INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING AND ITS INFLUENCE ON STUDENTS' PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN GEZAWA KANO, NIGERIA

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A THESIS SUBMITTED TO THE SCHOOL OF EDUCATION, DEPARTMENT OF EDUCATIONAL MANAGEMENT AND POLICY STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF EDUCATION IN RESEARCH

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DECLARATION

I Abdulkadir Shehu Adam hereby declare to the Department of Educational Management and policy studies that this thesis titled "Integration of Information and Communication Technology in Teaching and Learning and its Influence on Students' Performance in Public Secondary Schools in Gezawa Kano, Nigeria" is my original work and has not been presented partly or wholly for the award of any degree in any institution. No part of this work may be reproduced manually, electronically or otherwise without prior permission from the Author and/or Moi University.

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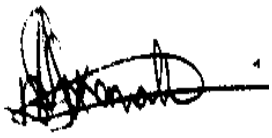

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DEDICATION

To my beloved parents; Shehu Adamu Gezawa and Hajia Maimuna Yahaya, the sources of my success. Thanks for their sacrifices and endless prayers.

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ABSTRACT

Many countries around the world have fully integrated ICT into their educational systems. The expansion of ICT use in educational settings has sparked a rush of research papers examining the link between ICT and academic performance. In Nigeria's education sector, ICT is being employed in secondary schools. However, their use in teaching and learning has remained sporadic. The purpose of this study was to examine the integration of ICT in teaching and learning and its influence on students' performance in public secondary schools in Gezawa area of Kano State, Nigeria. The study was guided by four objectives; to find out the availability of ICT infrastructure and their influence on students' performance; to determine teachers' attitude towards integration of ICT in teaching and learning and their influence on students' performance; to establish teachers' competence on ICT and their influence on students' performance; and determine school support on ICT integration and their influence on students' performance. The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Davis, and Morris (2003) were used to guide the study. The sample size consisted of 152 teachers and 297 students from 16 schools. Questionnaires for teachers and document analysis for students were used to collect data in this study. Descriptive statistics included frequency counts, percentages, means and standard deviation, whereas inferential statistics involved Pearson Product Moment correlation coefficient, factor and multiple regression analysis. The results of the study revealed a weak negative relationship ($r=-.068$, $p>.05$) between availability and student's performance, a significant positive relationship ($r=.178$, $p<.05$) between teacher's attitude towards ICT integration and student's performance, a weak negative relationship ($r=-.021$, $p>.05$) between teachers' competence on ICT and students' performance, and a weak positive relationship ($r=.023$, $p>.05$) but insignificant at .05 between school support on ICT integration and students' performance. Regression results gave a coefficient determination of $R^2 = .042$ which means 4.2% variation in students' performance can be explained by the four predictor variables combined. It can be concluded that availability of ICT infrastructure and teachers' competence on ICT were negative for students' performance, while teachers' attitude and school support on ICT integration were positive for students' performance. The researcher recommends that the government through the Ministry of Education should provide enough ICT resources to secondary schools, ensure more in service training, and incorporate ICT training in all teacher training courses. Besides ICT awareness and integration strategies should be prioritized by school managers to arouse and maintain positive staffs' attitudes and ensure utilization of available resources as they were significant for students' performance. This would help secondary schools in their long-term, continuous efforts for the integration of ICT and its improvement thereby raising students' performance.

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ABBREVIATIONS AND ACRONYMS

CERM-ESA East and South African-German Centre of Excellence for Educational Research Methodologies and Management

CVI Content Validity Index

FC Facilitating Conditions

FME Federal Ministry of Education

ICT Information and Communication Technology

ICTs Information and Communication Technologies

IT Information Technology

ITS Intelligent Tutoring Systems

NCE National Certificate in Education

NGOs Non-Governmental Organizations

NPE National Policy on Education

PEx Performance Expectancy

SPSS Statistical Package for the Social Sciences

UNESCO United Nations Educational Scientific and Cultural Organization

USA United States of America

UTAUT Unified Theory of Acceptance and Use of Technology

VR Virtual Reality

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1. Introduction

The fundamental elements of the study on the integration of ICT in teaching and learning are presented in this chapter of and its influence on students' performance. It covers information on the background of the study, the statement of the problem, the purpose of the study, the study's objectives, and the study's hypotheses. Along with them, the chapter discusses the significance of the study, its scope and limitations, its assumptions, its theoretical and conceptual framework, and finally the operational definition of the study's essential concepts.

1.2. Background of the Study

Mudasiru (2015) pointed out that information and communication technologies (ICTs) are essential and necessary aspects in the world of today. Because of ICT's widespread use, enormous technological, social, political, and economic changes have taken place, creating a society of networks centered on ICTs (Castells, 2016). According to Lemke & Coughlin (2017), the pervasive effect of ICTs has not gone unnoticed in the realm of education. At traditional and distance learning institutions, ICTs have unquestionably had an impact on the quality, quantity, and excellence of teaching and learning as well as research. Numerous studies, such as those conducted by Belts (2013) and Francisca (2017), among others, have empirically verified that new technologies motivate students and ICTs have the ability and potential to improve the practice, quality and effectiveness of teaching, learning and research across all educational levels. But, in order to do this, a strategic plan of action must be put in place in such a way that the execution procedure should be consistent and coherent. (Heaney, 2013). Teaching and learning be can improved through ICT by providing active, interactive, powerful, dynamic, and interesting information, as well as real opportunity for individualized education (Lemke, 2017). Information and communication technologies have the ability and potential to deepen skills, accelerate and enhance; to engage, fascinate and motivate students in learning; to assist students in making the connection between their school experiences and their job habits; to contribute to the economic viability of tomorrow's workforce; to contribute to significant improvements in the school; to improve teaching and course of instruction; and to give opportunities for students to

connect with the rest of the world in all aspects (Davis & Tearle, 2019). Information and communication technologies (ICTs) may boost the school's efficiency and productivity, resulting in a variety of tools to assist and lift professional action and activities of teachers and instructors (Kirschner & Woperies, 2013). Honey, Culp, and Mandinach (2013) proposed some primary justifications for the use of ICTs in teaching and learning based on an examination of 28 important papers on the integration and use of technology in American schools. They said that technology is typically used as (a) a tool to address problems in teaching, learning and instruction. (b) a catalyst for transformation, and (c) a key driver for competitiveness in the marketplace and economy.

Globalization has significantly improved our communication avenues in the twenty-first (21st) century. Issifu and Buabeng-Andoh (2014) reported that many countries in the world have recognized some opportunities presented by the developing information age embodied by ICTs. Such developments are propelling national development initiatives and efforts around the world, as such, a number of developed, developing and even some underdeveloped countries are looking into ways to speed up their development processes by incorporating ICTs into their economies and social structures. According to Law and Pelgrum (2013), in the mid-1980s, ICTs problem in education became more important in policy making when relatively inexpensive computers became available to the general public. They added that, the development of the digital economy and global financial competition compelled governments all over the world to arrange high-quality and long-term learning through provision of educational opportunities to everybody. Wallet (2014) cited that, strategy makers usually believe that integration of information and communication technology (ICT) in education can help people create a talented work restriction and encourage social adaptation to compete in a global market. They highlighted that the use of ICT in teaching and learning has a multiplier effect across the educational framework, since it improves learning and gives understudies new abilities; gaining access to understudies who have limited or no access (particularly those in remote and rural areas); improving and supporting instructor preparation; and reducing costs related to the delivery of traditional teaching.

One of the fundamental human right is the right to education which is the process of providing individuals with the basic knowledge, skills, and values necessary to become effective citizens in

their immediate communities (Wolfenson, 2019). Education is key to human rights according to the Dakar Action Framework, is also vital and necessary for all other human rights as well as development. Education is considered as the foundation of human cultural and social as well as economic advancement (Martinez & Guzman, 2013). Because of the acceleration in the rate of technological change in the world, technology must find a place in education to assist students in meeting the needs of the twenty-first century. The use of radio, television, cellular phones, cameras, computer hardware and software, satellite systems, and the myriad applications and services linked with them like videoconferencing and distance learning have increasingly been utilized in the educational platform (Aypay, 2020). According to Ikpeama (2018), ICTs teaching strategies are frequently based on cognitive view of teaching and learning, and the areas in which teachers can use technology in their delivery are diverse. Even though such teaching methodologies are hard to find, new and intriguing tools and procedures are regularly created, as is the case with most technology advancements. Projectors, multimedia, CDs, web-based learning, intelligent tutoring systems (ITS), virtual reality (VR), audio visual aids, computer-assisted training, and a number of other recent network innovations are examples of such capabilities (Stephen et al. 2017). Many countries around the world have fully integrated ICT into their educational systems. Coutries like Philippines, Indonesia, Malaysia, Uzbekistan, and Vietnam have developed ICT policies to make teaching and learning more engaging and convenient for students and teachers. Like in Canada, school principals and instructors use information and communication technology (ICT) for educational objectives such as lesson planning, implementation, and evaluation (Luu & Freeman, 2016). Andres and Roland (2019) noted that, thanks to developments in IT, such as quick, low-cost computer power, worldwide networking, infrastructure, and extensive databases, comprehension of many problems in chemistry and simulation of complicated biological processes has become more relevant and achievable. This facilitates the understanding of scientific topics and allows pupils to grasp them more quickly. While ICTs continue to grow in Western and Asian countries, Elisha (2021) pointed out that African countries are still lagging behind in terms of implementation, widening the digital and knowledge disparities. ICT in schools serves two major purposes: first, to meet society's demands for ICT skills, and second, to better and improve the quality and quantity of education in schools (Sorgo, Verckovnik and Kocijancic, 2017). Therefore, ICTs is increasingly becoming important in society's day-to-day operations and globalization. ICT is necessary part of

everyday life and it plays a very important role in globalization for society that is why it's used in schools (Kubiatko, 2016). Due to this, ICT is seen as critical in meeting society's expectations for ICT skills and in helping to improve educational quality.

In most African secondary schools, ICT integration is an uncommon occurrence in the educational system. Conflicts (ethnic, cultural, religious, social and political), low economic development rates and diseases (like HIV/AIDs) in developing nations, notably in Sub-Saharan Africa, all have a negative impact on education quality. This has hindered the growth of education in these countries, requiring schools to rely on basic instructional resources such as chalk and blackboards. This has a negative impact on educational advancement. As a result, many of African developing countries have begun to embrace technology and innovation, which has the potential to be a powerful development tool. The positive impact of ICT on development of industrialized countries makes it a vital requirement for development of most African countries. In Kenya for example, ICT usage in schools is critical to help the growth of social and financial justice (Maiyo, 2019). According to Buabeng-Andoh and Issifu (2014), in Ghana, a National Policy on ICT Plan and Development was established in 2002 to develop, formulate and ICTs policy termed as Information and Communication Technologies (ICTs) for Accelerated Development, this is as effort of Ghana's Government engagement to a broad and comprehensive program for rapid implementation and utilization as well as exploitation of ICT in the education sector and others in the country.

The expansion of integration and use of ICTs in educational environment have not only become a legislative goal in many countries, but also sparked a rush of research papers examining the link between ICT and academic performance. In Nigeria's education sector, there have been some changes that show that ICT is being employed in secondary schools. However, despite enormous investment in resources and training, secondary schools are still far behind the curve in using ICTs in science teaching, learning and instruction (Machin, McNally and Silva, 2017; Eteokleous, 2018). This study sought to investigate the integration of ICT in teaching and learning and its influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

1.3. Statement of the Problem

A number of teachers in African countries have not incorporated ICT in teaching and learning (Tedla, 2012). Nigeria has advocated for and pursued technological growth, but the results have been both unsatisfying and encouraging (Adedayo, 2018). Despite the obvious importance of ICT in education, as well as massive capital investments by both the Federal and State governments through ICT-driven projects such as "school net" (Okebukola, 2014 and Adomi, 2016) aa well as donations from non-governmental organizations to Nigerian secondary schools, their use in teaching and learning has remained sporadic. Performance among learners in Kano State has been dismal with reported failures ranging from 39%, 48%, 57% 52% and 61% for the years 2017, 2018, 2019, 2020 and 2021 respectively **(**KSSSSMB, 2022). Available literature has demonstrated a direct link between integration of ICT in teaching and learning and students' academic performance. Integration of ICTs in teaching and learning help students with learning at their own expense that greatly improve their performance (Valasidou and Bousiou, 2015). On the contrary, Leuven et al. (2014) claim that there is no evidence for a link between increased educational use of ICT and students' performance. In fact, they find a consistently negative and marginally significant relationship between use of ICTs and student performance. In addition, some students may use ICT to increase their leisure time and have less time to study.

Given the contradictory findings on the relationship between integration of ICT in teaching and learning and student's performance, there is need to probe this issue further. This study therefore examined the integration of ICT in teaching and learning and its' influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

1.4. Purpose of the Study

The purpose of the study was to examine the integration of ICT in teaching and learning and its influence on student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

The following particular objectives served as the study's guiding principles:

i. To find out the availability of ICT infrastructure and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.
ii. To determine teachers' attitude towards integration of ICT in teaching and learning and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.
iii. To establish teachers' competence on ICT and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.
iv. To determine school support on ICT integration and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

1.5. Hypothesis

i. $H0_1$: There is no significant relationship between the availability of ICT infrastructure and student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria.
ii. $H0_2$: There is no significant relationship between teachers' attitude towards integration of ICT in teaching and learning and students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.
iii. $H0_3$: There is no significant relationship between teachers' competence on ICT and student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria.
iv. $H0_4$: There is no significant relationship between school support on ICT integration and students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

1.6. Justification and Significance of the Study

1.6.1. Justification of the Study

In Nigeria, there have been some changes in the education sector which indicates that ICT is being used in secondary schools. The Federal Ministry of Education's National Policy on Education (FME-NPE, 2013) recognizes the critical significance of ICTs in today's world and has integrated ICTs throughout Nigerian education. Despite enormous investment in training and resources, schools are still far behind the curve when it comes to using ICT in science teaching,

learning and instruction. And despite the evident usefulness of information and communication technology (ICT) integration in education, as well as massive capital investments by both the Federal and State governments through ICT-driven projects such as "school net" and donations from non-governmental organizations to Nigerian secondary schools, some teachers remain hesitant, ineffective, and unproductive in their use of ICT to improve students' academic performance. In view of this, this study sought to examine and investigate the integration of information and communication technology (ICT) into teaching and learning and its influence on student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

1.6.2. Significance of the Study

The outcome of the study investigated the integration of information and communication technologies (ICTs) into teaching and learning and its influence on student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria. The findings of the study were expected to immensely benefit the government, the school authorities, parents and guardian's, teachers, NGOs, students, and researchers as well.

The results of this study were expected to help the government understand the importance of providing ICT infrastructure/support and suitable materials to schools so that teachers may use them in their teaching/instruction, and students can use them in their own learning. The results also were anticipated to be valuable to the ministry of education, which aims at integrating ICT into teaching, learning and instruction in all Nigerian secondary schools. They will be told if there are ICT resources available in schools, teachers' attitudes and competence level concerning the use of ICTs and resources, as well as their effects on student's performance, all of which will help to structure ICT pedagogies for teaching and learning in teacher training programs. The results of the study were expected to aid school administrators to understand how to efficiently manage available ICT facilities and other learning resources so that instructors and students may access them when needed. As the joy and happiness of every parent and guardian is to see his/her child is performing well and since ICT infrastructure can boost student performance, findings of the study were expected to benefit them, as they will be more aware of their obligations in providing essential learning materials (such as ICT tools) for student's practice at home as well as monitoring their children's progress.

The study's findings and conclusions were anticipated to be beneficial to teachers as it will present useful details that can be used to enhance students' performance. They will be forced to reconsider their approach and methodology for teaching, particularly as it relates to ICTs usage into their teaching and learning process. Through final recommendation and suggestions of this study, the findings were expected to also provide key policy pronouncements on how ICTs might be used to improve student performance. The study's recommendations were anticipated to assist school administrations, boards of management, and non-governmental organizations (NGOs) working in the education sector in the study area in prioritizing and providing student's with the required ICT resources to boost their academic performance in their schools.

The study was also expected to aid students who must learn to manage and balance their time in order to contribute to society's progress. They should be more informed of the benefits of ICT because it will batten their creativity and technical skills without detracting from their core goal of reading. It is also expected to aid students by teaching them how to use ICT in their studies.

Finally, the outcomes of this study were expected to contribute to the most recent literature in the area of ICT integration in teaching and learning and its influence on student's performance, thereby forming the empirical literature for future research in the field.

1.7. Scope and Limitation of the Study

The study was designed particularly for the investigation of ICT integration teaching and learning and its influence on student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria. Data were collected from teachers and document analysis between November, 2022 and January, 2023. The study was attempted to measure ICT integration in terms of infrastructure, teacher competence, teacher attitude and school support. However, to achieve complete estimation of these variables as used in the questionnaire were not possible but the study estimated them based on available literature.

It was impossible to include all aspects of variables involved with the examined subject of the study. Because of a shortage of time and resources, all the variables were not covered, and the study was limited in the following ways:

- This study used questionnaire to collect data which generated self-report data that was not verified.
- This study only covered teachers and their student's in public secondary schools of Gezawa Area, therefore findings were not generalizable to other students and teachers.

1.8. Assumptions of the Study

It was assumed that there was ICT infrastructure/support available in schools for teaching and learning of and it was assumed that most of the teachers have knowledge on how to integrate ICT in their teaching; as such the researcher assumed that most of them are utilizing the available ICT infrastructure during their course of instruction. The researcher assumed that most of the schools have computer laboratory to accommodate the class during lesson when the need arises. It was assumed that all students in the schools have access to ICT facilities that are readily or easily available in the school. The researcher goes further and assumed that teachers' opinions and attitudes regarding utilizing ICT in teaching and learning vary which may have influence on students' performance.

1.9. Theoretical Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT), created by Venkatesh, Davis, and Morris in 2003 were used as a theoretical framework to direct the research. UTAUT has identified four important factors (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions). The first three are direct predictors of usage intent and behavior, whereas the fourth is a predictor of user behavior. The impact of the four fundamental elements on usage intention and behavior is said to be moderated by gender, age, experience, and voluntariness of use. In essence, according to UTAUT, behavioral intention to utilize a technology is influenced by performance expectancy, effort expectancy, and social influence, while behavioral intention and facilitating conditions determine technology use. In addition, different combinations of the four moderators have been theorized and found to regulate certain UTAUT interactions. Moreover, self-efficacy, anxiety, and attitude toward using technology are mediators, not direct drivers of behavioral intention.

Venkatesh et al., (2003), Performance expectancy (PEx) is defined as a person's belief that using the system will assist him or her improve his or her performance and so improve the quality of

his or her job. The degree to which an individual believes that an organizational and technological infrastructure exists to support use of the system is characterized as facilitating conditions/compatibility (FC). In terms of the mediators, psychologist Albert Bandura (1995) defined self-efficacy as a person's belief in their own ability to succeed in a certain scenario or complete a task. A person's entire emotive reaction to utilizing a system might be defined as their attitude toward using technology (Venkatesh et al., 2003).

This theory was chosen because it is particularly useful in understanding technological innovation and how its characteristics influenced school administrators to integrate technology, as well as the innovation, decision processes, and stages involved, the innovativeness and technological needs of various adopter categories, communication channels used by individuals to share information related to technology adoption, and the organizational unit of the. Principals, senior instructors, and assistant teachers all need to be familiar with modern technology. Computers, the internet, and related applications should all be presented to them. Technical assistance should be supplied in equal measure, they must be persuaded and willing to participate actively in the implementation process by paying attention to various aspects of the situations in which the innovation is employed, and they should be given equal technical assistance. At the decision-making level, principals and teachers must be trained; this will result in the development of skills and the formation of new attitudes toward innovation, resulting in a favorable view of its implementation. During the implementation phase, principals, senior teachers, and assistant teachers consider the benefits and efficacy of integrating ICT in school management, teaching, and learning, and indicate their willingness to do so. The theory's characteristics were used in this study to explain why some teachers employ ICT in their teaching and learning assignments while others do not. Factors that aid or obstruct ICT integration in secondary schools teaching and learning can be explained, shown, and accounted using UTAUT theory. The theory also aids educators in identifying characteristics that make ICT integration in teaching and learning to become potentially more appealing to users. Rodgers (2011) reported that, the pace of adoption of a new technology is determined by the communication channels used to spread news about it and the nature of society. This can be accomplished in schools through training or ICT literacy upgrading courses, as well as Ministry of Education policy statements and circulars. The theory was chosen for this research because it

emphasizes the viewpoints and elements that influence ICT integration in secondary school teaching and learning.

1.10. Conceptual Framework

A conceptual framework is a model of presentation in which a researcher graphically or diagrammatically depicts the link between variables in a study (Orodho, 2009). As a result, as shown below, the conceptual framework is a diagrammatic representation of the imagined link between study variables.

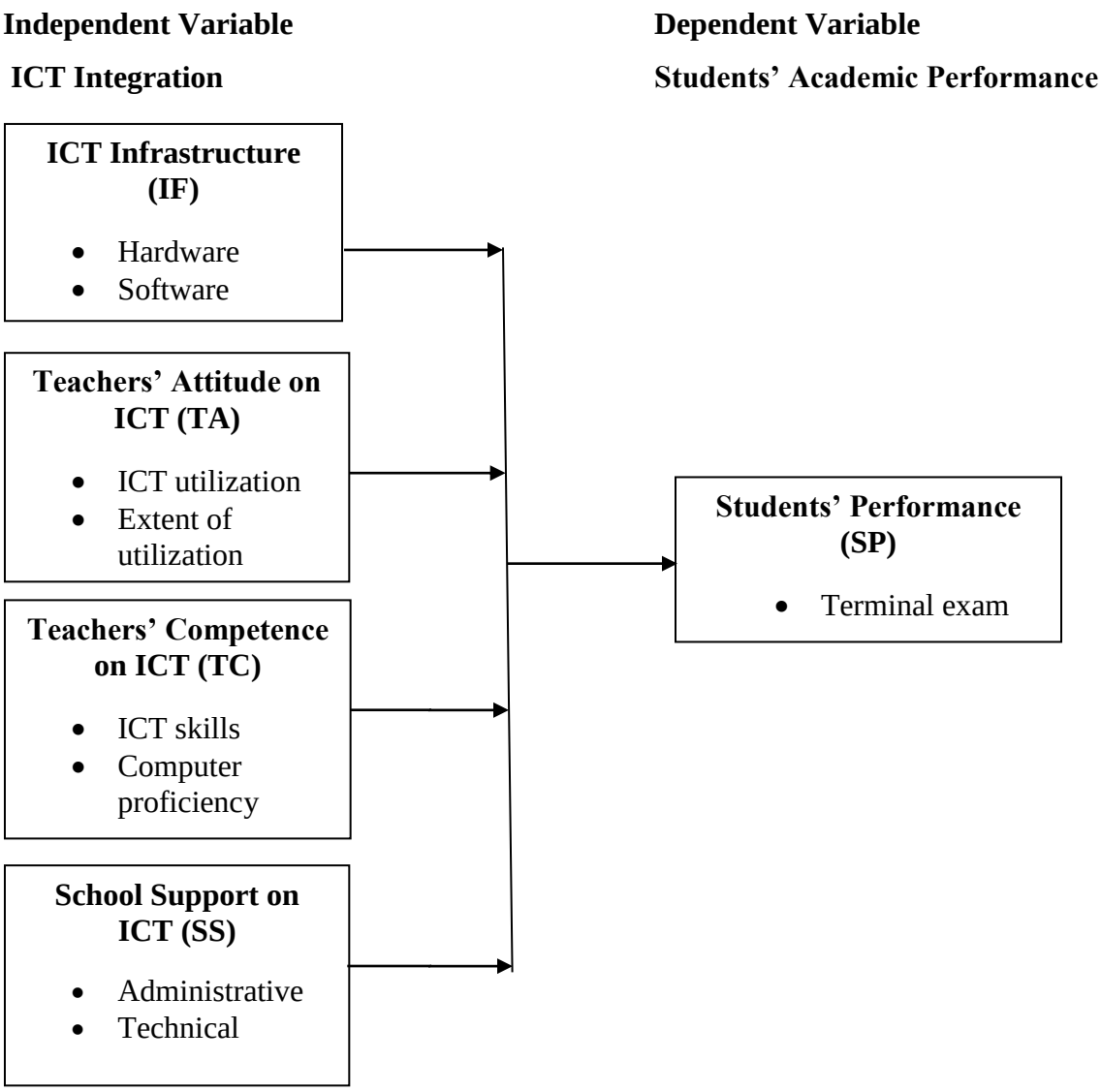

Figure 1.1: Conceptual Framework

1.11. Operational Definition of Key Terms

ICT Integration: The act of using and incorporating ICT: for example, incorporating ICT into teaching and learning

ICT Infrastructure: Projectors, computers, radio, television, networked computers and the internet, personal digital assistants like tablets and smartphones, applications, programs, smart boards, led-display boards, and other tools and equipment are included here.

Teachers' Attitude: a feeling or way of thinking that affects teachers' behavior which shows their tendency to express an opinion about the use of ICT tools in teaching and learning, either favorably or unfavorably

Teachers' Competence: This means teachers skills and quality of being able or suitable to perform a particular task successfully or efficiently

Teaching and Learning: Teaching and learning is a process that includes many variables. These variables interact as learners work toward their goals and incorporate new knowledge, behaviors, and skills that add to their range of learning experiences

Students' Performance: Is the measurement of student achievement that represents performance outcomes which indicate the extent to which a student has accomplished specific goals. Teachers and education officials typically measure achievement using classroom performance, graduation rates and results from standardized tests

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter reviewed the related literature on the topic under study or related topic in the past. It goes further to investigate ICT in teaching and learning and academic performance, availability of ICT infrastructure and their influence on students' performance, teachers' attitude towards integration of ICT in teaching and learning and their influence on students' performance, teachers' competence on ICT and their influence on students' performance. Finally, critical review of the literature and summary of the review.

2.2. ICT in Teaching and Learning and Academic Performance

Aina's (2012) observations shows teaching techniques have advanced beyond the conventional approach using discussion and chalk. ICT is widely acknowledged as a cutting-edge teaching technology that helps teachers to change their lesson plans in order to better engage their students, claims Valasidou (2008). Furthermore, digital technologies, according to Van Rooy and Wilhemina (2012), have improved understanding of topics that were formerly too small, large, fast, slow, or even too complex to be taught. This includes the increasing knowledge in science courses. We can profit from these advancements when we are connected to the global community through ICT since research is dynamic and new discoveries in science and teaching methodology are made every day (Aina, 2013). ICT use in the classroom was stressed by teachers, as well as changes in developing kinds of activity that complemented or altered traditional classroom activities (Hennessy, Ruthven and Brindley, 2015). Abichandani (2012) clarified that ICT simulations can be utilized in science education to help students learn theories, principles, ideas, and concepts. Ideas may be disseminated globally through the use of ICT, which can support schools in improving learning and, as a result, academic success (Flores, 2014). Wainaina (2016) stated unequivocally that ICT should be incorporated into modern learning, and previous pedagogies must be abandoned since the potential of ICT in education to be really revolutionary rests in the development of fresh, contemporary methods of instruction.

Computer programs are being created by software developers with the intention of grabbing learners' attention and assisting teachers in creating more engaging and interactive lessons (Wamari, 2014). According to Bingimlas (2009), it is crucial to employ ICT in the classroom to give students the chance to practice how to function in the information age. Aina (2013) noted that excellent instruction is necessary in science education when using ICT. Van Rooy and Wilhemina (2012) assert that teachers will quickly see the pedagogic value to student learning if professional development chances are made available when the science teaching methodology and its digital representations are present. ICT needs to be prioritized on par with language and math literacy, according to Abichandani (2012), ICT is therefore a necessary component of society since it facilitates access to information anywhere in the globe, encourages networking across boundaries of language and culture, stimulates community empowerment, and disseminates knowledge (Adebayo, 2010). According to Kariuki (2014), PowerPoint slides and free web video clips have been widely used by science teachers. To make studying more engaging, pleasurable, and fun for students, the application's content includes animations, videos, songs, music, games, and quizzes (Merab, 2014). ICT, according to Selinger (2004), can increase educational standards because it facilitates the understanding and illustration of complicated concepts in ways that were previously impractical using traditional teaching materials and techniques. Kingori (2016) asserts that educational movies that teachers can download and show to their pupils on tablets make learning more dynamic. Abichandani (2012) pointed out that future instructors must be adept not only at using ICT but also at incorporating it into their lesson plans. Wainaina (2016) observed that as ICT practice relies around pedagogical transformation rather than simply incorporating ICT in teaching, the necessity to reform and modernize the way we educate the next generation must be agreed upon. According to Mwunda and Ogutu's (2018) proposals, the government must provide policy guidelines for integrating ICT into teaching and learning procedures.

Mukhtar (2017), a successful accomplishment or performance in a particular subject area is referred to as academic performance, it is represented by marks, scores and grades of descriptive commentary that illustrate how students deal with their studies and how they cope with or complete various tasks assigned to them by their teachers throughout the course of a specific time period or academic year. Fajola (2018), individuals' knowledge and judgments about

themselves in academic performance, as well as convictions that they can successfully accomplish a certain academic work at defined levels, are referred to as academic self-concept. He also stated that academic self-concept is a more past-oriented, relatively stable judgment and aggregated about one's self-perceived ability in a specific academic field, whereas academic self-efficacy is a context-specific and largely future-oriented assessment of one's confidence in doing an impending subject-specific academic activity satisfactorily. Karthigeyan (2018), Academic performance is widely regarded as a key criterion for assessing one's complete potential and capability in the educational system, and it plays a critical role in the learning process. Nirmala (2017) cited that, the extent to which skill or information has been transferred to a student that donates the knowledge obtained and skills developed in the school topic and subjects which is usually defined by test scores is represented in his performance. Academic performance has become a barometer of a student's future success in this highly competitive world, and it is one of the most essential aims of the educational process. However, not everyone performs equally; there is a lot of variability and dispersion (Santrock, 2016). According to Ahmad (2018), there are labels like 'bright student,' 'average student,' and 'dull student' in the common pupil group, but diversity is the result of a lot of factors such as IQ, study habits, self-concept, creativity, aptitude, interests, family background, and so on. Because education is such an important necessity in today's society, academic achievement is highly rated in the national agenda, with educators, stakeholders and policymakers focusing on testing, proving, accountability, and other related issues (Mark 2015). In Kenya, education is exam-oriented, hence examinations are the only means of assessing performance (Maiyo, 2019).

Computer and ICT availability and utilization were proven to have positive effects on students' performance in a number of studies (Luu & Freeman, 2014; Kubiatko & Vlckova, 2015). In order to increase student learning outcomes, the research found that developing skills of teachers in utilizing computers and sophisticated communication technologies was crucial (Lee & Kissinger, 2019). Other researchers, on the ot her hand, discovered unfavorable links between computer and use of ICT and achievement in school. Wittwer and Senkbeil (2018) found that ICT use have no significant impact on student’s performance. Other factors, such as background and process-related variables, may alter the relationship between use of ICT by teachers and learning achievement of students, resulting in inconsistent outcomes (Song & Kang, 2017). Luu

& Freeman (2021), further explained that, as a result, some academics have suggested that further research be done on the links of ICT use with learning attainment, while also considering into account some important variables like the purpose of the use of ICT, because various applications affect students' performance in distinct ways. Meta-analytic study on the relationship between ICTs and student performance has also suggested that ICTs have a positive impact on students' accomplishment levels when compared to traditional instruction (Liao, 2017). Technology has the ability to assist and support education in the curriculum so as to give chances for communication successfully between instructors and students in a way that has never been feasible in the past (Watson, 2011). ICT should be utilized to promote educational objectives such as accessing and evaluating information, cooperating, communicating, and solving problems, all of which are vital for children's preparedness for a knowledge society (Drent and Meelissen, 2017). According to Vogt and Johnson (2015), through computer simulations, a model of what might transpire in a real-world scenario is made under specific parameters. Furthermore, ICT play an important part in student skills, knowledge, ability and motivation, and may be utilized in delivering information to students as well as assist them in completing learning activities (Grabe and Grabe, 2017), hence simplifying learning.

According to Ogunsola, (2005) as cited in Obinna (2018: 3), Students who are taught through ICTs gain a greater knowledge of complicated themes and concepts, they are also highly likely to retain information and apply it in the classroom and beyond. 'Countries have made significant investments in ICT over the previous two decades. In fact, most EU and Asian countries have prioritized the ICT integration and usage in training and education over the previous decade, albeit success has been odd and unbalanced. ICTs have a significant role in education, both in terms of organizational structure and teaching and learning methods. However, ICT investment levels vary significantly between nations, as well as within institutions between countries. In certain nations, schools have integrated ICT in their curriculum and showed high levels of acceptable and effective ICT use in a range of subject areas. Nonetheless, in some countries, schools are still in the early phases of ICT adoption, with some developments in e-learning (ICT-enabled learning) and considerable improvements in the learning process, but no significant benefits in the process (Aristovnik, 2012). According to Stephen, Thomas, and Cook (2014), in education; the use of Information and Communications Technologies (ICTs) has transformed

teaching and learning processes, when instructors employ ICT to complement their courses, students with a variety of learning styles can maximize their learning potential. ICT also enables learners to be more independent, reflective, and self-regulated in their learning process, according to the study. In addition, ICT allows students to get virtual instruction outside of the classroom. Although it relies on the teacher's instructional purpose, students' abilities, instructional needs, and accessible resources, ICTs assist students in mastering materials and skills.

Wittwer and Senkbeil (2018) stated that; in Nigeria, despite the fact that the economy is still largely dependent on low-tech, low-value industries, the importance of ICT to the growth of the nation is acknowledged by the government. The ICT usage in education has changed dramatically since the emergence of information and communication technology. ICTs help students learn school subjects and the basic skills they need to make a living, contributing to the growth of their local surroundings and society as a whole. ICT has revolutionized almost every aspect of modern life. Particularly, it has become an important aspect of education, and its influence on teaching and learning is well acknowledged.

The Federal Ministry of Education's National Policy on Education (FME-NPE, 2013) recognizes the critical significance of ICTs in today's world and has integrated ICTs throughout Nigerian education. For this goal to be achieved, it is stated in the document that the government will provide basic resources, infrastructure and training at primary and junior secondary school levels, and that computer education will become a prevocational elective at junior secondary school level and a vocational elective at senior secondary school level. Again, the government intends to provide the infrastructure and resources as well as the training required for the ICTs integration into the secondary school education system. National policy on education (FME, 2004) on secondary school education also recognizes the critical role of information technology in the growth of knowledge, and declares that the government will provide the necessary infrastructure, resources and training required for information technology (IT) integration into the educational system. For this, the National policy for information technology's first mission statement is to employ IT for education. It also includes as one of its general goals that integration of information technology into the system of education and training. In Nigerian school system, this will surely be a first (Adediran & Morenikeji. 2019).

2.3. Availability of ICT Infrastructure and their Influence on Students' Performance

2.3.1. Availability of ICT Infrastructure for Teaching and Learning

According to researches, there are many different types of ICT infrastructure and resources that can be utilized in teaching and learning. ICT, according to Sarkar (2012), are the networks, hardware, software, and programs used to gather, store, process, transmit, and present information (voice, data, text, and images), as well as related services. Information handling tools used to create, store, process, distribute, and exchange information are referred to as ICT resources (Torruam and Abur, 2013). Radio, television, video, DVD, phones, satellite systems, computer and network technology, as well as the hardware and services that these technologies provide, like videoconferencing and email, were also highlighted by UNESCO (2006). ICT is employed in teaching and learning in a variety of ways, according to Valasidou (2008), including teleconferencing, videoconferencing, and e-learning applications. Internet, videophone systems, video and teleconferencing devices, computers, scanners, multimedia PCs and projectors are becoming a cause of increasing concern (Sabina, 2012). Kubiatko (2006) recommended that all schools be provided with software and hardware, such as instructive DVDs, and that ICT classrooms be set up for the teaching and learning. Vogt and Johnson (2005) have suggested using computer programs, which are collections of instructions that are written in a way that computers can understand ("machine readable") and direct them on how to carry out particular activities. ICT tools include computer lab networks, data show/projectors, electronic whiteboards, digital cameras, audio visual equipment, and software that enables distributed teaching among networked computers. Osama (2008) pointed out that for science courses like chemistry and biology, digital microscopes with sensors are also available. Other examples include the internet, wireless application protocols (WAP), videophone systems, teleconferencing gear, radio and microwaves, television and satellites, multimedia computers, and projectors. Smart phones, ordinary mobile phones, digital televisions, computers, smart boards, iPads, and tablets are some examples of more technology.

The curriculum material may also be delivered to the students simultaneously while they are in class using texts and visuals such as photos, posters, audiovisual materials with multiple colors, maps, and graphics (Osama, 2008). According to Kingori (2016), Through web-based portals, teachers and students may communicate with one another and access the most recent curriculum

materials on desktop computers, laptops, and tablets with the aid of e-learning platforms. He continues by saying that students can conduct online discussions and even take tests in real time with the use of webcams and programs like Skype and Zoom. According to Bingimlas (2009), teachers should be given access to ICT resources, such as software and hardware, effective professional development, enough time, and technical assistance in order to have excellent ICT integration in the classroom. Ouma (2015) noted that the "tablets for schools" initiative might change teaching and learning, and Kingori (2016) backed up this claim by noting that teachers could use tablets to direct pupils to a variety of online resources such case studies and web connections while in class.

2.3.2. Influence of the Availability of ICT Infrastructure on Student Performance

Hennessy, Ruthven, and Brindley's (2015) research supported the idea that poor school infrastructure in developing countries may be a factor in children's low levels of learning and that educational inputs, such as instructional materials, are essential for the instruction and understanding of every subject covered in the school curriculum. According to Wainer, et al. (2008), using instructional resources would ensure that students retained newly learned facts. He also said that by offering students something practical to see and do while simultaneously instructing them, the creative and well-planned use of audio-visual aids in courses should do much to combat apathy, make up for the shortcomings of books, and pique students' enthusiasm in learning. He emphasized that choosing resources that are pertinent to a lesson's or course's core concepts aids in the students' knowledge of that lesson in-depth since they make the subject appealing to them, grabbing their attention and inspiring them to learn. In listing the potential causes of variable academic performance within and between schools. The most notable conclusion from empirical research on the effects of ICT is that there is a constant correlation between student performance and the sheer availability of ICT resources. The results of two significant studies conducted in the United States Wenglinsky (2004) and Fuchs and Woefsmann (2011) revealed a favorable correlation between test scores and the presence of computers in classrooms. The presence of computers in the house is positively correlated with student performance, according to two sizable studies: one by Wenglinsky (2004) that surveyed U.S. schools and the later that included 31 industrialized and developing nations. This immediate connection has been the subject of some research. For instance, the Wenglinsky (2004) study,

which was previously mentioned, examined the correlation between math test results and the number of computers utilized in math classes. In both the fourth and eighth grades, the study discovered a beneficial connection between computer use and performance. In one such trial, pupils in elementary schools in Vadodara, India, utilized computer games for mathematics two hours per week whereas others in comparable schools did not. On a maths test, the children who utilized computers performed noticeably better than the control group. The bottom set of kids profited the most, and girls as well as boys benefited. Even though the Vadodara study is very helpful, it is most certain that; availability and student's suitable use of ICT facilities closely correlates with their success in their particular subject areas. The availability and effective use of ICT infrastructure by qualified teachers with ICT skills is essential to influence students' academic progress and performance in a topic (Egwali, 2009).

Using practical integration tools while learning can result in a practical comprehension of subjects and improved performance (Varughese, 2012). The availability of ICT does not, however, have an educational value in and of itself, according to Ifenthaler et al. (2012); rather, it only becomes valuable when teachers employ it in the teaching and learning process. ICT can offer impaired students a variety of opportunities to develop their skills. Education software and textbooks must be integrated by science educators and curriculum designers (Bektaş et al., 2012).

Yassanne (2014) ascertains that the accessibility and incorporation of computer technology into biology instruction enhances student academic performance and achievement as well. The study employed a nonequivalent quasi-experimental control group design. According to the study's findings, the experimental group's performance and participation were superior to those of the control group on the post-test. This finding shows a notable distinction between the academic performance of Biology students exposed to computer technology and those exposed to the conventional teaching technique. According to Nyaga (2016), although not all teachers or students were able to access or use digital content, it had a favorable impact on students' assessments and academic performance in the sampled secondary schools. Abdullahi (2014) in his analysis of how ICT is used to teach science in schools found that ICT fosters students' intellectual capabilities by fostering higher order thinking, enhanced communication skills, problem-solving abilities, and a thorough comprehension of the teaching materials and subject matter. He added that having access to ICT guarantees a more engaging, interactive learning

environment and equips students with ICT knowledge and abilities. In their 2016 study, Zakaria and Khalid examined the advantages and drawbacks of using information and communication technology (ICT) to teach mathematics. The research found that using ICT to teach and study mathematics promoted student interaction, information sharing, enhanced motivation and interest, the development of higher-level thinking skills, and improved student performance. According to Rabah (2015), the advantages of integrating ICT into teaching and learning include increased student engagement, capturing students' attention, assisting with diverse education, enhancing the learning process, cooperative learning, and preparing students for the digital world.

Researches have shown that the availability and utilization of ICT in teaching and learning has a positive influence on students' performance. Use of ICT therefore translates to improved learning outcomes which are reflected in improved students' performance in examinations. According to Omollo (2013), who agreed with this statement stated that the availability and use of ICT in the classroom helps learning more successfully and improves students' conceptual understanding, this is anticipated to result in increased knowledge and better exam results, leading to strong performance. Drent (2005) provided evidence for this claim when he said that creative uses of the ICT infrastructure that is already in place in the classroom can promote student-centered learning, which can then lead to positive learning outcomes and, ultimately, strong performance in exams. Mbugua, Gori and Tanui (2015) observed that the goal of international investments in ICT has been to enhance teaching and learning in classrooms since using ICT resources in the classroom makes classes more engaging, which in turn improves students' exam performance. Additionally, Abichandani (2012) noted that there are specific simulations in the form of virtual experiments through online laboratories that improve students' conceptual comprehension and lead to strong performance in exams. Manyindo and Muthini (2014) found that after adopting ICT-integrated learning using the available resources, the majority of schools had success. Through a project that aims to test the viability of using tablets in teaching and learning, the schools that are currently utilizing modern technology in learning have seen improved results (Merab, 2014).

Oyebola (2018) found that the usage of multimedia enhances learning and has a favorable impact on students' academic performance, hence integrating ICT into the teaching and learning is

necessary. According to Basri, Alandejani, and Almadani (2018), there is a connection between ICT integration and academic performance since effective ICT integration in the classroom leads to better academic performance. This is further reinforced by Ishtiaq, Qaiser, Naseeruddin, and Farhan (2017) who found that ICT integration has a favorable impact on students' academic performance and retention, which in turn leads to strong exam performance. Additionally, Mbugua, Kiboss, and Tanui (2015) in their research also came to the conclusion that ICT integration in teaching is an essential part of enhancing students' academic performance.

Inevitably, technology is quickly gaining ground in classrooms, with teachers in more advanced educational institutions making creative use of ICT to support learning for strong exam results (Wamari, 2014). According to Van Rooy and Wilhemina (2012), students are better able to comprehend such challenging topics that were also a challenge in exams when ICT resources are available and utilised effectively in the teaching process. As a result, they are more likely to achieve success. ICT integration in science instruction is anticipated to facilitate learning and understanding of some abstract scientific concepts, leading to improved performance (Gakime, 2016).

A study conducted in Chile on the availability and use of ICT revealed ICT integration was restricted to a few particular resources, such as a computer and projector (Brun and Hinostroza, 2014). The accessibility of ICT resources is crucial to the successful integration of technology in the classroom. In the majority of poor nations, a major hurdle to technology integration is instructors' lack of ready access to technologies. The results of a study conducted in rural South Africa revealed that teachers' primary problems adopting ICT in classrooms were a lack of resources (Mathevula and Uwizeyimana, 2014). A study was carried out to determine the barriers to the use of already-existing ICT resources in secondary schools in Kwekwe town, Zimbabwe as well as to evaluate the availability and usage of ICT for teaching and learning. The results demonstrated that few of the ICT training resources were available in the studied schools, and those that were available were insufficient. The survey also showed that relatively little of the available ICT resources were being used. The study also determined the barriers to ICT use in these schools, including inadequate power supplies, a lack of resources, apprehension about technology, a lack of motivation, a lack of ICT skills, increased ICT costs, and inadequate physical infrastructure (Mavellas et al., 2015). According to a study about ICT integration in

Ethiopian teaching and learning practices, inadequate technical and pedagogical assistance and improper access to ICT resources are some of the major barriers to ICT integration in teaching and learning. The data analysis showed that ICT integration into teaching and learning had not yet been accomplished (Alemu, 2015). A study to analyze the technological integration in teacher education was conducted in Ghana. The study's conclusions demonstrated that a barrier to Ghana's educational system's adoption of ICT was a lack of technological resources (Agyei, 2013).

The master plan for Nigeria's ICT project, which ran from 2013 to 2023, called for a stronger integration of ICT into the country's educational system and economic operations (Kamunyu, 2014). Ouma (2015) stated that while public schools continue to wait for the government's promised computer for school's program to be implemented, which is nine years from now (2022), the usage of technology in select schools makes learning fun and boosts student performance and attendance. Manu (2014) discovered a comparable outcome in Nigeria. Findings showed that insufficient facilities, such as those for electricity and telecommunications services, posed problems for the use of ICT. Another study conducted in Nigeria found that few educational institutions had access to ICTs that could be used effectively for teaching and learning (Asiyai, 2014). In order to evaluate the availability, management, and use of ICT resources for teaching the English language in secondary schools in Kaduna State, Nigeria, a research was conducted. The survey found that there were few ICT facilities in schools, few schools had internet access, very little was used of the ICT facilities that were there, and there were frequently power outages during class hours. According to the report, the majority of teachers lacked the knowledge and abilities needed to effectively use ICT in the classroom, the majority of teachers (78%) believed that their ICT training was inadequate and that this had an impact on productivity. This study showed that teachers are generally supportive of using ICT to teach English (Yusuf et al., 2013). A study to examine Availability and Utilization of ICT Resources in Teaching and Learning in Secondary Schools in Ardo-Kola and Jalingo, Taraba State, Nigeria, found out that: availability, accessibility, and use of ICT resources were severely underutilized for teaching and learning in secondary schools. ICT resources were not present in the schools under consideration, according to responses from more than 80% of respondents;

ICT resources can only be accessible and used by instructors and students if they are present in the schools for teaching and learning (Onwuagboke et al., 2014).

Nigeria has put a lot of work into improving its educational system. The Nigerian government is convinced that ICT can enhance both the quality and accessibility of education. 2005 saw the creation of Nigeria's national ICT policy for education. Studies on the availability and use of ICT in education in Nigeria, particularly in rural regions, are few and far between. As a result, the researcher was eager to learn more about the ICT infrastructures that are present and their influence on student's performance in public secondary schools in the Gezawa Area of Kano State, Nigeria.

2.4. Teachers' Attitude towards Integration of ICT in Teaching and Learning and their Influence on Students' Performance

2.4.1. Attitude of Teachers towards Integration of ICT in Teaching and Learning

It's critical to consider how teachers feel about incorporating ICT into teaching and learning because this has a significant impact on how well ICT is used in educational settings (Selewyn, 1999). This is reinforced by Rhoda and Gerald (2000), who noted that effective ICT integration in teaching and learning depends on having a favorable attitude about using ICT. According to Myers and Halpin (2002), teachers' attitudes on the use of ICT in the classroom are a key indicator of how the technology will be used in the future. If teachers have a favorable attitude toward using educational ICT, they will be able to quickly offer insightful information about the adoption and integration of ICT into teaching activities (Buabeng-Andoh, 2012). Kubiatko and Halakova (2009) found that the influence of ICT on the teaching and learning processes had an effect on attitudes regarding its use in the classroom. The teacher's opinion of the significance of an application and their level of expertise with it are more significant obstacles to computer use (Sorgo, Vercknovnik and Kocijancic, 2010). According to Kubiatko (2006), there are a lot of issues that arise when using ICT, such as instructors' fear of using the technology. If teachers can overcome these issues, they will learn about the new opportunities that ICT has given to the classroom. Slout and Barton (2007) found that including variation into the classes and using ICT to maintain both teachers' and students' own interest in teaching and learning can inspire students to learn. According to Rhoda and Gorard (2000), a favorable attitude toward the use of ICT is

acknowledged as a fundamental requirement for successful ICT integration in teaching. According to Becta (2004), a key obstacle to integrating ICT in teaching and learning was a negative attitude. According to Bitok (2014), the majority of teachers only use ICT sporadically, hence it is important to educate them on its importance because many of them tend to think of themselves as being technologically incapable. Acikalin (2014) indicated that the preparation of knowledgeable teachers with favorable attitudes toward utilizing ICT in teaching and learning is greatly aided by teacher education programs.

To ensure that the technology integration is successfully carried out in the curriculum of the school as well as during teaching and learning, it is crucial that school teachers have positive attitudes about the use of ICTs, thus, teachers' views are influenced by how they view the value of ICT, how they intend to behave, and pedagogical factors, also, several factors affect teachers' views on utilizing ICT in teaching and learning (Amuko, Miheso and Ndethiu, 2015). Factors that can influence the teacher attitude towards ICT include ICT related knowledge and skills, and motivation to use ICT. In addition, Jimoyiannis, Tsiotakis, Roussinos and Siorenta, (2013) found that Teachers' post-training opinions about the use of ICT in education were influenced by their gender, age, and teaching experience across a variety of topic areas and ICT in education was often seen more favorably by men facilitators than by female facilitators, who tended to be neutral or critical. Successful ICT integration into teaching is influenced by the attitudes and beliefs of the teachers (Keengwe, Onchwari and Wachira, 2008). Amuko, Miheso and Ndethiu (2015) stated that teachers' attitudes toward learning with or without technology are essential because they may have an impact on curriculum reform and teaching and learning. Teachers' belief systems appear to have a significant mediating effect on how they incorporate computers into their classroom education (Sang, Valcke, van Braak, Tondeur and Zhu, 2011). Furthermore, instructors' attitudes toward using computers in the classroom as a teaching and learning tool have a direct impact on the integration of computers into the classroom. When implementing ICT, cultural perspectives such school cultures and social cultural variables must be taken into consideration, and culture may have a significant impact on how teachers view the usage of ICT (Sang et al., 2011).

One of the teacher's characteristics that influences the classroom's use of ICT is attitude. ICT integration in education requires a positive outlook. A study on teachers' opinions of ICT

integration was conducted by Hong (2016) utilizing open-ended, semi-structured interviews with 23 teachers from various parts of Colorado, USA. The survey found that the teachers who participated in it had a favorable opinion of ICT as a teaching tool. They like using ICT as a teaching resource and pedagogical tool. Teachers demonstrated their willingness to often integrate ICT into their lessons and their desire to discover new ways to use ICT to successfully provide instructional materials to students. This is due to their conviction that ICT is a growing trend and offers numerous advantages to pupils. The study also discovered that there were significant obstacles preventing the use of ICT in the classroom, including a lack of ICT resources, particularly computers, and a poor internet connection. Muslem, Yusuf and Juliana (2018) conducted a study on attitude and barriers to ICT use among English teachers in Indonesia. The study used a questionnaire and interview for 26 teachers selected by purposive sampling technique. The study's conclusions demonstrated that participant teachers had favorable opinions about the use of ICT in classroom instruction and learning. Teachers feel that ICT supports them in their lessons and makes it simple and quick for them to find material that enhances their lessons. Additionally, they believe that ICT makes classroom instruction more engaging. In their experimental study on in-service mathematics teachers' use of ICT as an innovative practice in lower secondary, Daher, Baya'a, and Anabousy (2018) discovered that the teachers had favorable attitudes and beliefs. Despite their positive attitudes, teachers were hesitant to incorporate technology into their lessons because of their limited expertise and the various barriers ICT integration in education presented. According to a study by Semerci and Aydn (2018) on 353 teachers working in various schools in Ankara, Turkey, they used a descriptive research design and questionnaire to examine high school teachers' attitudes toward using ICT in the classroom. Teachers exhibited a high degree of positive attitude and low degree of worry toward the use of ICT in education. According to Ottestad (2013), an online survey of 386 teachers and 247 school leaders from Norwegian primary and lower secondary schools showed a correlation between teachers' attitudes and behaviors about the use of ICT in the classroom and those of school leaders.

Adegbenro, Gumbo, and Olakanmi (2017) used a questionnaire and focus group discussions to evaluate the needs of in-service secondary school teachers for technology integration in an ICT enhanced classroom in Pretoria, South Africa. The study's conclusions showed that instructors

were generally supportive of using computers in the classroom. The use of computers in teaching and learning was something that teachers were open to learning more about. However, because they lacked the expertise and pedagogical abilities to use ICT effectively, instructors encountered challenges integrating it into their daily activities in the classroom. Msila (2015) conducted a study in South Africa utilizing an interview to learn more about teachers' perspectives on the usage of digital technology in the classroom. Findings demonstrated that younger teachers were more accepting than older teachers, who were discouraged by the introduction of ICT. In the end, the study came to the conclusion that teacher proficiency and favorable attitudes toward ICT are more important factors in the use of digital technology in classrooms. Findings from a study done in Kenya by Amuko, Miheso and Ndethiu, (2015) has shown that when employing ICT in the classroom, instructors first think that the technology adds to their workload. They also discovered that instructors hold unfavorable opinions about the use of computers in scientific instruction as a result of unfavorable experiences, but they asserted that these opinions may be modified via in-service and out-of-service courses that emphasize a long-term constructivist approach. They added that teachers' ideas might evolve over time and they can create situations that are more constructivist when they have access to socially supportive environments and enough technological substructures. In a similar vein, a study on the attitudes of pre-service Chemistry teachers about the use of ICT in instruction found that all pre-service instructors had positive attitudes, regardless of gender or class (Yapici and Hevedanli, 2012).

The use of ICT in instruction is improved by instructors' favorable attitudes. However, nothing was known about the opinions of teachers in Kano State, Nigeria, regarding the use of ICT in teaching and learning. This section deal with the negative or positive attitude of teachers towards integration of ICT in their teaching and learning process. These studies confirm that positive attitude in teachers towards the use of ICT in teaching is important for effective integration of ICT but negative attitude is a major barrier to integration of ICT in teaching. So it was of paramount importance to conduct a study to determine the attitude of teachers towards integration of ICT in teaching and learning in Gezawa Area of Kano State, Nigeria.

2.4.2. Influence of Teacher's Attitudes towards ICT on Student Performance

Teachers' attitudes and perspectives on the use of ICTs in teaching and learning can have an impact on students' academic performance. According to research, teachers' attitudes on technology use play a significant role in how well technology is used in educational settings (Baylor & Ritchie, 2012). The use of new technology in educational settings is seen to be greatly influenced by the attitudes of the teachers. Therefore, how they feel about computers can have a big impact on whether or not they are accepted and used. The instructors' views about using technology effectively in the classroom play a major role in this (Kluever, 2014). Correspondingly Harrison and Rainer (2012), found that participants with poor computer skills were less likely to embrace and adapt to technology than those with favorable views, who also had better computer skills. In a study undertaken by Albirini (2014) to look into how Syrian high school teachers felt about using technology in the classroom, both quantitative and qualitative methods were used to gather information. He discovered that teachers had favorable opinions toward the use of technology in the classroom. According to Scrimshaw (2004), among other things, ICT can help teachers change their traditional pedagogical beliefs, implement new student-centered teaching strategies, and enhance stronger relationships between teachers and students. It can also increase their enthusiasm and efficiency as well as their cooperation and planning with ICT. However, these can only be accomplished if the teacher takes the lead in bringing about change by supporting innovation and adopting a positive attitude toward it. Actually, whether this invention succeeds or fails will depend on the attitude of the teacher (Pelgrum & Anderson, 2013). According to Becta (2004), the proportion of teachers utilizing computers and the internet declines as instructors' ages rise. Pelgrum and Anderson's (2013) investigation of how teachers in various nations view computers revealed that age is not a significant factor in how educators feel about them. It's interesting to note that Dawson and Rakes (2003) discovered that teachers' ages are a key factor impacting technology integration in schools, with older instructors (ages 41 to 55) having a greater impact than younger teachers. It is important to remember that teachers' usage of ICT is unquestionably influenced by the professional environments they work in. Other contextual factors that can act as barriers to positive attitudes include lack of motivation, unscheduled use of dedicated ICT suites, unreliable equipment, classroom practices that conflict with the culture of student exploration, and

interactivity within which much technology-based activity is said to be situated. These factors are in addition to the new interpersonal and pedagogic skills that teachers need to use ICT in their classrooms (Gakuu & Kidombo, 2010).

At this point, it would be important to find out from research the influence of integration of ICT in teaching and learning on students' performance. The section below is about what other researchers have found in order to establish teacher's competence on ICT in teaching and learning and its influence on students' performance.

2.5. Teachers' Competence on ICT and their Influence on Students' Performance

2.5.1. Teachers' Competence on ICT

ICT integration in the classroom is significantly predicted by teachers' computer proficiency. The majority of teachers who expressed a negative or neutral attitude toward the use of ICT in teaching and learning processes, according to the evidence, likely lacked the knowledge and abilities necessary to make an "informed decision" (Amuko, Miheso and Ndethiu, 2015). The ability of teachers and their attitudes toward utilizing modern technology in their teaching and learning of mathematics are related to the successful integration of ICT in the classroom (Amuko, Miheso and Ndethiu, 2015). When analyzing teacher education programs, Lim and Pannen (2012) discovered a connection between ICT proficiency and pedagogical consideration. However, deeply ingrained ideas can be difficult to identify, and programs may teach skills and information without resulting in the essential change in pedagogy until significant modifications are made (Lim and Chai 2008). Teachers need to be skilled ICT users in order to successfully integrate ICT into both teaching and learning, as well as to promote their own professional productivity and development. For the successful integration and sustainability of ICT in science education, effective teacher preparation and competency are crucial (Jimoyiannis, Tsiotakis, Roussinos and Siorenta, 2013). The successful educational applications of ICT depend on competence in the instructional strategies used in science education, and technical competency is a significant predictor of ICT integration (Girgin, Kurt and Odabasi, 2011). While pedagogical and instructional concerns such as why and how to use those technologies to increase learning are frequently ignored, the majority of ICT teacher professional development activities tend to concentrate on technological features (i.e., how to use various tools).

Training and the typical content of technological instruction for instructors are also reported as limited to computer literacy, focusing on basic computer operations and standard applications rather than preparation on how to use technology as a pedagogical tool (Scheg, 2014). In many nations around the world, ICT has grown to be a significant component of education. ICT integration helps educators better align their instruction with best practices around the world. Modern teaching methods have been replaced by technology-based teaching and learning tools and facilities, which have improved teachers' readiness and competencies (Ghavifekr, 2015). As a result, effective teacher preparation serves as the foundation for the integration of ICT in instruction. 292 people took part in a study on how Finnish teachers use IT in the classroom. ICT use in the classroom was investigated by the researcher using a survey design. The findings indicated that highly skilled teachers commonly employed ICT in the classroom. Integration wasn't totally realized for the teachers who lacked the necessary ICT knowledge and abilities, Nevertheless, in affluent nations, there are inconsistencies between the official organizational frameworks of educational institutions and routine classroom procedures (Sipilä, 2014). Samuel and Zaitun (2007) study findings in Malaysian schools revealed that, teachers must possess the requisite ICT integration skills in order for this to be done effectively in the teaching and learning processes. Implementing ICT integration in teaching and learning activities requires teachers to be trained in ICT skills. There will be more ICT-integrated activities in the classroom when teachers gain proficiency with ICT tools. According to Ghavifekr (2015), a survey questionnaire and a sample of 101 participants were utilized in a Malaysian study on the efficiency of ICT integration in schools. Findings of the study indicated that teachers that are well-versed in ICT integration is one of the key determinants in the success of technology-based teaching and learning. Another investigation was made into the ICT proficiency levels and classroom usage of Malaysian technical and vocational teachers. A quantitative approach was used in the investigation. 329 instructors' responses to a questionnaire were used to gather data using the survey method. The study's conclusions showed that teachers' ICT proficiency was moderate and that most of them (70%) frequently used ICT in their classroom instruction. In other words, teachers used ICT in the classroom in a reasonable manner. More so, the study also discovered a strong link between instructors' ICT competency and ICT integration in classroom instruction (Alazam et al., 2012). The study was consistent with that of Samuel & Zaitun (2007),

who discovered that many English teachers possessed the required ICT abilities despite the fact that Malaysian schools' use of the resources was far from optimal.

Tedla (2012) asserts that contrary to expectations, the majority of teachers in East African nations do not include ICT into their lessons. The instructor factor can be one of many interconnected elements that account for the situation. The impact of teacher competency on the integration of ICT in teaching and learning in public secondary schools was the subject of a study done in Kenya. The results showed that the majority of respondents had ICT training up to the reading level, and that they had little confidence in their ability to use ICT for the teaching and learning process. The result also indicated that teachers believe and their competency on ICT enhances learning (Michael et al., 2016). Another study was also conducted by Amuko (2015) in Kenya employing a descriptive survey approach in 12 secondary schools in Nairobi County, on the advantages and disadvantages impacting the integration of ICT in teaching and learning. The study's findings revealed that teachers confront numerous difficulties, including learning technical skills and information on their own and undergoing self-training for using ICTs in their instruction. A research by Moluayonge and Innwoo (2017) on teachers' use of information and communications technology in education in Cameroon secondary schools was carried out. The study used a survey method to collect data from 320 teachers. The findings indicated that insufficient ICT infrastructure and teachers low level competence skilss on ICT in secondary schools in Cameroon is partially to blame for the limited adoption of ICT in teaching and learning. The survey also discovered that instructors lacked expertise and confidence, had limited access to resources, and received insufficient ICT assistance while employing technology in the classroom. Due to restricted technological access and competency, Agyei and Voogt (2012) reported low levels of technology integration among practicing and student math teachers in Ghana. The problems of ICT integration in Ghana were identified by Agyei (2013) after examining the technology integration in teacher education in Ghana. Other institutional factors and a lack of qualified human resources were also identified as challenges.

Sulaiman, Hindatu and Lawal (2017) investigated teachers' awareness of the utilization of ICT for Biology teaching in secondary schools in Matazu Local Government Area, Katsina State, Nigeria. The study used a survey method, and a questionnaire was administered for 18 Biology teachers and five school principals. According to the study's findings, teachers are aware of how

important ICT is for the teaching and learning process. But most of them weren't utilizing it in their teaching. As such, inadequate ICT infrastructure and power outages were barriers to ICT integration in schools.

2.5.2. Influence of Teacher's ICT Competence on Student Performance

Numerous research exploring ICT integration in educational settings have uncovered issues brought on by instructors' lack of knowledge, expertise, and abilities about such integration (Hennessy, et.al 2015). In this context, numerous researches have shown the ongoing issues with integrating ICT-supported educational resources into classroom settings. According to Selwein (2011), adopting and implementing information technology by instructors is a more complex and time-consuming undertaking than doing so with other instructional technologies. The researchers came to the conclusion that understanding the integration of ICT in school settings depends on teachers' perspectives and attitudes toward ICT skills and competencies. Teachers must have a good attitude toward technology and receive training in the usage of contemporary educational technologies if they are to use technology in the classroom effectively. Studies have shown that 50% of teachers who had access to computers in their classrooms actually used them. Only two thirds of them felt comfortable using ICT in the classroom. This is due to the fact that creative computer use in the classroom depends not only on the availability of computers in schools but also on teacher preparation and competency, encouraging programs, and supporting policies.

After receiving ICT training, the majority of the instructors in a poll of 23 primary school teachers in Cyprus who participated in telephone interviews either changed their attitudes toward technology or learned the fundamentals (Kang, Heo & Kim, 2011). The same study, however, found no evidence of a substantial effect of ICT training on using ICT in the learning process. It appears that training techniques have only had a substantial influence on instructors' attitudes when training participants overcame their worries by employing technology and became personally empowered by its possibilities. The evaluation of the World Links program (2014) found learning these new computer abilities and teaching techniques helped teachers develop more favorable attitudes about technology and instruction and has great influence on students' performance, according to the program, ICT use is frequently believed to significantly alter how teaching is done in classrooms. This was confirmed by surveys of schools done in 26 different

nations and a number of case studies done in 27 different nations in Europe, Asia, North America, South America, and Africa. The substantial teacher training offered by the World Links program led to changes in both instructors' instructional strategies and their acquisition of new abilities. These methods included carrying out research projects, compiling and evaluating data, working with students from different nations on projects, and interacting with parents and other community members.

Teachers' skills and competences for ICT integration in Kano secondary schools are imperative. However, the state of secondary school teachers' competency in integrating ICT in the classroom is unknown. Hence, the study developed an interest in this issue i.e. to find out teacher's competences on ICT and its influence on student's performance in Gezawa Area.

2.6. Critical Review of the Literature

According to Bingimlas (2009), teachers should be given access to ICT resources, such as software and hardware, effective professional development, enough time, and technical assistance in order to have excellent ICT integration in the classroom. Yassanne (2014) ascertains that students' academic performance is enhanced when computer technology is available/accessible and integrated into lessons. No studies have been carried out in Gezawa Area on the availability of ICT infrastructure and their influence on students' performance. Adegbenro, Gumbo and Olakanmi (2017) in their study found that instructors were open to learning more about how to integrate ICT in teaching and learning process and had good attitudes regarding using computers in their classrooms. Semerci and Aydn (2018) discovered that instructors had a high degree of positive attitude and low level of anxiety regarding using ICT in the classroom. At this time, it would be necessary to understand through research the attitude of teachers toward integration of ICT in teaching and learning and its influence on students' performance because there is a dearth of information on this topic. A study was conducted in Kenya on the impact of teacher competency on the integration of ICT in teaching and learning in public secondary schools. The results showed that the majority of respondents had received literacy-level ICT training, and that they had only a limited level of ICT competency and confidence in using ICT for the teaching and learning process (Michael et al., 2016). For the successful integration and sustainability of ICT in science education, effective

teacher preparation and competency are crucial (Jimoyiannis, Tsiotakis, Roussinos and Siorenta, 2013). Teachers' skills and competences for ICT integration in Kano secondary schools are imperative. However, least is known if secondary school teachers in the state are trained on the integration of ICT in classrooms. Hence, the study developed an interest in finding out teacher competences on ICT and its influence on student's performance in Gezawa Area.

2.7. Summary of the Review

In summary, this chapter discussed ICT in teaching and learning and academic performance, availability of ICT infrastructure and their influence on students' performance, teachers' attitude towards integration of ICT in teaching and learning and their influence on students' performance, teachers' competence on ICT and their influence on students' performance. It also critically reviewed the literature in line with the objectives of the study.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

This chapter deals with the methodology or steps that will be use during the course of this study for the purpose of establishing the desired objectives issues like the type of design will be taken, study location, target population, sampling, data collection, data analysis procedure and the ethical issues/consideration.

3.2. Research Design

A research design is described as the blueprint of carrying out research study (Arwa, 2017). Kothari (2013) defines a research design as a blueprint for fulfilling objectives and answer to research questions. Research design is an outline of the research being carried out from the beginning to the end, it is a plan which the research will follow (Kahawa 2008). The descriptive survey research design was adopted for this study, through which views and opinion were collected from the sample. Descriptive survey are those studies concerned with collecting and describing (in a systematic manner) the characteristic features and facts about a given population. Kombo and Tromp (2006) indicated that the major purpose of descriptive research is description of the state of affairs as it exists. A survey research is also defined as a research design for the examination of variation across cases, usually in terms of a range of variables of interest to the researcher (Henn, Weinstein, and Foard, 2009). This design was suitable because it permits the collection of data from a large number of respondents, describes the present conditions as they exist in their natural settings and allows a representative of the population to be sampled. According to Kothari (2004), such designs are efficient methods of collecting descriptive data regarding the characteristics of populations, the current practices and conditions or needs. In essence, the design was adopted in order to capture descriptive data from the respondents in the sample schools, assess their attitudes and make conclusions based on the findings and generalize the findings to the population from which the sample will be selected. The quantitative research approach was adopted for its execution and postpositivist philosophical assumption guided the study which recognizes that we cannot be absolutely positive about our claims of knowledge when studying the behavior and action of humans, this worldview is deterministic, as such, the

study was carried out to determine the integration of ICT in teaching and learning and its influence on students' performance.

3.3. Study Location

This study was carried out in Gezawa local government area of Kano State, Nigeria. Gezawa local government area was formally established in the year 1976 during the military regime of General Murtala Ramat Muhammad. Gezawa is a local government area in Kano state. It is one of the 15 local government that make up the Kano central senatorial district and is 20KM away from Kano metropolis city. Gezawa local government borders Gabasawa local government to the northeast, Minjibir local government to the northwest, Ungogo local government to the west, Warawa local government to the south and some part of Nassarawa local government to the west.

According to 2016 population projection by National Population Commission of Nigeria and National Bureau of Statistics, Gezawa local government has an area of 340 square kilometer ($340km^2$) and a population of 392,700 with density of $1155/km^2$. The projection shows that males take the highest percentage with the youth taking the largest number of the population. The postal code of the area is 702. The Gezawa local government council is in charge of public administration in Gezawa local government area. The council is led by a chairman who is the executive head of the local government. The Gezawa legislative council makes laws governing Gezawa local government area. It consists of 10 Councilors representing the 10 wards of the local government area. The wards are Gezawa, Sararin Gezawa, Ketawa, Wangara, Jogana, Zango, Babawa, Gawo, Tumbau and Tsamiya Babba.

Gezawa local government is a Hausa and Fulani dominated town and a less number of other ethnic groups like Yoruba, Igbo and some other languages that are largely Muslim. The majority of Gezawa Muslims are Sunni, though a minority adhere to the Shi'a branched. Christians and followers of other non-Muslim religions form a small part of the population. Discrimination and violence against Christians are not common and very rare. (Kano: Nigeria's ancient-state, BBC online, 2018).

The cultural activity of Gezawa people is durbar festival whereby the district head hosts a Durbar to mark and celebrate two of the annual Muslim festivals eid al-fitr (to mark the end of the Holy

month of Ramadan) and eid al-adha (to mark the Hajj Holy pilgrimage). The durbar culminates in a procession of highly elaborately dressed horsemen who pass through the town to the district palace. Once assembled near the palace, group of horsemen, each group representing a nearby village, take it in turns to charge toward the district head, pulling up just feet in front of the seated dignitaries to offer their respect and allegiance.

In terms of occupation or economic activities, majority of Hausa and Fulani in Gezawa are doing small scale business as trading, tailoring, dyeing, blacksmithing etc. with minority of them working with civil services. Most of the females especially the house wives are selling food items and ingredients. Availability of fertile land in the area make most of the people take farming as their means of generating money and sustaining life. Some Yoruba and Igbo in the area are engage in buying and selling of goods as plastics, rubbers, ceramic materials, cosmetics and pharmaceuticals.

Education is universally acknowledged as a weapon against ignorance, unawareness and insanity, yet it is also means of raising and enlightened citizenry. The lowest qualification among people in Gezawa local government area is mainly secondary school certificate especially among the youth with some of them have diploma, NCE, degree or master's certificates. They also have some doctors (PhD) and professors. There are also professional doctors, engineers and barristers in Gezawa local government area of Kano state.

3.4. Target Population

A population is any group of individuals that has one or more characteristics in common and that is of interest to the researcher. In other word, it is a group of individuals with at least one common characteristic which distinguishes that group from other individuals (Best and Kahn, 2010). According to Mugenda and Mugenda (1999), target population is defined as a population which a researcher wants to generalize the results of the study. The target population comprised of an aggregate of individuals with similar characteristics and with respect to a particular area of the study. The target population for this research was the entire teachers in public secondary schools of Gezawa local government which comprise of 16 schools, 245 teachers and 1,340 S.S 2 students. Teachers were chosen because they directly involved in the teaching and assessment of students. S.S 2 students were targeted because it is at this level that the content starts to

become more difficult and abstract, so, any intervention (like ICT integration) that can make the content appear simple will positively influence learners' attitude toward learning and therefore improve their performance.

3.5. Sampling

According to Creswell (2014), sampling is defined as the process of selecting certain members or a subset of the population to make statistical inferences from them and to estimate characteristics of the whole population. Sampling is widely used by researchers in market research so that they do not need to research the entire population to collect actionable insights. It is also a time-convenient and a cost-effective method and hence forms the basis of any research design.

3.5.1. Sampling Technique

Simple random sampling was used to select teachers and the students to participate in the study from the 16 schools. The technique was chosen in order to obtain trustworthy information where every single member of a population was chosen randomly merely by chance and each individual have the exact same probability of been part of the sample.

3.5.2. Sample Size Determination

Kothari (2013) defines the size of a sample as the number of items to be selected from the universe to constitute a sample. A sample size of 152 teachers and 297 students were used with reference to Krejcie and Morgan (1970) table for determining sample size from a given population. The sample size of the study will be shown in the table below;

Table 3.1: Table Showing Sampling Frame and Sample Selected for Teachers/Students

NO	SCHOOL	Teachers	%	SAMPLE	Students	%	SAMPLE
1	School A	22	9	14	124	9	26
2	School B	18	7	11	112	8	25
3	School C	22	9	14	136	10	30
4	School D	18	7	11	105	8	24
5	School E	20	8	12	98	7	21
6	School F	16	7	11	120	9	26
7	School G	17	7	10	77	6	17
8	School H	22	9	14	96	7	21
9	School I	10	4	6	40	3	9
10	School J	8	3	5	32	2	7
11	School K	7	3	4	35	3	8
12	School L	18	7	11	80	6	18
13	School M	12	6	8	65	5	15
14	School N	8	3	5	42	3	9
15	School O	20	8	12	88	7	21
16	School P	7	3	4	90	7	20
	Total	**245**	**100**	**152**	**1340**	**100**	**297**

3.6. Data Collection Instruments

3.6.1. Questionnaire

Orodho (2003) defined descriptive survey as a method of collecting information by interviewing or administering a questionnaire to a sample of individuals. Orodho (2004) defines a questionnaire as an instrument used to gather data, which allows a measurement for or against a particular viewpoint. He emphasizes that a questionnaire has the ability to collect a large amount of information in a reasonably quick space of time. Ary et al. (2009) further states that a questionnaire is the basic way in which data is gathered in survey research. The researcher used questionnaire because of its ability to collect large amount of data very quickly and at ago and the fact that teachers were considered literate, they could easily read and interpret the questions with a lot of ease. The researcher administered one questionnaire namely: Questionnaire for Teachers (QFT) which consist of scales on availability of ICT infrastructure, teachers' attitude towards integration of ICT in teaching and learning, teachers' competence on ICT and school support on ICT integration.

3.6.2. Document Analysis

Document analysis was used to obtain records of students' performance for individual students' average scores in their terminal examinations for the last academic session (2021/2022) which consist of three terms.

3.6.3 Validity and Reliability of Research Instrument

The reliability of the questionnaire means the ability of the questionnaire to gather the same data consistently under similar conditions (Burke & Christensen, 2008). Creswell et al. (2018) defines reliability as the degree to which the instrument produces the same results or data after several trials. Correspondingly Kothari (2004) describes reliability as the central criterion that reveals the degree to which an instrument quantifies what it is supposed to quantify.

The researcher used data gathered from the pilot study to establish the reliability of the instrument's items for quantitative data. The data collected from the pilot study was used to calculate both the internal and external reliability of the instrument's items. Reliability

coefficient is used to evaluate the consistency of the data with Cronbach Alpha being the most commonly used measure (Hair et al., 2010). The reliability coefficient was calculated to test the internal consistency among the variables and to select how the variables correlated among themselves. The rationale for determining internal consistency was that the individual items of the scale should all be measuring the same construct and thus be highly inter-correlated. The reliability test was done for the four constructs of availability of ICT infrastructure, teachers' attitudes on ICT, teachers' competence on ICT, and school support using Cronbach alpha. Kothari (2004) level of 0.7 was used as a benchmark level to indicate acceptance levels of internal consistency of the instruments. Table 3.2 presents the results of the reliability test.

Table 3.2: Cronbach alpha coefficients

Variables	Cronbach alpha	Number of items
Availability	.825	10
Teacher's attitude	.876	10
Teacher's competence	.878	10
School support	.858	10

Validity is a measure of the degree to which a research instrument measures what it is meant to measure. Validity is a measure of the degree to which a research instrument measures what it is meant to measure. Validity refers to the degree to which an instrument is truthful and accurate in measuring the trait it is supposed to measure (Denga, 2003). Amin (2005) defines validity as the appropriateness of a tool in measuring whatever it intends to measure. The researcher used face, construct and content validity as they are relevant to the nature and purpose of the questionnaire that were used. Face validity refers to the extent to which a test seems to cover the relevant content it intends to cover (Onen, 2016). The content validity refers to connections between the test items and the subject related tasks in a manner sufficiently representative, relevant and comprehensible (Creswell, 2012), while construct validity is about how well a test measures the concept it was designed to measure. It's crucial to establishing the overall validity of a method. For construct and face validity, the clarity of the items, completeness and level of language was

checked through consultations with the researchers' course supervisors and ICT specialists which helped to assess the significance of each item on the Likert scale in the questionnaire. The advice of these experts helped to design the questions that captured all objectives of the research study. This is reinforced by Kothari (2004), who contends that validity, should not depend on the subjective judgments of only one specialist rather several specialists can give test items. Their feedback was then used to revise the contents of the instruments accordingly.

For content validity, the Content Validity Index (CVI) based on the results was gotten for the questionnaires. (Yusoff, 2019) defines the Content Validity Index as, the degree to which elements of an assessment instrument are appropriate to and representative of the target attributes for a particular assessment. Amin (2005) argues that content validity is determined by expert judgment where experts in the field being studied are asked to assess its validity. Therefore, he gives the formula of content validity index CVI as:

C.V.I = No. of items declared valid by judges/Total number of items

Based on the responses from expert judgment, and using the above formula, the researcher calculated the number of items that were rated relevant against the total number of items to obtain I-CVI. 0.80 value for two experts was attained. This is regarded as evidence of good content Validity of an instrument (Yusoff, 2019). According to Amin (2005), the research instrument is considered valid when the C.V.I output is 0.5 and above.

3.6.4. Administration of the Instrument

The questionnaire was self-administered to the sampled schools in the target population and were distributed to teachers by the help of head teachers at various schools.

3.7. Data Analysis Procedure

Descriptive and inferential statistics were used for the analysis procedure. The generated data for the survey was analyzed using simple frequency and percentage. Simple linear regression was used to assess the relationship between the IVs and the DV and to test the preset hypotheses. Table below shows the analysis procedure of the study.

Table 3.3: Data Collection Methods and Analysis Matrix

Task	I.V	D.V	Collection method	Analysis technique
Obj. 1	Availability of ICT infrastructure	Students' performance	Questionnaire, Document analysis	Mean, Frequencies, Percentages, Standard Deviation, Correlation, Linear regression using Bootstrapping
Obj. 2	Teachers' attitude toward ICT integration	Students' performance	Questionnaire, Document analysis	Mean, Frequencies, Percentages, Standard Deviation, Correlation, Linear regression using Bootstrapping
Obj. 3	Teachers' competence on ICT	Students' performance	Questionnaire, Document analysis	Mean, Frequencies, Percentages, Standard Deviation, Correlation, Linear regression using Bootstrapping
Obj. 4	School support on ICT integration	Students' performance	Questionnaire, Document analysis	Mean, Frequencies, Percentages, Standard Deviation, Correlation, Linear regression using Bootstrapping

3.8. Ethical Issues/Consideration

According to Creswell (2014), research ethics is a codification of scientific morality in practice. The researcher obtained permission from the School of Education Moi University to be allowed to carry out the research. The researcher then visited Gezawa Zonal Education Office with the introductory letter from CERM-ESA and seek permission to visit the schools for some information regarding the schools like population, students' performance etc. And obtained permission from the principals and head of departments to be allowed to collect data in their schools. Voluntary consent of the respondents was also obtained, the researcher ensured confidentiality of the data, respect the interests of the participants and report their responses

honestly to avoid biasness and misrepresentation. The researcher arranged with the principals to confirm the dates for data collection and get the consent to carry the research in the sampled schools. This eliminated cases of surprising entry into schools without prior visit to clarify on the intention of the visit. The researcher also ensured confidentiality of the information given by the respondents, such was done by using the information without mentioning the specific names or schools where the data was collected from. The researcher also promised to avail the findings of the study to the relevant authority and those participants who will take part in the study as they would be interested in knowing the results.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4.1. Introduction

This chapter presents the results of data analysis on integration of information and communication technology in teaching and learning and its influence on students' performance in public secondary schools in Gezawa Area in Kano State, Nigeria. In this chapter, interpretation and discussion of the data is also presented in relation to the objectives of the study. The chapter presents descriptive and inferential statistics to meet the research objectives and test hypotheses respectively. The chapter begins by describing the demographic characteristics of the respondents which are followed by the descriptive statistics of the Likert scale items (which include the mean, standard deviation and percentages), as well as frequencies and percentages. The descriptive statistics are followed by simple linear regression to test the hypotheses and lastly discussion.

4.2. Questionnaire Return Rate

Questionnaire return rate is the proportion of the sample that participated as intended in all the research procedures. One hundred and fifty-two (152) questionnaires were distributed to the respondents; however, one hundred and forty-four (144) were fully answered and returned. This represented a response rate of 94.73% which was above 70% acceptable minimum set out by Draugalis et al. (2008). Also Mugenda and Mugenda (2003) assert that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and 70% and above is excellent for statistical reporting. The high questionnaire return rate was possible because the researcher administered the questionnaires in person whereby, the questionnaires were administered to the teachers, allowed some time/days to fill them, and picked immediately after they were dully filled. Therefore, this study was able to collect sufficient data to generate a comprehensive report.

4.3. Demographic Information of Teachers

The study collected demographic information from teachers based on gender, age, highest academic qualification and years of teaching experience. The results are presented in table 4.1

Table 4.1. Demographic Information of Teachers

	ITEM	FREQUENCY	PERCENTAGE %
Gender	Male	120	83.3
	Female	24	16.7
Age	Below 30	30	20.8
	30-39	62	43.1
	40-49	38	26.4
	50 and above	14	9.7
Qualification	SSCE	11	7.6
	NCE/Diploma	61	42.4
	Degree	61	42.4
	Masters/PhD	11	7.6
Teaching Experience	Below 5 years	56	38.9
	5-10 years	55	38.2
	11-15 years	18	12.5
	Above 15 years	15	10.4

The sample of participants consisted out of 120 (83.3%) males and 24 (16.7%) females. The age bracket of teachers showed that 30 (20.8%) were in the age group less than 30 years, 62 (43.1%) were in the age group 30-39 years, 38 (26.4%) of teachers were in the age group 40-49 years and 14 (9.7%) were in the age group 50 years and above, which highlights that most of the participants, *i.e.* 69.5% were within the 30 to 49 years of age groups. The age range thus suggests that majority of the participants were in the middle group. According to the findings, the level of academic qualification showed that 11 (7.6%) of the participants were SSCE holders, 61 (42.4%)

were NCE/Diploma holders, 61 (42.4%) were undergraduate degree holders, and 11 (7.6%) were postgraduate degree holders. The above information indicates that majority of the teachers have NCE/Diploma and undergraduate degree qualification and only a very small number of the teachers have masters and/or PhD. The years of teaching experience of the participants showed that 56 (38.9%) were below 5 years, 55 (38.2%) were 5-10 years, 18 (12.5%) were 11-15 years and 15 (10.4%) were above 15 years. This implies that majority (77.1%) of the participants have teaching experience of 0-10 year.

4.4. Presentation and Analysis of Empirical Data

This section presents the empirical findings of the study objectives. Analysis of the findings involved descriptive statistics of frequencies, percentages, mean and standard deviations derived from responses of respondents for each item. Inferential statistics of correlation analysis were applied to get the nature of the relationship between the Independent and Dependent variables while regression analysis was used to establish the extent to which the independent variable affects the dependent variable.

4.4.1. Availability of ICT Infrastructure

Objective one sought to find out the availability of ICT infrastructure and their influence on students' performance. To achieve this objective, the teachers were asked to respond to section 2A of the questionnaire. This was based on a rated five-point scale of; (5) = Very Available (VA); (4) = Available (A); (3) = Sometimes Available (SA); (2) = Not Sure (NS); (1) = Not Available (NA). Table 4.2 presents the findings. In data analysis, reference was made to the five-point scale. Thus, the mean score 1.0 – 2.0 = NA; 2.1 – 2.9 = NS; 3.0 = SA; 3.1 – 4.0 = A, and 4.1 – 5.0 = VA. The SD values ranged from 0.307 (interactive whiteboard) to 1.432 (desktop computers), an indicator that the scores didn't deviate significantly from the mean and from one another.

Table 4.2. Availability of ICT Infrastructure

Tested items	NA	NS	SA	A	VA	Mean	SD
Desktop computers	27 18.8%	0 0%	0 0%	62 43.1%	55 38.2%	3.82	1.432
Laptop computers	10 6.9%	0 0%	16 11.1%	65 45.1%	53 36.8%	4.05	1.053
Printers and photocopiers	0 0%	0 0%	0 0%	86 59.7%	58 40.3%	4.40	0.492
Projectors	33 22.9%	0 0%	89 61.8%	22 15.3%	0 0%	2.69	0.991
Internet connections	26 18.1%	0 0%	37 25.7%	81 56.3%	0 0%	3.20	1.119
Video players	89 61.8%	55 38.2%	0 0%	0 0%	0 0%	1.38	0.488
Teaching software	79 54.9%	65 45.1%	0 0%	0 0%	0 0%	1.45	0.499
Smart boards	26 18.1%	14 9.7%	58 40.3%	46 31.9%	0 0%	2.86	1.062
Interactive whiteboard	0 0%	0 0%	0 0%	15 10.4%	129 89.6%	4.90	0.307
Digital sound system	0 0%	0 0%	14 9.7%	84 58.3%	46 31.9%	4.22	0.608

With regard to desktop computers, most of the respondents 62 (43.1%) said they are available and 55 (38.2%) very available, while 27 (18.8%) not available. The corresponding mean value obtained was 3.82 which reflects availability of desktop computers while the standard deviation of 1.4 shows that there were high variations in responses. This means that respondents generally agree that desktop computers are available.

Most of the respondents 65 (45.1%) said laptop computers are available and 53 (36.8%) very available, 16 (11.1%) sometimes available, while a very few 10 (6.9%) not available. The results show that overall, the majority of the respondents were in agreement that laptop computers are available. The findings were justified with a corresponding mean score of 4.05 which is above average and a standard deviation of 1.053 which reflects high variations in responses. This

implies that generally, respondents consented that laptop computers are available. However, high variation in responses indicated by a high standard deviation implies that whereas the majority of the respondents said laptop computers are available, some percentage of respondents said they are not available.

For printers and photocopiers. 58 (40.3%) of the respondents argued that they are very available and 86 (59.7%) available. The findings were justified with a corresponding mean score of 4.40 which is above average and a standard deviation of 0.492 which reflects low variation in responses. This implies that printers and photocopiers are available.

On projectors, a very few of 22 (15.3%) of the respondents said they are available, on the other hand, 89 (61.8%) sometimes available, whereas 33 (22.9%) not available. The findings were further supported with a mean response of 2.69 which is below average, implying that the majority respondents said projectors are not available, and a standard deviation of 0.991 which reflects low variation in responses.

For internet connections, majority of the respondents 81 (56.3%) said they are available, while 37 (25.7%) sometimes available and 26 (18.1%) not available. The findings were justified with a corresponding mean score of 3.20 which is above average and a standard deviation of 1.119 which reflects high variation in responses. Whereas the mean score implies that generally, respondents concurred that internet connections are available, the high standard deviation implies high variations in responses meaning that some of the respondents said they are not available.

With regard to video players, most of the respondents 89 (61.8%) said they are not available and 55 (38.2%) respondents are not sure. This was justified by the corresponding mean value of 1.38 which is below average reflecting that majority of the respondents said video players are not available and a standard deviation of 0.488 which reflects low variation in response.

For teaching software, most of the respondents 79 (54.9%) said they are not available and 65 (45.1%) respondents are not sure. This was further justified by the corresponding mean value of 1.45 which is below average reflecting that majority of the respondents said teaching software are not available and a standard deviation of 0.499 which reflects low variation in responses

For smart boards, 46 (31.9%) respondents said they are available, 58 (40.3%) sometimes available, 26 (18.1%) not available and 14 (9.7%) not sure. The findings were justified with a corresponding mean score of 2.86 which is below average and a standard deviation of 1.062 which reflects high variations in responses. This implies that generally, respondents consented that smart boards are not available. However, high variation in responses indicated by a high standard deviation implies that whereas the majority of the respondents said smart boards are not available, some percentage of respondents said they are available.

With regard to interactive whiteboard, most of the respondents 129 (89.6%) said they are very available and 15 (10.4%) available. The corresponding mean score of 4.90 indicates that majority of the respondents consented with the availability while a standard deviation of 0.307 means that there were low variations in responses. This implies that generally, respondents consented that smart boards are available

For digital sound system, most of the respondents representing 84 (58.3%) said they are available and 46 (31.9%) respondents very available, while 14 (9.7%) sometimes available. The findings were verified with a mean score of 4.22 indicating that the majority of the respondents agreed with the availability. The corresponding standard deviation of 0.608 reflects low variations in responses in the obtained results. This implies that respondents generally said that digital sound system are available.

4.4.2. Teachers' Attitude towards Integration of ICT

Objective two sought to determine teachers' attitude towards integration of ICT in teaching and learning and their influence on students' performance. Teachers were asked to indicate their attitude towards ICT integration with regard to the level of their utilization in their teaching. The teachers were therefore asked to indicate the frequency with which they used some common ICT infrastructure found in schools. This was based on a rated five-point scale of; (5) = Very often (VO); (4) = Often (O); (3) = Sometimes (S); (2) = Rarely (R); (1) = Never (N). In data analysis, reference was made to the five-point scale. Thus, the mean score 1.0 – 2.0 = N; 2.1 – 2.9 = R; 3.0 = S; 3.1 – 4.0 = O, and 4.1 – 5.0 = VO. The standard deviation (S.D) below 1.0 implies high agreement of the respondents as well as reasonable validity of the reported mean values. The S.D

which is high (above 1.0) shows high variations in responses about the items asked. Table 4.3 presents the findings

Table 4.3. Teachers' Attitude toward ICT Integration

Tested items	N	R	S	O	VO	Mean	SD
Desktop computers	39 27.1%	8 5.6%	24 16.7%	42 29.2%	31 21.5%	3.13	1.514
Laptop computers	41 28.5%	12 8.3%	34 23.6%	35 24.3%	22 15.3%	2.90	1.442
Printers and photocopiers	27 18.8%	14 9.7%	38 26.4%	41 28.5%	24 16.7%	3.15	1.338
Projectors	74 51.4%	15 10.4%	32 22.2%	18 12.5%	5 3.5%	2.06	1.247
Internet connections	58 40.3%	11 7.6%	22 15.3%	27 18.8%	26 18.1%	2.67	1.582
Video players	77 53.5%	33 22.9%	21 14.6%	9 6.3%	4 2.8%	1.82	1.075
Teaching software	101 70.1%	13 9.0%	12 8.3%	11 7.6%	7 4.9%	1.68	1.198
Smart boards	65 45.1%	16 11.1%	20 13.9%	32 22.2%	11 7.6%	2.36	1.432
Interactive whiteboard	39 27.1%	11 7.6%	17 11.8%	31 21.5%	46 31.9%	3.24	1.617
Digital sound system	55 38.2%	16 11.1%	30 20.8%	35 24.3%	8 5.6%	2.48	1.359

As presented in table 4.3, 31 (21.5%) respondents utilized desktop computers very often and 42 (29.2%) often, while 24 (16.7%) sometimes, 8 (5.6%) rarely and 39 (27.1%) never. A corresponding mean value of 3.13 which is slightly above average, indicates that generally, respondents utilized desktop computers while the standard deviation of 1.514 shows high variations in responses. This implies that the majority of the respondents utilized desktop computers often, the high standard deviation implies high variations in responses meaning that some good number never utilized it.

With regard to laptop computers, 22 (15.3%) of the respondents utilized it very often and 35 (24.3%) often, 34 (23.6%) sometimes, 12 (8.3%) rarely and 41 (28.5%) never used it. The corresponding mean score of 2.90 which is below average indicates that majority of the respondents do not utilized laptop computers or used it rarely while a standard deviation of 1.442 means that there were high variations in responses. This implies that while majority of the respondents do not utilized laptop computers, a good number utilized it.

With regard to printers and photocopiers, most of the respondents 41 (28.5%) utilized it often and 24 (16.7%) very often, while 38 (26.4%) sometimes, 14 (9.7%) rarely and 27 (18.8%) never used it. The findings were further supported with a mean response of 3.15 which is slightly above average, implying that the majority respondents were utilizing printers and photocopiers, and a standard deviation of 1.338 which reflects high variation in responses. Whereas the mean score implies that generally, respondents utilized printers and photocopiers, the high standard deviation implies high variations in responses meaning that some good number do not utilized it.

For projectors, a very few respondents 18 (12.5%) utilized it often and 5 (3.5%) very often, while most of the respondents 74 (51.4%) never used it and 15 (10.4%) rarely, however 32 (22.2%) used it sometimes. The findings were justified with a corresponding mean score of 2.06 which is below average and a standard deviation of 1.247 which reflects high variations in responses. This implies that generally, respondents do not utilized projectors. However, high variation in responses indicated by a high standard deviation implies that whereas the majority of the respondents do not utilized projectors, some percentage of respondents utilized it.

On internet connection, majority of the respondents 58 (40.3%) never used it and 11 (7.6%) rarely, whereas 27 (18.8%) often and 26 (18.1%) very often, 22 (15.3%) sometimes. The corresponding mean score of 2.67 indicates that majority of the respondents do not utilize internet connection while a standard deviation of 1.582 means that there were high variations in responses. This implies that generally, respondents do not utilize internet connection. However, high variation in responses indicated by a high standard deviation implies that whereas the majority of the respondents do not utilize internet connection, a good percentage of respondents utilized it.

For video players, 4 (2.8%) respondents utilized it very often and 9 (6.3%) often, 21 (14.6%) sometimes, 33 (22.9%) rarely and 77 (53.5%) never used it. The findings were further justified by the corresponding mean score of 1.82 which is below average and a standard deviation of 1.075 which indicates there were high variation in responses. This implies that majority of the respondents do not utilized video players.

For teaching software, a very few respondents 7 (4.9%) utilized it very often and 11 (7.6%) often, 12 (8.3%) sometimes, while majority 101 (70.1%) never used it and 13 (9.0%) rarely. The corresponding mean score of 1.68 indicates that majority of the respondents do not utilize teaching software while a standard deviation of 1.198 means that there were high variations in responses. This implies that generally, respondents do not utilize teaching software.

For smart boards, a few respondents 11 (7.6%) utilized it very often and 32 (22.2%) often, 20 (13.9%) sometimes, while most of the respondents 65 (45.1%) never used it and 16 (11.1%) rarely. The findings were justified with a corresponding mean score of 2.36 which is below average and a standard deviation of 1.432 which reflects high variations in responses. This implies that generally, respondents do not utilize smart boards. However, high variation in responses indicated by a high standard deviation implies that whereas the majority of the respondents do not utilize smart boards, some percentage of respondents utilized it.

With regard to interactive whiteboard, 46 (31.9%) respondents utilized it very often and 31 (21.5%) often, 17 (11.8%) sometimes, while 11 (7.6%) rarely and 39 (27.1%) never used it. The findings were further supported with a mean response of 3.24 which is above average, implying that the majority respondents were utilizing interactive whiteboard, and a standard deviation of 1.617 which reflects high variation in responses. Whereas the mean score implies that generally, respondents utilized interactive whiteboard, the high standard deviation implies high variations in responses meaning that some good number do not utilized it.

For digital sound system, 8 (5.6%) respondents utilized it very often and 35 (24.3%) often, 30 (20.8%) sometimes, 16 (11.1%) rarely and 55 (38.2%) never used it. The corresponding mean score of 2.48 indicates that majority of the respondents do not utilize digital sound system while a standard deviation of 1.359 means that there were high variations in responses. This implies

that generally, respondents do not utilize digital sound system. However, high variation in responses indicated by a high standard deviation implies that whereas the majority of the respondents do not utilize digital sound system, some percentage of respondents utilized it.

4.4.3. Teachers' Competence on ICT

Objective three sought to establish teachers' competence on ICT and their influence on students' performance. A statement of some common ICT competence skills were provided, and teachers were asked to indicate their level of agreement. A five-point Likert scale was used by the researcher to rate respondents' opinions. This was rated on a scale of; (5) = Strongly Agree (4) = Agree, (3) = Not sure (2) = Disagree (1) = Strongly Disagree. In data analysis, reference was made to the five-point Likert scale. Thus, the mean score 1.0 – 2.0 = SD; 2.1 – 2.9 = D; 3.0 = NS; 3.1 – 4.0 = A, and 4.1 – 5.0 = SA. The standard deviation (S.D) below 1.0 implies high agreement of the respondents as well as reasonable validity of the reported mean values. The S.D which is high (above 1.0) shows high variations in responses about the items asked.

Table 4.4. Teachers' Competence on ICT

Tested items	SD	D	N	A	SA	Mean	SD
I can install education software in a computer	5 3.5%	15 10.4%	15 10.4%	68 47.2%	41 28.5%	3.87	1.053
I can download materials from the internet	5 3.5%	6 4.2%	10 6.9%	64 44.4%	59 41.0%	4.15	0.970
I can produce PowerPoint presentations	5 3.5%	23 16.0%	23 16.0%	67 46.5%	26 18.1%	3.60	1.066
I can take photos using digital devices and show them to students in the computer	8 5.6%	16 11.1%	37 25.7%	45 31.3%	38 26.4%	3.62	1.153
I can comfortably locate and retrieve curriculum resources in the internet	12 8.3%	34 23.6%	35 24.3%	33 22.9%	30 20.8%	3.24	1.259
I can prepare lesson that involve the use of ICT	7 4.9%	15 10.4%	25 17.4%	55 38.2%	42 29.2%	3.76	1.128
I can use computer spreadsheets to assess and evaluate my students	14 9.7%	20 13.9%	39 27.1%	48 33.3%	23 16.0%	3.32	1.186
I can file documents in electronic folders in the computer	4 2.8%	9 6.3%	5 3.5%	64 44.4%	62 43.1%	4.19	0.968
I can send electronic mail via the internet	5 3.5%	8 5.6%	7 4.9%	51 35.4%	73 50.7%	4.24	1.019
I can produce simulations and use them in teaching	15 10.4%	32 22.2%	34 23.6%	35 24.3%	28 19.4%	3.20	1.277

As presented in table 4.4, most of the respondents 68 (47.2%) agreed and 41 (28.5%) strongly agreed that they can install education software in a computer. On the other hand, only 15 (10.4%) disagreed, and 5 (3.5%) strongly disagreed with the statement, while 15 (10.4%) were neutral. The results indicate that on average, the majority of the respondents agreed with the statement. The corresponding mean value obtained was 3.87 which reflects general agreement with the statement while the standard deviation of 1.053 shows that there were high variations in responses. This means that while most of the respondents agreed that they were competent in installing education software in a computer, some percentage disagreed with the statement.

The study found that most respondents 64 (44.4%) agreed that they can download materials from the internet and 59 (41.0%) strongly agreed. However, few respondents 6 (4.2%) disagreed and 5 (3.5%) strongly disagreed with the statement, while 10 (6.9%) were neutral to that. The results show that overall, the majority of the respondents were in agreement with the statement. The findings were justified with a corresponding mean score of 4.15 which is above average and a standard deviation of 0.970 which reflects low variations in responses. This implies that generally, respondents consented that they can download materials from the internet.

On whether respondents can produce PowerPoint presentations, 26 (18.1%) of the respondents strongly agreed. They were seconded by 67 (46.5%) who agreed, however, 23 (16.0%) were neutral, 23 (16.0%) disagreed with the statement and 5 (3.5%) strongly disagreed with it. The findings were further supported with a mean response of 3.60 which is above average, implying that the majority respondents were in agreement with the statement, and a standard deviation of 1.066 which reflects high variation in responses. Whereas the mean score implies that generally, respondents concurred with the statement that they can produce PowerPoint presentation, the high standard deviation implies high variations in responses meaning that some good number disagreed with the statement.

With regard to I can take photos using digital devices and show them to students in the computer, most of the respondents 45 (31.3%) agreed and 38 (26.4%) strongly agreed with the statement, 37 (25.7%) were neutral, 16 (11.1%) disagreed with the statement and 8 (5.6%) strongly disagreed. The findings show that on average, the majority of the respondents were in agreement with the statement. The corresponding mean score of 3.62 indicates that majority of the respondents consented with the statement while a standard deviation of 1.153 means that there were high variations in responses. This high variation could mean that respondents were most varied on the statement which implies that much as the majority agreed with the statement, others disagreed.

The study found that 30 (20.8%) of the respondents strongly agreed that they can comfortably locate and retrieve curriculum resources in the internet and 33 (22.9%) agreed with the statement. However, 35 (24.3%) of the respondents were neutral to that, also, 34 (23.6%) disagreed, and 12 (8.3%) strongly disagreed with the statement. The findings were verified with

a mean score of 3.24 indicating that the majority of the respondents agreed with the statement. The corresponding standard deviation of 1.259 reflects high variations in responses in the obtained results. This implies that whereas majority of the respondents agreed with the idea that they can comfortably locate and retrieve curriculum resources in the internet, some percentage disagreed.

On the statement, "I can prepare lesson that involve the use of ICT" most of the respondents 55 (38.2%) agreed and 42 (29.2%) strongly agreed. A few respondents 15 (10.4%) disagreed with the statement and 7 (4.9%) strongly disagreed with it. However, 25 (17.4%) were neutral with a corresponding mean value of 3.76, which indicates that generally, respondents were in agreement with the statement while the standard deviation of 1.128 shows high variations in responses. This implies that the majority of the respondents held that they can prepare lesson that involve the use of ICT and some others disagreed.

With regard to “I can use computer spreadsheets to assess and evaluate my students” 23 (16.0%) of the respondents strongly agreed with the statement and 48 (33.3%) agreed, 39 (27.1%) were neutral, 20 (13.9%) disagreed with it and 14 (9.7%) strongly disagreed. The findings show that on average, the majority of the respondents were in agreement with the statement. The corresponding mean score of 3.32 indicates that majority of the respondents consented with the statement while a standard deviation of 1.186 means that there were high variations in responses. Thus, the findings reflect general agreement, which implies that the majority of the respondents can use computer spreadsheets to assess and evaluate students

The study found that most of the respondents 64 (44.4%) agreed and 62 (43.1%) strongly agreed that they can file documents in electronic folders in the computer, while 5 (3.5%) were neutral, a very few of 9 (6.3%) disagreed and 4 (2.8%) strongly disagreed. The results show that on average, respondents generally agreed with the statement. The corresponding mean score of 4.19 reflects general agreement with the statement while a standard deviation of 0.968 indicates low variations in responses. This implies that overall, respondents consented that they can file documents in electronic folders in the computer.

With regard to “I can send electronic mail via internet” majority of the respondents representing 73 (50.7%) strongly agreed with the statement and 51 (35.4%) agreed, 7 (4.9%) were neutral, 8 (5.6%) disagreed with the statement and 5 (3.5%) strongly disagreed. The results show that overall, the majority of respondents were in agreement with the statement. The findings were justified with a corresponding mean score of 4.24 which is above average and a standard deviation of 1.019 which reflects high variations in responses. This implies that while most of the respondents indicated that they can send electronic mail via internet, some others disagreed.

On the statement, "I can produce simulations and use them in teaching", 28 (19.4%) of the respondents strongly agreed, they were seconded by 35 (24.3%) who agreed, however, 34 (23.6%) were neutral, 32 (22.2%) disagreed with the statement, and 15 (10.4%) strongly disagreed with it. The results show that on average, the majority of the respondents agreed with the statement. The obtained mean value of 3.20 was corresponding to respondents agreeing with the statement and a standard deviation of 1.277 shows high variations in the responses obtained. The results therefore indicate that much as the majority of the respondents agreed with the statement, others were also in disagreement which was indicated by a high standard deviation.

4.4.4. School Support on ICT Integration

Objective four sought to determine school support on ICT integration and their influence on students’ performance. A statement of some common school support on ICT integration were provided, and teachers were asked to indicate their level of agreement based on 5-Likert scale of Strongly Agree (SA); Agree (A); Neutral (N); Disagree (D); and Strongly Disagree (SD). Table 4.5 presents the findings

Table 4.5. School Support on ICT integration

Tested items	SD	D	N	A	SA	Mean	SD
The school has clearly articulated the vision and mission of ICT integration	8 5.6%	22 15.3%	28 19.4%	55 38.2%	31 21.5%	3.55	1.152
The school encourages autonomy and teamwork to enhance ICT use among the staff	4 2.8%	16 11.1%	39 27.1%	65 45.1%	20 13.9%	3.56	0.959
The school gives flexibility for staff to adapt ICT integration in teaching and learning	6 4.2%	15 10.4%	51 35.4%	48 33.3%	24 16.7%	3.48	1.024
The school organizes the appointment of an ICT coordinator who can provide technical support.	16 11.1%	49 34.0%	34 23.6%	30 20.8%	15 10.4%	2.85	1.182
The school provides consistent hardware and software updates	31 21.5%	48 33.3%	25 17.4%	32 22.2%	8 5.6%	2.57	1.210
The school employs ICT technician who ensures proper functioning of software and hardware	33 22.9%	40 27.8%	32 22.2%	26 18.1%	13 9.0%	2.63	1.268
The school employs a computer laboratory attendant who ensures proper access to the computers	15 10.4%	27 18.8%	23 16.0%	63 43.8%	16 11.1%	3.26	1.194
Training programs are provided for staff to increase their awareness about the value of ICT use	8 5.6%	25 17.4%	41 28.5%	45 31.3%	25 17.4%	3.38	1.127
I am supported to attend workshops or training programs in order to integrate ICT effectively	13 9.0%	32 22.2%	33 22.9%	36 25.0%	30 20.8%	3.26	1.268
Important decisions about ICT integration are made at all levels	18 12.5%	23 16.0%	31 21.5%	44 30.6%	28 19.4%	3.28	1.294

As presented in table 4.5, 31 (21.5%) of the respondents strongly agreed that the school has clearly articulated the vision and mission of ICT integration and most of the respondents 55 (38.2%) agreed with the statement, 28 (19.4%) were neutral, 22 (15.3%) disagreed and 8 (5.6%) strongly disagreed with the statement. The corresponding mean value obtained was 3.55 which shows that majority respondents agreed with the statement. In addition, a standard deviation of 1.152 implies high variations in responses. The findings reflected a general view of strong

agreement with the idea that the school has clearly articulated the vision and mission of ICT integration.

The study found that majority of the respondents 65 (45.1%) agreed that the school encourages autonomy and teamwork to enhance ICT use among the staff and 20 (13.9%) strongly agreed. However, 39 (27.1%) of the respondents were neutral to that, whereas 16 (11.1%) disagreed and 4 (2.8%) strongly disagreed with the statement. The results were verified with a mean score of 3.56 which indicates that many respondents agreed with the statement while the standard deviation of 0.959 shows low variations in responses. The results reflect general agreement, which implies that several schools encourage autonomy to enhance ICT use among the staff.

On the statement, "The school gives flexibility for staff to adapt ICT integration in teaching and learning" 24 (16.7%) of the respondents strongly agreed. They were seconded by 48 (33.3%) who agreed, while most of the respondents 51 (35.4%) were neutral, 15 (10.4%) disagreed with the statement and 6 (4.2%) strongly disagreed with it. The corresponding mean score of 3.48 shows that respondents generally agreed with the statement while a standard deviation of 1.024 shows high variations in responses. The findings imply that schools give flexibility for staff to adapt ICT integration in executing their tasks.

With regard to “The school organizes the appointment of an ICT coordinator who can provide technical support” most of the respondents 49 (34.0%) disagreed and 16 (11.1%) strongly disagreed. 15 (10.4%) of the respondents strongly agreed and 30 (20.8%) agreed with the statement, while 34 (23.6%) were neutral. The findings show that on average, the majority of the respondents disagreed with the statement. The corresponding mean score of 2.85 indicates that the majority of the respondents disagreed with the statement while a standard deviation of 1.182 means that there were high variations in responses. Thus, the findings reflect general disagreement, which implies that schools do not organize the appointment of an ICT coordinator who can provide technical support.

The study found that 8 (5.6%) of the respondents strongly agreed that the school provides consistent hardware and software updates and 32 (22.2%) agreed with the statement. While 25 (17.4%) of the respondents were neutral to that, however most of the respondents 48 (33.3%) disagreed and 31 (21.5%) strongly disagreed with the statement. The results indicate that the

majority of the respondents disagreed with the statement. The corresponding mean score of 2.57 reflects general disagreement of the respondents with the statement while standard deviation of 1.210 shows high variations in responses. This implies that most respondents disagreed with the idea that the school provides consistent hardware and software updates.

On the statement, “The school employs ICT technician who ensures proper functioning of software and hardware" a very few representing 13 (9.0%) of the respondents strongly agreed and 26 (18.1%) agreed, whereas majority of the respondents representing 40 (27.8%) disagreed and 33 (22.9%) strongly disagreed with the statement, however 32 (22.2%) were neutral. The results indicate that the majority of the respondents disagreed with the statement. The corresponding mean score of 2.63 reflects general disagreement of the respondents with the statement while standard deviation of 1.268 shows high variations in responses. This implies that most respondents disagreed with the idea that the school employs ICT technician who ensures proper functioning of software and hardware.

With regard to “The school employs computer laboratory attendant who ensures proper access to the computers” majority of the respondents 63 (43.8%) agreed and 16 (11.1%) strongly agreed with the statement, while 27 (18.8%) disagreed and 15 (10.4%) strongly disagreed. However 23 (16.0%) were neutral. The results show that overall, most respondents were in agreement with the statement. The findings were justified with a corresponding mean score of 3.26 which is above average and a standard deviation of 1.194 which reflects high variations in responses. This implies that while majority of the respondents agreed that the school employs a computer laboratory attendant who ensures proper access to the computers, some percentage do not agree with the statement.

The study found that majority of the respondents representing 45 (31.3%) and 25 (17.4%) agreed and strongly agreed that training programs are provided for staff to increase their awareness about the value of ICT use respectively, while a few 25 (17.4%) disagreed and 8 (5.6%) strongly disagreed, whereas 41 (28.5%) were neutral to the statement. The results indicate that the majority of the respondents agreed with the statement. The corresponding mean score of 3.38 reflects general agreement of the respondents with the statement while standard deviation of 1.127 shows high variations in responses. This implies that whereas most respondents agreed

with the idea that training programs are provided for staff to increase their awareness about the value of ICT use, some others disagreed.

With regard to “I am supported to attend workshops or training programs in order to integrate ICT effectively” 30 (20.8%) strongly agreed and 36 (25.0%) agreed with the statement, but 33 (22.9%) were neutral, while 32 (22.2%) disagreed and 13 (9.0%) strongly disagreed. The results indicate that on average, the majority of the respondents agreed with the statement. The corresponding mean value obtained was 3.26 which reflects general agreement with the statement while the standard deviation of 1.268 shows that there were high variations in responses. This means that while most of the respondents agreed that they were supported to attend workshops or training programs in order to integrate ICT effectively, some good number disagreed with the statement.

On the statement, "Important decisions about ICT integration are made at all levels", 28 (19.4%) of the respondents strongly agreed, they were seconded by majority 44 (30.6%) who agreed, 23 (16.0%) disagreed and 18 (12.5%) strongly disagreed with it, however, 31 (21.5%) were neutral. The results show that overall, the majority of the respondents were in agreement with the statement. The findings were justified with a corresponding mean score of 3.28 which is above average and a standard deviation of 1.294 which reflects high variations in responses. This indicates that most respondents agreed with the idea that important decisions about ICT integration are made at all levels.

4.4.5. Data Reduction and Test for Statistical Assumptions

To perform inferential statistics analysis, one has to ensure the quality of data. This is done by carrying out factor analysis, reliability analysis and regression analysis. The quality and output of any analysis are dependent on the quality of initial data screening and treatment (Hair et al., 2010). This involves reducing the original data or variables into a new composite smaller grouping of components or factors which highly correlate with each other and develops new labels or naming of each group of variables (Hair et al., 2010). This section required the analysis of both the independent and dependent variables. It involved the use of factor analysis, reliability analysis, and inferential statistics. Given this, the data that was obtained in this study was explored with Principal Components Analysis (PCA). The original independent variable factors

for ICT integration measured with factors; availability, utilization, teacher's competence and school support are discussed and the dependent variable is student's performance.

4.4.6. Data Reduction using Factor Analysis

Factor analysis is a multivariate statistical technique that is used to examine the structure of the interrelationships among large number of items in a variable and reduce them into smaller set of factors that are highly interrelated and are presumed to represent the dimensions within the data (Hair et al., 2010). To execute data reduction using factor analysis, there are three important decisions applied. These are elaborated below.

4.4.6.1. Calculating the Input Data

In order to calculate the input data (Correlation Matrix) using R-Factor Analysis to meet the specified objective of grouping variables, the researcher did the following:

i. The researcher designed the study variable in terms of the number of tested items. Key variable items were identified that were closely related and reflected the hypothesized underlying factors. The validated variables derived were used in assessing whether the results had practical significance.
ii. The sample size valid for factor analysis had to be greater than 100. The satisfactory sample size had to have a 10:1 ratio. In this study, the sample size was 152 and 4 variables so the ratio of 38:1 was above the threshold to conduct factor analysis (Hair et al., 2010).

4.4.6.2. Assumptions for Factor Analysis

The crucial assumptions for conducting factor analysis are more conceptual than statistical. In factor analysis, the superseding concern focuses on the character and configuration of the variables. The conceptual issue assumption states that there should be some underlying structure existing in the set of the selected variables. Secondly, the sample is supposed to be homogeneous to the original factor structure.

4.4.6.3. Overall Measure of Inter-Correlation

In order to ensure that the data had adequate correlation to justify the use of factor analysis, testing Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (KMO) and Bartlett's test of sphericity was calculated to offer statistical significance that the correlation matrix had significant correlations among at least some of the variables (Yong & Pearce, 2013). The significance <.05 shows that sufficient correlation exists among the variables. Therefore, the researcher was at liberty to proceed to the next step.

The (KMO) measures of sampling adequacy gives an index value between 0 and 1 of the percentage of variance among the variables that might be mutual variance. Kaiser (1974) recommended that a KMO near 1.0 is suitable for factor analysis and that anything below 0.5 is not recommended. Values closer to 1 show that the patterns of correlations are slightly condensed and that factor analysis would derive a more discrete and reliable factor (Kaiser, 1974). A value above the least threshold of 0.5 is acceptable.

Snedecor and Cochran, (1983) suggested that Bartlett's test should be used to determine if the items have equal variances across samples. The items are called homogeneity of variances. Bartlett's Test of Sphericity examines the null hypothesis when the correlation matrix is an identity matrix. If there is no correlation between variables, factor analysis cannot work. To find out if there was a correlation, a threshold value was selected, known as the significant level at $p < 0.05$. Values below .05 significance show a high chance that there were significant correlations between variables, whereas higher values > 0.1 indicate the data is unsuitable for factor analysis. The KMO and Bartlett tests are shown in Table 4.8.

Table 4.6: KMO and Bartlett's Test Result

Variables	Kaiser-Meyer-Olkin of sampling adequacy	Barlett's test of Sphericity approx Chi-square	Df	Sig.
Availability	.674	1031.312	45	.000
Teacher's attitude	.856	622.582	45	.000
Teacher's competence	.847	707.466	45	.000
School support	.851	539.252	45	.000

As shown in Table 4.6 above, the test on KMO of sampling adequacy and Bartlett's test of sphericity tests were appropriate and viable for all the variables since KMO measures of sampling had reached the values of above 0.6 and Bartlett's Test of Sphericity was significant at $p < 0.05$ meaning that the correlation matrix was not an identity matrix and therefore was able to constitute factors. This test, therefore, concludes that the Kaiser-Meyer-Olkin measure of Sampling Adequacy (KMO) and Bartlett's measure were suitable for the factor analysis of variables to be performed.

4.4.7. Factor Analysis for Availability

Based on Hair et al. (2010), the sample size of 152 respondents, and a threshold factor loading of .50 and above was considered significant for interpretation purposes. The availability dimension had ten (10) items originally from the questionnaire, these items were subjected to extraction and only three (3) items were dropped as they did not meet the recommended threshold of 0.5 and above (Hair et al., 2010). The items deleted are indicated with (*) and were not considered for further analysis. As shown in Table 4.7 factor loading scores ranged from .615 to .933 (absolute values). This indicates a good correlation between the items and the factor they belong to.

Table 4.7: Rotated Factor Analysis for Availability

Component matrix	Component
Desktop computers	.825
Laptop computers	.294*
Printers and photocopiers	.736
Projectors	.898
Internet connections	.862
Video players	.104*
Teaching software	.027*
Smart boards	.933
Interactive whiteboard	.615
Digital sound system	.748

**** Item deleted***

4.4.8. Factor Analysis for Teachers' Attitude

The dimension had ten (10) items initially from the original questionnaire, these items were subjected to extraction and only one (1) item were dropped as it does not meet the recommended threshold of 0.5 and above (Hair et al., 2010). The item deleted is indicated with (*) and was not considered for further analysis. As shown in Table 4.8 factor loading scores ranged from .583 to .780 (absolute values). This indicates a good correlation between the items and the factor they belong to.

Table 4.8: Rotated Factor Analysis for Teachers' Attitude

Component matrix	Component
Desktop computers	.665
Laptop computers	.766
Printers and photocopiers	.583
Projectors	.754
Internet connections	.779
Video players	615
Teaching software	.423*
Smart boards	.712
Interactive whiteboard	.780
Digital sound system	.765

**** Item deleted***

4.4.9. Factor Analysis for Teachers' Competence

The dimension had ten (10) items initially from the original questionnaire, these items were subjected to extraction and all the items met the recommended threshold of 0.5 and above (Hair et al., 2010). The ten items had a loading ranging between scores of .544 to .802 as indicated in Table 4.9.

Table 4.9: Rotated Factor Analysis for Teachers' Competence

Component matrix	Component
I can install education software in a computer	.754
I can download materials from the internet	.741
I can produce PowerPoint presentations	.753
I can take photos using digital devices and show them to students in the computer	.802
I can comfortably locate and retrieve curriculum resources in the internet	.769
I can prepare lesson that involve the use of ICT	801
I can use computer spreadsheets to assess and evaluate my students	583
I can file documents in electronic folders in the computer	.617
I can send electronic mail via the internet	.544
I can produce simulations and use them in teaching	.557

4.4.10. Factor Analysis for school support

The dimension had ten (10) items initially from the original questionnaire, these items were subjected to extraction and only one (1) item were dropped as it does not meet the recommended threshold of 0.5 and above (Hair et al., 2010). The item deleted is indicated with (*) and was not considered for further analysis. As shown in Table 4.10 factor loading scores ranged from .593 to .801 (absolute values). This indicates a good correlation between the items and the factor they belong to.

Table 4.10: Rotated Factor Analysis for School Support

Component matrix	Component
The school has clearly articulated the vision and mission of ICT integration	.629
The school encourages autonomy and teamwork to enhance ICT use among the staff	.724
The school gives flexibility for staff to adapt ICT integration in teaching and learning	.613
The school organizes the appointment of an ICT coordinator who can provide technical support.	.801
The school provides consistent hardware and software updates	.721
The school employs ICT technician who ensures proper functioning of software and hardware	.647
The school employs a computer laboratory attendant who ensures proper access to the computers	.456*
Training programs are provided for staff to increase their awareness about the value of ICT use	.766
I am supported to attend workshops or training programs in order to integrate ICT effectively	.694
Important decisions about ICT integration are made at all levels	.593

**** Item deleted***

4.4.11. Construct Validity using Cronbach Alpha

Construct validity is an evaluation of the degree of consistency between several measurements of a construct (Cronbach, 1951). Reliability coefficient can be used to assess the consistency of the data with Cronbach Alpha being the most widely used measure (Hair et al., 2010). The reliability coefficient was computed to test the internal consistency among the variables in a summated scale and to select how the variables correlated among themselves. The rationale for internal consistency is that the individual items or indicators of the scale should all be measuring the same construct and thus be highly inter-correlated. The general acceptable lower limit for Cronbach's alpha is .70 and above (Hair et al., 2010). Results of Cronbach Alpha for the extracted variables are indicated in Table 4.11.

Table 4.11: Cronbach Alpha of the Variables

S/N	Variables	Cronbach alpha	Number of items
1	Availability of ICT infrastructure	.825	10
2	Teachers' attitude on ICT	.876	10
3	Teachers competence on ICT	.878	10
4	School support on ICT integration	.858	10

4.4.11.1. Test for Statistical Assumption

The underlying assumptions for analyzing and hypotheses testing are; participants are randomly selected, the dependent variable is assessed using a scale measure and the distribution of the population must be approximately normal (Emmert-Streib & Dehmer, 2019). In this study, after generating a sampling frame for teachers from the target population of the respective schools where the research took place, the researcher drew a sample of the teachers for the study using the simple random technique as every participant had an equal opportunity to participate in the study. This ensured that bias in selection did not occur. Secondly, the dependent variable was measured using document analysis. The next step was to test for the normality of the population distribution.

4.4.11.2. Tests of Normality

To ensure that data on the objectives was normally distributed, normality tests were conducted. Shapiro-Wilk test which is normally used to satisfy the assumption of parametric statistics was used to detect departures from normality for small sample sizes less than 2000 with the help of the SPSS 21.0 version (King et al., 2016). If the significant value of the Shapiro-Wilk is greater than 0.05 then the data is normal. The results for the tests of Shapiro-Wilk are indicated in Table 4.18.

Table 4.12: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Availability	.161	144	.000	.897	144	.000
Teachers' attitude	.100	144	.001	.955	144	.000
Teacher's competence	.094	144	.003	.962	144	.000
School support	.073	144	.060	.987	144	.185

The findings in Table 4.12 above indicate that; availability, teachers' attitude and teacher's competence had p values less than 0.05 which is an indication that their data was not normally distributed**.** The data was not normally distributed therefore hypothesis testing could only be performed through bootstrapping. According to King et al. (2016) the normal distribution is the underpinning of many statistical analysis techniques of parametric statistics.

4.4.11.3. Multi-collinearity Diagnostics

Collinearity means that two or more of the independent variables in a regression have a linear relationship. This causes a problem in the interpretation of the regression results. First, an examination of the correlation matrix of the independent variables was done. The presence of high correlations in the region of r=0.9 and above is an indication of substantial collinearity (Field, 2009).

Secondly, collinearity could be due to the combination of two or more other independent variables. Multi-collinearity was measured using Variance Inflation Factors (VIF) and tolerance. This was done through running a linear regression analysis in SPSS at a confidence level of 95% to determine collinearity diagnostics. A threshold of Variance inflation factor of not more than 10 and a tolerance value of between 0.2 and 10 is suggested (Field, 2009). The variance inflation factor values for availability, utilization, teacher's competence and school support are in the range of 1.487- 1.095. The results are presented in Table 4.19 below

Table 4.13: Collinearity Statistic for variables

Model		Collinearity Statistics	
		Tolerance	**VIF**
	(Constant)		
	Availability	.907	1.103
1	Teacher's attitude	.914	1.095
	Teacher's competence	.672	1.487
	School support	.686	1.457

4.4.12. Correlation Analysis of Study Variables

Pearson correlation analysis was used to examine the relationship between the variables (Wong & Hiew, 2005). Coefficient measures the strength of the linear relationship between variables. The coefficient ranges from -1 to +1 where by r=1 means a perfect positive correlation, 0.5>1 means strong positive correlation, 0>0.5 means weak positive correlation, 0 means no correlation, 0>-0.5 means weak negative correlation, -0.5>-1 means strong negative correlation while -1 means a perfect correlation. Availability and student's performance had weak negative relationship (r=-.068, p> .05). There was a weak positive relationship between utilization and student's performance (r=.178, p < .05). While teacher's competence and student's performance indicated a weak negative correlation (r=-.021, p>.05). And there was weak positive relationship between school support and student's performance (r=.023, p > .05). Correlation coefficients are presented in table 4.20 below;

Table 4.14: Correlation Coefficients

Variable	Student's performance	
	Correlation Coefficient	Sig. Value
Availability	-.068	.419
Teacher's attitude	.178*	.033
Teacher's competence	-.021	.807
School support	.023	.782

4.4.13. Multiple Regression using Bootstrap Technique

The research in this study used the multiple regression bootstrapping method to make inferences about the study population, because the data from participants violated the assumptions for normally distributed data (Demiralp et al., 2008). Bootstrapping procedure is a method that is used to estimate the statistical accuracy from the data in a single sample with potential bias in the sample data (Wilcox, 2017). The sample data may have outliers that skew the data. This creates problems in case one wants to apply a parametric test such as the Pearson Correlation Coefficient which obeys the assumptions of the linear model (Efron, 1979; Wilcox, 2017). Bootstrapping is a technique that violates the assumptions of linearity. Bootstrapping works by resampling with the replacement of the original sample data, via the drawing of a large number of smaller samples, each of which is the sample size (Wilcox, 2017). Samples are selected randomly and the test statistic is computed for each sample (Sideridis & Simos, 2010). The distribution for the bootstrap sample can be treated as though it were a distribution constructed from the real sample. To conclude, it is usual to assume that the error of measurement associated with the observation comes from a normal distribution. To ensure that the probability of type 1 error is approximately $\acute{\alpha}$ in analyzing the linear relationship for a paired observation, procedures for gaining the bootstrap distribution of paired observation are presented.

The important feature of this method is that a large number of bootstrap samples of the observation are considered with the property that each bootstrap is equally alike under the hypothesis to be tested. Bootstrap methods are applied because the distribution of the observation

under the null hypotheses need not be known to obtain a p-value. Sideridis and Simos (2010) stress that the bootstrap method is as powerful as the best parametric test when based on the same statistics. In this study, bootstrap procedures were used to measure the linear association between the independent and the dependent variables.

Table 4.15: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.205[a]	.042	.014	6.59719

a. *Predictors: (Constant), availability, teachers' attitude, teachers' competence, school support*

Results in Table 4.14 R square indicates the coefficient of determination: meaning it explains how much students' performance can be explained by availability, utilization, teachers' competence and school support combined together. In this case, 4.2% of the total variation in students' performance can be explained by the linear relationship between availability, utilization, teachers' competence and school support indicators and students' performance. However, Hair et al. (2010) recommended the use of Adjusted R Square given that R square exaggerate, in this case, 4.2% explains the relationship between the four independent variables (availability, utilization, teachers' competence, school support) and students' performance while the remaining therefore implies that 95.8% of the variance in students' performance can be explained by other variables not in the model, but outside the model.

To test the hypotheses that there is no significant relationship between availability of ICT infrastructure and student's performance, there is no significant relationship between teachers' attitude on ICT and student's performance, there is no significant relationship between teachers' competence on ICT and student's performance, there is no significant relationship between school support on ICT and student's performance in public secondary schools of Gezawa area, Nigeria, an F-test was done as shown in Table 4.15.

Table 4.16: Analysis of variance

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	264.171	4	66.043	1.517	.200[b]
	Residual	6049.678	139	43.523		
	Total	6313.849	143			

a. Dependent Variable: Students' performance

b. Predictors: (Constant), availability, teachers' attitude, teachers' competence, school support

Table 4.15 indicates the test of significance of the model in predicting the dependent variable. The regression model was not significant at an F (4,139) = 1.517, p>0.05 to predict the criterion variable. The hypotheses tested, availability, utilization, teachers' competence and school support combined together in the regression model are not statistically fit to predict the criterion variable of students' performance. Considering the findings, the F-test is not statistically significant at p>0.05. This, therefore, indicates that availability, utilization, teachers' competence and school support combined together not predict students' performance.

To determine the regression equation, the bootstrap coefficient was performed as shown in Table 4.17 below.

Table 4.17: Bootstrap for Coefficients

Bootstrap for Coefficients

Model		B	Bootstrap[a]				
			Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
						Lower	Upper
1	(Constant)	55.925	-.318	4.208	.001	47.775	64.112
	Availability	-.698	.039	.839	.425	-2.343	1.022
	Teachers' attitude	1.437	.020	.603	.021	.268	2.550
	Teachers' competence	-.708	.045	.819	.413	-2.188	.909
	School support	.527	-.006	.741	.489	-.895	1.968

Interpreting the confidence interval for the intercept using Bias Corrected Accelerated (BCA), the researcher is 95% confident that the teacher's attitude is statistically significant because its lower bound and upper bound is not intercepted by zero (.268 and 2.550). For every 1-unit increase in teachers' attitudes, we expect students' performance to increase by 1.437. We conclude that there is a statistically significant correlation between teachers' attitudes and students' performance. However, the researcher is 95% confident that the availability, teachers' competences and school support data is not statistically significant because the lower bound and upper bound are intercepted by zero (-2.343 and 1.022), (-2.188 and .909), and (-.895 and 1.968).

The summary of the results of hypotheses testing using bootstrapping technique are indicated in Table 4.18.

Table 4.18: Summary of the results of hypothesis testing

Null hypothesis	Confidence interval		conclusion
	Upper	Lower	
H_{o1} = There is no significant relationship between availability of ICT infrastructure and student's performance in public secondary schools of Gezawa area, Nigeria	-2.343	1.022	Not rejected
H_{o2} = there is no significant relationship between teachers attitude toward ICT integration and student's performance in public secondary schools of Gezawa area, Nigeria	.268	2.550	Rejected
H_{o3} = There is no significant relationship between teacher's competence on ICT and student's performance in public secondary schools of Gezawa area, Nigeria	-2.188	.909	Not rejected
H_{o4} = There is no significant relationship between school support on ICT and student's performance in public secondary schools of Gezawa area, Nigeria	-.895	1.968	Not rejected

4.5. Discussion of Research Findings

This section provides a discussion of the findings of the study presented in sections 4.3 above. As part of the discussion process, the researcher corroborates the major findings of the study with those of similar researches from the literature reviewed in chapter two using the Unified Theory of Acceptance and Use of Technology. This was to establish and describe their point of convergence and divergence. The discussion in this section is about availability of ICT infrastructure, teacher's attitude towards ICT integration, teacher's competence on ICT & school support on ICT and their influence on student's performance in public secondary school of Gezawa Area in Kano State, Nigeria.

4.5.1. Availability of ICT Infrastructure and their Influence on Students' Performance

Findings of the study revealed that most of the ICT infrastructures are available in the study area. Infrastructure like desktop computer, laptop computers, printers and photocopiers, internet

connection, interactive whiteboard and digital sound system are available, on the other hand, some of them like projectors, video players, teaching software and smart boards are not available. This is contrary with the finding of the study in Kwekwe town, Zimbabwe by Mavellas et al. (2015) who found that few of the ICT training resources were available in the studied secondary schools, and those that were available were insufficient. The survey also showed that relatively little of the available ICT resources were being used. Again, this study is consistent with the study to analyze the technological integration in teacher education conducted in Ghana. The study's conclusions demonstrated that a barrier to Ghana's educational system's adoption of ICT was a lack of technological resources (Agyei, 2013). It is also in agreement with a study conducted in Kaduna State, Nigeria by Yusuf et al. (2013) to evaluate the availability, management, and use of ICT resources for teaching the English language in secondary school. The survey found that there were few ICT facilities in schools, few schools had internet access, very little was used of the ICT facilities that were there, and there were frequently power outages during class hours.

Findings of this study revealed a weak negative relationship between the availability of ICT infrastructure and student's performance, this is consistent with the finding of Ifenthaler et al. (2012) who pointed ou that the availability of ICT does not have an educational value in and of itself, rather, it only becomes valuable when teachers employ it in the teaching and learning process. On the other hand, this is contrary to the findings of Wenglinsky (2004) and Fuchs & Woefsmann (2011). The former examined the correlation between math test results and the number of computers utilized in math classes. The study discovered a beneficial connection between computer use and student's performance. The later in his study found a favorable correlation between test scores and the presence of computers in classrooms. He further explained that the presence of computers in the house is positively correlated with student performance.

4.5.2. Teachers' Attitude towards Integration of ICT in and their Influence on Students' Performance

Findings of the study revealed that few of the ICT infrastructures like desktop computers, printers and photocopiers and interactive whiteboard are utilized by the respondents. While most of the infrastructures like laptop computers, projectors, internet connection, video players,

teaching software and smart boards are not utilized. This implies that teachers have negative attitude towards integration of ICT. This is in consistent with the finding of Bitok (2014) which revealed that the majority of teachers only use ICT sporadically. It is in agreement with Msila (2015) who conducted a study in South Africa. Findings demonstrated that teachers were reluctant to the use of ICT and some were even discouraged by the introduction of ICT. It is also in consistent with Daher, Baya'a, and Anabousy (2018) study whom discovered that teachers were hesitant to incorporate technology into their lessons. This study's finding is contrary to the finding of Yapici and Hevedanli (2012) whom asserted that instructors had positive attitudes towards ICT utilization, regardless of gender or class. It is also contrary to that of Semerci and Aydn (2018) whom revealed that secondary school teachers exhibited a high degree of positive attitude and low degree of worry toward the use of ICT in education in Ankara, Turkey.

To ensure that the technology integration is successfully carried out in the curriculum of the school as well as during teaching and learning, it is crucial that school teachers have positive attitudes about the use of ICTs, thus, teachers' views are influenced by how they view the value of ICT, how they intend to behave, and pedagogical factors, also, several factors affect teachers' views on utilizing ICT in teaching and learning (Amuko, Miheso and Ndethiu, 2015). Findings of this study revealed a weak positive relationship between teachers' attitude toward ICT and student's performance. And that teachers' attitude towards ICT has some influence on student's performance. This is in agreement with the findings of Baylor & Ritchie (2012) and Kluever (2014) in their studies. The former discovered that teachers' attitudes on technology use play a significant role in how well technology is used in educational settings, he further explained that teachers' attitudes toward ICT utilization greatly influence student's performance. The later asserted that the use of new technology in educational settings is seen to be greatly influenced by the attitudes of teachers in terms of utilization. Therefore, how they feel about computers can have a big impact on whether or not they are accepted and used. The instructors' views about using technology effectively in the classroom and level of their utilization plays a major role on student's performance. It is also consistent with report of Scrimshaw (2004); ICT can help teachers change their traditional pedagogical beliefs, implement new student-centered teaching strategies, and enhance stronger relationships between teachers and students thereby improving student's performance.

4.5.3. Teachers' Competence on ICT and their Influence on Students' Performance

Findings of the study revealed that most of the respondents have competence skills on ICT despite lack of ICT infrastructures in the study area. Majority of the resondents have some common competence skills on ICT like installing education software in a computer, downloading materials from the internet, producing PowerPoint presentations, preparing lesson that involve the use of ICT, filing documents in electronic folders in the computer and sending electronic mail via the internet. The study was consistent with that of Samuel & Zaitun (2007), who discovered that many English teachers possessed the required ICT abilities despite the fact that Malaysian schools' use of the resources was far from optimal. A study in Kenya by Michael et al. (2016) is also in agreement with current study, the results showed that the majority of respondents had ICT training up to the reading level, and that they had confidence in their ability to use ICT for the teaching and learning process. On the other hand, findings of the current study is contrary to the study conducted by Amuko (2015) in Kenya which revealed that teachers confront numerous difficulties, including learning technical skills and information on their own and undergoing self-training for using ICTs in their instruction. It is also contrary to the findings of Moluayonge and Innwoo (2017) which indicated that insufficient ICT infrastructure and teachers low level competence skills on ICT in secondary schools in Cameroon is to blame for the limited adoption of ICT in teaching and learning.

Teachers need to be skilled ICT users in order to successfully integrate ICT into both teaching and learning, as well as to promote their own professional productivity and development as well as their student's performance. Findings of this study revealed a weak negative correlation between teachers' competence on ICT and student's performance. Thus teachers' competence on ICT has no influence on student's performance. The teacher's opinion of the significance of an application and their level of expertise with it are more significant obstacles to computer use (Sorgo, Vercknovnik and Kocijancic, 2010). Harrison and Rainer (2012) found that participants with poor computer skills were less likely to embrace and adapt to technology than those with favorable views, who also had better computer skills. According to Nyaga (2016), although not all teachers or students were able to access or use digital content competently, it had a favorable impact on students' assessments and academic performance in the sampled secondary schools.

4.5.4. School Support on ICT integration and their Influence on Students' Performance

Findings of this study revealed a moderate level of school support on ICT integration in the study area. The study pointed out some of the school support like; clearly articulating the vision and mission of ICT integration, encouraging autonomy and teamwork to enhance ICT use among the staff, employing a computer laboratory attendant who ensures proper access to the computers, making important decisions about ICT integration. Kubiatko (2006) recommended that all schools be provided with software and hardware, such as instructive DVDs, and that ICT classrooms be set up for the teaching and learning. According to Bingimlas (2009), teachers should be given access to ICT resources, such as software and hardware, effective professional development, enough time, and technical assistance in order to have excellent ICT integration in the classroom. Abdullahi (2014) pointed out that having administrative support to ICT guarantees a more engaging, interactive learning environment and equips students with ICT knowledge and abilities. Mavellas et al. (2015) revealed that lack of motivation and support are among the barriers to ICT use in schools. Alemu, (2015) asserted that inadequate technical and pedagogical assistance and improper access to ICT resources are some of the major barriers to ICT integration in teaching and learning.

The current study found a weak positive relationship between school support and student's performance, thus school support on ICT has some influence on student's performance. Yassanne (2014) ascertains that school support in terms of the accessibility and incorporation of computer technology into instruction enhances student academic performance and achievement as well. Mbugua, Gori and Tanui (2015) observed that the goal of international investments in ICT has been to enhance teaching and learning in classrooms since using ICT resources in the classroom makes classes more engaging, which in turn improves students' exam performance.

4.6. Chapter Summary

This chapter provided an interpretation and discussion of the study findings**.** As part of the discussion process, the researcher compared major findings of the study with other researches in chapter two, and more literature review to explain their point of convergence, and divergence. Sections have been arranged logically according to the research objectives and the research questions. Covered in this section were the discussions related to availability, teachers' attitudes,

teachers' competencies and school support about ICT integration in teaching and learning and their influence on students' performance in secondary schools in general.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.1. Introduction

Based on the data presented and interpreted in the previous chapters, a summary of the findings, conclusion, and recommendations are successively presented in this chapter. Areas for further study according to the outcomes realized in the study were also presented.

5.2. Summary of Study Findings

A summary of the study findings is presented based on the objectives of the study as below:

5.2.1. Availability of ICT Infrastructure and their Influence on Students' Performance In Public Secondary Schools of Gezawa Area in Kano State, Nigeria.

This section summarizes the findings of the first objective of the study which sought to find out the availability of ICT infrastructure and their relationship with students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria. Findings showed that infrastructures like; desktop computers, laptop computers, printers and photocopiers, internet connections, interactive whiteboard and digital sound system were available to facilitate ICT integration. This was reflected by the high mean scores of the items which were above average of three (3). However, it was also revealed that these resources were not enough when compared to the available number of teachers and learners in the schools studied. Some infrastructures like; projectors, video players, teaching software and smart boards were not available in the schools studied as reflected by the items mean scores which were below the average of three (3). The study established that the relationship between availability of ICT infrastructure and students' performance in public secondary schools of Gezawa Area was not significant ($r=-.068$, $p>.05$). Therefore, availability of ICT infrastructure has no influence on student's performance in the schools studied.

5.2.2. Teachers' Attitude towards Integration of ICT in Teaching and Learning and their Influence on Students' Performance in Public Secondary Schools of Gezawa Area in Kano State, Nigeria.

This section presents a summary of the findings for the second objective which sought to examine teachers' attitude towards integration of ICT in teaching and learning and their relationship with students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria. Findings revealed some level of ICT infrastructure utilization by teachers. Teachers utilized only desktop computers, printers and photocopiers and interactive whiteboard. This was reflected by the high mean scores of the items which were above average of three (3). However, other infrastructures like laptop computers, projectors, internet connections, video players, teaching software, smart boards and digital sound system were not utilized by teachers in the schools studied as reflected by the items mean scores which were below the average of three (3). The established that the relationship between teachers' attitude towards integration of ICT in teaching and learning and students' performance in public secondary schools of Gezawa Area was significant ($r=.178$, $p<.05$). Therefore, teachers' attitude toward integration of ICT in teaching and learning has some influence on student's performance in the schools studied.

5.2.3. Teachers' Competence on ICT and their Influence on Students' Performance in Public Secondary Schools of Gezawa Area in Kano State, Nigeria.

In this objective, the study examined teachers' competence on ICT and their relationship with students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria. It was found that teachers have ICT competencies with reference to the mean scores of the items that is above the average of three (3). Teachers were very good in ICT competence skills like installing education software, downloading materials from the internet, preparing lesson that involve the use of ICT, filing documents in computer and sending mail via the internet. The study established that the relationship between teachers' competence on ICT and students' performance in public secondary schools of Gezawa Area was not significant ($r=-.021$, $p>.05$). Thus teacher's competence on ICT has no influence on students' performance in the schools studied.

5.2.4. School Support on ICT Integration and their Influence on Students' Performance In Public Secondary Schools of Gezawa Area in Kano State, Nigeria.

This section presents a summary of the findings for the fourth objective which sought to find out school support on ICT integration and their relationship with students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria. Findings showed some good school support on ICT integration like articulating the vision and mission, encouraging autonomy and teamwork to enhance ICT use among the staff, giving flexibility for staff to adapt, employing computer laboratory attendant, training programs for staff and supporting staffs to attend workshops. This was reflected by the high mean scores of the items which were above average of three (3). The relationship between school support on ICT integration and students' performance in public secondary schools of Gezawa Area was significant ($r=.023$, $p>.05$). Therefore, school support on ICT integration has little influence on students' performance in the schools studied.

5.3. Conclusion

This section presents the conclusion of the study given the findings and interpretation of the study. The conclusion reflects on the findings of the study indicating their implications, which led to the drawing of recommendations of the study. The study sought to examine integration of ICT in teaching and learning and its influence on student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria. A number of conclusions were arrived at based on the study objectives.

5.3.1. Availability of ICT Infrastructure and their Influence on Students' Performance

In relation to the findings of study objective one, availability of ICT infrastructure in secondary school is an important aspect of ICT integration. The researcher concludes that there were ICT infrastructures available in the study area and these infrastructures were not adequate considering the number of teachers and students in the schools studied. The researcher also concludes that availability of ICT infrastructure has no influence on students' performance in public secondary schools of Gezawa Area, Kano State Nigeria. To a greater extent when ICT infrastructures are available in schools like computers, projectors, smart boards, etc. are favorable, ICT integration

in schools is bound to increase hence leading to increase in student's performance. However, study results also showed that there were limited ICT resources in most schools when compared to the number of teachers and other ICT users in schools.

5.3.2. Teachers' Attitude towards Integration of ICT in Teaching and Learning and their Influence on Students' Performance

In the light of findings of the second objective, teachers' attitudes towards ICT integration in secondary schools is an important aspect of ICT integration. The researcher concludes that teachers utilized some available ICT infrastructures in their teaching and learning. Also, the researcher concludes that teachers' attitudes have a positive significant effect on student's performance. The association between teachers' attitudes towards ICT integration and student's performance were positive and the former had contribution on latter in the government aided secondary schools in Gezawa Area, Kano State Nigeria. To a greater extent when teachers have positive attitudes towards ICT integration in their schools, ICT usage in schools is bound to increase which leads to better service delivery in schools leading to increase in student's performance.

5.3.3. Teachers' Competence on ICT and their Influence on Students' Performance

In the light of findings of the third objective, it can be concluded that teachers have a very good competency on some common ICT skills like, installing education software in a computer, downloading materials from the internet, preparing lesson that involve the use of ICT, filing documents in a computer and sending mail via the internet. The researcher concludes that teacher's competence on ICT have a negative effect on student's performance. The connection between teacher's competence on ICT and student's performance were negative in public secondary schools of Gezawa Area, Kano State Nigeria. However, it was found to be influenced by age and the level of training attained by the individual. Teacher's competences among the ICT users in the studied schools are generally limited especially to the staff members of older age. Most staff members had inadequate and limited ICT skills to integrate ICT in teaching and learning in secondary schools.

5.3.4. School Support on ICT Integration and their Influence on Students' Performance

Based on the study objective four findings, the study conclusion was that school support on ICT integration is an important aspect of ICT integration. There was some school support on ICT integration but inadequate regarding the demands and number of students in the studied schools. The researcher concludes that school support on ICT integration was significant on student's performance as there were a positive association between them in public secondary schools of Gezawa Area, Kano State Nigeria. To a greater extent when school support on ICT integration increases, ICT usage in teaching and learning as well as monitoring and supervision is bound to increase which leads to better service delivery in schools due to good student's performance.

5.4. Recommendations

Based on the above discussions and conclusions, this study makes the following recommendations:

5.4.1. Availability of ICT Infrastructure

1. The government, through the ministry of education should ensure that ICT resources in schools are adequate in order for teachers and students to access and utilize them in the teaching and learning process. This can be done through the establishment of computer laboratories and resource centers in schools.

2. This study revealed that schools in the study sample had inadequate ICT facilities. In view of this finding, it is recommended that the school managers look into ways and means of sourcing for more facilities especially computers, projectors, internet connection, digital and video cameras, etc.

5.4.2. Teacher's Attitude on ICT Integration

1. In line with users' attitudes, the government, in conjunction with school administration should organize forums where teachers can be sensitized on importance of ICT integration in teaching. Backed up with evidence on the influence of ICTs on student's performance, this can go a long way in ensuring that teachers embrace ICTs and use them more frequently in teaching

2. The school heads should always act timely in responding to teachers' and other staffs' needs concerning ICT usage to enhance and maintain their ICT passion for effective ICT integration in teaching and learning for better student's performance in secondary schools.

5.4.3. Teacher's Competence on ICT

1. On teacher's competency, teacher training colleges should incorporate computer education and training on how to integrate ICT in education in the curriculum so that pre-service teachers leave the college being well prepared with ICT competency uniformly.

2. The government of Nigeria through the Ministry of Education should consider organizing more in-service and on job training in retooling of school-based ICT users including school heads, teachers and other staff within the schools to increase their competencies in information processing, communication and content creation using ICT for effective ICT integration teaching and learning for better students' performance.

5.4.4. School Support on ICT Integration

1. Most of the sample schools did not have well documented policies on ICT integration in teaching and learning. It is recommended that school principals be sensitised on the importance of having well documented ICT policies which should dove-tail into the NPE ICT policy in education.

2. School management need to make the computer studies compulsory to all students so that students can acquire basic skills on the use of ICTs for educational purposes.

5.5. Suggestions for Further Research

This section suggests areas for further research on some unexplored issues, which were identified as a result of this current study but existed beyond its scope. The current study only focused on only a few factors for integration of ICT in teaching and learning in public secondary schools and their influence on students' performance because of limited time and resources: The following are key areas for future research:

1. A study should be conducted to explore ICT integration by students in learning and its influence on their performance since this study focused only on the integration of ICT by teachers in teaching and learning and its influence on students' performance.

2. The study focused on few factors for ICT integration that is, availability of ICT infrastructure, teachers' attitude, teachers' competence and school support on ICT integration in teaching and learning of secondary schools. For this reason, there is a need for further research on other factors for ICT integration in teaching and learning of secondary schools.

3. This study was limited in one area; therefore, a similar study should be conducted on the integration of ICT in teaching and learning and its influence on students' performance in other areas of Kano, so that comparison can be made.

4. A similar study could be replicated in private secondary schools in the same area or in another area of the state.

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APPENDIX I
LETTER TO RESPONDENTS

Dear Respondent,

RE: REQUEST FOR PARTICIPATION IN DATA COLLECTION

I am a Post Graduate Student at Moi University, Kenya pursuing a Master of Education in Research in the School of Education. As part of the course requirement, I am currently carrying out a research on **"Integration of ICT in teaching and learning and its influence on student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria"**. For this purpose, therefore, your school has been sampled for the study. Teachers are selected as respondents. Please help answer the questions as truthfully as possible. The results of this study will be used for academic purposes only, and will be treated with the confidentiality that it deserves. I kindly request for your cooperation and support.

Yours faithfully,

Abdulkadir Shehu Adam

APPENDIX II
QUESTIONNARE FOR TEACHERS (QFT)

A: Teacher's Bio Data

1. Please indicate your gender Male [ ] Female [ ]

2. Tick your appropriate age group

Below 30 years [ ] 30 – 39 [ ] 40 – 49 [ ] 50 years and above [ ]

3. Highest academic qualification

SSCE [ ] N.C.E/Diploma [ ] Degree [ ] Masters/PhD [ ]

4. Years of teaching experience

Below 5 years [ ] 5 – 10 years 11 – 15 years [ ] Above 15 years [ ]

Objective 1: To find out the availability of ICT infrastructure and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

Below is a list of some common ICT infrastructure found in schools, please indicate the degree to which they are available in your school

KEY

Very Available (VA)

Available (A)

Not Sure (NS)

Sometimes Available (SA)

Not Available (NA)

ITEMS	NA	NS	SA	A	VA
Desktop computers					
Laptop computers					
Printers and photocopiers					
Projectors					
Internet connections					
Video players					
Teaching software					
Smart boards					
Interactive whiteboard					
Digital sound system					

Objective 2: To determine teachers' attitude towards integration of ICT in teaching and learning and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

Below is a list of some common ICT infrastructure found in schools, please indicate your attitude towards their integration with regard to the level of their usage in your teaching

KEY

Very often (VO)

Often (O)

Sometimes (S)

Rarely (R)

Never (N)

ITEMS	N	R	S	O	VO
Desktop computers					
Laptop computers					
Printers and photocopiers					
Projectors					
Internet connections					
Video players					
Teaching software					
Smart boards					
Interactive whiteboard					
Digital sound system					

Objective 3: To establish teachers' competence on ICT and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

Below is a statement of some common ICT competence skills, please indicate your level of agreement

KEY

Strongly Agree (SA)

Agree (A)

Neutral (N)

Disagree (D)

Strongly Disagree (SD)

ITEMS	SD	D	N	A	SA
I can install education software in a computer					
I can download materials from the internet					
I can produce PowerPoint presentations					
I can take photos using digital devices and show them to students in the computer					
I can comfortably locate and retrieve curriculum resources in the internet					
I can prepare lesson that involve the use of ICT					
I can use computer spreadsheets to assess and evaluate my students					
I can file documents in electronic folders in the computer					
I can send electronic mail via the internet					
I can produce simulations and use them in teaching					

Objective 4: To determine school support on ICT integration and their influence on students' performance in public secondary schools of Gezawa Area in Kano State, Nigeria.

Below is a statement of some common school support on ICT integration, please indicate your level of agreement

KEY

Strongly Agree (SA)

Agree (A)

Neutral (N)

Disagree (D)

Strongly Disagree (SD)

ITEMS	SD	D	N	A	SA
The school has clearly articulated the vision and mission of ICT integration					
The school encourages autonomy and teamwork to enhance ICT use among the staff					
The school gives flexibility for staff to adapt ICT integration in teaching and learning					
The school organizes the appointment of an ICT coordinator who can provide technical support.					
The school provides consistent hardware and software updates					
The school employs ICT technician who ensures proper functioning of software and hardware					
The school employs a computer laboratory attendant who ensures proper access to the computers					
Training programs are provided for staff to increase their awareness about the value of ICT use					
I am supported to attend workshops or training programs in order to integrate ICT effectively					
Important decisions about ICT integration are made at all levels					

APPENDIX III

RECORD OF STUDENTS' PERFORMANCE SHEET FOR 2021/2022 ACADEMIC SESSION

Dear Sir/Madam,

I am a Post Graduate Student at Moi University, Kenya pursuing a Master of Education in Research in the School of Education. As part of the course requirement, I am currently carrying out a research on **"Integration of Information and Communication Technology in teaching and learning and its influence on student's performance in public secondary schools of Gezawa Area in Kano State, Nigeria"**. For this purpose, your school has been sampled for the study. Please provide individual students' average scores in their terminal examinations for the last academic session (2021/2022) in the table below. The data collected and findings of this study will be used for academic purposes only, and will be treated with the confidentiality it deserves. I kindly request your cooperation and support.

Yours faithfully,

Abulkadir Shehu Adam

S/N	1ST TERM	2ND TERM	3RD TERM	S/N	1ST TERM	2ND TERM	3RD TERM	S/N	1ST TERM	2ND TERM	3RD TERM
1				11				21			
2				12				22			
3				13				23			
4				14				24			
5				15				25			
6				16				26			
7				17				27			
8				18				28			
9				19				29			
10				20				30			

APPENDIX IV
MOI UNIVERSITY RESEARCH PERMIT

MOI UNIVERSITY
Office of the Dean School of Education

Tel: (053) 43001-8
(053) 43555
Fax: (053) 43555

P.O. Box 3900
Eldoret, Kenya

REF: MS/R/5888/22 **DATE:** 11th November, 2022

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: RESEARCH PERMIT IN RESPECT OF ABDULKADIR SHEHU ADAM – MS/r/5888/22

The above named is a 2nd year Master of Education in Education Research student at Moi University, School of Education, Department of Educational Management and Policy Studies.

It is required of his M.Ed studies to conduct a research project and produce a research report. His research topic is entitled:

"Integration of Information and Communication Technology in Teaching and Learning and its Influence on Students' Performance in Public Secondary Schools in Gezawa, Kano, Nigeria."

Any assistance given to enable him conduct research successfully will be highly appreciated.

MOI UNIVERSITY SCHOOL OF EDUCATION NOV 2022 P.O. BOX 3900-30100, ELDORET

Yours faithfully,

PROF. ANNE S. KISILU
DEAN, SCHOOL OF EDUCATION

(ISO 9001 – 2015 Certified Institution)

APPENDIX V

CERM-ESA INTRODUCTORY LETTER

CERM-ESA

17/06/2022

Moi University
Tel. Eldoret (0321)43001-8/43620
P.O. BOX 3900,
Fax No. (0321) 43047
Eldoret, Kenya

To whom it may concern

Dear Sir/Madam,

RE: ABDULKADIR SHEHU ADAM - MS/R/5888/22

The above-named person is a student at CERM-ESA Moi University pursuing master of education in research. He has completed his course work and has been released to start his field work on research area of interest.

Any assistance accorded to him will be appreciated.

17/06/2022

DR. SUSAN KURGAT,
PROJECT COORDINATOR, CERM-ESA
MOI UNIVERSITY
Tel: 0722449288

APPENDIX VI

GEZAWA ZONAL EDUCATION OFFICE INTRODUCTORY LETTER

KANO STATE SECONDARY SCHOOLS
MANAGEMENT BOARD

GEZAWA ZONAL EDUCATION DIRECTORATE

Our Ref: _____ Your Ref: _____ Date: 12th September, 2022

The principal

_____

_____

_____

INTRODUCTION LETTER IN RESPECT OF ABDULKADHIR SHEHU ADAM

The above named person is a student of Moi University Kenya pursing master of education in research.

You can give him all the necessary assistance that he may require while conducting his research work.

Best regards

KABIRU MUHAMMAD
DD special assignment
For: Zonal director