

**FACTORS INFLUENCING THE INTEGRATION OF ICT IN TEACHING AND
LEARNING. A CASE OF PUBLIC PRIMARY SCHOOLS IN KITUI CENTRAL
SUB COUNTY, KITUI COUNTY, KENYA**


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DECLARATION

I declare that this document and the research it describes are my original work and that they have not been presented in any other university for academic work

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This research has been conducted under our supervision and is submitted with our approval as University supervisors

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DEDICATION

I dedicate this research to my beloved husband Joseph Murithi and my lovely daughters Joan Kaari and Precious Gatwiri. Thank you for the unconditional moral, spiritual and financial support throughout my period of study

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I wish to convey my sincere gratitude to the Almighty God for giving me life and good health throughout the study period. Many thanks to my supervisors, Dr. Eng. Boniface Njunguna Mwangi and Dr. Lucy Kirima for their guidance, support and encouragement during the course of this research report. Your suggestions and corrections gave my research a course that led to it taking a professional direction. I am also grateful to my parents; Jacob Muia and Justina Mbithe for encouraging me to always aim higher. Thanks for inspiring me to exploit my potentials.

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
ABSTRACT	x
DEFINITION OF TERMS	xi
LIST OF ABBREVIATIONS AND ACRONYMS	xii
CHAPTER ONE	1
INTRODUCTION	1
1.1 Introduction	1
1.2 Background of the Study	1
1.3 Statement of the Problem	5
1.4 Purpose of the Study	6
1.5 Objectives of the Study	6
1.6 Hypotheses of the Study	7
1.7 Significance of the Study	7
1.8 Scope of the Study	8
1.9 Delimitations of the Study	9
1.10 Limitations of the Study	9
1.11 Assumptions of the Study	9
1.12 Theoretical Framework	10
1.13 Conceptual Framework	15
CHAPTER TWO	17
LITERATURE REVIEW	17
2.1 Introduction	17
2.2 Concept of Computer and ICT Literacy	17
2.3 Empirical Studies Review	19
2.31 Teachers' ICT Literacy and ICT Integration in Teaching and Learning	19
2.32 Teachers' Attitude and ICT Integration in Teaching and Learning	23

2.33 Availability of ICT facilities and ICT Integration in Teaching and Learning	28
2.34 Summary of Literature and Research Gaps.....	32
CHAPTER THREE.....	33
RESEARCH METHODOLOGY	33
3.1 Introduction	33
3.2 Research Design	33
3.3 Research Site	33
3.4 Target Population	34
3.5 Sample and Sampling Techniques.....	34
3.6 Data Collection Measures	35
3.6.1 Teachers' Questionnaire	35
3.6.2 Head teachers' Interview Schedule	35
3.7 Pilot Testing of Research Instruments	36
3.8 Validity of the Data Collection Instruments	36
3.9 Reliability of Data Collection Instruments	36
3.10 Data Collection Procedures	37
3.11 Data Processing and Analysis	37
3.12 Legal and Ethical Considerations	38
CHAPTER FOUR	39
DATA ANALYSIS AND FINDINGS.....	39
4.1 Introduction	39
4.2 Demographic Characteristics of Respondents.....	39
4.2.1 Response Rate.....	39
4.2.2 Gender of Respondents.....	40
4.2.3 Age bracket of respondents.....	40
4.2.4 Teachers' Highest Level of Professional Training in Education.....	41
4.2.5 Teachers' Computer Skills.....	42
4.3 Teachers' Level of ICT Literacy	43
4.4 Teachers' Attitude on ICT Integration in Teaching and Learning	50
4.5 Availability of ICT Resources and ICT Integration in Teaching and Learning.....	53
4.6 Teachers' Level of ICT Integration in Teaching and Learning.....	58
4.7 Hypotheses Testing.....	60
CHAPTER FIVE	65

DISCUSSION, SUMMARY, CONCLUSION AND RECOMMENDATIONS	65
5.1 Introduction	65
5.2 Discussion of the Findings	65
5.2.1 Influence of Teachers’ ICT Literacy on ICT Integration in Teaching and Learning	65
5.2.2 Influence of Teachers’ Attitude on ICT Integration in Teaching and Learning	68
5.2.3 Influence of Availability of Teaching Resources on ICT Integration in Teaching and Learning	72
5.3 Summary of Findings.....	74
5.4 Conclusion.....	75
5.5 Recommendations.....	76
5.6 Suggestions for Further Research.....	77
REFERENCES	78
APPENDICES	86
APPENDIX I: LETTER OF TRANSMITTAL	86
APPENDIX II: TEACHERS’ QUESTIONNAIRE	87
APPENDIX III: INTERVIEW RECORDING CONSENT FORM.....	93
APPENDIX IV: HEAD TEACHERS’ INTERVIEW SCHEDULE.....	94
APPENDIX V: KITUI CENTRAL SUB COUNTY PUBLIC PRIMARY SCHOOLS ...	95
APPENDIX VI: INTRODUCTION LETTER FROM AFRICA NAZARENE UNIVERSITY.....	96
APPENDIX VII: RESEARCH LICENSE FROM NACOSTI	97
APPENDIX VIII: MAP OF KENYA SHOWING KITUI COUNTY	98
.....	98
APPENDIX IX: MAP OF KITUI COUNTY SHOWING KITUI CENTRAL SUB COUNTY	99

LIST OF TABLES

Table 3.1: Sample Size Distribution	35
Table 4.1: Gender Distribution of Respondents	40
Table 4.2: Respondents' Age Bracket Distribution.....	41
Table 4.3: Teachers' Response on their Level of ICT Literacy	44
Table 4.4: Teachers' Attitude on ICT Integration in Teaching and Learning	50
Table 4.5: Availability of ICT Resources	54
Table 4.6: Teachers' Level of ICT Integration in Teaching and Learning	58
Table 4.7: Multiple Regression Model Summary	61
Table 4.8: Multiple Regression Model Significance (ANOVA).....	61
Table 4.9: Summary of Multiple Regression Model Coefficients	62

LIST OF FIGURES

Figure 1.1: TPACK Framework by Koehler and Mishra (2008).....	12
Figure 1.2 Conceptual Framework showing the Interplay between Presumed Factors Influencing ICT Integration in Learning	15
Figure 4.1: Teachers' Highest Level of Professional Training in Education	42
Figure 4.2: Teachers' Self Rating in Computer Skills	43

ABSTRACT

Integrating technology into classroom practices is one of the challenges in the 21st century. Effectively integrating ICT into teaching learning process is much more complicated than providing computers and securing a connection to the Internet. The purpose of the study was to investigate the factors influencing integration of ICT in teaching and learning in public primary schools in Kitui Central Sub County. The study objectives were to assess the influence of teachers' ICT literacy, to establish the influence of teachers' attitude, and to examine the influence of availability of ICT resources on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. The study was anchored on the Technological Pedagogical Content Knowledge (TPACK) Model for Technology Integration in teaching and learning and the Technology Acceptance Model (TAM). The study adopted descriptive survey research design. The study targeted 70 head teachers and 1053 teachers from 70 public primary schools. Through simple random sampling, 21 head teachers and 105 teachers were selected for the study. Data was collected through the head teachers' interview schedule and teachers' questionnaire. To ascertain reliability and validity of research instruments, the Pilot testing was conducted in the neighboring Kitui West Sub County. Reliability of the research instruments was calculated using test-retest technique obtaining a coefficient of 0.84. Content and construct validity were ascertained through the university supervisors' scrutiny and pilot testing. Both descriptive and inferential statistics were used to analyze the data. Descriptive statistics included frequencies, means and standard deviations while multiple regression analysis was used to test the formulated three hypotheses. Qualitative data was put into broad themes for interpretation. However, some qualitative data was used verbatim in order to maintain the power of the participants' spoken words. The study found that teachers' ICT literacy was low, attitude towards ICT integration moderately positive while availability of ICT resources was moderate. The study's three independent variables contributed 62.3 % of variance in the level of ICT integration in teaching and learning ($R^2 = 0.623$). Teachers' ICT literacy was the most potent predictor of ICT integration ($\beta = 0.568$, $t(89) = 5.365$, $p < 0.05$). It is hoped that the findings will serve as an important feedback to the government in regard to the National ICT policy on Education and Digital Learning Programme which was meant, ostensibly, to entrench information and communication technology (ICT) in the teaching and learning process in primary schools in Kenya. The study recommends that the MOE should organize frequent compulsory in service training to equip all teachers with the appropriate skills and knowledge in ICT.

DEFINITION OF TERMS

Attitude: Is an inward feeling expressed by the outward behavior of a person (Coles & Scior, 2012). In this study it refers to the way teachers think and feel about the use of ICT in teaching and learning.

ICT Integration: refers to the process of incorporating or aligning ICT educational technologies with the pedagogy and their usage to enhance teaching and learning (Behnam, 2012).

ICT Literacy: refers to the knowledge, skills and abilities in operating the range of technologies that are applied in the process of collecting, storing, editing, retrieving, and transferring of information in various forms to meet personal, educational and labour market goals (Tekyiwa & Asare, 2016)

Information Communication Technology: The term ICT encompasses the range of hardware (desktop and portable computers, projection technology, calculators, data-logging, and digital-recording equipment), software applications (generic software, multimedia resources), and information systems (Intranet, Internet) (Anyanful & Abdulai, 2018).

Perception: A process by which individuals organize and interpret their sensory impressions in order to give meaning to their environment, and it is influenced by perceiver's attitude which may be positive or negative interest, experience or situation (Wasike, 2018)

LIST OF ABBREVIATIONS AND ACRONYMS

CBC	Competence Based Curriculum
COVID 19	Corona Virus Pandemic in 2019
CSO	Curriculum Support Officer
DVD	Digital Versatile Disk
ECDE	Early Childhood Development Education
GITR	Global Information Technology Report
ICT	Information Communication Technology
ICT-TPD	Information and Communication Technology for Teacher Professional Development
KICD	Kenya Institute of Curriculum Development
MOE	Ministry of Education
NACOSTI	National Council for Science, Technology and Innovation
NGO	Non-Governmental Organization
OLPCP	One Laptop Per Child Policy
PE	Perceived Usefulness
PEUU	Perceived Ease of Use and Usability
PTA	Parents Teachers Association
SMC	School Management Committee
SPSS	Statistical Package for Social Scientists
TAM	Technology Acceptance Model
TPACK	Technological Pedagogical Content Knowledge
TSC	Teachers Service Commission
UNESCO	United Nations Educational, Scientific and Cultural Organization
URT	United Republic of Tanzania
USA	United States of America

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter provides the background to the study and the statement of the problem. The chapter also contains the purpose, objectives, hypotheses, significance, scope, delimitation, limitation and assumptions of the study. The chapter culminates with delineation of the study's theoretical framework and conceptual framework.

1.2 Background of the Study

The need for development of Information Communication Technologies (ICTs) has proved to be of great significance to all mankind and as such the need for its development has become a global resolution (Mohammed & Abdulghani, 2017). These technologies have become fundamental to contemporary societies. Use of ICT include sending an email, watching the news on television, talking on the phone, booking a plane ticket online, using an e-book and many others. Ghavifekr, Razek, Ghani, Ran, Meixi and Tengyue (2019) regard ICT as a shorthand for the software, computers, networks, satellite links and related systems that permit people to create, access, analyze, exchange and use information, data and knowledge in numerous ways.

The UNESCO ICT Competency Framework for Teachers recognizes the importance of ICT in education and highlights that it ensures that the students are fully capacitated in the 21st century (Sutter & Kihara, 2019). With the advent of new technology globally, most countries have adopted digital literacy project with an aim of enhancing the skills of the students' participation. Behnam (2012) posit that appropriate ICT integration into teaching and learning, can improve the quality of education by facilitating engagement and

communication in classroom learning, help promote higher-order thinking, active learning, and better understanding of concepts, and in that way increase the student's motivation.

Global Information Technology Report (GITR) 2017-2018 ranking shows that globally, Sweden and Singapore are at the top in adoption of ICT in education and as the most digitized and innovative nations (Ghavifekr et al. 2019). Additionally, the report observed that some countries in Europe, Asia and North American are also in the forefront in leveraging ICT to transform their economies. Lee, Kim and Lee (2015) observe that one of Singapore's education system key pillar has been the focus on integration of ICT into the classroom. Thus, school principals, students and teachers' use of ICTs form the foundation of Singapore's education system.

In cognition of the importance of ICT in education, the Malaysia government in one of its latest Education blueprint (2013-2025), initiated integration of ICT into the national curriculum for primary and secondary school (Ghavifekr, et al. 2019). In South America, the government of Peru initiated frameworks for implementation of digital literacy project in schools by ordering the procurement of over 600,000 laptops for consumption by children in rural primary schools in the country and for future use. The program however faces challenges of not just teacher computer literacy, but also difficulties in infrastructure such as electricity and modern buildings (Warschauer & Matuchniak, 2010).

In Africa, Ghana is one of the countries which has drafted comprehensive ICT policies and committed huge investment geared to develop and enhance technology up take in all sectors (Hitachi, 2009). Enu, Nkum, Ninsin, Diabor and Korsah (2018) observe that ICT is currently an integral part of the of Ghana education service strategic plan. For instance, Ghana introduced an intervention programme dubbed "One Laptop per Child Policy"

aimed at enhancing teaching and learning as well as cultivating pupils interest towards the use of ICT. The programme has resulted in many basic schools furnished with a number of laptop. In Tanzania, the government embraced the Technological Pedagogical Content Knowledge (TPACK) framework and developed the Information and Communication Technology for Teacher Professional Development (ICT-TPD) as espoused in the basic education policy (Swarts & Wachira, 2010). The main aim of ICT-TPD was to improve teachers' ICT uptake capacity as they integrate technology in English, mathematics, and science subjects in Tanzania education system.

In Kenya, the government recognizes the positive effect of ICT in making the country a middle level economy as envisaged in Kenya vision 2030 (ROK, 2012a). In 2006 the government disseminated National ICT policy on education with a section promoting acquisition of knowledge through e-learning, connecting schools to electricity grid through rural electrification programme, among other policies (ROK, 2012b). In 2013, the Kenyan government embarked on an ambitious project of supplying all the 1.2 million class one pupils with laptops (Wanzala & Nyamai, 2018). Ostensibly, the one-laptop-per-child digital learning programme was predestined to entrench ICT in the teaching and learning process in schools. However, Wanzala and Nyamai (2018) observe that during the one-laptop-per-child programme roll-out in May 2016, the policy shifted from laptops to tablets due to the cost implications. Nonetheless, by July 2018, 19,000 public primary schools had received tablets out of the 23,951 public primary schools targeted (Abuya, 2019; Wanzala & Nyamai, 2018). A survey by the Kenya Institute of Curriculum Development (KICD, 2018), however, found that, although some public schools were endowed with ICT facilities supplied through the digital literacy programme and solicited from other sources, only a few were using ICT tools in enhancing teaching and learning. This was attributed to

possible teachers' lack of capacity and unwillingness to integrate ICT in the teaching and learning process.

Several studies conducted in developing countries reveal that despite the introduction of ICT in education, there has been a slow uptake of technology by teachers (Adebayo & Fagbohun, 2013; Kafyulilo, Fisser, Pieters & Voogt, 2015; Sulemana, Anyanful & Abdulai, 2018; Sutter & Kihara, 2019). Computers are mainly used for teaching basic ICT skills and administration purposes but not as tools for instructional delivery (Anyanful & Abdulai, 2018). The low uptake of technology by teachers has been attributed to the limited knowledge and skills of teachers on technology integration in teaching (Kafyulilo et al. 2015). Additionally, Usman and Pascal (2014) posit that most of reforms and initiatives in using ICT in teaching in schools fail as a result of top-down approach that hardly consider teachers' attitude and awareness of ICT as a pedagogical tool.

Srivastava (2016) maintains that there are many benefits to the pupils when ICT is integrated into lessons. Some of these benefits include improvement of knowledge retention, encouragement to individual learning, provide more opportunities for children with special needs, and learning and development of special life skills. Likewise, Amin (2019) observes that, while conventional teaching has emphasized content in which textbooks content has been rehearsed and mastered, contemporary settings are now preferring curricula that promote competency and performance. Thus, the emphasis is on capabilities and the concern is inclined to how the information will be used than with what the information is. Amin further observes that ICT has greatly enhanced accessibility and the quality of education by increasing the flexibility of delivery such that learners can access knowledge from anywhere at any time. Use of ICT has enabled students read e-books, gain access to teaching and learning aids which were none existent in their schools,

and sample past examination papers (Amin, 2019). Moreover, they can also have access to mentors, peers world over, professionals and other resource persons.

The current study focused on Kitui Central Sub County public primary schools. Kitui Central Sub County comprises of Kitui town and its environs and as such most of the primary schools are in an urban setting while a few are in a rural setting. According to Kenya National Bureau of Statistics (KNBS, 2018), most of the public primary schools in Kitui Central Sub County have high population and classrooms are normally overcrowded. Regarding ICT integration in teaching and learning, the Kitui County schools census report of 2018 shows that even though some schools are well endowed in ICT facilities, teachers hardly integrate technology in their teaching (MOE, 2018). The report noted with concern that the rampant use of traditional teacher centered lecture method in overcrowded classes has been detrimental to the Kitui County goal of enhancing education standards through ICT uptake. To this end, it was imperative to investigate the factors influencing ICT uptake among teachers that could ultimately determine the level of ICT integration in teaching and learning in Kitui Central Sub County.

1.3 Statement of the Problem

The integration of ICT in all sectors of the economy has been emphasized in Kenya under the country's Vision 2030 blueprint. It is through ICT integration in teaching and learning that the government hoped to overcome the issue of overcrowded classes, shortage of teaching personnel and text books, implementation of inclusion education, disruption of children education in Arid and Semi-Arid Lands (ASAL) and shift from content based to competence based curricula. However, ICT penetration rate in the education system in Kenya remains well below the 50% global threshold (Sutter & Kihara, 2019). In particular,

the level of integration of ICT in teaching and learning in most public primary schools remains obscure.

According to Kitui County schools census report 2018 (MOE, 2018), use of technology in teaching and learning has been minimal in most public primary schools in Kitui Central Sub County even though majority of schools are endowed with the basic ICT resources. Additionally, most of the teachers rely on cyber services to accomplish their ICT related tasks such as filing their annual online returns to the employer-Teachers Service Commission (TSC) and examination analysis. The slow uptake and use of ICT by teachers is likely to jeopardize the envisaged provision of quality education in the background of overcrowded classrooms, shortage of teachers and inclusion of children with special needs in Kitui Central Sub County. Several studies have investigated the issue of teachers' ICT integration in teaching and learning mainly in secondary schools (Mbithe, 2016; Mingaine, 2013; Mutwiri, Kafwa & Kyalo, 2017; Tanui, 2013). However, these studies present contextual differences since they were all focused on secondary schools in different sub counties in Kenya and thus, the findings from these studies cannot be generalized to Kitui Central Sub County public primary schools. The current study, therefore, aimed at establishing the influence of teachers' ICT literacy, attitude and availability of ICT resources on teachers' level of ICT integration in teaching and learning in public primary schools in Kitui Central Sub County.

1.4 Purpose of the Study

The purpose of the study was to investigate the factors influencing integration of ICT in teaching and learning in public primary schools in Kitui Central Sub County.

1.5 Objectives of the Study

The study was guided by the following objectives:

- (i) To assess the influence of teachers' ICT literacy on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County;
- (ii) To establish the influence of teachers' attitude on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County;
- (iii) To examine the influence of availability of ICT resources on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County

1.6 Hypotheses of the Study

The study was guided by the following null hypotheses

HO₁: Teachers' ICT literacy has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County

HO₂: Teachers' attitude has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County

HO₃: Availability of ICT resources has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County

1.7 Significance of the Study

Significance of a study shows how the research benefits or impacts others in part or whole (Simon & Goes, 2013). The study findings may be important to MOE, County directors of education, head teachers, teachers, parents, curriculum support officers (CSOs), Non-Governmental Organizations (NGOs), researchers and other education stakeholders.

The study aimed at establishing the level of ICT integration in teaching and learning. The generated data may serve as an important feedback to the government concerning the National ICT policy on Education and Digital Learning Programme which was meant, ostensibly, to entrench information and communication technology (ICT) in the teaching and learning process in primary schools. The noted discrepancies between the envisaged and the established level of integration might then guide the policy makers and the quality assurers as they embark on curricula implementation. Additionally, the generated information may act as a gauge of milestones towards accomplishment of one of tenet of Kenya Vision 2030.

By establishing the extent to which teachers are literate in ICT and their attitude towards use of ICT, teachers and head teachers might plan for the appropriate professional development. Moreover, the MOE, TSC and other stakeholders may reassess their top down approach in teachers' capacity building in a bid to influence teachers' attitude.

The study findings on the influence of availability of ICT facilities on teachers' ICT integration in teaching and learning in Kitui Central Sub County may act as the reference point as head teachers solicit funds and more facilities from donors. The study may also serve as the reference point to other researchers in the field of ICT and development in education.

1.8 Scope of the Study

The scope of the study is the geographical and methodological limits within which the study operates (Marylin & Goes, 2013). The study was confined to Kitui Central Sub County, Kitui County, Kenya. Data was collected from 21 out of 70 public primary schools and involved 21 head teachers and 168 teachers. The study adopted descriptive survey

research design which aims at establishing conditions or relationships that exist, practices that prevail, processes that are ongoing, attitudes that are held or trends that are developing (Babbie, 2014). However, being a non- experimental design the causal- effect could not be ascertained.

1.9 Delimitations of the Study

The delimitations of the study are the boundaries set by the researcher by conscious exclusionary and inclusionary decisions in regard to the subject of interest (Simon & Goes, 2013). Delimitations are within the researcher's control. There are many factors that may influence teachers' ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. However, this study's focus was on the influence of teachers' ICT literacy, teachers' attitude and the availability of ICT facilities.

1.10 Limitations of the Study

Limitations are possible short comings or influences that can affect the study and are not under control of the researcher. They limit the extent to which a study can go and may affect the end results of the study (Simon &Goes, 2013). The teachers' questionnaire mainly comprised of self-assessment items in which teachers tend to overrate or underrate their prowess in ICT. Sharma (2008) argues that there is a tendency of people to over-rate themselves on desirable traits and under-rate themselves on undesirable traits. To mitigate against such tendencies, the researcher assured the respondents that the sole purpose of the study was academic and that anonymity and confidentiality were to be maintained.

1.11 Assumptions of the Study

Simon (2011) explicates that assumptions are underlying ideologies that the researcher trusts or admits but that are difficult to attest in any actual way. In other words, assumptions

are realistic expectations believed to be true facts necessary for the relevance of the study as they provide the basis of the development and implementation of the research. Similarly, Merriam (2014) regards assumptions in research as truthful observations acknowledged to be true but not actually confirmed. There were necessary elements required to enable the researcher to conduct the study. The study assumed that all the primary school teachers had been exposed to the basic computer knowledge. This implies that the sampled teachers would be able to rate their capability in use of computer spread sheets, search engines, and various ways of trouble shooting. It was also assumed that teachers were aware of the various ICT facilities and that the need for integration of ICT in teaching and learning would continue to necessitate the demand for total integration of ICT in education. Finally, the study assumed that teachers in public primary schools are well grounded in content and pedagogical skills to make integration of ICT a reality.

1.12 Theoretical Framework

The study was premised on two theories: the Technological Pedagogical Content Knowledge (TPACK) Model for Technology Integration in teaching and learning by Mishra & Koehler (2008) and the Technology Acceptance Model (TAM) by Davis (1989).

1.12.1 Technological Pedagogical Content Knowledge (TPACK) Model

According to Mishra and Koehler (2008), TPACK is a way of thinking about the knowledge teachers need such as computer literacy and subject matter in order to integrate technology effectively into their classrooms. The proponents further argue that, teachers who exhibit best practices with ICTs are creative, flexible and adapt ways in which they navigate the constraints, affordances, and interactions within TPACK framework. Mishra and Koehler (2006) submit that at the heart of good teaching, there are three components; technology, pedagogy and content, plus the relationship among and between them which

makes up TPACK. They further assert that TPACK consists of seven components. Of the seven, three form the core components namely content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). It follows that, the interaction between the three components, results in pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPCK). According to Thompson and Mishra (2007-2008), the seven components are combined together to form Technological Pedagogical and Content Knowledge (TPACK).

Koehler and Mishra (2008) further, added context to the framework arguing that context determines to a large extent the way technology can be used in educational practice. Koh, Chai and Tay (2014) observe that though most studies on TPACK ignore context in the way TPACK can be used and understood in practice, it makes the framework relevant for many different contexts. For instance, due to challenges of supplying laptops or tablets to large number of pupils after introduction of Free Primary Education (FPE) in Kenya, the government has abandoned the ‘one laptop per child’ programme for computer laboratory project (Abuya, 2019). Figure 1.1 shows the TPACK framework in which the relationships among the three areas (TK, PK & CK) are considered and acknowledges that educators are acting within this complex space.

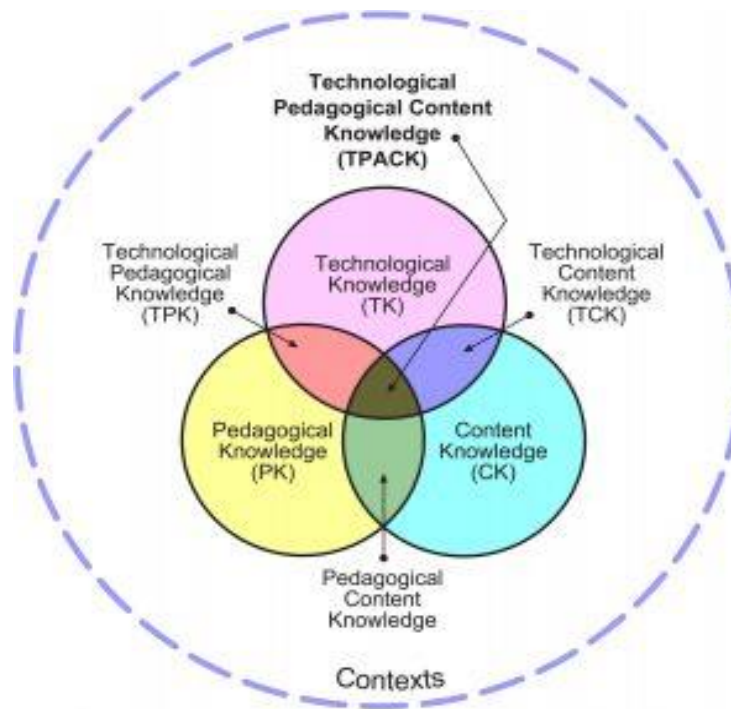


Figure 1.1: TPACK Framework by Koehler and Mishra (2008)

According to the TPACK framework, to guide and instruct students towards a better and more robust understanding of subject content, technological tools such as software, hardware and applications should be used. To achieve this, the three types of knowledge – CK, PK, and TK – are combined and recombined in various ways within the TPACK framework. Technological content knowledge (TCK) describes relationships and interactions among technologies and learning objectives, pedagogical content knowledge (PCK) describes the same between pedagogical practices and specific learning objectives while Technological pedagogical knowledge (TPK) describes relationships and interactions between technological tools and specific pedagogical practices.

The TPACK framework was found relevant in this study since it is a productive way of considering how teachers could integrate ICT into the classroom. Additionally, TPACK can also serve as a measurement of instructor knowledge in ICT, subject matter content, and pedagogy, potentially impacting both training and professional development offerings

for teachers at all levels of experience. Further, TPACK assists in minimizing the teachers' tendency of treating technology as if it is separate from teaching and learning. It follows that professional development for teachers should desist from training teachers on how to use some particular software or app only, but also on how to fit it into classroom. By so doing, teachers will have self-efficacy in application of ICT and thus shape their attitude towards use of technology in classrooms.

Mishra and Koehler (2008) explicate that the lack of awareness of TPACK keeps technology separated from content and pedagogy. This leads to some problems with using technology in the classroom. First, there occurs rapid changes in technology that the teacher and learners find it extremely difficult to keep pace and end developing unfounded technophobia. The second problem arises from the fact that most software are designed for business, not for education. It therefore, means that students end up learning how to use the program and not learning the content of the class. The third problem that arises when technology is separated from content and pedagogy is the situational nature of the classroom. For instance, though an instructor may adjust a lesson to suit specific learners' needs, the available instructional video remains the same every time it is played.

Finally, taking into account that through experience and professional development most teachers may have acquired the appropriate content and pedagogy, the study embarked on how the level of teachers' technology knowledge in varied contexts (availability of facilities and teachers' disposition) has influenced technology integration in class. Additionally, the TPACK framework theory informed the discussion of how the teachers' have integrated technology in their pedagogy and subject matter.

1.12.2 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) by Davis (1989) offers an elucidation about user acceptance of a technology (in this case, ICT integration in teaching and learning process). Davis (1989, 93) posit that specific behaviour, beliefs, perceived ease of use and perceived usefulness determines on individuals' attitudes (or perceptions in this case) towards using any new technology. Perceived usefulness is the extent to which a person believes that using a technology increases performance and output, while perceived ease of use is the degree to which a person believes that using a technology will be effortless.

Davis, Bagozzi and Warshaw (1989), aver that due to perceived complexity of new technologies such as ICT, there exists an element of uncertainty in the minds of users regarding the successful adoption of them. Thus, people form perceptions and intentions towards trying to learn, and to use the new technology. This means that teachers using new technology would have to consider the perceived usefulness in the use of the new technology to accept it. They would need to believe the new technology to accept it. They would also need to belief that the use of new technology would enhance their job performance. Furthermore; the teachers would have to consider the perceived ease of use of the new technology. That is, they would have to know the degree to which they believe that using a particular system would be free from efforts. Thus new technology is accepted for use if the teachers perceive that there are personal gains to be obtained. TAM was found useful in the study as the researcher aimed at establishing what shapes the teachers' attitude and the resulting influence on technology use in teaching and learning process in Kitui Central Sub County in Kenya.

1.13 Conceptual Framework

Creswell (2014) regards conceptual framework as a research tool intended to help a researcher to develop cognizance and understanding of the condition under inquiry. Creswell further proffers that when clearly enunciated, a conceptual framework has potential usefulness as a tool to assist a researcher comprehend the meaning of subsequent findings. Figure 1.2 depicts the proposed study conceptual framework.

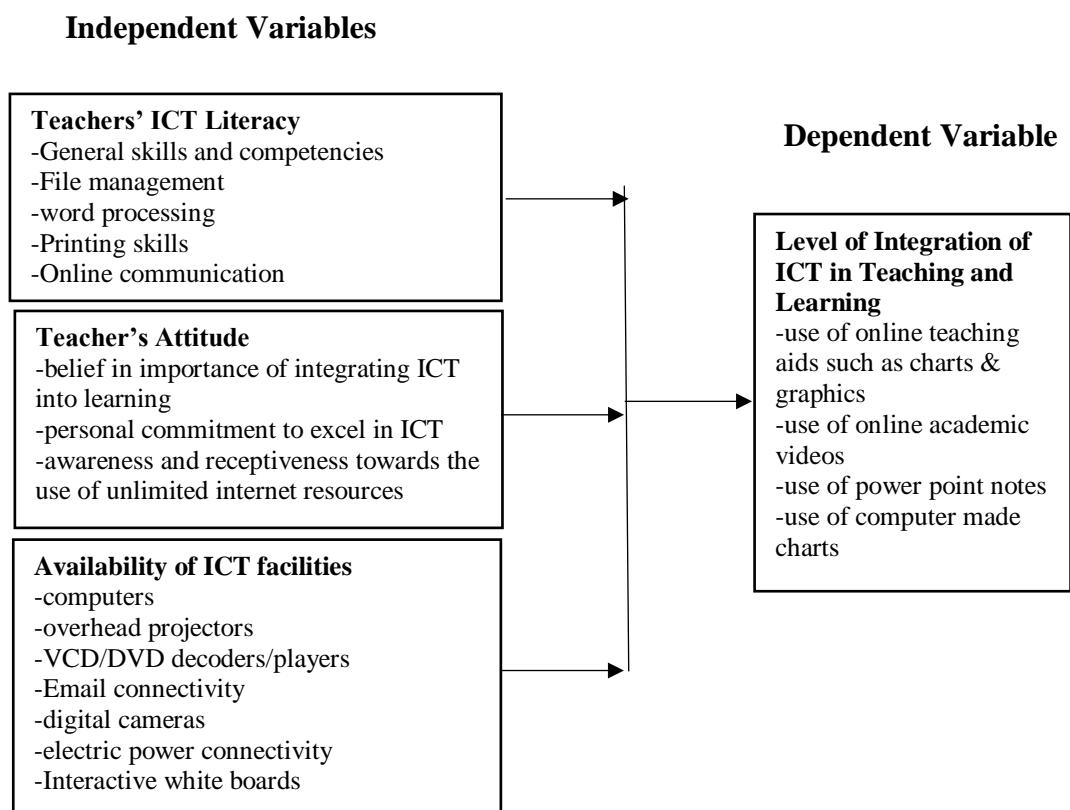


Figure 1.2: Conceptual Framework showing the Interplay between Presumed Factors Influencing ICT Integration in Learning

According to Figure 1.2, the three independent variables were conceptualized to have a relevant and relative influence to the level of integration of ICT in teaching and learning in public primary schools in Kitui Central Sub County. In other words teachers' ICT literacy, attitude and availability of ICT resources was hypothesized to influence the level of integration of ICT in teaching and learning. The study TPACK theoretical framework has

influenced the conceptual framework. When technological knowledge is appropriately combined with content and pedagogy knowledge and taking into account the prevailing contexts, complete ICT integration in teaching and learning can be achieved.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, literature has been reviewed in view of the research objectives. First, the concept of computer and ICT literacy has been succinctly delineated. Secondly, the review of empirical literature relevant in the proposed study has been done. The empirical literature review is in accordance to the study objectives. Finally, the chapter culminates with a summary of the reviewed literature and elucidation of research gaps.

2.2 Concept of Computer and ICT Literacy

Omotayo (2015) regards computer as an electronic machine that accomplishes in a logical manner the function of inputting, processing, and outputting data. Basic computer literacy instructions are essential before a person is successfully introduced to the use of the computers. However, regarding the measurement and definition of computer literacy, scholars are yet to form a consensus. Osunwusi and Abifarin (2013) observe that while some researchers measure and define computer literacy in terms of the presence of computer at home, computer related courses completed and the quality time spent on the computer, others measure in terms of the familiarity with computer terms, ability and experiences. Omotayo (2015) defines computer literacy as the ability to identify and operate the hardware and software of a computer aiming at achieving a certain goal. Similarly, Oluwatayo (2012) defines computer literacy as the knowledge and skills exhibited by a person to undertake tasks using a computer. Computer literacy is also regarded as the ability to instruct the computer what to do as well as comprehending what it does (Bada, Adewole & Olalekan, 2009).

It is certain that the various definitions of computer literacy as a concept converges to a deduction that computer literacy entails the ability to operate computer by feeding it, extracting, sending and processing information for meaningful interpretation. However, as observed by Ivankovic, Spranec and Miljko (2013), the term ICT literacy has gradually replaced computer literacy. Sulemana et al. (2018) explicate that while the two terms are used interchangeably and alludes to almost the same concept, ICT literacy is broader and comprehensive and includes the use of computers, projectors, broadcasting networks, robots, cell phones, the unseen satellites orbiting the earth constantly sending signals from one place to another, radios, video cameras and television. Thus, computer literacy is viewed as a precursor to ICT literacy (Ivankovic et al., 2013).

Sulemana et al. (2018) regards ICT literacy as the capability to use digital technology, networks to access and communications tools, integrate, manage, create and evaluate information geared to function in a knowledge-driven society. Similarly, Tekyiwa and Asare (2016) define ICT literacy as the abilities, skills and knowledge in operating various technologies that are applied in the process of collecting, storing, editing, retrieving, and transferring of information in various forms to meet educational, personal and labour market goals. Kuskaya and Kocak (2010) posit that the ICT use among educators is to create, transmit, share, store, or exchange information by various technologies such as internet, television, radio, telephone, video, DVD, computers, and satellite systems. It can therefore, be deduced from the various definitions, that ICT literacy is the possession of knowledge, skills and ability to use mainly digital technology to manage information for a certain purpose.

2.3 Empirical Studies Review

2.31 Teachers' ICT Literacy and ICT Integration in Teaching and Learning

In many nations, ICT has become an important component of education. Sulemana et al. (2018) aver that when used wisely by well-trained teachers, ICT can do wonders in classroom. ICT enhances teaching and learning process by increasing students' motivation. For instance, explanation of difficulty concepts and word can be made easy by use of ICT in class.

Teachers are at the heart of the education enterprise, and as such, they have an obligation to play a cardinal role in leveraging ICT technology in teaching and learning (Tekya & Asare, 2016). However, Bhattacharjee and Deb (2016) posit that for successful integration of ICT into teaching and learning, teachers must be capable of structuring their learning environments to merge technology in non-traditional ways. A teacher's lack of expertise in use of technology will therefore, curtail creativity and confidence on how to incorporate it in teaching. Further, Kamaruddin, Abdulla, Idris and Nawi (2017) postulates that the teachers' ability to incorporate technology into classroom activities as well as appreciating the technologies' versatility as an important tool in teaching and learning depends on the degree of familiarity and the ability to manipulate ICTs. This implies that capacity building of teachers in ICT knowledge accompanied with constant practice is a crucial prerequisite to effective integration of ICT in teaching. As the world becomes increasingly digital and virtual classrooms are on the rise, teachers must be ready to use technology in dissemination of the required knowledge. It is no wonder that the issue of teachers' level of ICT literacy has attracted many researchers globally.

Nurhabibah, Setian, Yanti, Miraj and Yannuar (2018) did analysis of ICT literacy competence among vocational high school teachers in Indonesia. Among major findings,

teachers were found to lack self-confidence in use of ICT. It was also found that the level of ICT literacy was higher in male than female. Further, there were noted differentials in the level of ICT literacy when data was segregated into age groups and educational level. The relatively younger teachers at the age group 21-40 showed a higher level of ICT literacy compared with the older group while teachers with lower education level had lower literacy level in ICT. Gender and age factor could be a crucial issue in Kenya where most of teachers in public primary schools are female of 40 years and above (KNBS, 2018). This necessitates the question that: could Kenyan public primary schools be experiencing slow uptake of technology in teaching and learning due to the fact that most of the teachers are middle age and above and of female gender? Nurhabibah et al. (2018) study had, however, a major limitation in that it used descriptive desk top approach. The researchers did literature review and document analysis mainly from secondary sources such as research journals and research report books. The current study made use of mainly the primary data by use of interview schedules and questionnaires.

A study done in Malaysia by Alazam, Bakar, Hamzar and Asmiran (2012) focused on vocational and technical teachers' ICT Integration in the Classroom and ICT Skills. The study found that most of the teachers use of ICT in classroom teaching was moderate, and that teachers' ICT skills was moderate. A significance difference was noted in teachers' ICT skills as a function of demographic factors such as age, type of ICT training, gender, and years of teaching experience. It was also established that the correlations between ICT integration in classroom and ICT skills among teachers was significant. However, teachers' gender, age, and teaching experience did not influence ICT integration in classroom. While Alazam et al. (2012) study focused on vocational and technical teachers, the current study focused on primary school teachers.

In Ghana, Enu et al. (2018) investigated the ICT skills of basic school teachers and their ICT usage in the Classroom. Through Qualitative analysis, the study found that teachers' ICT skills were at the moderate level. Most of the teachers indicated that they use ICT for general and personal purposes such as communicating and chatting with friends as well as family members via Facebook, WeChat and WhatsApp. Teachers attributed their minimal ICT integration in their lessons due to lack ICT integration skills and ICT infrastructure. Enu et al., recommended a government sponsored continuous professional development for teachers focusing on ICT integration in teaching and learning.

In Kenya, Kisirkoi (2015) conducted a case study to establish of the level of ICT integration in education in a certain secondary school which had adopted ICT in most of the school operations and registered a tremendous improvement in KCSE results. The study aimed at establishing teachers' motivation for integration, computer literacy levels, reason for the intervention and the impact on teaching and learning. Using a sample of 30 students and 18 teachers, the researcher found that teachers and students were computer literate and could therefore use computer applications for teaching and learning. The Learning was student centred in which learners were fully involved in the learning activities. Students and teachers were motivated by the desire to gain more through ICT integrated learning coupled with supportive and visionary school leadership. However, since the study was not experimental and the researcher used only questionnaires and interviews as the only data collection instruments, cause and effect could not be ascertained. Therefore, Improvement of KCSE performance could be attributed to several other factors other than integration of ICT in teaching and learning.

Mbithe (2016) investigated the factors influencing teachers' integration of ICT in teaching and learning in public secondary schools in Machakos Sub County. Among other findings,

it was established that majority of the head teachers and teachers had basic ICT literacy. However, only a few teachers and head teachers integrated ICT in teaching and learning. Additionally, while many secondary schools were found to have built computer laboratories, there was a critical mismatch between the number of pupils and the number of computers. The study also found that teacher ICT competency had a weak positive relationship with ICT integration ($r = 0.366, p < 0.001$). Mbithe (2016) study was however, not conclusive since it relied on just one data collection instrument, the questionnaire. More information could have been generated through interviews and class observation to ascertain the extent of ICT integration. Moreover, the study targeted secondary schools whose financial base is most often better than primary schools. The current study targeted public primary schools.

Sutter and Kihara (2019) embarked on a study to establish the determinants of effective implementation of digital literacy project in public primary schools in Baringo County in Kenya. School leadership was found to have the greatest influence, followed by ICT infrastructure. Teachers' competence in ICT and teachers' workload showed a relatively lower influence on the implementation of digital literacy project. Multiple regression analysis showed that 73.7% variations in implementation of digital literacy project in public primary schools in Baringo County in Kenya are explained by school leadership, teachers ICT competence, and teachers' workload and ICT infrastructure. However, while Baringo County is vast and has a large remote insecure part where ICT infrastructure is totally none existent and very few teachers, Kitui Central Sub County is largely composed of Kitui town and its environs. That implies that schools in Kitui Central Sub County are relatively better in regard to ICT infrastructure and teacher workload. Therefore, there was a contextual lacuna that spurred the need to undertake the study.

2.32 Teachers' Attitude and ICT Integration in Teaching and Learning

Van Hoorn, Nourot, Scales and Alward (2011) explicate that attitudes influence teachers' thinking, motivation and behavior. Thus, the strength of teachers' attitudes helps determine the amount of effort they will put on an activity, the duration of their perseverance when threatened with impediments, and how they manage contingencies in technology. Therefore, the term attitude can be considered as the sum total of man's feelings and inclination, prejudice or bias, fears, pre-conceived notions, threats, ideals, and convictions about a specific topic (Khochen & Radford, 2012). It then follows that, attitude is a personal disposition that impels a person to react to an object, situation or proposition in favourable or unfavourable way. Attitude can also be regarded as an organized and consistent manner of thinking, feeling and reacting to individuals, groups, or to any event (Coles & Scior, 2012). To a greater extent perception is shaped by the attitude and quite often the two terms are used interchangeably though different. While attitude and perceptions are sometimes used interchangeably, perceptions is broader and is often influenced by a person's attitude. Wasike (2018) considers perception as a process by which individuals organize and interpret their sensory impressions geared to apportion meaning to their environment. It is influenced by perceiver's attitude which may have a negative or positive inclination.

Butucha (2012) observes that while the larger number of teachers believe that ICT has the potential to enhance classroom learning, an almost equal number of them were hesitant to identify any ICTs benefits or attribute it to improved results. Likewise, studies by Gakenga, Gikandi and Kamau (2015) and Ndibalema (2014), observes that despite the frequent hype of the benefits of ICT integration in teaching and learning, there is still a section of teachers who do not acknowledge any considerable benefit of using ICTs in learning. Rastogi and Malhotra (2013) posit that research on teachers' attitudes is vital in developing countries

such as India, where ICT is yet to be part of the school culture. Thus, the incongruity that is likely to arise between the teachers' pedagogic culture and techno-centric mindedness would often result in their alienation from the use of technology.

Papaioannou and Charalambors (2011) study explored the attitudes exhibited by primary school head teachers towards ICT in Cyprus. Using a sequential mixed method approach, the researchers analyzed information from 250 principals' and came up with several findings. Generally, primary school principals of Cyprus were found to have a positive inclination towards ICT. Majority of the principals agreed that it was worthwhile to know how to use computers, and not a waste of time; learning how to use a computer was very important for them; and that computers were essential as an instructional aid in all subjects. Although principals held a positive attitude towards ICT, the study found a number of statistically significant differences across academic qualifications, years of service, gender, in-service training on ICT for teaching and learning purposes, access to a computer and the internet at home, computer experience, and existence of a computer in the principal's office. However, majority of head teachers were cynical about computers' impact on society, since they believed that computers isolate people, are potentially capable of controlling people's lives, and can dehumanize the society. It is however, noteworthy to consider the Cyprus principals' demographic facts where about 80 % of principals had access to internet and computer services at their residence. Further, 78.6% of principals received training on ICT use for personal errands while 63.4 % of them were trained on ICT integration in learning and teaching purposes. Such demographic facts could be quite different from Kitui Central Sub County teachers' demographic facts implying that their attitudes towards ICT use may take a different trajectory.

Rastogi and Malhotra (2013) embarked on determining the relationship between teachers' possession of ICT skills and attitudinal outlook towards ICT in India. The study findings revealed that the success of ICT integration in teaching and learning largely depended on the teachers' attitudes and their enthusiasm in embracing ICT skills and knowledge. The study thus concluded that teachers who possessed high literacy level in ICT found it to be more useful and displayed greater confidence and less aversion when using it. However, the contextual differences between India and Kenya in terms of ICT infrastructure and manpower, warranted this research.

In a study to establish the level of knowledge and attitude towards integration of ICT in learning by secondary school teachers in Malaysia, Singh and Chan (2014) brought forth several findings. Majority of teachers (92 %) were found to be comfortable with the use of computer applications such as presentation software, spreadsheet, internet and e-mail. Unlike most of the other reviewed studies, over 80 % of teachers were also found to have proficiency in computer maintenance and graphics software. However, only 20 % of teachers could use the internet to effectively and efficiently search for information. Most importantly, teachers showed a positive attitude towards using ICT. Majority of them used ICT for teaching and learning and delineated how students benefitted from its use such as laying digital foundation for their further studies, work and private life. Although Singh and Chan (2014) study did not assess the availability of ICT facilities, the respondents' high proficiency in ICT implicitly implied that they were adequately exposed to ICT resources. Thus, in case of Kitui Central Sub County, there was a need to establish the level of ICT facilities, the teachers' competency, the attitude and their interrelationship with technology use in learning.

Kusano, Frederiksen, Jones and Kobayashi (2013) examined the teachers' attitude toward ICT integration in USA and Japanese elementary schools. The credence of their study was that though several studies in regard to teachers' attitude toward ICT had been done, international comparisons were yet to be done. The study participants comprised of the teachers at the elementary schools in southern Utah in the U.S.A and in Hokkaido (northern Japan). The teachers' perceived usefulness (PE), perceived ease of use and usability (PEUU), and attitudes toward using technology (AT) were identified through the technology acceptance model (TAM). Although the study showed that Japan availed lesser ICT resources in public education than USA, it is noteworthy that both economies are developed and technology environment may be quite different from Kenya.

Beri and Sharma (2019) investigated teachers' attitude towards ICT use among teachers educators in various teacher-training colleges in the State of Haryana, India. Most of the tutors had a positive attitude to towards the ICT usage in teacher education process. Teacher-educators were however, found to lack training and technical support and therefore, most had some anxiety towards use of ICT tools and devices during teaching learning process. It also emerged that though teachers believed use of ICT could have more benefits to the learners, lack self-efficacy led to demotivation as well as low passion regarding the use of ICT devices in teacher-training. While Beri and Sharma (2019) investigated the attitudes of tutors in teachers' training colleges in India, the current study focus was on primary school teachers' attitudes towards ICT integration in the teaching learning process.

In Kenya, a few studies in regard to teachers and principals attitudes and perceptions towards ICT use in teaching learning process have been conducted. Njathi, Ngaruiya and Maithya (2018) study aimed at establishing the association between principals' perception

towards computer application and utilization of computers in accomplishing various tasks in public secondary schools in Kiambu County. A semi-structured questionnaire was used to collect the data from 205 sampled principals. The study showed that only 23.5 % of the principals reported that they were using computers on daily basis. This was a very small percentage considering the effort that had been put by the government and other bodies to ensure computer use in school administration. Similarly, 94% of the respondents reported that they were using computers for administrative purposes at very low level and that the main use was for storing and retrieving information, and for generating student reports. Most principals expressed low confidence in ICT use. The Pearson coefficient correlation analysis showed that there was a moderate significant relationship between the principals' perception towards computer application and computer use ($r(204) = 0.423, p < 0.001$). Thus, most of the principals were technophobic and hardly applied ICT in their administrative tasks. This prompts some begging questions: how would such principals being the role models encourage and convince the teachers to integrate ICT in their work? Can such principals have moral authority to supervise ICT integrated teaching and learning in their schools?

Nzwili (2017) undertook a study to investigate the principals and teachers' perception on ICT integration of ICT in the public primary school curriculum in Kitui County in Kenya. The study involved 388 principals and 776 teachers. Among other findings, both teachers and principals perceived ICT as an essential tool in improving performance, collaboration, performance, learning outcomes and learning experiences. Generally, principals and the teachers were positive in regard to integration of ICT in the primary school curriculum. This was attributed to the awareness created by the government regarding the one laptop, one child project. However, Nzwili (2017) did not investigate the extent to which principals

and teachers had integrated technology in teaching and learning process. Thus, though the study established that teachers in Kitui County appreciated the importance of use of technology, it failed to explain the low uptake of technology in Kitui Central Sub County despite adequacy of ICT facilities in some schools.

2.33 Availability of ICT facilities and ICT Integration in Teaching and Learning

Abuya (2019) emphasizes that provision of up to-date ICT infrastructure and teachers' digital literacy are prerequisite in successful implementation of ICT in schools. In fact the presence of ICT infrastructure in a school would create curiosity and then action to even some of the most technophobic teachers. Furthermore, the availability of ICT resources that are vital in the implementation process are key factors in shaping the attitudes and perceptions of teachers towards ICT integration in learning process (Beri & Sharma, 2019; Kamaruddin et al. 2017; Nzwili, 2017; Sulemana, et al. 2018).

Betz (2011) aver that implementation of ICT in schools would be successful in schools where appropriate infrastructure is provided and both teaching and support staff receive continuous professional development. Bertz further maintains that teachers' competence in the integration of ICT and comprehensive understanding of the curricular, social, financial, technological and administrative dimension of ICT use in education is very crucial. Nzwili (2017) cautions that availability of ICT resources without the on-site technical support may present problems in terms of money and time lost due to technical breakdowns. Thus, for successful ICT integration, schools need personnel with general competencies in installation, operation and maintenance of both hard and software, network security and network administration.

In Nigeria, Yusuf, Maina and Dare (2013) investigated the usage of ICT facilities in teaching of English language in secondary schools in Kaduna State. Among other findings,

the study established that there was a shortage of ICT facilities and that most teachers were not competent in use of ICT facilities though they were expected to be the main implementers of ICT integration in school curriculum. Yusuf et al. (2013) recommended an establishment of an intervention program made up of government NGOs aiming at supplying ICT facilities and ensure the reliable source of electricity in every secondary school. Additionally, a comprehensive capacity building training programme for teachers should be put in place to ensure each school has a team which is proficient in ICT skills, use and maintenance.

Nwana, Ofoegbu and Egbe (2017) investigated the availability and utilization of ICT resources in the teaching of computer education among secondary school teachers in Anambra State, Nigeria. Using a self-developed 40 – item questionnaire for a sample of 300 computer teachers, the came with several salient findings. The findings revealed that there was inadequate ICT teaching resources. It was also revealed that despite the availability of some ICT resources, teachers were not using them. The materials that were highly available included computers as indicated by 93.0 % of teachers, scanner (83.3 %), printer (87.0 %), flash memories (82.0 %) and audio and video discs (83.3 %). Materials that were scanty included: multimedia projector (5.3%), electronic white board (4.0 %), e-graphics (3.0 %), power bank devices (8.0 %) and programmed instructional materials (6.0 %). However, Nwana et al. (2017) study did not determine the extent to which the availability of ICT resources influenced the ICT integration in teaching and learning in the institutions under study.

Sibanda, Mapenduka and Furusa (2016) study examined the use of ICT resources and factors that hindered maximum utilization of available ICT resources in Kwekwe, Zimbabwe. Some of the technologies assessed included computers, televisions, radios, interactive boards, networks, wireless technologies, internet, eLearning applications, email, projectors, and video conferencing. The research established that most ICTs such as interactive boards, computers and projectors were inadequate. Additionally, the available ICTs were utilization was minimal. Several factors such as insufficient resources, fear of technology, ICT skills deficiency, lack of power supply, lack of interest, and poor physical ICT infrastructure were identified as hindrances to the ICT utilization in these schools. Sibanda et al. (2016) recommended a regular training and ICT skills upgrading for teachers, the schools to put in place alternative sources of power such as generators and solar energy, and to engage personnel for the crucial technical support in order to motivate teachers' technology use.

Amuchie (2015) investigated the level of ICT integration in teaching and learning in secondary schools in Ardo-Kola and Jalingo, Taraba State, Nigeria. The study findings showed that there was very low availability and utilization of ICT resources. A sample of 264 teachers and principals was selected using stratified - random sampling technique. A researcher—made questionnaire with Likert scale type was used. Majority of teachers rated the availability of most ICT infrastructure as very poor-desk top computer (75.0 %), laptop (100.0 %), television (94.6 %), video player (98.2 %), digital camera (100.0 %), interactive white board (100.0 %), multimedia projector (100.0 %) and others. It was also found out that there were several factors that hindered ICT use such as poor power supply, lack of trained personnel, and prohibitive cost of computers and accessories.

In a similar study, Uriah, Eniekenemi and Okorogba (2016) investigated the availability and use of ICT resources in teaching and learning in Isaac Jasper Adakar Boro College,, Nigeria. Using simple random sampling technique, 26 lecturers and 300 students were sampled from the institution. The study findings revealed that most of the essential ICT facilities such as e-libraries were not available. Both lecturers and student were not exposed to ICT materials and facilities.

In Kenya, Obota, Oluoch and Makani (2015) undertook an assessment of the availability of ICT infrastructure in public secondary schools in Mumias Sub-County, Kakamega County. The researcher found that radio and computers were the main ICT facilities in place. However, the radios available were inadequate while computer to learner ratio of averaged 30:1. This made it very difficult for the teachers to practically guide students during computer interactive studies. In a similar study Mbugua, Gori and Tanui (2015), examined the use of ICT in teaching in public secondary schools in Nakuru County, Kenya. Among other things, ICT facilities were found to be inadequate and teachers' basic ICT skills were wanting.

It is noteworthy that all the reviewed studies conducted in Kenya as well as outside (Amuchie, 2015; Mbugua et al. 2015; Nzwili, 2017; Obota et al. 2015; Sibanda et al. 2016; Uriah et al. 2016; Yusuf et al. 2013) have striking similarities. The studies were focused on post primary institutions such as secondary schools, middle level colleges and universities. In most studies, ICT facilities were found inadequate, teachers were ill trained and ICT integration in teaching and learning was minimal. However, none applied the robust statistical method to ascertain the influence of availability of ICT resources on the level of ICT integration. The present study aimed at not only establishing the availability

of ICT facilities but also the influence on ICT integration in public primary schools in Kitui Central Sub County.

2.34 Summary of Literature and Research Gaps

The researcher has reviewed literature from global, regional to local perspectives in line with the study objectives. Unlike the present study, most of the reviewed studies (Alazam et al. 2012; Beri & Sharma, 2019; Mbugua et al. 2015; Njathi et al. 2018) and others, had their focus on ICT integration in teaching and learning process in post primary institutions. As noted by Obota et al. (2015), most of the post primary institutions have better ICT infrastructure as compared to public primary schools. However, the few studies that focused on primary schools (Papaioannou & Charalambors, 2011; Sutter & Kihara, 2019) have major contextual differences to the proposed study. Papaioannou and Charalambors (2011) study dealt with primary school head teachers in Cyprus who had access to computers and internet in their homes and most were highly trained in ICT. Sutter and Kihara (2019) study involved teachers from the vast and partially remote Baringo County in Kenya where some lessons are held without physical classrooms. Thus, the findings from such studies cannot be assumed to hold for Kitui Central Sub County public primary schools and hence the need for this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used by the researcher in collecting, analysis and interpretation of data. The chapter presents the research design, the study area information, the study population and sample size, sampling technique and procedures. It also describes the data collection instruments, pilot study, the validity and reliability of the research instruments, data analysis procedures, and the ethical and legal considerations.

3.2 Research Design

The study employed descriptive survey research design. Kothari (2014), explicates that descriptive survey research design is best adapted to obtain personal and social facts, beliefs and attitudes. It involves measurement classification, analysis, comparison and interpretation of data that results in the formation of important principles of knowledge and solution to significant problems. Descriptive survey design involves asking a sample population questions about a particular issue in order to explore their opinions, attitudes and knowledge about the issue in question (Fraenkel, Wallen & Hyun, 2012).

3.3 Research Site

The study was conducted in Kitui Central Sub-County, Kitui County. According to Kitui County schools census report (MOE, 2018), most public primary schools in Kitui Central Sub County are in urban setting and are characterized by high pupil population and low teacher to pupil ratio. ICT integration in teaching and learning has been identified as one strategy of managing and enhancing the academic standards of the overcrowded classes. Incidentally, the Kitui County schools census report decried of the teachers' slow uptake

and integration of ICT in teaching and learning in Kitui Central Sub County. This created the impetus for the study.

3.4 Target Population

Population refers to all elements, individual or objects having similar observable characteristics (Creswell, 2014). According to the Kitui Central Sub County Education Office (2020), there are 70 public primary schools. All the all the 70 head teachers and 1053 teachers in the 70 schools were targeted for the study. The head teachers were targeted since they are expected to spearhead the ICT uptake in their schools as well as soliciting ICT resources from various sources. Teachers were targeted since they are the main implementers of ICT integration programme in classroom.

3.5 Sample and Sampling Techniques

Babbie (2014) regards a sample as a subset of population. According to Gay, Mills and Airasian (2009), for sufficient and reliable findings, the sample size should be 10% to 30% of the population. Therefore, 21 primary schools which is 30% of 70 schools were sampled for the study. The researcher selected the 21 schools through simple random sampling technique. All the head teachers from the sampled 21 schools were subjected to an interview schedule. Further, 10 % of 1053 teachers in the sub county were sampled for the study. Thus, five teachers were selected through simple random sampling from each of 21 schools. The sample matrix consisted of 21 head teachers and 105 teachers. Table 3.1 shows the sample size distribution.

Table 3.1: Sample Size Distribution

Category of Respondents	Population	Sample	Percentage (%)	Sampling Technique
Head teachers	70	21	30.0	Simple random
Teachers	1053	105	10.0	Simple random
Total	1123	126	11.2	

3.6 Data Collection Measures

This study employed the teachers' questionnaire and the head teachers' interview schedule.

3.6.1 Teachers' Questionnaire

The teachers' questionnaire consisted of Likert scale that gathered quantitative data and open-ended questions that gathered qualitative type of information. The questionnaire comprises of sections A, B, C, D and E (refer to Appendix II). Section A sought the teacher's demographic information, section B gathered information in regard to teachers' ICT literacy level, section C solicited information on teachers' attitude, section D aimed at gathering information on availability of ICT facilities while section E sought information regarding the level to which the teacher integrates ICT in teaching and learning.

3.6.2 Head teachers' Interview Schedule

Use of interview schedule allows the researcher to pose probing questions to the interviewee and thus, generating more enriching data unlike the use of questionnaire (Fraenkel, Wallen & Hyun, 2012). Through the head teachers' interview schedule, the researcher aimed at gathering in depth information on ICT integration in teaching and learning in Kitui Central public primary schools. The interview schedule items are constructed according to the objectives of the study.

3.7 Pilot Testing of Research Instruments

To ensure validity and reliability of research instruments, it is important to conduct pilot testing (Creswell, 2014). Through pilot testing the clarity of the language, duration, layout of the tools and the process of administering will be ascertained. According to Sahu (2013), it is prudent to use 10% of the study's sample size when conducting a pilot test. Thus, the study involved two head teachers and 10 teachers from two public primary schools from the neighbouring Kitui West Sub County. The two head teachers were purposely sampled while teachers were selected through simple random sampling technique. The participants were encouraged to comment and make suggestions geared to improve the various items. The pilot study enhanced validity and reliability of the data collection instruments.

3.8 Validity of the Data Collection Instruments

Validity refers to the correctness, meaningfulness of inferences and soundness of outcomes of conclusion, which are based on the research findings (Kothari, 2014; Saunders, Lewis & Thornhill, 2012). The researcher sought the expert opinion on content and construct validity. The teachers' questionnaire and the head teachers' interview schedule were availed to two university supervisors before and after piloting in order to review the items in the instruments. Comments solicited from supervisors were then used to enhance the research instruments before commencing data collection.

3.9 Reliability of Data Collection Instruments

Reliability is the degree to which a research tool gives consistent data or results after repeated trials (Babbie, 2014). When a research instrument meets the aforementioned criteria then it is said to be reliable. It can be used severally and give similar outcome irrespective of the environmental set up. The test-retest technique was used to measure the reliability of teachers' questionnaire. The questionnaire was administered to the

respondents during pilot testing and administered again after a duration of two weeks. The data from the two sets of questionnaires was then correlated using Pearson Product Moments' correlation method. A correlation coefficient of 0.84 was obtained. According to Cohen, Manion and Morrison (2012) reliability coefficient of 0.7 and above is considered sufficient for a research instrument in social sciences.

3.10 Data Collection Procedures

The researcher secured a letter of introduction from Africa Nazarene University. The introduction letter enabled the researcher secure research permit from from the National Council for Science and Technology and Innovation (NACOSTI). The acquired permit was be presented to Kitui Central Sub County Education Officer who then issued a clearance letter for data collection from the sampled schools. The researcher visited the sampled schools and after presenting the official permission letters to principals and striking rapport, data collection commenced. The researcher personally administered the questionnaire to the teachers. Face-to-face interviews were then conducted with the head teachers. The interviews were carried out in varied places as found convenient. Before each interview, the respondents were requested to read and respond to the contents of consent form (Appendix E). Interviews were audio recorded using a smart phone and later transcribed by the researcher.

3.11 Data Processing and Analysis

Kombo and Tromp (2006) regard data analysis as the process of organizing the collected raw data in order to establish meaning or certain trends. The process started by editing to identify omissions and errors. After coding, the data from questionnaire was fed into the Statistical Package for Social Sciences (SPSS) version 22 software for analysis. The data collected were analyzed with respect of the study objectives using both descriptive an

inferential techniques. Descriptive statistics such as percentages, means and standard deviation were used while the three formulated null hypotheses were tested by use of multiple regression analysis. The regression equation is in the form of $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$, where Y = Teachers' ICT integration in teaching and learning, X_1 = teachers' ICT literacy, X_2 = teachers' attitude, X_3 = availability of ICT facilities while ϵ is the error term. Qualitative data was put into themes and where necessary converted into quantitative data for easier interpretation. Some of data generated from head teachers' interview schedule was reported verbatim and used to augment the quantitative data.

3.12 Legal and Ethical Considerations

To ensure legal measures were observed, the researcher sought a letter of introduction from Africa Nazarene University. The letter of introduction enabled the researcher to secure a research permit from National Council of Science, Technology and Innovation (NACOSTI). Subsequently, the acquired NACOSTI permit enabled the researcher to secure research clearance from County Commissioner and County Director of education. A prior visit to the sampled schools was made and after striking rapport with both teachers and head teachers, data collection commenced. To ensure ethical considerations, the respondents were assured of anonymity and utmost confidentiality. Interviewees were requested to fill a consent form (Appendix III). The consent form enabled the researcher to audio and visual record the interview proceedings. Respondents were assured of the right to withdraw from the data collection process at any stage without any consequences. They were also allowed to scrutinize the transcribed information and expunge any sections that might not reflect what they meant. To observe copy rights and avoid plagiarism, the researcher acknowledge all the sources of information collected from reviewed journals articles, textbooks, unpublished and published theses as well as other research materials.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter presents the analysis of the data collected in this study. The chapter contains the response rate, analysis of demographic data, and analysis of teachers and head teachers' response in accordance to the research objectives. The purpose of the study was to investigate the factors influencing integration of ICT in teaching and learning in public primary schools in Kitui Central Sub County. The study objectives were: to assess the influence of teachers' ICT literacy on ICT integration in teaching and learning; to establish the influence of teachers' attitude on ICT integration in teaching and learning; to examine the influence of availability of ICT resources on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. Data were collected through the teachers' questionnaire, and head teachers' interview guide.

4.2 Demographic Characteristics of Respondents

The researcher gathered the background information of the respondents, which formed the basis under which some of the interpretations of the study findings were made. The demographic information sought included: gender, age bracket, teachers and head teachers' highest level of professional education, teaching experience, formal training in computer and others.

4.2.1 Response Rate

The study sampled 105 teachers and 21 head teachers out of which 90 teachers and 17 head teachers took part in the study. Thus, the return rate was 86.0 % for teachers, and 81.0 % for head teachers. According to Fraenkel et al. (2012), a response rate of more than 60% is considered good for a study.

4.2.2 Gender of Respondents

The researcher sought to establish the gender distribution of the respondents. Table 4.1 shows the finding.

Table 4.1: Gender Distribution of Respondents

Category of respondent	Gender	Frequency	Percentage
Teachers	Male	26	28.9
	Female	64	71.1
	Total	90	100.0
Head teachers	Male	9	53.0
	Female	8	47.0
	Total	17	100.0

As evident from Table 4.1, female respondents were more than twice (71.1 %) the male respondents (28.9 %) reflecting the existing gender disparity among teachers in public primary schools in Kitui Central Sub County. There was a need to have more male teachers to whom the boy child can identify with. However, it was also notable that there was almost gender parity in case of head teachers (male-53.0 %, female-47.0 %) showing that the appointment of head teachers was not directly proportion to the teachers' gender in the sub county.

4.2.3 Age bracket of respondents

The researcher sought to establish the respondents' age bracket distribution. Table 4.2 depicts the findings.

Table 4.2: Respondents' Age Bracket Distribution

Age in years	Category			
	Teachers		Head Teachers	
	f	%	f	%
< 30	10	11.1	0	0.0
31-40	18	20.0	2	11.8
41-50	33	36.7	2	11.8
> 50	29	32.2	13	76.4
Total	90	100.0	17	100.0

Table 4.2 shows that only 11.1% of teachers were below 30 years of age. Majority of teachers (68.9 %) were 41 years and above implying that there was a looming demographic upheaval as aged teachers exit the profession after attaining retirement age of 60 years. Similarly, most of the head teachers (76.4 %) were 50 years and above. Thus, there was a possibility of skepticism and resistance to uptake of new technology among teachers who have been managing their work without it. There is need for the TSC to employ more relatively young teachers and who may be more receptive to the ICT uptake and integration in teaching and learning.

4.2.4 Teachers' Highest Level of Professional Training in Education

The study also sought to establish the teachers' highest level of professional training. The higher a teacher progresses in professional training, the more one is likely to be exposed to ICT use and application. Figure 4.1 shows the distribution of head teachers according to their highest level of professional training.

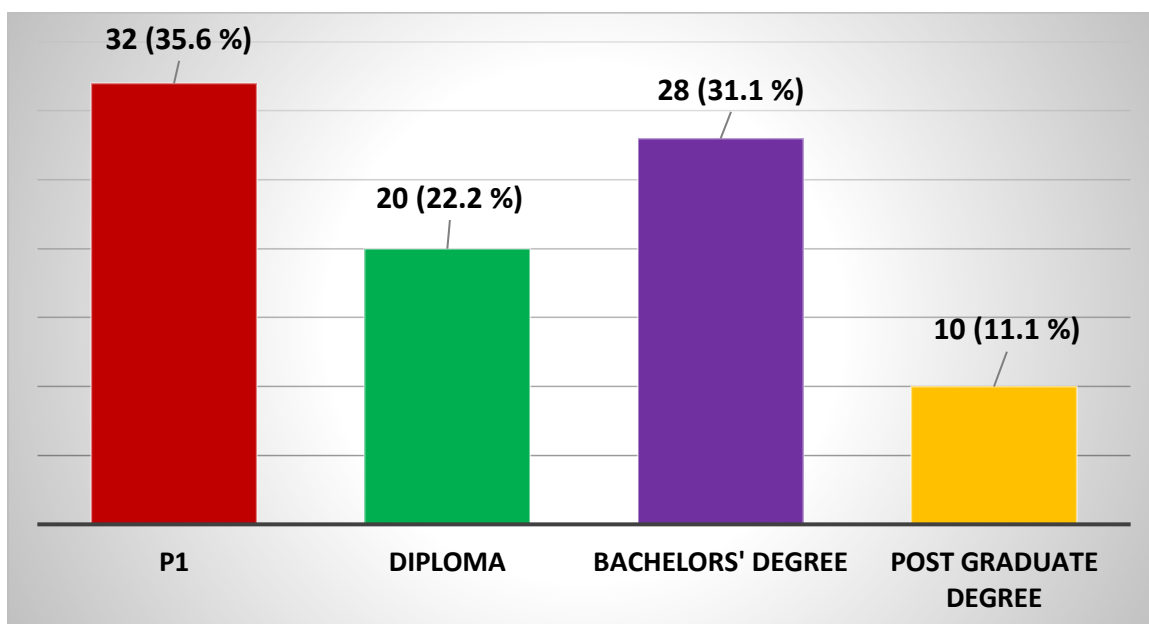


Figure 4.1: Teachers' Highest Level of Professional Training in Education

It was evident from Figure 4.1, that all the sampled teachers were professionally trained, though at different levels. Most teachers (35.6 %) had a P1 certificate in education as their highest level of professional training, followed by bachelor's degree education holders constituting 31.1 %. Only 11.1 % of teachers had a post graduate degree. Professionally trained teachers are expected to have acquired the necessary subject content and pedagogy. Thus, all the sampled teachers had the potential to augment the content and pedagogy with ICT to the benefit of the learner. This would also be in line with the overarching tenet of TPACK which is a way of thinking about the knowledge teachers need such as computer literacy and subject matter in order to integrate technology effectively into their classrooms.

4.2.5 Teachers' Computer Skills

The study sought to establish the level to which teachers' rate their computer skills and which could have a bearing on self-efficacy in integrating ICT in teaching and learning.

Figure 4.2 shows the teachers self-rating in computer skills.

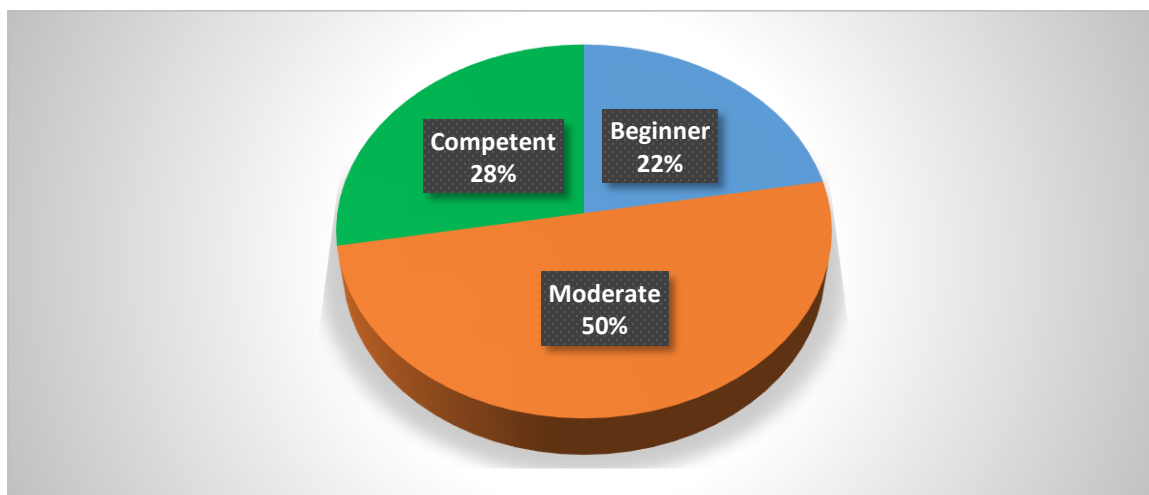


Figure 4.2: Teachers' Self Rating in Computer Skills

As shown in Figure 4.2, half of the teachers (50 %) considered their computer skills as moderate while 28% as competent. However, a considerable 22% of teachers felt that they were only beginners in regard to their computer skills level albeit having qualified as trained teachers. This implied that ICT literacy is not a prerequisite to qualify as a professional teacher in Kenya. Thus, Over 70 % of teachers who felt that they were either beginners or moderate in computer skills may lack the required self-efficacy to integrate ICT in teaching and learning.

4.3 Teachers' Level of ICT Literacy

The study first objective of the study was to assess the influence of teachers' ICT literacy on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. To assess the teachers' level of ICT literacy, teachers were requested to respond to items as provided in the ICT literacy survey adapted and modified from Morales (2013). The ICT literacy survey had five parts that aimed at assessing general computer skills, digital file management skills, computer word processing skills, computer printing skills and online communication. The self-rating questionnaire items were in the form of likert scale where levels of ICT literacy were rated as None-1, little-2, Average-3, Above

average-4, and Master-5. At level one (None), the person has no understanding of technology while at ‘Little’ level, the person has a basic understanding of the technology, but cannot perform the task successfully without assistance. At level 3 (Average), the person can perform the technology task, but struggles in some areas while at level 4 (Above average), the person can perform the technology task repeatedly with great success, but has not mastered all the elements. At level 5 (Master), the person has mastered the technology and can perform the task without any problems as well as mentoring others. Table 4.3 shows the analyzed head teachers’ responses in terms of means and standard deviations (SD).

Table 4.3: Teachers’ Response on their Level of ICT Literacy

Statement	Mean (M)	SD
General Skills		
Familiar with basic computer system parts and concepts (e.g. central processing unit-CPU, motherboard, hard drive, random access memory-RAM, etc.)	2.7	1.2
Able to use Help menus to find answers to my questions	2.6	0.8
Understand file extensions and differences between file types (e.g. .doc, .gif, .html, .ppt, .pdf, .docx etc.)	3.4	0.7
Able to shut down a computer appropriately	4.3	0.6
Able to perform a safe reboot of the operating system with keystrokes	2.4	0.6
Understand the difference between closing/minimizing/hiding windows and quitting a program	3.8	0.7
Able to use the mouse right-click menu functions	4.0	0.8
Able to install and uninstall a programme	2.1	0.6
Aggregate Mean score and SD	3.1	0.7
File Management Skills		
Able to navigate through files and directories (e.g. using Windows Explorer)	2.8	0.9
Able to organize, copy and paste files in directories	3.0	0.8
Able to move unwanted files into my recycle bin and delete them permanently from my hard drive	3.5	0.7
Aggregate Mean score and SD	3.1	0.8
Word Processing Skills		
Able to edit, copy, cut and paste a block of text or selected objects	4.1	0.9
Able to use undo/redo functions	4.5	0.7
Able to save, print and preview documents	3.3	0.8
Able to select and change fonts sizes and types, styles (e.g. boldface, italics, underlining, etc.)	3.5	0.7
Able to create itemized lists (e.g. bullets, numbered lists)	2.7	1.1
Able to insert pages to a formal report with preliminaries and the main body	1.7	0.6

Able to name and insert pages for tables and figures in a document	1.9	0.7
Able to insert automatic table of contents	1.3	0.4
Able to review a word document online	1.7	0.5
Able to use picture tools formatting commands such as cropping and wrap text	1.3	0.5
Able to use Equation editor	1.3	0.6
Able to insert symbols	2.5	1.0
Able to insert charts using excel	2.3	0.9
Able to lock a document with a pass word	1.2	0.5
Able to share information through Google drive sheets	2.0	0.8
Able to put several files in a zip	2.2	0.9
Aggregate Mean score and SD	2.3	0.8
Printing Skills		
Able to change printer parameters like page numbers, paper orientation, margins and proportions, etc.	1.7	0.8
Able to change printing options from grayscale, normal, fast draft or best	1.8	0.5
Aggregate Mean score and SD	1.8	0.7
Online Communication. Browser and Navigation Skills Online		
I am able to use the browser basic commands to surf the Internet	3.5	0.8
I am able to request, activate my email account	2.8	0.9
I am able to compose, send, receive, reply to and forward email messages	4.1	1.0
I am able to attach/detach documents to/from email messages	3.8	0.5
I am able to use search engines to locate desired information	1.8	0.9
I am able to understand the difference between Search Engines (e.g. Google) and Directories (e.g. Yahoo)	1.7	0.8
I am able to understand that some copyright restrictions apply to computer software and Internet documents	2.2	1.0
I am able to understand how I can use gathered information from the Internet without violating copyright laws	2.5	0.9
I am able to demonstrate an understanding of what constitutes plagiarism	2.5	0.7
I am able to know basic steps to ensure my online privacy and computer security	2.6	0.8
Aggregate Mean score and SD	2.8	0.8
n = 90		

Key: None-1, Little-2, Average-3, Above average-4, and Master-5

In reference to Table 4.3, most of the teachers indicated that they had little familiarity with basic computer system parts and concepts such as central processing unit-CPU, motherboard, hard drive, random access memory-RAM and others ($M = 2.7$, $SD = 1.2$). However, the relatively large standard deviation of 1.2 shows that there were considerable number of teachers whose opinion was contrary. Similarly, a majority of teachers indicated that they had little knowledge on how to use ‘help menus’ to find answers to my questions as well as being able to perform a safe reboot of the operating system with keystrokes ($M = 2.4$,

$SD = 0.6$). The inability to use keystrokes for reboot operation implied that a teacher would be stuck if the computer operation system become static (hangs). Further, most teachers could not install and uninstall a programme ($M = 2.1$, $SD = 0.6$). Nonetheless, most of teachers rated themselves as average in understanding the file extensions and differences between file types such as .doc, .gif, .html and others ($M = 3.4$, $SD = 0.7$). Similarly, teachers had moderate knowledge in understanding the difference between closing/minimizing/hiding windows and quitting a program ($M = 3.8$, $SD = 0.7$). Further, majority of teachers regarded themselves as being above average in being able to shut down a computer appropriately ($M = 4.3$, $SD = 0.6$) as well as being able to use the mouse right-click menu functions ($M = 4.0$, $SD = 0.8$). Overall, the teachers' general skill in computer was found to be average ($M = 3.1$, $SD = 0.7$).

Regarding the file management skills, most of the teachers felt that they have only a little knowledge on how to navigate through files and directories ($M = 2.8$, $SD = 0.9$). They however, rated their capability to organize, copy and paste files in directories as average ($M = 3.0$, $SD = 0.8$). Similarly, most teachers indicated that their ability to move unwanted files into recycle bin and delete them permanently from my hard drive, as average. Overall, file management skills had a mean of 3.1 and standard deviation of 0.8 showing teachers had average skills and thus, needed further training in order to enhance their skills in file management.

Overall teachers performed dismally in word processing skills ($M = 2.3$, $SD = 0.8$). However, there were both very strong and weak areas. Teachers overwhelmingly termed their capability to edit, copy, cut and paste a block of text or selected objects ($M = 4.1$, $SD = 0.9$) as well as being able to use undo/redo functions as above average ($M = 4.5$, $SD = 0.7$). This implied that teachers could easily browse the internet, get appropriate notes and

edit in line with their students' need. It was further established that teachers had an average ability to save, print and preview documents as well as able to select and change fonts sizes and types, styles such as boldface, italics, and underlining. Teachers scored dismally in all the other 12 areas as shown in Table 4.3. They had little ability to create itemized lists such as bullets and numbered lists, to insert pages to a formal report with preliminaries and the main body, to name and insert pages for tables and figures in a document, to insert automatic table of contents, to review a word document online, to use picture tools formatting commands such as cropping and wrap text, to use Equation editor, to insert symbols, to insert charts using excel, to insert charts using excel, to lock a document with a pass word, to share information through Google drive sheets, and to put several files in a zip.

Of more concern is the fact that almost all the teachers could not insert an automatic table of contents in a document ($M = 1.3$ $SD = 0.4$), use picture tools formatting commands such as cropping and wrap text ($M = 1.3$ $SD = 0.5$), use Equation editor ($M = 1.3$ $SD = 0.6$) and lock a document with a pass word ($M = 1.2$ $SD = 0.5$). These are all major and crucial functions that a teacher should possess in order to prepare and present the teaching material to the learners appropriately.

Concerning printing skills, most of the teachers indicated that they were not able to change printer parameters like page numbers, paper orientation, margins and proportions ($M = 1.7$, $SD = 0.8$). This was a serious handicap among teachers since their work involved preparation of handouts, notes and newsletters to convey well laid out important covered and upcoming events. Additionally, most teachers had no skills to change printing options from grayscale, normal, fast draft or best ($M = 1.8$, $SD = 0.5$). Overall, computer printing skills were low among public primary school teachers in Kitui Central Sub County.

The study also sought to establish teachers' skill in online communication, browser and navigation skills online. Most teachers indicated that they had average ability to use the browser basic commands to surf the Internet ($M = 3.5, SD = 0.8$). Further, teachers ability to compose, send, receive, reply to and forward email messages was found to be above average ($M = 4.1, SD = 1.0$) possibly due to the fact that similar functions are executed through the cell phones. Teachers were also able to attach/detach documents to/from email messages. However, there were a number of online communication activities that most teachers had either little or no skills to navigate. Most of the teachers indicated that they were not able to understand the difference between Search Engines such as Google and Directories such as Yahoo ($M = 1.7, SD = 0.8$), and how to use search engines to filter and locate desired information ($M = 1.8, SD = 0.9$). Without the prowess to search a particular information from the internet through search engines, most of the teachers lose the opportunity to gather pertinent information that is useful to them and students. Further, teachers had little understanding that some copyright restrictions apply to computer software and Internet documents ($M = 2.2, SD = 1.0$), and that they can use gathered information from the Internet without violating copyright laws. Finally, teachers indicated that they had little skills on how to demonstrate an understanding of what constitutes plagiarism ($M = 2.5, SD = 0.7$) and basic steps to ensure one's online privacy and computer security ($M = 2.6, SD = 0.8$).

The research gathered more information and clarification from head teachers regarding teachers' level of ICT literacy and its implications on ICT integration in teaching and learning. Over 80.0 % of head teachers indicated that most of the newly employed and relatively younger teachers were techno savvy and showed much interest in integrating ICT in their teaching. On the other, most of teachers in the age bracket of 45 and above, had

little knowledge beyond the basic computer operations and showed no interest in enhancing their skills. The head teachers entrusted the few teachers who had mastered the technology and could perform the task without any problems as well as mentoring others, to digitize the school time table, examination time table and examination result analysis. Additionally, the knowledgeable teachers were used as resource persons to impart knowledge to the other teachers.

Forty percent of head teachers termed themselves as beginners, 50.0 % as moderately computer literate while 10.0 % considered themselves as competent in computer literacy. The computer literate head teachers felt strongly that all teachers ought to be ICT literate in order to disseminate the same knowledge to pupils and apply it to improve student learning. The following comments exemplifies the varied head teachers' experiences and opinions on the level of teachers' ICT literacy, thus:

I am disappointed by some of my teachers who are completely kaput in application of ICT. They cannot go beyond opening the computer and worse still, they are not willing to engage in professional development....they claim that their time is over and wish retire peacefully without the bother of modern technology. (H 10).

The TSC and MOE requires all returns to be done online. However, though the school has invested in a laptop and several desk top computers, some of my teachers are technophobic. Apart from reading their emails, all the other other correspondence and uploading of vital returns to the secretary. This has led to compromise on some confidential information about teachers. Occasionally, serious antagonism arise between secretary and teachers over the leaked information. (H 17).

One of my teacher is well trained in computer technology and does almost all of his personal things online including and not limited to clothes, shoes and grocery. In his free time, he always on his laptop. Incidentally, he hardly incorporates his prowess in ICT in teaching, so I have not seen the connection between level of ICT literacy and integration in teaching and learning. (H 3).

Such comments from head teachers demonstrates the various school dynamics that impact on the level of ICT integration in teaching and learning of pupils in public primary schools in Kitui Central Sub County.

4.4 Teachers' Attitude on ICT Integration in Teaching and Learning

The second objective of the study was to establish the influence of teachers' attitude on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. To achieve the objective, a set of statements in form of five points Likert scale were posed to the teachers to indicate the extent to which they agreed or disagreed with them. The responses were coded such that strongly disagree (SD) was rated number 1 while strongly agree (SA) was rated number 4. The mean responses were computed such that: a mean response of above 2.5 was considered as agree while a mean of below 2.5 was considered as disagree. Table 4.4 shows the proportion of teacher respondents in various levels of agreement, the mean and standard deviation.

Table 4.4: Teachers' Attitude on ICT Integration in Teaching and Learning

Statement	SA	A	D	SD	Mean	SD
	%	%	%	%		
To be a competent teacher in the present era, computer knowledge is a must	27.8	33.3	16.7	22.2	2.7	1.2
Teachers should use internet material to supplement what they get from text books	33.3	47.8	20.0	14.0	3.1	0.9
Teachers should invest in a personal computer/laptop	31.1	22.2	30.0	16.7	2.7	1.0
Use of the internet resources as teaching aids can result pupils better understanding	46.7	42.2	5.6	5.6	3.3	0.7
Pupils should be encouraged to source information from internet	36.7	25.6	16.7	21.1	2.8	0.9
<i>I avoid using computers whenever I can</i>	27.8	28.9	26.7	16.7	2.3	1.0
ICT integration in teaching and learning can lead to pupils improved grades	25.6	22.2	33.3	18.9	2.5	1.1
<i>ICT integration requires a lot of time</i>	36.7	36.7	11.1	15.6	2.1	0.7
<i>Working with computers makes me feel isolated from other people</i>	25.6	33.3	18.9	22.2	2.4	1.0
<i>ICT integration in teaching and learning should start at secondary school education</i>	30.0	27.8	20.0	22.2	2.3	0.9
<i>Computers are difficult to use</i>	34.4	26.7	16.7	22.2	2.3	0.8
Use of computer reduces paper work for teachers	40.0	40.0	11.1	8.9	2.9	0.5
I store most of my information in computer than in files	16.7	18.9	22.2	42.2	2.1	0.7
Aggregate Mean Score					2.6	0.7

n = 90. NB: The scores for the statements in italics were reversed accordingly

In reference to Table 4.4, the statement ‘to be a competent teacher in the present era, computer knowledge is a must’ elicited varied opinions from teachers ($M = 2.7$, $SD = 1.2$). Thus, although 61.1 % of teachers affirmed, a considerable 38.9 % of them disagreed. Some teachers argued that though acquiring computer knowledge was important, the need for this knowledge has been exaggerated through media. The following excerpt from the open ended section of the teachers’ questionnaire demonstrates some of their views and beliefs in regard to acquisition of computer knowledge, thus:

I have been teaching mathematics, English and many other subjects for years now. I am just a beginner in computer literacy but my pupils always pass their class eight final examination with excellent grades to date. To me computer knowledge is not a must especially for a primary school teacher. The hyped urgency to acquire the knowledge is the creation of the media and the business sub sector. (Teacher)

Thus, some teachers’ belief that they can give quality services to learners without integrating ICT in their teaching. Such beliefs may lead to negative attitudes and slow uptake of ICT among teachers. Nevertheless, over 80.0 % of teachers agreed that teachers should use internet material to supplement what they get from text books. The sentiment was also echoed by more than 70.0% of the interviewed head teachers. One of the head teacher commented:

Teachers are gradually learning that through internet they can supplement all the knowledge they require in virtually all subjects effectively...we get meaning of words, vocabularies, pronunciation of words, worked examples in mathematics, formulas and past papers. Additionally, internet provides very rich and detailed historical information and scientific facts. It is prudent for a teacher to use textbooks as well as information from the internet in order to keep abreast with the world dynamics. (Head teacher 16).

The statement that ‘teachers should invest in a personal computer/laptop’ was affirmed by 53.3 % of teachers while 46.7 % disagreed. This implied that there was a large section of teachers who felt that work that involved use of computers can be confined to school and no need to have it at home. Majority of teachers (88.9 %) agreed that the use of the internet

resources as teaching aids can result pupils better understanding ($M = 3.3$, $SD = 0.7$). The constant use of internet resources as teaching aids has the potential benefit of not only improving the teacher prowess in computer technology but also enhancing the teachers' positive attitude towards ICT integration in teaching and learning. Majority of teachers (62.3 %) also felt that pupils should be encouraged to source information from internet. However, 37.8 % of teachers had a reservation on primary school pupils over relying on internet information and especially without guidance. Similar sentiments emanated from some head teachers who argued that there should be a limit to which pupils should source information from internet as they do their assignments. A head teacher narrated an experience where a pupil accomplished her mathematics assignments well with the aid of scientific calculator and computer software but became completely incapacitated without them. The head teacher commented:

I support the idea of pupils sourcing their information from internet as they do their assignments but we as teachers and parents should be vigilant of the other unintended information that pupils may acquire as they spend time on the media. Some pupils jeopardize their reasoning, internalizing of some concepts and finally perform dismally in their final examinations because of over relying on use of technology. (H 9)

The fear of learners' inadvertently acquiring unsolicited information from internet has made both teachers and parents to be hesitant in encouraging learners use internet as a source of information. It was no wonder that 52.2 % of teachers disagreed that ICT integration in teaching and learning can lead to pupils improved grades ($M = 2.5$, $SD = 1.1$). However, the relatively high standard deviation of 1.1, was an indicator that teachers' opinion on this issue was far from being homogenous.

Paradoxically, while 80.0 % of teachers affirmed that the use of computer reduces paper work for teachers, 64.4% of teachers indicated that they store most information in files than in computers. This implies that though teachers acknowledged the benefit of storing

information in soft copy, they were yet to embrace the use of technology in management and storage of information. Most of the teachers affirmed that they avoid using computers whenever they could (56.7 %), felt that ICT integration requires a lot of time (73.4 %), working with computers makes them feel isolated from other people (58.9 %), ICT integration in teaching and learning should start at secondary school education (57.8 %) and that computers are difficult to use (61.1 %). The affirmation of these statements constitutes a negative attitude towards use of computers in accomplishing various tasks and in extension a negative impact on ICT integration in teaching and learning. Overall, teachers were found to be just moderately positive towards ICT integration in teaching and learning ($M = 2.6, SD = 0.7$).

4.5 Availability of ICT Resources and ICT Integration in Teaching and Learning

The third objective of the study was to examine the influence of availability of ICT resources on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. To achieve the objective, a set of statements in form of four points Likert scale were posed to the teachers to indicate the extent to which ICT resources were available in their schools. The responses were coded such that Not Available (NA) was rated number 1, Sparingly Available (SPA) number 2, Moderately Available (MA) number 3, and Sufficiently Available (SA) was rated number 4. Table 4.5 shows the proportion of teacher respondents in various levels of agreement, the mean and standard deviation.

Table 4.5: Availability of ICT Resources

Statement	NA	SPA	MA	SA	Mean	SD
	%	%	%	%		
Desk top Computers for teachers & pupils use	14.4	21.1	43.3	21.2	2.7	0.6
Interactive white boards	27.8	22.2	22.2	27.8	2.5	1.3
Overhead projectors	30.0	31.1	22.2	16.7	2.3	1.0
Internet connection	27.8	11.1	41.1	20.0	2.4	0.7
Laptops for teachers	55.6	11.1	16.7	16.7	1.9	0.5
Source of electric power	11.1	11.1	18.9	58.9	3.3	0.5
Tablets for pupils	10.0	50.0	22.2	16.7	2.4	0.7
VCD/DVD Player	23.3	30.0	40.0	6.7	2.3	0.9
Video decoder/player	26.7	18.9	25.6	28.9	2.6	1.1
Copy scanner	16.7	13.3	31.1	38.9	2.9	0.7
Photocopy Machine	27.8	11.1	38.9	22.2	2.6	1.0
Television	16.7	16.7	33.3	33.3	2.5	0.9
Radio	11.1	11.1	63.3	14.4	2.8	0.5
Digital Camera	45.6	28.9	25.7	5.6	1.9	0.6
Wifi	28.9	22.2	32.2	16.7	2.4	1.2
Aggregate Mean Score					2.6	0.7

n = 90

Key: NA= Not Available (1) SPA= Sparingly Available (2) MA = Moderately Available (3) SA= Sufficiently Available (4)

It was evident from Table 4.5 that most of the schools were moderately equipped with desk top Computers for teachers and pupils use (43.3 %). It was also noteworthy that 14.4 % of teachers indicated that desktop computers were not available in their schools implying that there was a very remote possibility of advancing ICT literacy among teachers and students. Apart desk top computers, there are other essential facilities for successive integration of ICT in teaching and learning such as overhead projectors, white boards, video decoders,

internet connectivity and many others. The response on the availability of Interactive white boards was varied as 27.8 % indicated that they were not available, 22.2 % sparingly available, 22.2 % moderately available while 27.8 % had enough computers for students and teachers. In most schools overhead projectors were either not available (30.0 %) or sparingly available (31.1 %).

In most of the schools, teachers termed internet connectivity as either moderately available (41.1 %) or sufficiently available. However, 27.8 % of teachers indicated that the connectivity was not available. Without internet connectivity, teachers and students extent of ICT integration in teaching and learning was limited. Over half of teachers (55.6 %) indicated that there were no laptops meant for teachers in their schools. It was however encouraging that 44.4 % of teachers indicated the presence of such laptops. As teachers move from one class and task to another, a laptop computer becomes a very convenient working tool.

Most of the schools had adequate source of electricity as 58.9 % of teachers indicated that the source was sufficiently available, 18.9 % moderately available, while only 11.1 % of teachers indicated they had no source of power. Being a town based Sub County that included Kitui town, the county headquarters, Kitui Cenral Sub County is relatively well supplied and connected to the country national electricity grid. Tablets for pupils especially in the elementary classes were available in most schools as indicated by 90.0 % of teachers. Similarly, most schools had the minimum ICT infrastructure though in some cases very sparingly. Only 23.3 % of teachers indicated that VCD/DVD player was not available, video decoder/player (26.7 %), copy scanner (16.7 %), photocopier machine (27.8 %), television (16.7 %) while radio (11.1 %).

A sizeable number of schools did not have digital camera as 45.6 % of teachers indicated. Apart from being a great source of interest and curiosity, a digital camera could come in handy as pupils explored various topics in science and geography. Finally, the availability of wifi was varied across various schools as 28.9 % of teachers indicated they had no wifi, 22.2 % sparingly available, 32.2 % moderately available and 16.7 % sufficiently available. As the global trend in conducting transactions is becoming increasingly digital, wifi connection has become an essential feature in all institutions and homes. Overall, the availability of ICT resources was found to be moderately available ($M = 2.6$, $SD = 0.7$). This implied that, in terms of ICT resources, most of Kitui Central Sub County public primary schools had a leverage to fully integrate ICT in teaching and learning.

Despite the availability of ICT resources in some schools, some teachers and head teachers pointed out a several issues that thwart their efforts to utilize the resources. Several teachers indicated that most of the resources remain locked up since they were acquired. One of the teachers wrote:

My school is one of the schools considered to be well equipped in ICT infrastructure... but the truth of the matter is that nothing much is happening regarding ICT integration in teaching and learning...the computer laboratory is rarely open and computers and other items are only gathering dust and cobwebs while others are in disrepair. The pupils' tablets are also rotting in another strong room. The mode of teaching and learning has remained the same over the years. Our internet is another problem since it is very erratic and weak...you can download a large file forever. (Teacher 33).

On the same vein, a teacher noted the challenges they encounter due to lack of basic skills to operate some of the ICT resources. Thus:

Our school has been a beneficiary of several corporate ICT infrastructure donations and our e-resources laboratory is now full. However, most of us have technophobia and cannot manage the simple electrical connections needed for the apparatus to function. Thus, I waste a lot of time looking for assistance to set up say the projector, connect to the computer and start presenting. So I prefer using my old notes and lecture method in order to cover as much as possible. Furthermore, most

of our desktop computers are no longer operational due to lack of constant service. The school needs a laboratory assistance. (Teacher 46)

Similarly over 75.0% of the interviewed head teachers noted the slow uptake of ICT technology among teachers due to lack of self-efficacy, inability to operate some of the ICT resources and poor maintenance. The following comments from different head teachers exemplifies the magnitude of the problem.

In my school, we are twelve ladies and only two gentlemen. The ladies, I included have no confidence with issues to do with electrical and electronics. Therefore, despite the fact that the school has sufficient ICT infrastructure we rarely integrate technology in our teaching. However, the two male teachers, occasionally integrate ICT in their teaching. (Head teacher 3).

Three quarters of my staff are 45 years and above and though we have a number of ICT resources, most of us are stuck in the age old method of having text book, note book, chalk and board in class. Most of the teachers feel the emerging technology is best left for the youth and though they are expected to file their termly activities online, they enlist the services of persons from outside the school. (Head teacher 14).

I have been integrating ICT in my science lessons to a great success. My pupils have received resource information from well selected 'You Tube Videos' with a lot of enthusiasm and it is my hope that this will enhance their academic performance. However, use of power point, videos as teaching and other ICT related lessons requires a bit of prior preparation. So I view my most of my teachers' failure to incorporate technology in their teaching as just laziness and negative attitude. Most complain of the much time it takes to prepare and to present and our system being examination oriented, ICT integration has not been a priority. (Head teacher 11).

It was evident from the sentiments as expressed by teachers and head teachers that despite the adequate availability of ICT resources in some schools the level of ICT integration in teaching and learning was not commensurate. This was due to myriad of reasons that were mainly teacher and the school management related. However, it was also notable that there were many schools where vital ICT resource were none existent and thus leaving teachers and students with no option of ICT integration in their teaching and learning.

4.6 Teachers' Level of ICT Integration in Teaching and Learning

The dependent variable in the current study was the teachers' level of ICT integration in teaching and learning. The variable was measured by considering rate at which individual teachers had been integrating ICT in the various aspects of teaching and learning. Table 4.6 shows the proportion of teacher respondents in various levels of agreement, the mean and standard deviation. The following key was applied: **Not at all-1, Sometimes-2, Often-3, More often-4**. However, for the ease of interpretation, the mean was calculated such that a mean of below 2.5 was interpreted as 'sometimes' while a mean above 2.5 was interpreted as 'often'.

Table 4.6: Teachers' Level of ICT Integration in Teaching and Learning

Statement	Not at all	Some times	Often	More often	Mean	SD
I use ICT in teaching and learning	%	%	%	%		
to prepare lesson and reports	25.6	31.1	27.8	15.6	2.3	0.9
internet to search teaching material	33.3	22.2	24.4	20.0	2.3	0.9
to communicate with students and parents	50.0	22.2	16.7	11.1	1.7	0.6
especially computer and its applications	30.0	26.7	23.3	20.0	2.3	1.0
to monitor and evaluate children progress or performance	28.9	33.3	21.1	16.7	2.3	0.7
to make presentation slides/ delivery	40.0	31.1	16.7	12.2	2.0	0.6
to provide and prepare online work or assignment	33.3	27.8	20.0	18.9	2.3	0.8
I make use of the vast teaching aids from internet such as charts and pictures to enhance teaching in especially science and other subjects	31.1	35.6	16.7	16.7	2.2	0.7
I teach using audio visual aids such as videos	30.0	31.1	23.3	15.6	2.2	0.8
Aggregate Mean Score					2.3	0.7

n = 90

In reference to Table 4.6, only 25.6 % of teachers indicated that they were not using ICT at all in to prepare lesson and reports. Similarly, it was also encouraging that 66.7 % of teachers were using internet to search for teaching material. Teachers' explicated that they often use their phones to augment their teaching material from internet information. Half of teachers indicated that they never used ICT to communicate to parents and pupils, while 22.2 % communicated sometimes, 16.7 % communicated often and 11.1 % more often. This implied that teachers hardly consulted or deliberated with parents in regard to their children through the cell phones, emails, social media and other electronic methods. This trend could easily perpetuate an unhealthy disconnect between parents, teachers and learners.

Despite the major evolutionally breakthrough in computing voluminous students marks and automated ranking and comments by a computer software, it was noted that only 37.8 % of teachers often used ICT to monitor and evaluate children progress or performance. A considerable 28.9 % of teachers indicated that they never used such a system while 33.3 % of teachers used computer services 'sometimes'. Further, 40.0 % of teachers never made presentations by use of power point slides while 31.1 % did present 'sometimes'.

Only 38.9 % of teachers used ICT to provide and prepare online work or assignment while 33.4 % indicated that they often make use of the vast teaching aids from internet such as charts and pictures to enhance teaching in especially science and other subjects. Further, 38.9 % of teachers indicated that they often teach using audio visual aids such as videos. Overall, it was found that only about 35.0 % of teachers were really utilizing and integrating ICT resources during their teaching and pupils' learning ($M = 2.3$, $SD = 0.7$). The finding prompts the questions: What were the factors that influenced this category of teachers to be proactive and venture into use of ICT resources in order to enhance their

teaching? Would it be possible that these teachers had a positive attitude towards ICT integration, were well literate in ICT, and had ICT resources at their disposal? These questions have been addressed in the next section as the formulated hypotheses in section 1.6 are tested.

4.7 Hypotheses Testing

Through multiple regression analysis, the study aimed at ascertaining the magnitude of influence of each predictor (independent variables) and its significance influence on the level of ICT integration in teaching and learning. Additionally, the study aimed at determining the extent to which the combined factors influence and correlate to the level of ICT integration in teaching and learning. To achieve that, the mean response values for each independent variable were regressed against mean level of ICT integration for each respondent.

The regression model capturing the hypothesized relationship was given as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon, \text{ where;}$$

Y = the level of ICT integration

X₁ = teachers' ICT literacy

X₂ = teachers' attitude

X₃ = availability of ICT resources

ε = the error term.

Tables 4.7, 4.8 and 4.9 depict the summary of multiple regression analysis.

Table 4.7: Multiple Regression Model Summary

Model	R	R ²	Adjusted R ²	Standard error of the estimate
1	0.789	0.623	0.588	0.1714

Predictors: (constant), Teachers' ICT literacy, Teachers' attitude, Availability of ICT resources

Dependent variable: Level of ICT integration in teaching and learning

It was evident from Table 4.7, that there was a strong correlation between the observed values of dependent variable and the values of dependent variable predicted by the multiple regression model ($R = 0.789$). In other words, there was a strong correlation between the predicted and observed values of the level of ICT integration in teaching and learning. It can also be deduced from the value of R^2 in Table 4.8, that 62.3 % of variance in the level of ICT integration could be explained by the influence of teachers' ICT literacy level, attitude towards ICT integration and availability of ICT resources. Table 4.8 shows the significance of the study multiple regression model.

Table 4.8: Multiple Regression Model Significance (ANOVA)

Model	Sum of Squares	df*	Mean Square	F	Sig.
1 Regression	65.812	3	21.937	58.188	0.002
Residual	32.422	86	0.377		
Total	98.234	89			

df*- degrees of freedom.

In reference to Table 4.8, the F -ratio in the ANOVA table, has a value of 58.188 and a p value of 0.002. Since p was less than 0.05, it was deduced that the overall regression model was a good fit for the data. That is, the model, overall, resulted in a significantly good degree of prediction of the outcome variable. In other words, the joint independent

variables statistically significantly predicted the preschool learners academic performance ($F(3, 86) = 58.188, p < 0.05$). Table 4.9 shows the multiple regression model coefficients.

Table 4.9: Summary of Multiple Regression Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig. value
	Beta	Std. Error	Beta		
1 (Constant)	0.289	0.224		2.87	0.141
Teachers' ICT literacy level	0.568	0.152	0.527	5.365	0.003
Teachers' attitude	0.445	0.132	0.418	4.308	0.008
Availability of ICT resources	0.428	0.121	0.398	2.403	0.019

Dependent variable: Level of ICT integration in teaching and learning

Table 4.9 reveals the relative contribution of the three independent variables to the dependent variable, expressed as beta weights. Assuming the error term ε to be zero and substituting the unstandardized coefficients β values, the estimated multiple regression equation becomes: $Y = 0.289 + 0.568 X_1 + 0.445 X_2 + 0.428 X_3$

The β values indicate the individual contribution of each predictor to the model if the effects of all other predictors are held constant. Thus, when the teachers' level of ICT literacy increases positively by one unit, the level of ICT integration in teaching and learning literacy would increase by 0.568 units ($\beta = 0.568$) while holding the other factors constant. Similarly, when teachers' attitude increases positively by one unit, ICT integration would increase by 0.443 units ($\beta = 0.443$) while holding the other factors constant and so on.

The four null hypotheses of the study, were tested by considering the t statistic (Table 4.9) that tests whether a β value is significantly different from zero ($H_0: \beta = 0$). The hypotheses were tested at 95% confidence level.

HO₁: *Teachers' ICT literacy has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County*

In reference to Table 4.9, the unstandardized beta value for teachers' ICT literacy was found to be significantly greater than zero ($\beta = 0.568$, $t(89) = 5.365$, $p < 0.05$). Subsequently, the first null hypothesis was rejected. It was, therefore, deduced that Teachers' ICT literacy had statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. This meant that teachers who were trained and conversant with ICT, were more engaged in ICT integration in their teaching.

HO₂: *Teachers' attitude has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County*

Table 4.9 shows that the unstandardized beta value for teachers' attitude towards integration of ICT in teaching and learning was significantly greater than zero ($\beta = 0.445$, $t(89) = 4.03$, $p < 0.05$). Subsequently, the second null hypothesis was rejected. It was, therefore, deduced that teachers' attitude had a statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. This implied that teachers with positive attitude towards ICT integration were more likely to use technology in their teaching practices.

HO₃: *Availability of ICT resources has no statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County*

In reference to Table 4.9, the unstandardized beta value for availability of ICT resources was significantly greater than zero ($\beta = 0.428, t = 2.403, p < 0.05$). Thus, **HO₃** was rejected, implying that availability of ICT resources had a statistically significant influence on teachers' ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. This meant that most of the teachers who engaged in ICT integration came from schools with ICT resources.

CHAPTER FIVE

DISCUSSION, SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the discussion of the results as per research objectives, summary of the findings and conclusions derived from the findings and discussion, recommendations as per the objectives and suggestions of areas of further study. The purpose of the study was to investigate the factors influencing integration of ICT in teaching and learning in public primary schools in Kitui Central Sub County. Data were collected through the teachers' questionnaire and head teachers' interview schedule.

5.2 Discussion of the Findings

This section discusses the results and analysis of data (in chapter four) as per the three objectives.

5.2.1 Influence of Teachers' ICT Literacy on ICT Integration in Teaching and Learning

The study first objective of the study was to assess the influence of teachers' ICT literacy on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. In reference to section 4.3, most of the teachers had little familiarity with basic computer system parts and concepts such as central processing unit-CPU, motherboard, hard drive, random access memory-RAM and others ($M = 2.7$, $SD = 1.2$). Additionally, majority of teachers had little knowledge on how to use 'help menus' and not able to perform a safe reboot of the operating system with keystrokes ($M = 2.4$, $SD = 0.6$). Having little knowledge on the computer basic parts and functions such as rebooting can seriously curtail teachers' creativity and confidence in ICT integration. The finding deviated from the Kamaruddin et al. (2017) postulation that the teachers' ability to incorporate technology

into classroom activities as well as appreciating the technologies' versatility as an important tool in teaching and learning depends on the degree of familiarity and the ability to manipulate ICTs. Cognate to the study finding, Nurhabibah et al. (2018) found teachers in a vocational high school teachers in Indonesia lacked major skills and self-confidence in use of ICT. Additionally, the level of ICT literacy was higher in male than female. Further, the relatively younger teachers at the age 40 and below showed a higher level of ICT literacy compared with the older group. Similarly, most of head teachers in the current study, noted of higher ICT literacy and self-efficacy in male teachers than female. The head teachers hoped that as the number of younger and techno savvy generation of teachers gradually increase, ICT uptake and integration into teaching and learning will be become the norm.

Teachers rated themselves as average in several aspects that indicated their level of ICT literacy such as understanding the file extensions and differences between file types such as .doc, .gif, .html and others ($M = 3.4$, $SD = 0.7$). Similarly, teachers had moderate knowledge in understanding the difference between closing/minimizing/hiding windows and quitting a program ($M = 3.8$, $SD = 0.7$). The finding is similar to Choge (2019) where most public primary school head teachers' skills in closing/minimizing/hiding windows and quitting a program was rated as average. However, majority of teachers regarded themselves as being above average in being able to shut down a computer appropriately as well as being able to use the mouse right-click menu functions.

Overall, the teachers' general skill in computer was found to be average ($M = 3.1$, $SD = 0.7$). These findings were congruent to Alazam et al. (2012) finding that most of Malaysia vocational and technical teachers had moderate ICT skills were moderate and the use of ICT in classroom teaching was also moderate. It was also established that the correlations

between ICT integration in classroom and ICT skills among teachers was significant. In a similar study, Enu et al. (2018) found that teachers' ICT skills were at the moderate level in Ghana. Most of the teachers indicated that they use ICT for general and personal purposes such as communicating and chatting with friends as well as family members via Facebook, and WhatsApp. The moderate ICT skills and minimal ICT integration in teaching and learning among teachers was attributed to lack of ICT integration skills and ICT infrastructure. Thus, the researcher synthesis of the previous studies as well as the outcome of the current study, it was evident that teachers require a structured continuous professional development in order to acquire self-efficacy and find integration of ICT in their lessons an effortless procedure.

Concerning the word processing skills, teachers generally performed dismally ($M = 2.3$, $SD = 0.8$). Most teachers had little ability to create itemized lists such as bullets and numbered lists, to insert pages to a formal report with preliminaries and the main body, to name and insert pages for tables and figures in a document, to insert automatic table of contents, to review a word document online, to use picture tools formatting commands such as cropping and wrap text, to use Equation editor, to insert symbols, to insert charts using excel, to insert charts using excel, to lock a document with a pass word, to share information through Google drive sheets, and to put several files in a zip. The finding corroborates Oulo (2013) who found that 75% of teachers in Bondo district had no email accounts and were computer semi illiterate. The finding is also in tandem with Ogundele and Etejere (2013) that teachers are often keen with survival computer basic skills such as down loading and sending a document but they rarely delve into deeper functions and which can enhance their teaching practices such as reviewing a student work online.

Although, the overall teachers' ICT literacy was found to be average ($M = 3.1$, $SD = 0.7$) for this study, teachers' ICT literacy had statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County ($\beta = 0.568$, $t(89) = 5.365$, $p < 0.05$). This meant that teachers who have high level of ICT literacy engage more of ICT integration in their lessons than ones at lower level of literacy. The finding corroborates Mbithe (2016) finding where the teacher ICT competency was found to have a significant positive relationship with ICT integration ($r = 0.366$, $p < 0.001$). Further, the finding was in line with Rastogi and Malhotra (2013) whose study concluded that teachers who possessed high literacy level in ICT found it to be more useful and displayed greater confidence and less aversion when using it.

5.2.2 Influence of Teachers' Attitude on ICT Integration in Teaching and Learning

The second objective of the study is to establish the influence of teachers' attitude on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. In reference to section 4.4, 61.1 % of teachers affirmed that to be a competent teacher in the present era, computer knowledge is a must while 38.9 % disagreed ($M = 2.7$, $SD = 1.2$). This implied that though the larger percentage of teachers believed computer knowledge is a must for a teacher, a considerable percentage of teachers believed otherwise. The finding was congruent to Butucha (2012) observation that while the larger number of teachers believe that ICT has the potential to enhance classroom learning, an almost equal number of them were hesitant to identify any ICTs benefits or attribute it to improved results. Similar sentiments were echoed by Gakenga et al. (2015) and Ndibalema (2014) who observe that despite the frequent hype of the benefits of ICT integration in teaching and learning, there is still a section of teachers who do not acknowledge any considerable

benefit of using ICTs in learning. For such category of teachers, the availability of ICT infrastructure is likely to make no significant change in the use of technology in their classes.

Over 80.0 % of teachers agreed that teachers should use internet material to supplement what they get from text books. The sentiment was also echoed by more than 70.0% of the interviewed head teachers. The finding concurs with Nzwili (2017) who found that both teachers and principals perceived ICT as an essential tool in improving performance, collaboration, performance, learning outcomes and learning experiences. The finding was also in line with Choge (2019) and Mureithi and Mwangi (2019) who noted that teachers who perceived ICT integration in teaching and learning most often used internet to augment their teaching material.

The statement that ‘teachers should invest in a personal computer/laptop’ was affirmed by 53.3 % of teachers while 46.7 % disagreed. This implied that there was a large section of teachers who felt that a personal computer/laptop was not necessary. Cognate to the finding, Nzwili (2017) found that 80.1 % of teachers in Kitui County did not own a personal computer/laptop that could be used in teaching/learning process. Lack of initiative to own a personal computer/laptop signified that most of teachers were yet to consider computer as a basic working tool. Ironically, as some head teachers and teachers indicated, some of those who owned computer/laptop in their homes were also not utilizing them but acquired to be used mainly by their children. Nzwili (2017), however, concludes that teachers’ perception was positive towards adoption but they had no experience of using ICT resources in instruction.

Majority of teachers (88.9 %) agreed that the use of the internet resources as teaching aids can result to pupils better understanding ($M = 3.3, SD = 0.7$). Similarly, 62.3 % of teachers felt that pupils should be encouraged to source information from internet. However, 37.8 % of teachers had a reservation on primary school pupils' unguided use of internet. In concurrence Almasi et al. (2017) found that although the internet uses for educational purposes had improved among secondary school students most of them used the internet as a social media for socializing and chatting, listening to music and watching movies. This resulted to delay on schoolwork submission, school dodging, poor academic results and generally wastage of time. More importantly, Christopher and Maria- Gorretti (2012) explicates that the four top internet dangers that face students and youth in general include pornography, cyber bullying, sexual predators, and face book damaged reputations. With such information in mind some teachers acquire negative attitude and are hesitant to introduce primary school children to use of internet in search of academic materials. Similar sentiments emanated from some head teachers who argued that there should be a limit to which pupils should source information from internet as they do their assignments. It was no wonder that 52.2 % of teachers disagreed that ICT integration in teaching and learning can lead to pupils improved grades ($M = 2.5, SD = 1.1$). Nevertheless, in a study that was done in 644 schools, Aboderin et al. (2011) notes that "internet dangers" were shown to be more of a threat when students were allowed to bring in their own personal equipment such as phones.

The apprehension and negative attitude expressed by teachers regarding involving pupils in internet as a major source of information seemed unfounded since the access through mobile seems to occur more often. Almasi et al. (2017) study documented that of the students under study, 54.8% accessed the internet from their mobile phones, 32.3%

accessed the internet from the internet cafes, other 25 (8.1%) from homes and 15 (4.8%) from their personal computers and schools. It was therefore, evident that most students accessed the internet from the mobile phones and only a small percentage accessed from their homes through personal computers or from school computers. Thus, what pupils need is guidance and counselling as they get more access to internet because they finally get exposed through various means.

Overall, teachers were found to be just moderately positive towards ICT integration in teaching and learning ($M = 2.6, SD = 0.7$). However, teachers' attitude towards integration of ICT in teaching and learning had a statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County ($\beta = 0.445, t(89) = 4.03, p < 0.05$). This implied that teachers with positive attitude towards ICT integration were more likely to use technology in their teaching practices. Cognate to the study finding, Papaionnou and Charalambous (2011) found that Cyprus primary school principals, generally, hold positive attitudes towards ICT. However, the study found a number of statistically significant differences across academic qualifications, years of service, gender, in-service training on ICT for teaching and learning purposes, access to a computer and the internet at home, computer experience, and existence of a computer in the principal's office. Similarly Mwila (2018) study concluded that ICT integration into the teaching process largely depended on the attitude of teachers and student concerning ICT integration. Thus, teachers and head teachers tend to have a positive attitude towards ICT but fall short of appropriate application in their teaching practices showing that they still need more tailor-made in-service training and incentives in order to transfer their theoretical enthusiasm into practice.

5.2.3 Influence of Availability of Teaching Resources on ICT Integration in Teaching and Learning

The study third objective was to examine the influence of availability of ICT resources on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County. In reference to section 4.5, 43.3 % of teachers indicated that their schools were moderately equipped with desk top computers for teachers and pupils use. Additionally, 14.4 % of teachers indicated that desktop computers were not available in their schools implying that there was a very remote possibility of advancing ICT literacy among teachers and students. Lack of computers negates the teachers' effort to integrate ICT since as Abuya (2019) emphasizes, provision of up to-date ICT infrastructure and teachers' digital literacy are prerequisite in successful implementation of ICT in schools. Further, the presence of ICT infrastructure in a school would create curiosity and then action to even some of the most technophobic teachers.

Taking into account that 21.2 % of teachers regarded the availability of desk top computers in their schools as sufficiently available while 43.3 moderately available, most of the public primary schools in Kitui Central Sub County could be considered to have the minimum number of desk top computers for ICT integration to take off. Contrary to the finding, Amuchie (2015), Mbuguah et al. (2015), Uriah et al, (2016) and Yusuf et al. (2013) found that inadequacy of desk top computers had slowed the pace at which teachers and students applied computers in their work. For instance, according Amuchie (2015) teachers in secondary Schools in Ardo-Kola and Jalingo, Taraba State in Nigeria rated the availability of desk top computers as moderate (7.6%), poor (17.4 %) and as very poor (75.0 %). It was therefore puzzling why the most of the teachers' in Kitui Central public primary schools ICT integration in teaching was low despite having a considerable number of desk

top computers. In an attempt to explain the anomaly both teachers and head teachers indicted each other of different issues. On one hand teachers felt that the head teachers denied them the unlimited use of computers and other ICT infrastructure and on the other hand the headteachers felt that teachers showed no enthusiasm and commitment to use computers. Furthermore, the headteachers they had the obligation to protect the ICT infrastructure from damage, misuse and theft. Thus, in some schools, computers, tablets and other accessories remained locked in a special strong room unused for long.

The current study finding that teachers' utilization of some ICT resources remained low despite their availability was in tandem with Nwana et al. (2017) who revealed that some crucial resources needed for the teaching of computer education such as multimedia projector, electronic white board and programmed instructional materials were not being used by the teachers.

Nwana et al. (2017) maintain that apart desk top computers, there are other essential facilities for successive integration of ICT in teaching and learning such as overhead projectors, white boards, video decoders, internet connectivity and many others. The response on the availability of interactive white boards in the current study was varied as 27.8 % indicated that they were not available, 22.2 % sparingly available, 22.2 % moderately available while 27.8 % had sufficient computers for students and teachers. In most schools overhead projectors were either not available (30.0 %) or sparingly available (31.1 %). This implied that in some situations teachers were handicapped and could not put their expertise in ICT into practice.

Finally, the multiple regression analysis showed that availability of ICT resources had a statistically significant influence on teachers' ICT integration in teaching and learning in

public primary schools in Kitui Central Sub County ($\beta = 0.428$, $t = 2.403$, $p < 0.05$). This meant that most of the teachers who engaged in ICT integration came from schools with ICT resources. It was also a prediction that teachers in schools endowed with ICT infrastructure were more likely to engage in ICT integration in teaching and learning.

5.3 Summary of Findings

This section presents the summary of the study findings in accordance to the objectives of the study.

The study finding shows that most of the teachers had little familiarity with basic computer system parts and concepts such as central processing unit-CPU, motherboard, hard drive, and random access memory-RAM. Most teachers had little ability a number of essential word processing skills such as inserting pages to a formal report with preliminaries and the main body, inserting an automatic table of contents, use of picture tools formatting commands such as cropping and wrap text, inserting and locking a document with a password. However, teachers' ICT literacy had statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County ($\beta = 0.568$, $t(89) = 5.365$, $p < 0.05$).

Most of the teachers affirmed that working with computers makes them feel isolated from other people (58.9 %), ICT integration in teaching and learning should start at secondary school education (57.8 %), they avoid using computers whenever they could (56.7 %), computers are difficult to use (61.1 %) and felt that ICT integration requires a lot of time (73.4 %). The affirmation of these statements constituted a negative attitude towards use of computers in accomplishing various tasks and in extension a negative impact on ICT integration in teaching and learning. Overall, teachers were found to be just moderately

positive towards ICT integration in teaching and learning ($M = 2.6, SD = 0.7$). However, teachers' attitude towards integration of ICT in teaching and learning had a statistically significant influence on ICT integration in teaching and learning in public primary schools in Kitui Central Sub County ($\beta = 0.445, t(89) = 4.03, p < 0.05$).

Concerning the availability of ICT infrastructure, most of the schools were moderately equipped with desk top Computers for teachers and pupils use (43.3 %). In most schools overhead projectors were either not available (30.0 %) or sparingly available (31.1 %). In most of the schools, teachers termed internet connectivity as either moderately available (41.1 %) or sufficiently available. Over half of teachers (55.6 %) indicated that there were no laptops meant for teachers in their schools. Most of the schools had adequate source of electricity as 58.9 % of teachers indicated that the source was sufficiently available. Finally, about 30.0% of teachers indicated they had no wifi in their schools. Overall, the availability of ICT resources was found to be moderately available ($M = 2.6, SD = 0.7$). Availability of ICT resources was found to have a statistically significant influence on teachers' ICT integration in teaching and learning in public primary schools in Kitui Central Sub County ($\beta = 0.428, t = 2.403, p < 0.05$).

5.4 Conclusion

From the study findings and foregoing discussions, several conclusions were made:

Most of the teachers' level of ICT literacy in public primary schools in Kitui Central Sub County could be termed as 'little' implying that the person has a basic understanding of the technology, but cannot perform the task successfully without assistance and more training may be required.

Some teachers and headteachers in public primary schools in Kitui Central Sub County believe that they could give quality services to learners without integrating ICT in their teaching. Nevertheless, they agreed that teachers should use internet material to supplement what they get from text books. Most teachers still viewed ICT integration as a difficult process which could consume a lot of time and thus less suitable for examination oriented teaching. Teachers were found to be just moderately positive towards ICT integration in teaching and learning.

In general public primary schools in Kitui Central Sub County are moderately equipped with ICT infrastructure. However, teachers have been slow in ICT uptake due to teacher and administrative related factors resulting to a very low level of ICT integration in teaching and learning.

5.5 Recommendations

The following recommendations were made based on the findings and conclusions made. In order to improve ICT integration in teaching and learning in public primary schools in Kitui Central Sub County and the entire country, the teachers' employer (TSC) should make ICT literacy one of the minimum requirements for recruitment of teachers. In so doing, a critical mass of teachers who are not technophobia will be attained. In addition, MOE should organize frequent compulsory in service training to equip all teachers with the appropriate skills and knowledge in ICT. The curriculum should also be reviewed to insert an online component where teachers will be required to prepare and implement it to supplement the tradition method.

In order to cultivate teachers' positive attitude towards ICT integration, the government in collaboration with other stakeholders should embark on equipping all public school with

ICT infrastructure and capacity building of teachers. In order to encourage teachers to venture more in ICT integration the individual effort could be captured in their periodical appraisal and become a key item in subsequent promotions.

5.6 Suggestions for Further Research

The following areas have been suggested for further research:

- (i) An audit to establish the available ICT infrastructure in all public primary in Kitui Central Sub County should be made with a view of inviting cooperate bodies, NGOs and other stakeholders to supplement the government's effort of digitalizing all functions in schools
- (ii) A study should be carried out to establish how the current curriculum can be reviewed to incorporate an online component and which each teach should accomplish.
- (iii) A similar study should be made national wide by MOE in order to offer appropriate guidance to the government in regard to the level of ICT integration and the various challenges encountered.

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APPENDICES**APPENDIX I: LETTER OF TRANSMITTAL**

Dear Respondent,

I am a Post-Graduate Student in the Africa Nazarene University, pursuing a master's degree in Education. I am currently carrying out a research on: **FACTORS INFLUENCING INTEGRATION OF ICT IN TEACHING AND LEARNING. A CASE OF PUBLIC PRIMARY SCHOOLS IN KITUI CENTRAL SUB COUNTY, KITUI COUNTY, KENYA**, as part of the course requirement. For this reason, therefore, your school has been sampled for the study and you have been selected as a respondent. Kindly answer the questions as candidly as possible. There is no right or wrong answer. Do not write your name on the questionnaire. The results of this study will be used for academic purposes only. Thanks

Yours Faithfully,

REGINAH KAVINYA MUIA

CELL PHONE: 0729287376

EMAIL ADDRESS: reginamuia2014@gmail.com

APPENDIX II: TEACHERS' QUESTIONNAIRE

You are expected to respond to all questions by ticking (✓), commenting or providing information as requested

SECTION A: General Information

1. Gender: Male Female

2. Age bracket:

Below 30 years 31 – 40 41 – 50 Above 50

3. Highest level of education in teaching Profession attained

P1 Certificate Diploma Bachelor's Degree

Post graduate Degree

4. How would you rate your use of computer skills level?

Beginner

Moderate

Competent

SECTION B: Teachers' ICT Literacy

5. Please rate your level of ICT literacy by considering the skills and knowledge you possess in regard to computer use. NB. Try to be as honest as possible.

Level: 1 – None: The person has no understanding of technology and appropriate training is required to for developing technology competency

Level: 2 – Little: The person has a basic understanding of the technology, but cannot perform the task successfully without assistance-more training may be required

Level: 3 – Average: The person can perform the technology task, but struggles in some areas. Advance training for developing technology competency will improve performance

Level: 4 – Above Average: The person can perform the technology task repeatedly with great success, but has not mastered all the elements.

Level: 5 – Master: The person has mastered the technology and can perform the task without any problems. The person can mentor others.

General Skills	None (1)	Little (2)	Average (3)	Above Average (4)	Master (5)
Familiar with basic computer system parts and concepts (e.g. motherboard, central processing unit (CPU), hard drive, random access memory-RAM, etc.)					
Able to use Help menus to find answers to my questions					
Understand file extensions and differences between file types (e.g. .doc, .gif, .html, .ppt, etc.)					
Able to shut down a computer appropriately					
Able to perform a safe reboot of the operating system with keystrokes					
Understand the difference between closing/minimizing/hiding windows and quitting a program					
Able to use the mouse right-click menu functions					
Able to install and uninstall a programme					
File Management Skills	1	2	3	4	5
Able to navigate through files and directories (e.g. using Windows Explorer)					
Able to organize, copy and paste files in directories					
Able to move unwanted files into my recycle bin and delete them permanently from my hard drive					
Word Processing Skills	1	2	3	4	5
Able to edit, copy, cut and paste a block of text or selected objects					
Able to use undo/redo functions					
Able to save, print and preview documents					
Able to select and change fonts sizes and types, styles (e.g. boldface, italics, underlining, etc.)					
Able to create itemized lists (e.g. bullets, numbered lists)					
Able to insert pages to a formal report with preliminaries and the main body					
Able to name and insert pages for tables and figures in a document					
Able to insert automatic table of contents					
Able to review a word document online					
Able to use picture tools formatting commands such as cropping and wrap text					
Able to use Equation editor					
Able to insert symbols					

Able to insert charts using excel					
Able to lock a document with a pass word					
Able to share information through Google drive sheets					
Able to put several files in a zip					
Printing Skills	1	2	3	4	5
Able to change printer parameters like page numbers, paper orientation, margins and proportions, etc.					
Able to change printing options from grayscale, normal, fastdraft or best					
Online Communication. Browser and Navigation Skills Online	1	2	3	4	5
I am able to use the browser basic commands to surf the Internet					
I am able to request, activate my ODU email account					
I am able to compose, send, receive, reply to and forward email messages					
I am able to attach/detach documents to/from email messages					
I am able to use search engines to locate desired information					
I am able to understand the difference between Search Engines (e.g. Google) and Directories (e.g. Yahoo)					
I am able to understand that some copyright restrictions apply to computer software and Internet documents					
I am able to understand how I can use gathered information from the Internet without violating copyright laws					
I am able to demonstrate an understanding of what constitutes plagiarism					
I am able to know basic steps to ensure my online privacy and computer security					

6. Write any other information regarding your ICT literacy

SECTION C: Teachers' Attitude towards ICT Integration in Teaching

7. Please indicate your level of agreement or disagreement in regard to the following statements:

SD=Strongly Disagree D= Disagree A= Agree SA = Strongly Agree

Statements	SD	D	A	SA
To be a competent teacher in the present era, computer knowledge is a must				
Teachers should use internet material to supplement what they get from text books				
Teachers should invest in a personal computer/laptop				
Use of the internet resources as teaching aids can result pupils better understanding				
Pupils should be encouraged to source information from internet				
I avoid using computers whenever I can				
ICT integration in teaching and learning can lead to pupils improved grades				
ICT integration requires a lot of time				
Working with computers makes me feel isolated from other people				
ICT integration in teaching and learning should start at secondary school education				
Computers are difficult to use				
Use of computer reduces paper work for teachers				
I store my information in a computer more than in files				

8. Write any other opinion you have about Integration of ICT in teaching and learning

SECTION D: Availability of ICT Facilities

9. Please indicate the level of availability of the following ICT facilities in your school using the following scale:

NA= Not Available (1)-Completely none existent

SPA= Sparingly Available (2)-Available but extremely few to have an impact

MA = Moderately Available (3)-Available in quantities that can create an impact, though not sufficiently adequate

SA= Sufficiently Available (4)-Available and adequate for the school needs

S/N	ICT Facility/Resource	NA	SPA	MA	SA
i	Desk top Computers for teachers & pupils use				
ii	Interactive white boards				
iii	Overhead projectors				
iv	Internet connection				
v	Laptops for teachers				
vi	Source of electric power				
vii	Tablets for pupils				
viii	VCD/DVD Player				
ix	Video decoder/player				
x	Copy scanner				
xi	Photocopy Machine				
xii	Television				
xiii	Radio				
xiv	Digital Camera				
xv	Wifi				
xvi	Fax machine				

10. Write any other information you have on availability of ICT resources in your school

SECTION E: Level of ICT Integration in Teaching and Learning

11. Please rate the level to which you have been integrating ICT in your teaching using the following scale: **Not at all-1, Sometimes-2, Often-3, More often-4**

Statement I use ICT in teaching and learning	Not at all	Sometimes	Often	More often
to prepare lesson and reports				
internet to search teaching material				
to communicate with students and parents				
especially computer and its applications				
to monitor and evaluate children progress or performance				
to make presentation slides/delivery				
to provide and prepare online work or assignment				
We make use of the vast teaching aids from internet such as charts and pictures to enhance teaching in especially science and other subjects				
We sometimes teach using audio visual aids such as videos				

12. Write any other information on how you integrate ICT in your teaching

APPENDIX III: INTERVIEW RECORDING CONSENT FORM

I appreciate your participation in this research study, however, in order to protect your interests as one of the participants, kindly read through the interview recording consent form and confirm your consent by signing accordingly.

The researcher aims at gathering data through teachers' questionnaires and head teachers' interview schedules. All data will be confidential and transcripts, observational notes and electronic files will be stored securely and will be destroyed five years after completion of this study.

You have the right to consent to digital audio recordings for the desired purpose of the study. You also have the right not to answer all the questions if you so wish. The audio-recorded information will be transcribed and analyzed to discover major themes that were discussed. You will be presented with a "smoothed narrative" version of the transcription - where false starts, repetitions, and paralinguistic utterances are removed to improve readability. You will be asked to check the transcription to clarify and add information, so as to construct the meanings and interpretations that become "data" for later interpretation by the researcher. You may delete anything you do not wish to be quoted within the study.

Participation is voluntary, and you may withdraw from this study at any time without fear of penalty or reprisal. If you choose to withdraw, the audio tape recordings, transcripts and interview data will be destroyed.

The results of the study will be disseminated in the researcher's Master of Education Thesis. Later, the study may be published as an article in a scholarly journal or presented at a conference. Your confidentiality and anonymity will be protected through the use of pseudonyms. If you have any questions about your participation or your rights as a participant within this study, you may contact the researcher at **reginamuia2014@gmail.com** or Cell phone: **0729287376**. Thanks

I, _____, understand the guidelines above, agree to participate in the study and have received a copy of the consent form for my records.

Date: _____

Participant's signature: _____

Researcher's signature: _____

APPENDIX IV: HEAD TEACHERS' INTERVIEW SCHEDULE

The head teachers' Interview will be guided by the following questions;

1. How would you rate yourself and your teachers on ICT literacy?
2. How do your teachers view ICT integration in teaching and learning?
3. How do your teachers integrate ICT in their curriculum implementation? Explain
4. Which subject do you teach? As a role model, how have been applying ICT in your teaching?
5. What is the teachers' general attitude in regard to ICT integration in teaching and learning and how has it influenced the process?
6. Which facilities do you have for ICT integration? Are they adequate for your school?
7. What do you think would be the best strategies to enhance ICT integration in teaching and learning in your school and in the entire Kitui Central Sub County?

APPENDIX V: KITUI CENTRAL SUB COUNTY PUBLIC PRIMARY SCHOOLS

S/NO	SCHOOL	S/NO	SCHOOL	S/NO	SCHOOL
1.	CENTRAL PRIMARY	25.	KAVETA	49.	MUKUKU
2.	KITUI PRIMARY	26.	KATYETHOKA	50.	ULONZO
3.	MUSLIM PRIMARY	27.	KAVUVUU	51.	MUTUKYA
4.	MULUNDI	28.	MUTUNE	52.	MIAMBANI
5.	ISAANGWA	29.	GIRLS	53.	KANZAU
6.	KALAWA	30.	MULUTU	54.	KIVIU
7.	ITHOOKWE	31.	KASYALA	55.	MUTULA
8.	KWA-UKUNGU	32.	NDUUMONI	56.	MUTULU
9.	MUSEVE	33.	WANZUA	57.	MWANYANI
10.	VINDA	34.	ITHIANI	58.	KAMANDIO DEB
11.	KYALILINI	35.	UNYAA	59.	KILINGILE
12.	KWA-NGINDU	36.	MBUSYANI	60.	KILUMA
13.	NGIINI	37.	MUTENDEA	61.	MAKAANI
14.	WALUKU	38.	NGOLENI	62.	NGEVENI
15.	KATIA	39.	KWA-KUNUVWA	63.	NZAAYA
16.	MANYENYONI	40.	KALIMENZA	64.	A.I.C KATISAA
17.	KITUI DEAF SCHOOL	41.	KWA-IKOLANIA	65.	NZUNE
18.	MAKUTANO	42.	NGUMBWA	66.	NDITHINI
19.	KALIAKAKYA	43.	KILUNGU	67.	KWA-NZOU
20.	KWA-KAME	44.	ILOOI	68.	KILUILU
21.	KYEMWENGI	45.	KITUMUI	69.	KITULA
22.	KWA-MAINGI	46.	KAVUTINI	70.	NYEKINI
23.	KWA-MBOO	47.	ISEVINI		
24.	TIVA	48.	IMALE		

**APPENDIX VI: INTRODUCTION LETTER FROM AFRICA NAZARENE
UNIVERSITY**




24th June 2020

RE: TO WHOM IT MAY CONCERN

Muia Regina Kavinya (1601DMED001) is a bonafide student at Africa Nazarene University. She has finished her course work and has defended her thesis proposal entitled: - *“Factors influencing integration of ICT in teaching and learning, a case study of public primary schools in Kitui Central Sub County, Kitui County, Kenya.”*

Any assistance accorded to her to facilitate data collection and finish her thesis is highly welcomed.



Rodney Reed, PhD.

DVC Academic & Student Affairs.

APPENDIX VII: RESEARCH LICENSE FROM NACOSTI

Republic of Kenya
Ref No: 174692

RESEARCH LICENSE



This is to Certify that Miss. REGINA KAVINYA MULA of Africa Nazarene University, has been licensed to conduct research in Kitui on the topic: Factors influencing integration of ICT in teaching and learning, a case study of public primary schools in Kitui Central Sub County, Kitui County, Kenya, for the period ending : 22/July/2023.

License No: NACOSTI/P/28/5834

174692

Applicant Identification Number

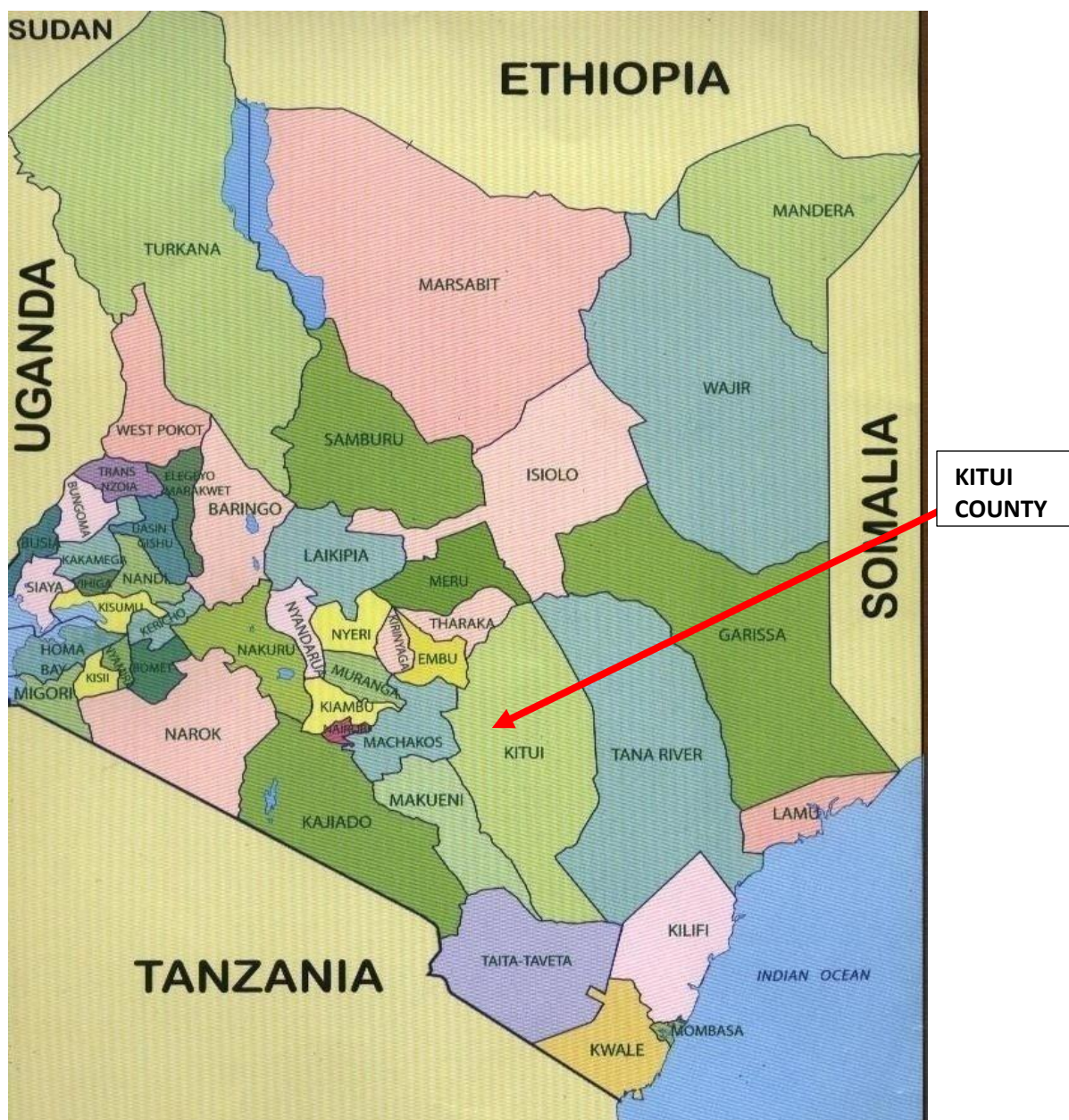
Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code



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APPENDIX VIII: MAP OF KENYA SHOWING KITUI COUNTY



Source: https://en.wikipedia.org/wiki/Counties_of_Kenya

APPENDIX IX: MAP OF KITUI COUNTY SHOWING KITUI CENTRAL SUB COUNTY

