive feedback, and reflective opportunities, resulting in transformed classroom questioning, more student-centered activities, and enhanced student conceptual understanding of science. The study adopted a case study design while the current study adopts a correlational design.

Agyei (2021) conducted a study aimed at assessing the influence of an ICT-instructional professional development initiative on the quality and extent to which teachers were able to translate the ideas and concepts acquired during capacity building into their classroom instructional practices. The study used semi-structured survey instruments and diaries as tools to capture the various activities and events that unfolded during the implementation of the program. Findings revealed satisfaction among teachers regarding both the content of the program and the processes involved. There were inadequate conditions that hindered the effective transfer of program ideas into the school-level implementation phase. The study highlighted the need for

sustainable effects on teaching and learning. ICT-instructional professional development is conceptually different from teacher professional development, which has a wider scope.

Based on the professional competencies they believed were necessary for their jobs and their self-perceived competence levels, Njenga (2022) evaluated the learning needs of vocational teachers in Kenya. Six hundred and seventy questionnaires were distributed to 6 institutions. The teachers acknowledged a great desire for continual professional development (CPD) while feeling quite competent. Instructors who had received Initial Teacher Education (ITE) showed the greatest need for CPD, demonstrating ITE's effectiveness in making instructors aware of its significance. New teachers, however, exhibited lower perceptions of competence, highlighting the need for mentorship. The study also revealed that TVET teachers in Kenya tended to equate content mastery with effective teaching skills, underscoring the importance of reviewing the TVET teacher curriculum to enhance subject-specific teaching skills recognition and development. The study focused on TVETs, while the current study focuses on JSS.

2.2.3 Relationship between Provision of Resources by School Leaders for Instructional Support and Implementation of Integrated Science in Junior Secondary Schools

The body of research emphasizes how important it is to have enough resources to support efficient teaching and learning in integrated scientific classrooms. In addition to improving the learning environment, having access to excellent teaching resources helps educators create compelling classes that encourage active inquiry and conceptual understanding across a variety of scientific disciplines.

Research shows that teachers' capacity to carry out integrated science curricula faithfully is directly affected by the resources that are available to them. Schools are better positioned to support interdisciplinary teaching approaches and give students real-world experiences that encourage scientific inquiry and critical thinking skills when they have access to technology-rich learning environments, well-stocked science laboratories, and libraries. Various studies on the provision of resources have been carried out as described below.

Khosa and Makuvire (2021) evaluated challenges hindering the adoption of the revised curriculum in secondary schools in Zimbabwe. They employed a combination of cluster, random, and purposive sampling methods to select a representative sample of participants, consisting of 45

teachers and five school principals, chosen from a larger pool of 825 teachers and 35 school heads. This approach ensured diversity in the selection, representing various educational contexts. Data for the study were collected through the use of semi-structured questionnaires and in-depth interviews, with analysis carried out using NVivo Version 10 software. The research identified barriers to successful curriculum implementation as inadequate compensation, poor working conditions and inconsistencies in managing curriculum changes. The government took specific actions to address these challenges. These actions included recruiting a sufficient number of teachers to support curriculum implementation and provision of financial resources. These measures were proposed to facilitate a more effective and successful implementation of the revised curriculum in Zimbabwean secondary schools. The study suggested that teachers receive better salaries and improved working conditions commensurate with their societal roles. Adequate preparation of teachers in handling curriculum issues and minimizing political interference within schools were also highlighted as essential steps. The study did not correlate leadership practices in implementing integrated science in the competence-based curriculum.

Ogah (2023) conducted a study on the implementation of the science curriculum in Ghanaian senior high schools. Employing a mixed-methods approach, specifically a convergent design, the research sampled 200 Form 2 science students and observed five science teachers from four public senior high schools in the district. Quantitative data were collected via a 28-item questionnaire for students and analyzed using means and standard deviations. Qualitative data, obtained from teacher interviews and lesson observations, were organized into narrative themes. Findings underscored the need for improved science instruction, emphasizing learner-centered approaches. Recommendations included head teachers promoting learner-centered teaching and provision of adequate materials for learning. The study used convergent design, while the current study adopts a correlational research design.

Calvin (2019) conducted qualitative research exploring the implementation of curriculum by district officials in South Africa. Interviews were used for theme identification, highlighting challenges faced by these officials, including resource shortages, financial constraints for support materials, infrastructure issues, inadequate district support, and staffing deficiencies. The study concluded by advocating for qualified district officials, ongoing Department of Basic Education support, resource provision, anti-corruption measures and continuous capacity building. The study

presents a methodological gap as it solely relied on qualitative methods for data collection and analysis while this research used mixed methods. The study aimed to address this gap by employing a mixed-methods approach, thereby incorporating both quantitative and qualitative techniques to provide a more comprehensive and robust understanding of the research topic.

M'mboga (2021) focused on the early phases of implementing CBC in Kenya and its challenges. The study presents a valuable critique of the educational transformation underway in Kenya, shedding light on several key challenges and offering constructive recommendations. The study highlights the issue of resource inadequacy. This is a critical challenge as it affects the effective execution of the CBC. Resources, including teaching materials, infrastructure, and technological tools, are essential for delivering the curriculum as intended. The lack of sufficient resources can hamper the curriculum's implementation, leading to suboptimal results. According to the study, there may be misalignments between what is taught (the content) and how it is taught (pedagogy) under the CBC. Such discrepancies can result in confusion among educators and learners, potentially undermining the curriculum's overall effectiveness. This critique draws attention to the importance of ensuring that both content and teaching methods are coherent and aligned with the CBC's goals and principles. Additionally, the study underscores the significance of public participation in the curriculum change process. Engaging various stakeholders, including parents, students, teachers, and the wider community, is crucial to ensure that the CBC reflects the diverse needs and aspirations of all those involved. Limited public participation can lead to resistance to the curriculum and a lack of ownership among key stakeholders. The study advocates for adequate school resourcing. To successfully implement CBC, teachers need to be adequately prepared. This involves providing teachers with training that aligns with the principles and pedagogical approaches of the CBC.

Onyango (2022) investigated the effectiveness of resource mobilization strategies for implementing the CBC in secondary education. The study emphasized the importance of physical resources for CBC implementation. A mixed research approach was used, involving a convergent parallel design. The study sampled 87 respondents from 5 public secondary schools. Data was collected through questionnaires, interviews and observations. Findings indicated fundraising strategies were not effectively acquiring CBC resources. Recommendations included diversifying resource mobilization strategies for successful CBC implementation in secondary schools.

However, it's essential to acknowledge a limitation of the study, which is its relatively small sample size of 87 respondents. This limited scope could potentially affect the generalizability of the findings to a broader context. Nevertheless, the study's insights into resource mobilization strategies for CBC implementation in secondary education are valuable and offer practical implications for enhancing the curriculum's success.

2.3 Theoretical Framework

A theoretical framework consists interlinked concepts and ideas that are built upon established theories. It serves as a logical structure of statements, derived from and backed by empirical data or evidence. By accounting for and elucidating phenomena, a theoretical framework aims to provide explanations for the underlying reasons behind observed occurrences. According to Kivunja (2018), theories empower researchers to draw novel conclusions, enhance practical actions, and foster the development of more advanced theories. This study is guided by the social development theory and the participative leadership theory.

2.3.1 Social Development Theory

The theory, attributed to Lev Vygotsky (1896-1934), posits that each task in a child's cultural development manifests itself twice: first, at the societal level, and subsequently, at the personal level. Key principles of the theory involve the notions of the More Knowledgeable Other and the Zone of Proximal Development and scaffolding (MockingJay, 2022). The More Knowledgeable Other refers to an individual possessing greater expertise than the learner in a particular task, such as a teacher, an older adult, or a peer. It is noteworthy that the More Knowledgeable Other need not necessarily be a person; it could also be an entity or resource with additional information on the subject compared to the learner. Effective school policies regarding ICT use, proficient head teachers, teachers, and learners act as the More Knowledgeable Others, playing a crucial role in shaping the implementation of digital literacy. The Zone of Proximal Development delineates the cognitive space where the More Knowledgeable Other offers suitable assistance or instructive lessons, facilitating a child's development of skills that they can subsequently apply independently, thereby enhancing advanced mental capabilities. Collaborative learning, particularly within the zone of proximal development, is instrumental in cultivating the skills of pupils (Healy, 2015).

Lev Vygotsky's Social Development theory is not without limitations. Firstly, measuring a child's zone of proximal development proves challenging, given that this zone lacks associated metrics. Secondly, whether a wide or narrow zone of proximal development is considered desirable or undesirable depends on the context. The theory also presents a generalization of learners' zones of proximal development without accounting for the existing inequalities among them, such as differences in cultural backgrounds, abilities, ages, gender and religion (Healy, 2015).

Despite these limitations, the theory is relevant for this study as it highlights the societal role in "constructing meaning." Vygotsky emphasizes that an individual's social and cultural background influences their development, which, in turn, affects the integration of digital technologies (Law, 2022). Recognizing personal growth is best achieved by considering the cultures within the society that surrounds individuals. Advanced intellectual practices have roots in societies, leading to diverse ways of reasoning among individuals from different cultures, races, genders and religions. The theory applies to this study as it emphasizes the establishment of learner-centered classrooms where students are encouraged to solve problems and play an active role in constructing their own knowledge.

In such educational environments, students are viewed as unique individuals, and the primary emphasis is on fostering personal meaning rather than solely relying on teacher-imparted knowledge and instructor-directed activities. Through this theory, the implementation of integrated science in CBC diverges from the traditional teacher-centered approach, placing a significant emphasis on empowering students to actively engage in the learning process. The integration of science into the CBC for junior secondary schools necessitates school administrators to allocate adequate resources, that would enhance active learner engagement. Drawing from the social development theory, teacher professional development and teacher knowledge are critical in integrated science integration. Learners are empowered to build on educational foundations based on guidance from teachers, enabling them to develop their own reality and knowledge. This theory emphasizes collaboration, interaction, scaffolding and practical experiences in the learning process.

2.3.2 Participative Leadership Theory

The participative theory of leadership suggests that an effective management style is one that encourages and welcomes contributions from others (Lumbasi, K'Aol & Ouma, 2013). Leaders following this approach value the input and dedication of team members and actively involve them in the decision-making process. In the participative theory, the leader has the authority to allow others to participate in decision-making. While participation can take various forms, there is a general pattern of what typically occurs. Participative leadership encourages open debates, data sharing, and learning, which are essential elements of informed decision-making. Leaders motivate individuals to express their ideas and incorporate all available data, including the proposed solutions from the team. The leader then synthesizes this information to formulate the best possible solution, which is then shared with the group. According to Lam, Huang, and Chan (2015), participative leadership involves subordinates in the decision-making process, fostering a sense of ownership among them. It is a democratic leadership style that aims to ensure harmony in the workplace. However, it also has its drawbacks, such as the potential for decision-making to take longer, especially when conflicting ideas arise, and its lesser effectiveness with less skilled workers.

Participative leadership is not universally applicable and may not work well in every workplace environment. In the implementation of integrated science in CBC, participative leadership can be beneficial and aid in the smooth transition of curriculum changes. Participatory leaders in schools give teachers the tools, resources, and chances for professional growth they need to succeed, enabling them to take charge of the curriculum implementation process. Leaders at the CBC encourage a culture of innovation, creativity, and ongoing development in the classroom by giving teachers the freedom to decide for themselves and take the lead when adopting integrated science.

It fosters a sense of inclusion and responsibility among all members of the organization. Consequently, the team tends to perform better as individual employees are more committed to achieving the organization's goals and objectives (Zhang, Wang & Fleenor, 2011). The provision of teacher professional development opportunities and resources for instructional support would enhance the implementation of integrated science in CBC in junior secondary schools. Through effective leadership, the team becomes more cohesive, leading to improved performance even in

the absence of the leader due to increased group spirit and reduced competitiveness. However, implementing participative leadership may have some challenges. It may lead to social pressure to conform to group knowledge, and the decision-making process could take more time to achieve consensus. Additionally, it might result in higher costs, inefficiency, uncertainty and potential ineffectiveness.

2.4. Conceptual Framework

It's a network of interconnected assumptions or hypotheses that elucidate the functioning of a specific phenomenon or how its elements relate to each other (Crawford (2019). This framework is commonly depicted graphically in the form of a diagram, which aids in comprehending the proposed relationships. Essentially, a conceptual framework provides a solid basis for grasping the correlations or causal links between observations and their interpretations.

Independent Variables

Dependent Variable

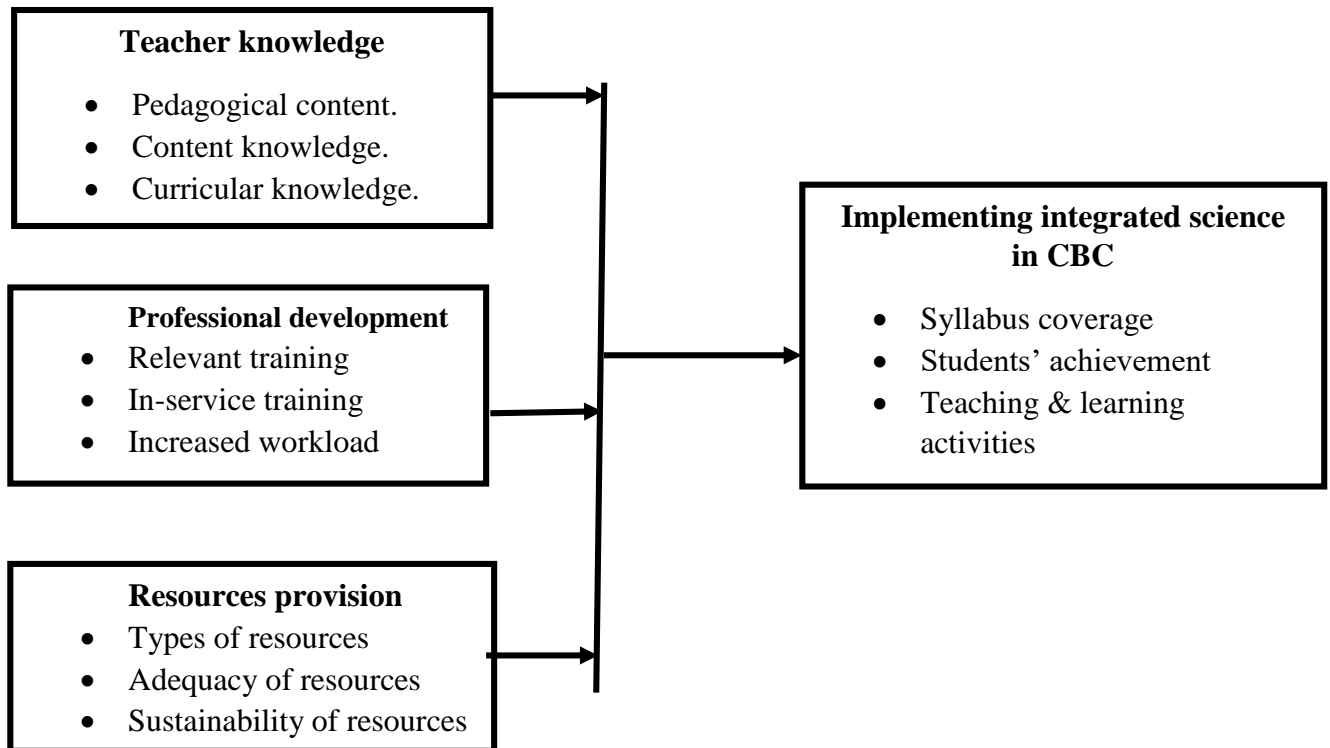


Figure 2.1: Conceptual Framework

Source: Author (2024)

Figure 2.1 indicates the independent variables as teacher knowledge, professional development and resources allocation. Teacher knowledge indicators are pedagogical knowledge, content knowledge and curricular knowledge in class. Teacher preparedness, professionalism and access to resources among teachers have a great influence over their students' achievements (Wambua & Samuel, 2019). The correlation between teachers' capabilities and students' performance is significant, highlighting the importance of investing in teachers for curriculum implementation (Njenga, 2022). Proficiency in content knowledge enables teachers to create significant links between concepts, improving students' understanding and retention (Khosa & Makuvire, 2021). Professional development was measured through relevance of the training, in service training and continuous education and its sustainability. Teacher professional development programs in integrated science can improve the quality of instruction and the learning outcomes (Uzule, 2020). Teachers can better understand the interdisciplinary connections within science, investigate cutting-edge teaching techniques and create curriculum materials that are in line with integrated science objectives by taking part in workshops, seminars, collaborative planning sessions and other professional development activities (Sakib & Obra, 2019).

Resources provision indicators include the type of resources, resources adequacy and sustainability of resources. The implementation of CBC necessitates proficient and well-informed facilitators, sufficient resources and appropriately equipped educational institutions (Ogah, 2023). Okoth (2018) highlights the importance of resources, teachers' preparedness and CBC-focused training. To successfully implement the CBC, instructors must be well-informed and prepared to adopt coaching and facilitation roles instead of merely transmitting knowledge to students. Awili and Begi (2021) acknowledge that a teacher's value and quality are important, making teacher training a crucial factor curriculum implementation. This study seeks to assess the relationship between the independent variable and dependent variable, implementation of integrated science in CBC, indicated by syllabus coverage, student achievement and teaching & learning activities.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The research design used for this study is discussed in this chapter. Details on how a sample was selected are also highlighted, along with information about the target population. Tools that were used for data collection are also outlined. The methods used to examine the data are covered in the chapter's later sections. The chapter concludes by looking at the ethical considerations.

3.2 Research Design

This study used a correlational research design. A correlational research design examines connections between variables without the researcher having control over any of them. A correlation indicates how strong and/or in which direction variables are related. A correlation can have either a positive or negative direction (Mohajan ,2017). This design entails observing and examining the study variables as they naturally exist, without any intentional manipulation or alteration. The design was important to the study as it helped to assess the relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands Subcounty Nairobi City County.

3.3 Study Location

The study was conducted in junior secondary schools in Westlands subcounty. It is one of the seventeen sub counties in Nairobi county. The sub county has 5 wards. Westlands Sub County was selected as it has a good distribution of public and private JSS and being an urban centre, it becomes a mirror for the other urban centres in the country.

3.4 Study population

This study's target population were teachers, principals and heads of departments (HODs) in the 30 JSS schools in Westlands Sub-County Nairobi City County. Table 3.1 shows the distribution of the study population.

Table 1: Target Population

Category	Population
Teachers	94
Head of departments	30
Principals	30
Total	154

Source: Ministry of Education, 2023

3.5 Sampling procedure

3.5.1 Sample size

The study selected all teachers in the 30 JSS schools in the sub county as the population is small and easily accessible. Mugenda and Mugenda (2003), a sample size of 10%-30% is adequate for analysis. Consequently, this study selected 10 HODs and 10 principals. Table 2 illustrates the sample size: -

Table 2: Sample Size

Category	Population	Sample
Teachers	94	94
Head of departments	30	10
Principals	30	10
Total	154	114

3.5.2 Sampling Techniques

The study employed a census for all the 30 schools in the sub-county, as the population was small and easily accessible. Five Heads of Departments (HODs) from public schools and five HODs from private schools were also purposively sampled. 5 principals from a public school and 5 principals from private schools were purposively selected for the study. Nyimbili and Nyimbili (2024) note that, qualitative samples are purposive, meaning they are chosen specifically for their

ability to provide richly detailed information relevant to the phenomenon being studied. Indeed, Herber and Barroso (2020) suggest that qualitative sample sizes should be large enough to enable the development of a 'new and richly textured understanding' of the phenomenon being studied, but also small enough to ensure that 'deep, case-oriented analysis' of the qualitative data is feasible. Moreover, Morse (2015) argues that collecting more usable data from each participant reduces the number of participants needed. Similarly, Sim, Saunders, Waterfield and Kingstone (2018) emphasize the importance of aligning the operationalization of saturation with the research question, theoretical perspective, and chosen analytic framework. Consequently, data saturation can be achieved with a sample size of five to fifteen respondents (Sim et al., 2018).

3.6. Data Collection Procedure

3.6.1 Data Collection Techniques

The data collection procedure commenced with the recruitment and training of one research assistant, who was trained on the research objectives. The distribution of questionnaires was conducted in person to ensure an even distribution of respondents, with all schools being visited. The study's objectives were clearly communicated to the participants, and those who agreed to participate were provided with the questionnaires and given ample time to complete them. In cases where participants encountered difficulties in filling out the questionnaires, both the researcher and the research assistant were available to assist. Subsequently, the questionnaires were collected, and their accuracy examined.

The researcher then held interviews with the sampled principals and HoDs. This commenced with booking appointments with the principals one week in advance. The study's objectives were explained to these respondents, and each interview session was timed to take approximately 30 minutes to obtain in-depth information. The interviews were recorded for examination and respondents were informed of the recording, most respondents were not comfortable being recorded but were ready to give the responses.

3.6.2 Data Collections Tools

Data was collected through mixed methods using questionnaires and interviews. The study provided a structured questionnaire to the teachers of integrated science in all the schools, with

detailed instructions on how to complete the questionnaires to ensure accuracy and consistency in the responses. The researcher reassured respondents that their participation in the study entailed no risk. Additionally, the study conducted interviews with Heads of Departments (HoDs) and sampled Junior Secondary School (JSS) principals to gather additional information.

3.6.3. Ethical considerations

An authorization letter from KCA University was sought. Additionally, a permit from the National Council of Science and Technology (NACOSTI) was also sought. The collected data was for academic purposes. Participants were informed of the research's objectives, and their informed consent was sought. Respondents willingly provided the information requested from them, and the data provided by them was treated with the utmost confidentiality. The study prioritized the preservation of the integrity of the crucial data being gathered. No participant was individually identified based on the information provided in the questionnaire, thus safeguarding the rights and privacy of the respondents. Participants were specifically advised not to include any personal identifying details.

3.7 Validity and Reliability of the Research Instruments

3.7.1 Pilot Study

A pilot study was carried out before the major data collection phase, and a preliminary study was conducted to assess the validity and reliability of the research instruments. The pilot study was conducted in two schools, one private and one public: Moi Educational Centre in Lang'ata sub-county, Nairobi County and PC Kinyanjui Road Primary School in Dagoretti North sub-county, Nairobi County. A subset of 12 responses made up the pilot test group, following Connelly's (2008) recommendation that the pilot sample should make up 10% of the anticipated sample size for the main study. The 12 participants were informed of the study's goals and purpose. They were then given questionnaires to complete, and the researcher took note of any difficulties experienced by the respondents, modifying the statements when necessary.

3.7.2. Validity of the Research Instruments

To assess the quality of the research instruments, an evaluation was conducted encompassing construct, content and criterion validity (Sürücü & Maslakçı, 2020). Construct validity was employed to ascertain whether the instruments effectively captured the intended concepts. Content validity focused on examining how well the instruments represented the research objectives by ensuring that irrelevant questions identified during the pilot study were eliminated and replaced with pertinent ones. Criterion validity was utilized to assess the consistency of the instrument tests. This involved recording and analyzing the degree of correlation among the results obtained from various instruments administered to the participants during the pilot study. The instruments were also given to the supervisors for additional inspection for any potential gaps, which were then filled by the researcher.

3.7.3. Reliability of the Research Instrument

According to Mohajan (2017), this relates to the instrument's ability to give equivalent or virtually equal findings when the same test is run repeatedly. Test-retest and internal consistency metrics were also used to assess this consistency. Under test-retest, the questionnaires were administered twice, with the second round conducted one week after the initial test. The aim was to assess the consistency of responses generated by the questionnaire across both tests. To quantify this, the correlation coefficient was employed, measuring the degree of similarity in responses. Internal consistency measured the coherence of the questions within the instrument, whereas test-retest evaluated consistency throughout various time periods. Results indicated coefficients of 0.893, 0.901, 0.872 and 0.864 for teacher knowledge, teacher professional development, provision of resources and implementation of integrated science in the CBC in JSS respectively. According to Segal and Coolidge (2018), a correlation coefficient of 0.8 is acceptable.

3.8. Data Analysis Techniques

The accuracy and consistency of the questionnaires were carefully assessed. Quantitative data was analyzed using the Statistical Package for Social Sciences, employing correlation and regression analysis techniques. Descriptive analysis was conducted to examine the data. Each independent variable was compared to the dependent variable using inferential statistics. The Pearson correlation coefficient was used to assess the relationship between the variables. Regression

analysis was also carried out to examine the cumulative effect of the factors. The study variables were tested at a significance level of 5%. The research adopted the multiple regression model for analysis: -

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where: -

Y implementation of Integrated Science, β_0 is a constant, $(\beta_i; i=1, 2, 3)$ are the Beta coefficients, X_1 is teacher knowledge, X_2 is teacher professional development opportunities, X_3 is the provision of resources by school leaders for instructional support and ε is the error term

Qualitative data was categorized into themes to facilitate analysis. Graphs, tables, and narrations were used to present findings.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSIONS

4.1 Introduction

This study sought to assess the relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands Subcounty Nairobi City County. Data was collected through questionnaires and interviews. This chapter includes demographics, descriptive statistics, inferential statistics, interpretations, and discussions, as well as data analysis based on objective ; that is, to examine to examine the relationship between teacher knowledge, teacher professional development and provision of resources by school leaders for instructional support and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.

4.2 Response rate

The study issued 90 questionnaires to the teachers of integrated science in all the schools, out of which 87 were completed and returned; this was a response rate of 97%. Additionally, the researcher successfully interviewed the 8 out of 10 principals, hence 80% responses rate. Likewise, 8 HODs out of 10 were successfully interviewed. Wu, Zhao and Aime (2022), Sammut, Griscti and Norman (2021), López (2023), Shiyab, Ferguson, Rolls and Halcomb (2023) recommend a response rate of 50% or higher for data analysis, with a 60% and 70% rate being considered very good and excellent. Consequently, the study's response rate of 97% is excellent. The response rate is as per Table 4.1:

Table 4.1: Response rate

Category	Sample	Responses	Response rate
Teachers	94	87	93%
Head of departments	10	8	80%
Principals	10	8	80%
Total	114	103	90%

Source: Research Data

4.3 Reliability results

The pilot study for this study was carried out at Moi Educational Centre and school and PC Kinyanjui Road primary school, which are located in Nairobi City County. The pilot test involved a sample of 12 respondents. Table 4.2 indicates the results of the pilot study's reliability results:

Table 4.2: Reliability results

Variable	Item	Alpha Value	Recommendations
Teacher knowledge	6	0.893	Reliable
Teacher professional development	6	0.901	Reliable
Provision of resources	6	0.872	Reliable
Implementation of integrated science	6	0.864	Reliable

Source: Research Data

The Cronbach Alpha Coefficient was calculated for all the variables. The coefficient for implementation of integrated science was 0.864, teacher knowledge was 0.893, teacher professional development was 0.901 and provision of resources was 0.872. All the variables had reliability values higher than 0.7, which was adequate in the study.

4.4 Validity tests

The study tested the questionnaire's validity. Seeking professional input from the university supervisors helped to ensure the instrument validity of the study. The questionnaire was reviewed, modified and accepted based on appropriate supervisor's recommendations. The questionnaire generated data that accurately answered the study's research questions.

4.5 Demographic information

The research sought to determine the respondents' demographic information. The study considered: Gender, age, level of education, years of experience on leadership practices on implementation of integrated science in competency-based curriculum in JSS in Westlands sub county in Nairobi Citycounty.

4.5.1 Respondents' gender

The research sought to establish the respondents' gender. Results are shown in Table 4.3.

Table 4.3 Respondents' gender

Gender	Frequency	Percent
Male	50	57
Female	37	43
Total	87	100

Source: Research Data

Out of 87 respondents, 50 (57%) were male and 37(43%) were female. This showed that 50(57%) had the highest frequency distribution as illustrated in the table above.

4.5.2 Respondents' age

The research sought to establish the respondents' age. Figure 4.1 indicates that out of 87 respondents, 14(16%) were between the age of 18-25 years, 50(57%) were 26-35 years, 20 (23%) were 36-45 years and 3(3%) were 46-55 years of age. This showed that 50(57%) had the highest frequency. It was a fair distribution as illustrated.

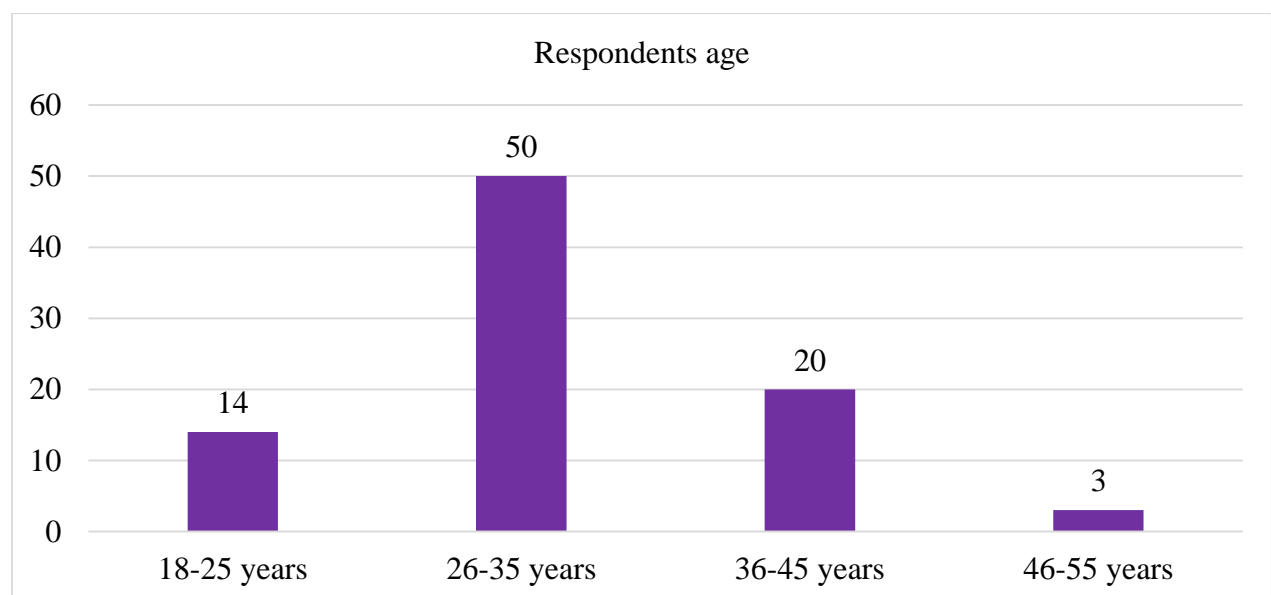


Figure 4.1: Respondents' age

4.5.3 Respondents' Education

The research sought to establish the respondents' education. Results are shown in Table 4.4

Table 4.4 Respondents' Education

Education	Frequency	Percent
Diploma	19	22
Bachelors	53	61
Masters	15	17
Total	87	100

Source: Research Data

The table above indicates that out of 87 respondents, 19(22%) had diploma education, 53(61%) had bachelors' education and 15(17%) had masters' education. This showed that bachelor's degree had the highest frequency distribution.

4.5.4 Respondents' Experience

The research sought to establish the respondents' experience. Results are shown in Figure 4.2

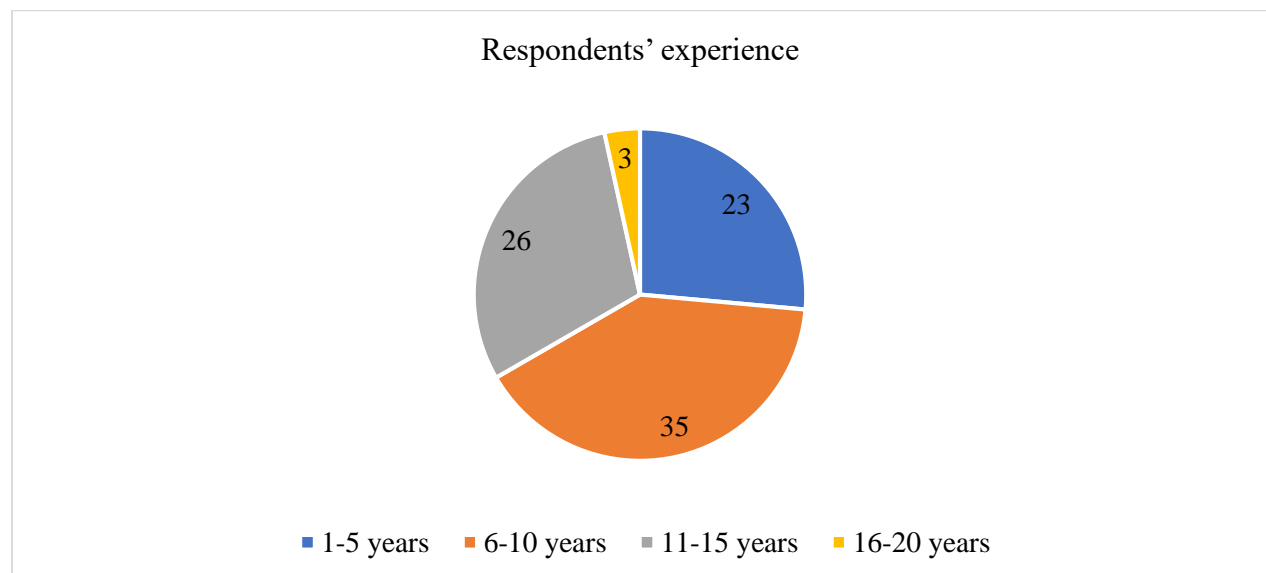


Figure 4.2: Respondents' experience

Out of 87 respondents, 23 (26%) had 1-5 years of experience, 35 (40%) had 6-10 years, 26 (30%) had 11-15 years and 3 (3%) had 16-20 years of experience. This showed that 35 (40%) had the highest frequency.

4.6 Descriptive Analysis

This section presents descriptive statistics used by the researcher to establish the main findings of the study and draw conclusions. The analyses relate to the analysis of relationship between leadership practices and implementation of integrated science in competency-based curriculum in JSS in Westlands subcounty. The analysis is presented as per the research objectives that is: to analyse the relationship between teacher knowledge on the implementation of Integrated Science in JSS, to evaluate the relationship between teacher professional development opportunities provided by school leaders and implementation of Integrated Science in JSS and to assess the relationship between provision of resources by school leaders for instructional support and implementation of Integrated Science in junior secondary schools in Westlands Subcounty.

4.6.1 Teacher Knowledge on the Implementation of Integrated Science in JSS

The first objective determined the relationship between teacher knowledge and implementation of integrated science in JSS in Westlands Subcounty. Respondents were asked six questions regarding the relationship between teacher knowledge on the implementation of Integrated Science in JSS. The responses were presented on a Likert scale. The study participants' responses are summarized and presented in Table 4.5: -

Table 4.5 Teacher Knowledge on the Implementation of Integrated Science in CBC

Statements	N	Mean	Std. Dev.	SA	A	N	D	SD
Teachers in the school are well aware of the pedagogical content in integrated science.	87	2.63	1.132	7	18	18	44	13
Instructional goals for Integrated science are clear to the teachers.	87	2.74	1.166	7	28	7	49	9
There is coherence of instruction from the teachers in the school to the learners	87	2.48	1.337	9	16	21	22	32
Teachers in the school have knowledge on integrated science content outcomes.	87	2.57	1.335	7	30	2	36	25
Teachers in the school are well aware of the curriculum content for integrated science.	87	2.80	1.310	15	14	20	36	15
Educational contexts are well known by JSS integrated science teachers in the school	87	2.66	1.301	9	23	14	32	22

Source: Research Data

Table 4.5 indicates that out of 87 responses, 7% strongly agreed that teachers in the school were well aware of the pedagogical content in integrated science, 18% agreed, 18% were not sure of that, 44% disagreed and 13% strongly disagreed (Mean=2.63; SD=1.132). Additionally, 7% strongly agreed that instructional goals for Integrated science were clear to the teachers, 28% agreed, 7% were not sure, 49% disagreed and 9% strongly disagreed (Mean=2.74; SD=1.166). Nine percent strongly agreed that there was coherence of instruction from the teachers in the school to the learners, 16% agreed, 21% were not sure, 22% disagreed and 32% strongly disagreed (Mean=2.48; SD=1.337). Moreover, 7% strongly agreed that teachers in the school had knowledge on integrated science content outcomes, 30% agreed, 2% were not sure, 36% disagreed and 25% strongly disagreed (Mean=2.57; SD=1.335). Furthermore, fifteen percent (15%) strongly agreed that teachers in the school were well aware of the curriculum content for integrated science, 14% agreed, 20% were not sure 36% disagreed and 15% strongly disagreed (Mean=2.80; SD=1.310). Moreover, 9% strongly agreed that educational contexts were well known by JSS integrated science teachers in the school, 23% agreed, 14% were not sure, 32% disagreed and 22% strongly disagreed (Mean=2.66; SD=1.301).

The study sought to know how their school supported teacher knowledge on the implementation of Integrated Science. HOD1 noted, "The school has challenges in supporting teacher knowledge on the implementation of Integrated Science. Although the school makes effort in enhancing teacher knowledge, there is the issue of insufficiency of resources. Integrating various scientific

disciplines into one cohesive curriculum requires access to a wide range of teaching materials, textbooks and laboratory equipment, which may not always be readily available. Additionally, ensuring that teachers have the necessary expertise in all areas of Integrated Science is challenging. Therefore, the school continuously work towards sourcing and developing comprehensive resources and providing targeted training to bridge any knowledge gaps among our teaching staff."

HOD4 asserted, "The school ensures that teachers are provided with internet so that they stay updated with the latest teaching methodologies and technological advancements. However, organizing regular workshops and training sessions is challenging, especially with competing demands on teachers' time. The school strives to address this challenge by leveraging online resources, peer to peer evaluation and organizing collaborative learning where teachers can exchange ideas and experiences."

HOD7 indicated, "The school encourages teachers to use various assessment methods, including project-based assessments and performance tasks, that better reflect the interdisciplinary nature of Integrated Science. Designing assessments that accurately measure students' understanding of interdisciplinary concepts is however, challenging. The school offers in service training session to teachers to enhance their knowledge."

The study inquired from the principals how their schools supported teacher knowledge on implementation of Integrated Science in CBC. Principal 4 noted, "The school has established a comprehensive professional development program that specifically addresses the interdisciplinary nature of Integrated Science. This program includes workshops, seminars and peer mentoring sessions focused on equipping teachers with the necessary knowledge and skills to effectively integrate multiple scientific disciplines into their instruction. Additionally, we provide access to a wide range of resources, including textbooks, online databases, and teaching materials, to support teachers in staying updated with the latest advancements in Integrated Science. Furthermore, we encourage collaborative lesson planning and sharing of best practices among our teaching staff to foster a culture of continuous improvement."

Principal 5 indicated, "The school offers regular workshops and training sessions specifically tailored to Integrated Science instruction, where teachers can learn about effective teaching

strategies, assessment techniques and curriculum alignment. Additionally, we provide opportunities for teachers to collaborate with colleagues, share resources and engage in peer learning communities focused on Integrated Science education. Moreover, we encourage teachers to pursue further education and training through external courses, conferences, and online resources."

Principal 8 noted, "Supporting teacher knowledge is challenging to the school. The school provides guidance, resources and support to teachers of integrated science to enhance their teaching strategies. These are designed to equip teachers with the necessary tools and strategies to effectively integrate multiple scientific disciplines into their instruction. The school encourages a culture of collaboration and reflection among our teaching staff, where teachers can share best practices, seek feedback, and learn from each other's experiences. "

4.6.2 Teacher Professional Development Opportunities Provided by School Leaders to Facilitate Implementation of Integrated Science in CBC JSS

The study's second objective was to evaluate the relationship between teacher professional development opportunities provided by school leaders and implementation of CBC IN Integrated Science in JSS in Westlands Subcounty. The respondents were asked six questions regarding the objective. Likert scale was used to present responses.

Table 4.6 Teacher Professional Development and Implementation of Integrated Science in CBC

Statements	N	Mea n	Std. Dev	S			S	
				A	A	N	D	D
The number of duties for teachers of integrated science in the school have increased.	8 7	3.06	1.473	23	2 5	2	3 3	16
Teachers in the school receive on the job training on integrated science.	8 7	2.52	1.119	5	1 8	1 8	4 1	17
There is continuous education for teachers of integrated science in the school.	8 7	2.34	1.160	2	2 1	1 4	3 6	28
Teachers in the school are involved in research work for development.	8 7	2.44	1.107	0	2 5	1 6	3 6	23
Techers in the school are offered job assignments to sharpen their integrated science skills.	8 7	2.49	1.055	2	2 1	1 6	4 6	15
Teachers in the school are members of professional organisations for sciences.	8 7	2.34	1.055	2	1 4	2 3	3 8	23

Source: Research Data

Out of 87 responses, 23% strongly agreed that the number of duties for teachers of integrated science in the school had increased, 25 % agreed, 2% were not sure, 33% disagreed and 16% strongly disagreed (Mean=3.06; SD=1.473). Additionally, 5% strongly agreed that teachers in the school received job training on integrated science, 18 % agreed, 18% were not sure, 41 % disagreed and 17% strongly disagreed (Mean=2.52; SD=1.119). Two percent strongly agreed that there was continuous education for teachers of integrated science in the school, 21% agreed, 14 % were not sure, 36 % disagreed and 28% strongly disagreed (Mean=2.34; SD=1.160). Additionally, 25% agreed that teachers in the school were involved in research work for development, 16% were not sure, 36% disagreed and 23 % strongly disagreed (Mean=2.44; SD=1.107). Two percent strongly agreed that teachers in the school were offered job assignments to sharpen their integrated science skills, 21% agreed, 16% were not sure, 46 % disagreed and 15% strongly disagreed (Mean=2.49; SD=1.055). Moreover, 2% strongly agreed that teachers in the school were members of professional organizations for sciences, 14 % agreed, 23 % were not sure, 38% disagreed and 23 % strongly disagreed (Mean=2.34; SD=1.055).

The study sought to know the opportunities for teacher professional development in the implementation of Integrated Science. HOD2 noted, "The school offers regular workshops and seminars specifically tailored to Integrated Science pedagogy, where teachers can learn about the

latest teaching methodologies, assessment strategies and curriculum alignment techniques. The school facilitates teachers to participate in external professional development opportunities, such as conferences, workshops and online courses, to further enhance their knowledge and skills in Integrated Science instruction."

HOD3 indicated, "Training sessions focus on teaching methods and curriculum development and assessment strategies. Experienced educators and external experts in the field, providing teachers with valuable insights and practical strategies to enhance their teaching practice, lead these sessions. The school provides access to the internet and textbooks to support teachers in their professional development journey."

HOD6 asserted, "The school organizes workshops on pedagogical strategies in integrated science. However, the training is not adequate as the scope is limited. Seminars ensure knowledge is shared amongst teachers. Symposiums are organized, which enhances the knowledge of teachers. The school facilitates collaborative learning communities where teachers can engage in peer-to-peer support, share best practices, and collaborate on curriculum development projects. The school provides access to science teaching materials, to support teachers in their professional development." This corroborates teachers' responses that teachers hardly received on the job training on integrated science and there was inadequate continuous education for teachers of integrated science in the school. Additionally, teachers were seldom involved in research work for development.

The study inquired from principals' the teacher professional development opportunities provided to facilitate the implementation of Integrated Science. Principal 1 indicated, "At our school, we provide targeted workshops and training sessions to enhance teachers' knowledge and skills in integrated science. The school facilitates teachers with teaching materials to support teachers in integrated science. The school aims to empower teachers with tools and knowledge needed to effectively implement Integrated Science curriculum."

Principal 3 Response: "At our school, we understand the importance of providing comprehensive teacher professional development opportunities to support the successful implementation of Integrated Science. The school has set aside some funds for teacher development that will enhance

implementation of integrated science. The school facilitates teachers in peer-to-peer support and collaboration on curriculum development. The school facilitates partnerships with other schools. Teachers in the school receive on the job training on integrated science. " This agrees with teachers' responses that there were challenges in continuous education for teachers of integrated science in the school.

Principal 7 Response: " Our school offers professional development opportunities for teachers to enhance their knowledge and skills in Integrated Science. These include workshops, seminars, and training sessions led by experienced educators. Teachers are encouraged to participate in action research projects and collaborative learning communities. Access to resources and a culture of inquiry empowers teachers to effectively implement Integrated Science curriculum and inspire students." This agrees with HOD responses that schools provided workshops on pedagogical strategies in integrated science, but the training was limited. Seminars and symposiums organised enhanced teachers' knowledge. It was also indicated that there was limited access to science teaching materials and teacher professional training was not adequate.

4.6.3 Provision of Resources by School Leaders for Instructional Support in the Implementation of Integrated Science in CBC in JSS

The study's third objective was to assess the relationship between provision of resources by school leaders for instructional support and implementation of Integrated Science in CBC in JSS in Westlands Subcounty. Respondents were asked six questions regarding the objective. Likert scale was used to present responses.

Table 4.7 Provision of Resources and Implementation of Integrated Science in CBC

Statements	N	Mean	Std. Deviation	SA	A	N	D	SD
There are adequate teaching resources for integrated science support in the school	87	2.55	1.086	10	11	11	61	7
The types of resources provided in the school are relevant for instructional teaching.	87	2.59	1.157	7	18	16	44	15
Teachers in the school are well trained on the use of apparatus and equipment for integrated science instructional support.	87	2.38	1.203	7	16	8	46	23
The schools' provision of teaching resources is sustainable for instructional support	87	2.37	1.101	5	16	9	52	18
Integrated science learning equipment in the school is of the latest model/standards	87	2.37	1.192	5	20	6	45	24
The school secures teaching resources for durability.	87	2.46	1.149	5	21	9	47	18

Source: Research Data

Out of 87 responses, 10% strongly agreed that there were adequate teaching resources for integrated science support in the school, 11% agreed, 11% were not sure, 61% disagreed and 7% strongly disagreed (Mean=2.55; SD=1.086). Additionally, 7% strongly agreed that the types of resources provided in the school were relevant for instructional teaching, 18% agreed, 16% were not sure, 44% disagreed and 15% strongly disagreed (Mean=2.59; SD=1.157). Seven percent strongly agreed that teachers in the school were well trained on the use of apparatus and equipment for integrated science instructional support, 16% agreed, 8% were not sure, 46% disagreed and 23% strongly disagreed (Mean=2.38;1.203). Additionally, 5% strongly agreed that the schools' provision of teaching resources was sustainable for instructional support, 16 % agreed, 9% were not sure, 52% disagreed and 18% strongly disagreed (Mean=2.37; SD=1.101). Five percent strongly agreed that integrated science learning equipment in the school was of the latest model/standards, 20% agreed, 6% were not sure, 45% disagreed and 24% strongly disagreed (Mean=2.37; SD=1.192). Lastly, 5% strongly agreed that the school secures teaching resources for durability, 21% agreed, 9% were not sure, 47% disagreed and 18% strongly disagreed (Mean=2.46; SD=1.149).

The study inquired from the HODs the resources provided for instructional support in the implementation of Integrated Science. HOD5 indicated, "Our school emphasizes the importance of providing comprehensive resources for Integrated Science instruction. We offer a variety of materials and tools to supplement lessons. We also have well-equipped science laboratories for hands-on experiments. Educational software and multimedia resources enhance learning

experiences and cater to diverse learning styles. We encourage collaboration and resource sharing through digital platforms and learning management systems. The school aims to support teachers in delivering engaging, meaningful Integrated Science instruction that promotes inquiry, critical thinking, and scientific literacy."

HOD8 asserted, "Our school endeavors to provide instructional support resources to enhance Integrated Science instruction. These include textbooks, reference materials, laboratory equipment, educational software, simulations, and multimedia resources. We also encourage collaboration through professional learning communities and digital platforms. Though the learning resources are not adequate, our goal is to empower teachers to deliver high-quality Integrated Science instructions." This corroborates information from teachers, who noted that there were inadequate teaching resources for integrated science support in the school. It was noted that schools' provision of teaching resources was not sustainable for instructional support.

In the same vein, the researcher inquired from the principals the resources provided for instructional support in the implementation of Integrated Science in their schools. Principal 2 noted, "Our school invests in Integrated Science, providing comprehensive instructional support resources. We have a well-stocked science laboratory, access to textbooks and free internet. We have challenges with educational software and multimedia resources for instructional science."

Principal 6 indicated, "Our school is dedicated to implementing Integrated Science through various initiatives. We offer various learning resources in time and adequately. There is also collaboration with other institutions and teachers to enhance teaching and learning in the school. However, this has faced challenges, due to the limited teacher numbers and time available for training." This agrees with information from the HODs that JSS provided instructional support resources to enhance Integrated Science instruction. The schools encouraged collaboration through professional learning communities and digital platforms.

4.6.4 Implementation of Integrated Science in the CBC

The study's dependent variable was implementation of Integrated Science in the CBC in JSS. Respondents were asked six questions regarding the objective. Likert scale was used to present responses.

Table 4.8 Implementation of Integrated Science in the CBC

Statements	N	Mean	Std. Deviation	SA	A	N	D	SD
The syllabus for integrated sciences is covered in time in the school.	87	3.05	1.210	14	32	0	53	1
There is improved pedagogical approach in integrated science courses in the school	87	2.66	1.265	9	21	16	34	20
Students in the school achieve set outcomes in integrated science.	87	2.48	1.265	5	25	11	31	28
Teaching and learning activities in the school run effectively in the laboratory.	87	2.62	1.164	7	20	14	45	14
Teaching and learning activities in the school are efficient.	87	2.54	1.354	11	16	15	30	28
There is improvement for integrated science performance among students in the school.	87	2.74	1.253	8	30	3	45	14

Source: Research Data

Out of 87 responses, 14% strongly agreed that the syllabus for integrated sciences was covered in time in the school, 32 % agreed, 53% disagreed and 1% strongly disagreed (Mean=3.05; SD=1.210). Additionally, 9% strongly agreed that there was improved pedagogical approach in integrated science courses in the school, 21% agreed, 16% were not sure, 34% disagreed and 20% strongly disagreed (Mean=2.66; SD=1.265). Five percent strongly agreed that students in the school achieved set outcomes in integrated science, 25% agreed, 11% were not sure, 31% disagreed and 28% strongly disagreed (Mean=2.48; SD=1.265). Additionally, 7% strongly agreed that teaching and learning activities in the school runs effectively in the laboratory, 20% agreed, 14% were not sure, 45% disagreed and 14% strongly disagreed (Mean=2.62; SD=1.164). Eleven percent strongly agreed that teaching and learning activities in the school were efficient, 16% agreed, 15% were not sure, 30% disagreed and 28% strongly disagreed (Mean=2.54; SD=1.354). Moreover, 8% strongly agreed that there was improvement for integrated science performance among students in the school, 30% agreed, 3% were not sure, 45% disagreed and 14% strongly disagreed (Mean=2.74; SD=1.253).

The study sought from the HODs their department's status on the implementation of Integrated Science. HOD4 noted, "The department has not made significant progress in implementing Integrated Science in its curriculum. Teachers have barely undergone any training to understand the principles and methodologies of Integrated Science instruction. The program is continually refined and improved to meet student needs and prepare them for success in the ever-changing world. Limited resources are a huge barrier to full implementation of integrated science in CBC"

HOD7 indicated, "The department has not been very successful in implementation of integrated Science into its curriculum. Teachers have not received adequate training and professional development. Innovative instructional approaches, such as project-based learning and STEM activities, have not adequately engaged students in implementation of integrated Science into its curriculum." These align with teachers' responses that the syllabus for integrated sciences was not covered in time in schools. There was little improvement in pedagogical approach in integrated science courses in schools. Students rarely achieved set outcomes in integrated science. Teaching and learning activities in the school were rarely efficient. There was little improvement for integrated science performance among students in the school.

The study sought from the principals their schools' status on the implementation of Integrated Science. Principal 7 noted, "The school has not made significant progress in implementing Integrated Science in curriculum due to a lack of teaching staff and resources. There are inadequate financial resources and equipped laboratories to support implementation of integrated Science. Innovative instructional approaches like inquiry-based learning and project-based assessments have not been implemented. The school is however committed to ensure success of the program."

The study sought to comprehend challenges in the implementation of Integrated Science in JSS in their schools. Principal 1 indicated, "The implementation of Integrated Science in our school faces challenges such as coordinating the integration of scientific disciplines into a cohesive curriculum, maintaining teacher alignment, and maintaining a broad range of knowledge and skills. Assessment and evaluation also present challenges, as traditional methods may not capture students' understanding. Addressing these requires collaboration, professional development, and adaptation of instructional strategies to meet student needs effectively."

Principal 4 noted, "The school is implementing integrated science, addressing challenges such as teachers' training and support for integrating scientific concepts. They provide professional development opportunities, align curriculum, assessments, and instructional materials, and foster a collaborative culture. Despite these challenges, they remain committed to providing students with a rigorous and enriching education, ensuring teachers have the necessary training and support to effectively integrate concepts from multiple disciplines."

Principal 6 asserted, "The school is addressing challenges related to integrated science implementation, including resource availability, professional development opportunities and curriculum alignment. Teachers need access to diverse textbooks, equipment and digital resources. Continuous efforts are made to align assessments and evaluate student understanding. Despite these challenges, the school remains committed to a supportive learning environment." These corroborate responses for the HODs that some of the challenges towards the implementation of Intergrated science in CBC implementation include: teachers lacked training and professional development, and innovative instructional approaches failed to engage students in integrating Science into the curriculum.

The researcher inquired from principals on what could be done to address challenges in the implementation of Integrated Science in JSS in their schools. Principal 3 noted, "It is important to provide continuous professional development opportunities, enhance teacher collaboration and allocate adequate resources for implementation of integrated science in the CBC. This would enhance student engagement and achievement in CBC."

Principal 5 noted, "The government should provide comprehensive support to teachers and students, including professional development opportunities, collaboration and investment in technology. There should be adequate teacher to handle science subjects. Additionally, teachers should teach science subjects which they are competent in."

Principal 8 said, " There should be continuous professional development, financial resource provision and collaboration among teachers. The government should allocate adequate budget for JSS, including employment of teachers for integrated science. Funds should be disbursed in good time to enhance implementation of integrated science in the CBC in JSS."

4.7 Inferential Analysis

The study conducted a correlation and regression analysis, which illustrated the associations between the variables. The analysis revealed the strength and direction of the relationships among variables, which explains the relationship between leadership practices and implementation of integrated science in CBC in JSS .

4.7.1 Correlation Analysis

Pearson correlation analysis was carried out and results illustrated in Table 4.9

Table 4.9: Correlation Analysis

		Implementation
Implementation	Pearson Correlation	1
	Sig. (2-tailed)	
	N	87
Teacher Knowledge	Pearson Correlation	.926**
	Sig. (2-tailed)	0.000
	N	87
Professional Development	Pearson Correlation	.923**
	Sig. (2-tailed)	0.000
	N	87
Resources Provision	Pearson Correlation	.855**
	Sig. (2-tailed)	0.000
	N	87

** . Correlation is significant at the 0.05 level (2-tailed).

Source: Research Data

The research findings highlight correlations between variables. The significance of these correlations is determined by p-values. Results showed that teacher knowledge positively correlated with implementation of integrated science in the CBC in JSS($r=0.926$ $p=0.000$). teacher professional development opportunities positively and significantly correlated with implementation of integrated science in the CBC in JSS($r=0.923$, $p=0.000$). It was established that provision of resources by school leaders for instructional support significantly and positively correlated with implementation of integrated science in the CBC in JSS($r=0.855$, $p=0.000$).

4.7.2 Hypothesis Testing

The study tested hypothesis to investigate how the independent variables relate with the dependent variable. The first objective of the study was to assess the relationship between teacher knowledge and implementation of Integrated Science in junior secondary schools in Westlands Sub-County. The first hypothesis of the study was; H01 : There is no significant relationship between teacher knowledge and implementation of Integrated Science in junior secondary schools in Westlands Subcounty. Results indicate $t=22.611$; $p=0.000$ showing that teacher knowledge is a significant determinant of implementation of Integrated Science in junior secondary schools in Westlands Subcounty. The null hypothesis that there is no significant relationship between teacher knowledge

and implementation of Integrated Science in junior secondary schools in Westlands Subcounty is therefore rejected.

Indeed, Morrish and Neesam (2021) indicate that in integrated scientific classes, teacher knowledge is critical in determining the caliber of instruction and learning outcomes for students. Proficiency in content knowledge enables teachers to create meaningful links between disparate scientific concepts, improving students' understanding and retention (Beneitone & Yarosh, 2022). Furthermore, by effectively involving students in practical exercises, inquiry-based learning, and real-world applications, teachers who possess a thorough understanding of pedagogical methodologies specifically designed for integrated science can help students develop a deeper understanding of the subject (Sakib & Obra, 2019). Results of this study's first hypothesis is indicated in Table 4.10.

Table 4.10 : Hypothesis H₀₁ Testing

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
(Constant)	0.249	0.118		2.116	0.037
teacher knowledge	0.918	0.041	0.926	22.611	0.000

a. Dependent Variable: implementation of integrated science.

Source: Research Data

The second objective of the study was to investigate the relationship between nature of teacher professional development opportunities provided by school leaders and implementation of Integrated Science in junior secondary schools in Westlands Sub-County. The second hypothesis of the study was; H₀₂ : There is no significant relationship between teacher professional development opportunities provided by school leaders and implementation of Integrated Science in junior secondary schools in Westlands Subcounty. Results indicate t=22.107; p=0.000 showing that teacher professional development opportunities is a significant determinant of implementation of Integrated Science in junior secondary schools in Westlands Subcounty. The null hypothesis that there is no significant relationship between teacher professional development opportunities and implementation of Integrated Science in junior secondary schools in Westlands Subcounty is rejected.

Dolfing et al. (2021) indicate that specialized teacher professional development programs in integrated science can improve the caliber of instruction and the learning results of students. According to Agyei (2021), teachers can better understand the interdisciplinary connections within science, investigate cutting-edge teaching techniques, and create curriculum materials that are in line with integrated science objectives by taking part in workshops (Khosa & Makuvire, 2021), seminars, collaborative planning sessions and other professional development activities (Calvin, 2019).

Additionally, school administrators can assist in resolving issues and facilitating the integration of integrated science into the school's instructional methods and culture by offering teachers continuous assistance and mentoring throughout the implementation process (Ogah, 2023). School administrators can enable instructors to adopt innovative pedagogical approaches and modify their teaching strategies to cater to the varied requirements of their learners by cultivating an environment that values ongoing education and teamwork. Various studies on teacher professional development and gaps identified as described below (Looi et al., 2021). The results of the second hypothesis are indicated in Table 4.11

Table 4.11 : Hypothesis H₀₂ Testing

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
(Constant)	-0.009	0.131		-0.069	0.945
professional development	1.062	0.048	0.923	22.107	0.000

a. Dependent Variable: implementation

Source: Research Data

The third objective of the study was to examine the relationship between provision of resources by school leaders for instructional support and implementation of Integrated Science in junior secondary schools in Westlands Sub County. The third hypothesis of the study was; H₀₃ : There is no significant relationship between provision of resources by school leaders for instructional support and implementation of Integrated Science in junior secondary schools in Westlands Sub County. Results indicate t=15.183; p=0.000 shows that provision of resources is a significant determinant of implementation of Integrated Science in junior secondary schools in Westlands Subcounty. The null hypothesis that there is no significant relationship between provision of resources by school leaders for instructional support and implementation of Integrated Science in

junior secondary schools in Westlands Sub-County is rejected. Uzule (2020) emphasizes how important it is to have enough resources to support efficient teaching and learning in integrated scientific classrooms. In addition to improving the learning environment, having access to excellent teaching resources helps educators create compelling classes that encourage active inquiry and conceptual understanding across a variety of scientific disciplines (Morrish & Neesam, 2021).

According to Connolly et al. (2022), teachers' capacity to carry out integrated science curricula faithfully is directly affected by the resources that are available to them. Schools are better positioned to support interdisciplinary teaching approaches and give students real-world experiences that encourage scientific inquiry and critical thinking skills when they have access to technology-rich learning environments (Beneitone & Yarosh, 2022), well-stocked science laboratories and libraries (Tolliver et al., 2018). Results of the study's third hypothesis are indicated in Table 4.12

Table 4.12 : Hypothesis H₀₃ Testing

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
(Constant)	0.317	0.169		1.880	0.064
resources provision	0.964	0.063	0.855	15.183	0.000

a. Dependent Variable: implementation

Source: Research Data

4.7.3 Linear regression model

A regression analysis was done to explore how the independent variables effect the dependent variable. An overview of the linear regression model is shown in Table 4.13

Table 4.13: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.966 ^a	0.933	0.930	0.30859

a. Predictors: (Constant), resources provision, professional development, teacher knowledge

b. Dependent Variable: implementation

Source: Research Data

Results reveal that the coefficient of determination, r squared is 0.933 that is, 93.3%. This means that implementation of integrated science in the CBC in JSS would vary by 93.3% due to changes in teacher knowledge, teacher professional development opportunities and provision of resources by school leaders for instructional support, at 95% confidence level. Only 6.7 % of the variations in implementation of integrated science in the CBC in JSS can be ascribed to other factors. The correlation coefficient, denoted , R , is a measure for assessing the relationship between variables. The outcomes revealed a significant and positive correlation between the variables, evident by a correlation coefficient of 0.966.

Table 4.14: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	109.219	3	36.406	382.297	.000 ^b
Residual	7.904	83	0.095		
Total	117.123	86			

a. Dependent Variable: implementation

b. Predictors: (Constant), resources provision, professional development, teacher knowledge

Source: Research Data

ANOVA results showed a level of significance at $p=0.000$, highlighting the significant link between the dependent and independent variables. This finding reveals that there exists a significant relationship between variables. Moreover, the calculated F-value was observed to be greater than the critical F-value ($382.297 > 2.719$). The model employed in the study is thus reliable and consequently, the results are considered adequate to formulate conclusive findings and offer credible recommendations.

Table 4.15: Coefficients

	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.	VIF
(Constant)	-0.175	0.093		- 1.882	0.063	
teacher knowledge	0.355	0.066	0.358	5.369	0.000	5.461
professional development	0.464	0.072	0.403	6.417	0.000	4.856
resources provision	0.302	0.053	0.268	5.670	0.000	2.748

a. Dependent Variable: implementation of integrated science in JSS CBC.

Source: Research Data

Table 4.15 shows the model equation to be:

$$Y = -0.175 + 0.355 X_1 + 0.464 X_2 + 0.302 X_3 + \varepsilon$$

Assuming that the values of teacher knowledge, teacher professional development opportunities and provision of resources by school leaders for instructional support remain fixed at zero, performance would be at -0.175. Variance Inflation Factors (VIF) for the three variables ,5.461,4.856 and 2.748 all fall below the threshold of 10. This outcome indicates absence of multicollinearity. VIF indicates the extent to which the variance of the weight coefficient is inflated due to multicollinearity. It indicates the degree of correlation between each weight and the other predictors within the model. The low VIF values here suggest that the weights have limited correlation with the predictors in the model.

Findings reveal that teacher knowledge positively and significantly relates with implementation of integrated science in the CBC in JSS($\beta = 0.355$, $p = 0.000$). A unit increase in teacher knowledge leads to 0.355 unit increase in implementation of integrated science in the CBC in JSS. Teacher professional development opportunities positively and significantly relates with implementation of integrated science in the CBC in JSS($\beta = 0.464$, $p = 0.000$). A unit increase in teacher professional development opportunities leads to 0.464 unit increase in implementation of integrated science in the CBC in JSS. It was revealed that provision of resources by school leaders for instructional support positively and significantly relates with implementation of integrated science in the CBC in JSS($\beta = 0.302$, $p = 0.000$). A unit increase in provision of resources by school leaders for instructional support leads to 0.302-unit increase in implementation of integrated science in the CBC in JSS.

4.8 Discussion of Study Findings

4.8.1 Teacher Knowledge and Implementation of Integrated Science in CBC

Teacher knowledge positively and significantly relates with implementation of integrated science in the CBC in JSS. Indeed, social development theory proposes that learning occurs through social interaction and collaboration. Teachers who possess comprehensive knowledge of integrated

science and pedagogical strategies can effectively scaffold students' understanding and facilitate meaningful learning experiences (Healy, 2015). Teachers can create collaborative learning environments where students engage in inquiry-based activities, problem-solving tasks and hands-on experiments. Through active participation and interaction with peers, students construct their knowledge of integrated scientific concepts, fostering deeper understanding and skills development (Law, 2022). Therefore, teacher knowledge, informed by social development theory, significantly relates with the successful implementation of integrated science in CBC.

Study findings corroborate those of Sakib and Obra (2019) who assessed teachers' knowledge of teaching secondary science curricula in Isabela, Philippines. They evaluated teachers' understanding of subject matter, scientific process skills, curriculum planning, and methods. They also assessed challenges, teaching techniques, resources and evaluation methods. The study found teachers were well-prepared, but had difficulty with abstract concepts and mathematical calculations. Accessibility of educational technologies was an issue. Additionally, Chemagosi (2020) highlighted the importance of teachers' knowledge in implementing CBC in Kilifi and Nandi counties. The study emphasized the role of effective school leadership in implementing CBC, highlighting the need for teachers to be well-prepared and equipped with necessary knowledge. Likewise, Isaboke et al. (2021) found challenges in CBC implementation in Machakos County, Kenya, including inadequate teacher preparation, lack of school infrastructure, understaffing, and resource shortages. Awili and Begi (2021) found head teachers prioritized administrative roles over curriculum implementation, while Okoth (2018) found instructional leadership was moderate and dependent on teacher qualifications.

4.8.2 Teacher Professional Development and Implementation of Integrated Science in CBC

Teacher professional development opportunities positively and significantly relates with implementation of integrated science in the CBC in JSS. Participative Leadership Theory promotes collaboration, shared decision-making, and empowerment in educational settings. It involves teachers in curriculum development, instructional strategies, and professional development initiatives, enhancing their ownership and commitment to Integrated Science implementation (Lam et al., 2015). This encourages sharing expertise, ideas, and innovative teaching approaches, fostering a culture of continuous improvement in JSS.

This study's findings agree with those of Dolfing et al. (2021) adapted a professional development framework for teachers to teach science curricula with real-world applications. Six secondary school teachers participated in a program aimed at improving competence in creating a relevant classroom environment, adopting new teaching roles, and delivering new subject matter. Results showed that teacher professional development relates with CBC implementation. In the same vein, Looi et al. (2018) developed a teacher professional development model for a Singapore science curriculum and noted that structured professional development improved classroom questioning, student-centered activities, and conceptual understanding of science. Likewise, Agyei (2021) assessed the effect of an ICT-instructional professional development initiative on teachers' ability to translate capacity building ideas into classroom practices. Results showed dissatisfaction with program content and processes and inadequate conditions hindered effective curriculum implementation. Additionally, Njenga (2022) examined vocational teachers and found that they desire continuous professional development. Initial Teacher Education teachers showed the most need for CPD, while new teachers needed mentorship. The study highlighted the need for subject-specific teaching skills development.

4.8.3 Provision of Resources and Implementation of Integrated Science in CBC

Provision of resources positively and significantly relates with implementation of integrated science in the CBC in JSS. This relates with the participative leadership theory which encourages collaboration, shared decision-making and empowerment (Lumbasi et al., 2013). School principals and teachers in the JSS are involved in resource allocation, curriculum design and instructional strategies, enhancing their ownership and commitment to effective implementation. Study results agree with those of Calvin (2019), who conducted a qualitative research assessing the implementation of curriculum and highlighted challenges faced by these officials, including resource shortages, financial constraints for support materials, infrastructure issues, inadequate district support and staffing deficiencies. M'mboga (2021) critiques the early stages of implementing CBC in Kenya, highlighting resource inadequacy and potential misalignments between content and pedagogy. It emphasizes the importance of public participation in the curriculum change process to ensure diverse needs are met. The study also advocates for adequate school resourcing and teacher training that aligns with the CBC's principles and pedagogical approaches to successfully implement CBC. Onyango (2022) found that resource mobilisation

strategies are not effective in acquiring physical resources for implementing CBC. It was suggested that schools should diversify resource mobilization strategies for successful CBC implementation.

The researcher inquired from principals on what could be done to address challenges in the implementation of Integrated Science in JSS in their schools. Principals note that, it is important to provide continuous professional development opportunities, enhance teacher collaboration and allocate adequate resources for implementation of integrated science in the CBC. This would enhance student engagement and achievement in CBC. This aligns with a study by Sakib and Obra (2019), who recommended continuous training for teachers. Mutale and Ng'andu (2022) study on civic education in Zambia's secondary schools found that despite receiving in-service training, teachers were not effectively implementing recommended teaching methods. The study also found that teaching resources were deficient and educators had an incomplete grasp of how to use them effectively in curriculum implementation. The study recommended the Ministry of Education to prioritize retraining teachers and undergo learner-centered approaches to enhance students' skill acquisition. Principals in this study suggested that the government should provide comprehensive support to teachers and students, including professional development opportunities, collaboration and investment in technology. There should be adequate teachers to handle science subjects. Additionally, teachers should teach science subjects which they are trained and competent in. It was suggested by the principals that the government should offer continuous professional development, financial resource provision and collaboration among teachers. According to Nsengimana et al. (2021), continuous training programs should emphasize the implementation of the practical CBC and the requirement for the availability of suitable resources should support the successful completion of the science CBC. Principals suggested that the government should allocate adequate budget for JSS, including employment of teachers for integrated science. Funds should be disbursed in good time to enhance implementation of integrated science in the CBC in JSS.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter presents a summary of findings. It also makes conclusions of the study. The recommendations of the study are proposed. The recommendations for further studies are additionally outlined.

5.2 Summary of the Findings

This section presents a summary of the study's findings as per the research objectives.

5.2.1 Teacher Knowledge and implementation of Integrated Science in CBC

The results indicated that the 57% of teachers in the schools lacked awareness of the pedagogical content related to integrated science. Fifty eight percent of teachers did not have a clear understanding of the instructional goals for integrated science, leading to lack of coherent instruction from teachers to learners. Additionally, 61% of the respondents reported that teachers were unfamiliar with the content outcomes of integrated science, revealing a significant gap in their knowledge of the curriculum. This lack of awareness extended to the educational contexts within which integrated science should be taught, indicating that junior secondary school (JSS) integrated science teachers were generally not well-versed in the curriculum content and its instructional framework.

5.2.2 Teacher Professional Development and Implementation of Integrated Science in CBC

Forty eight percent of the respondents agreed that the number of duties for teachers of integrated science in the school had increased. Fifty eight percent of the teachers in the schools did not receive job training on integrated science and 64% of the respondents noted that there was no continuous education for teachers of integrated science in the schools. Fifty nine percent of the teachers in the schools were not involved in research work for development and were not offered job assignments to sharpen their integrated science skills. Only 16% of the teachers in the schools were members of professional organizations for sciences. The school provided workshops on integrated science pedagogy, seminars, and workshops, but lacked adequate training due to their limited scope. There was limited access to science teaching materials and teacher professional training was not

adequate. The schools offered workshops and seminars on Integrated Science pedagogy, focusing on teaching methods and curriculum development. However, the training was limited and the scope was not adequate. The schools provided access to science teaching materials and facilitated collaborative learning communities. Principals expressed their commitment to providing comprehensive teacher professional development opportunities, setting aside funds for such development, facilitating peer-to-peer support, and partnering with other schools. Principals also emphasized the importance of access to resources and a culture of inquiry in empowering teachers to effectively implement Integrated Science curriculum and inspire students.

5.2.3 Provision of Resources and Implementation of Integrated Science in CBC

Sixty eight percent of the respondents noted that there were inadequate teaching resources for integrated science support in the school. It was noted that the types of resources provided in the school were not relevant for instructional teaching. Sixty nine percent of the teachers in the schools were not well trained on the use of apparatus and equipment for integrated science instructional support. Additionally, schools' provision of teaching resources was not sustainable for instructional support. Sixty nine percent of the respondents noted that integrated science learning equipment in the school was not of the latest model/standards while 65% of the respondents indicated that most of the schools did not secure teaching resources for durability. HODs and principals expressed their support for Integrated Science instruction, highlighting the importance of materials, labs, software and multimedia resources. However, some principals faced challenges with educational software and multimedia resources.

5.3 Conclusions of the Study

This study concludes that majority of teachers in JSS lack awareness of the pedagogical content related to integrated science. There is no clear understanding of the instructional goals for integrated science, leading to a lack of coherent instruction from teachers to learners. Additionally, most JSS teachers are unfamiliar with the content outcomes of integrated science, revealing a significant gap in their knowledge of the curriculum. This lack of awareness extends to the educational contexts within which integrated science should be taught, indicating that JSS integrated science teachers are generally not well-versed in the curriculum content and its instructional framework.

The study concludes that many teachers noted an increase in their workload, yet few receive sufficient job training or continuous education opportunities in integrated science. Additionally, there is limited involvement in research activities and professional organizations among teachers. While schools offer workshops and seminars on integrated science pedagogy, the training provided is limited in scope. However, schools facilitate access to science teaching materials and enhance collaborative learning among teachers. Principals note a strong commitment to comprehensive teacher professional development, allocate funds and promote peer-to-peer. Principals emphasize the importance of access to resources and a culture of inquiry in empowering teachers to effectively implement the integrated science curriculum and inspire students.

The study concludes that, while the types of resources provided are relevant for instructional teaching, there is inadequacy in the provision of teaching resources. Despite moderate training on tools and equipment use for instructional support, there remains a gap in resource availability. HODs and principals express strong support for integrated science instruction, emphasizing the critical role of materials, labs, software and multimedia resources in facilitating effective teaching and learning. Principals encounter difficulties with educational software and multimedia resources, indicating the need for further support and investment in technological infrastructure to fully leverage integrated science education in CBC curriculum.

5.4. Recommendations of the Study

This study recommends that: -

- Junior secondary schools' management should prioritize the identification of resource gaps and develop strategic plans for procurement and development. The study highlights the critical need for schools to develop comprehensive resources, including teaching materials and laboratory equipment, to support integrated science instruction. Lack of these resources can hinder effective teaching and learning experiences.
- Junior secondary schools' boards of management should prioritize resolving the challenges associated with resource insufficiency for teachers. This entails conducting thorough needs assessments, developing strategic plans for resource allocation, seeking external funding opportunities and fostering partnerships with stakeholders. Consequently, schools can

ensure that teachers have the necessary materials and support to deliver quality education and enhance student learning experiences effectively.

- The management of JSS should leverage technological advancements and provide internet access, which plays a crucial role in keeping teachers updated on teaching methodologies and advancements in integrated science education. Online resources, webinars and professional development platforms should be availed to teachers to enhance their implementation of CBC.
- The management of junior secondary schools should invest in the development of robust assessment tools that align with the integrated science curriculum. Accurately measuring students' understanding of interdisciplinary concepts remains a challenge highlighted in the study. These tools should accurately measure students' comprehension and inform instructional practices to address areas of weakness.
- Principals of JSS should prioritize comprehensive teacher professional development initiatives, allocate funds and promote peer-to-peer learning opportunities. Principals play a pivotal role in providing guidance and support to teachers, fostering collaboration and sustaining teacher knowledge. The principals should empower teachers to effectively implement the integrated science curriculum.
- The Teachers Service Commission should employ and post more teachers with competence in each of the science subjects. This would ensure teacher workload management and promote teaching and learning in integrated science. In the same vein, the management of JSS should implement strategies to manage workload pressures, streamline administrative processes and offer incentives for participation in professional development activities. Continuous education opportunities ensure that teachers remain updated on best practices and innovations in integrated science education.
- The KICD should prioritize the development of a flexible curriculum framework that accommodates the effective implementation of Integrated Science within the CBC. This includes revising curriculum guidelines, designing adaptable instructional materials and providing professional development opportunities for teachers to enhance their competency in delivering integrated science education aligned with CBC objectives and pedagogical approaches.

- The CUE and universities should collaborate on a curriculum for integrated science teachers in physics, chemistry and biology, that incorporate interdisciplinary approaches, pedagogical techniques and practical experiences for effective instruction in the CBC.
- Teacher training workshops should expand the scope and depth of professional development opportunities to cover a broader range of topics, including assessment strategies, interdisciplinary teaching approaches, and technology integration. This ensures that teachers receive comprehensive training that addresses their diverse needs and challenges.
- The management of JSS should enhance collaborative learning communities among teachers to facilitate knowledge sharing, peer support and collaborative problem solving. Structured meetings, online forums and professional learning communities can provide avenues for teachers to collaborate, share resources and exchange ideas for improving integrated science instruction.
- The boards of management of JSS should provide leadership training, mentorship and resources to equip HODs and principals with the necessary skills and knowledge to support implementation of integrated science in CBC. Collaboration between school leadership, HODs and principals is critical for enhancing change and improvement in integrated science.
- The leadership of JSS should prioritize evaluation and continuous improvement strategies to assess the effectiveness of integrated science instruction and professional development initiatives. Regular feedback mechanisms, data analysis and stakeholder consultations can inform decision-making processes and drive ongoing improvements in teaching practices, resource allocation and support structures.

5.5 Recommendations for Further Studies

This study assessed the relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands Sub County Nairobi county. The study focused on Westlands Sub County, hence the study may not be representative of all JSS in Nairobi county. Further studies could examine implementation of integrated science in the CBC in JSS in other subcounties. In the same vein, further studies could conduct a comparative study among subcounties to enhance the comprehension of implementation of integrated science in the CBC.

The study focused on integrated science; further studies could widen the scope and assess the implementation of CBC in JSS. The study was limited to only teachers, heads of departments and principals of schools; further studies could widen the population scope and incorporate students and education administrators, to better understand implementation of integrated science in the CBC in JSS. This study focused on only teacher knowledge, teacher professional development opportunities and provision of resources by school leaders for instructional support. Further studies could focus on other independent variables and correlate with implementation of integrated science in the CBC in JSS.

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APPENDICES

Appendix I : Letter of introduction

My name is **Francis Irungu Waruiru**, a master's student at KCA University. As part of my course, I am doing research on '*relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands Sub County Nairobi county.*' The study will raise awareness among education stakeholders on leadership practices on teachers' understanding and commitment in the implementation of Integrated Science CBC in junior secondary schools. The findings will guide KICD in making informed decisions on leadership practices in the implementation of integrated science in CBC. You are kindly requested to fill out this questionnaire appropriately. Information given will be treated with confidentiality.

Thank you

Yours Faithfully,

Francis Irungu Waruiru

22/03723

Appendix II: Questionnaire for the teachers.

This study examines the relationship between leadership practices and implementation of integrated science in CBC in junior secondary schools in Westlands Sub County Nairobi county.

Kindly respond to all questions as appropriate.

SECTION A : Demographic information

1. Indicate your gender.

- i. Male
- ii. Female

2. Indicate your age.

- i. 18-25 years
- ii. 26-35 years
- iii. 36-45 years
- iv. 46-55 years
- v. Above 55 years

3. What is your highest level of education?

- i. Diploma
- ii. Bachelor's
- iii. Master's
- iv. PhD

4. Indicate your years of experience.

- i. 1-5 years
- ii. 6-10 years
- iii. 11-15 years
- iv. 16-20 years
- v. above 20 years

SECTION B : Teacher knowledge and implementation of Integrated Science in junior secondary schools

In this section, and the subsequent sections, use the below scale and tick (√) the score that you agree with most scale: *5=strongly agree ,4= agree, 3=not sure, 2=disagree and 1=strongly disagree*

Statement	5	4	3	2	1
Teachers in the school are well aware of the pedagogical content in integrated science.					
Instructional goals for Integrated science are clear to the teachers.					
There is coherence of instruction from the teachers in the school to the learners					
Teachers in the school have knowledge on integrated science content outcomes.					
Teachers in the school are well aware of the curriculum content for integrated science.					
Educational contexts are well known by JSS integrated science teachers in the school The teacher has the ability to teach three subjects					

SECTION C : Teacher professional development opportunities provided by school leaders and implementation of Integrated Science in junior secondary schools

Statement	5	4	3	2	1
The number of duties for teachers of integrated science in the school have increased.					
Teachers in the school receive on the job training on integrated science.					
There is continuous education for teachers of integrated science in the school.					
Teachers in the school are involved in research work for development.					
Teachers in the school are offered job assignments to sharpen their integrated science skills.					
Teachers in the school are members of professional organisations for sciences.					

SECTION E : Provision of resources by school leaders for instructional support and implementation of Integrated Science in junior secondary schools

Statement	5	4	3	2	1
There are adequate teaching resources for integrated science support in the school					
The types of resources provided in the school are relevant for instructional teaching.					
Teachers in the school are well trained on the use of apparatus and equipment for integrated science instructional support.					
The schools' provision of teaching resources are sustainable for instructional support					
Integrated science learning equipment in the school is of the latest model/standards.					
The school secures teaching resources for durability.					

SECTION E : Implementation of Integrated Science in Junior Secondary Schools

Statement	5	4	3	2	1
The syllabus for integrated sciences is covered in time in the school.					
Students in the school achieve set outcomes in integrated science.					
There is improved pedagogical approach in integrated science courses in the school					
Teaching and learning activities in the school run effectively in the laboratory.					
Teaching and learning activities in the school are efficient.					
There is improvement for integrated science performance among students in the school.					

Appendix III: Interview guide for heads of departments

- i. Has your school supported teacher content and curricular knowledge on the implementation of Integrated Science? Explain your answer.
- ii. What are the opportunities for teacher professional development in the implementation of Integrated Science in your school?
- iii. What resources are provided for instructional support in the implementation of Integrated Science in your school?
- iv. What is your department's status on the implementation of Integrated Science in JSS?
- v. What are some of the areas that need improvement in Intergrated science?

Appendix IV: Interview guide for principals

- i. How does the school support teacher knowledge on the implementation of Integrated Science?
- ii. Which teacher professional development opportunities are provided by the school to facilitate the implementation of Integrated Science?
- iii. What are the resources provided for instructional support in the implementation of Integrated Science in your school?
- iv. What is the status of the implementation of Integrated Science in JSS in your school?
- v. What are the challenges in the implementation of Integrated Science in JSS in your school?
- vi. What could be done to address the challenges in the implementation of Integrated Science in JSS in your school?

Appendix V : Introduction letter



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BOARD OF POSTGRADUATE STUDIES

KCAU/BPS/March.24/1

Date: Wednesday, March 13, 2024

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: FRANCIS IRUNGU WARUIRU REG NO: 22/03723

It is my distinct pleasure to introduce to you Francis Irungu Waruiru who is a student in our institution pursuing a Master of Education in the School of Education, Arts and Social Sciences.

Francis is conducting a research on a topic titled: *“Influence of leadership practices on implementation of integrated science in competency based curriculum in junior secondary schools in Westlands Sub County”* which is part of the requirements of the program he is pursuing. The research as well as the data procured thereof shall be used for academic purposes only.

Any assistance accorded to him is highly appreciated. ~

In case of further inquiry, do not hesitate to contact the undersigned.

Yours faithfully,

A handwritten signature in blue ink, appearing to read 'Dr. Jackson NdoLO', is written over a faint watermark of the KCA University logo.

DR. JACKSON NDOLO
DIRECTOR, BOARD OF POST GRADUATE STUDIES

Appendix VI : NACOSTI Licence



REPUBLIC OF KENYA



**NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION**

Date of Issue: **18 March 2024**

RESEARCH LICENSE



This is to Certify that Mr. FRANCIS IRUNGU WAREIRU of KCA University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: INFLUENCE OF LEADERSHIP PRACTICES ON IMPLEMENTATION OF INTEGRATED SCIENCE IN COMPETENCY BASED CURRICULUM IN JUNIOR SECONDARY SCHOOLS IN WESTLANDS SUB COUNTY for the period ending : 18/March/2025.

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Director General
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