INTEGRATION OF INFORMATION COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING PROCESSES: A CASE OF SELECTED SECONDARY SCHOOLS IN SHEEMA MUNICIPALITY IN UGANDA

BY

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DECLARATION

Declaration by Candidate

This thesis is my original work and has not been presented for a degree in any other University. No part of this thesis may be reproduced without the written permission of the author and/ or Moi University.

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DEDICATION

This thesis is dedicated to my parents Rev. Eliphaz Turyansigura and Mrs. Jesca Turyansigura for they have always been a pillar in my education journey. My parents have been constant cheerleaders through their faithful prayers to every academic and personal endeavor in my life. I also dedicate this thesis to my sisters Evelyn, Oliver, Allen, Moreen, Faith and my beloved brother Micheal for their prayers, unyielding love, support, guidance and encouragement that has made me complete this research project successful.

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ABSTRACT

Teaching and learning can be facilitated by Information Communication Technology. But the rate at which technology is used in classroom instructions across schools in many parts of Uganda is still wanting. Therefore, there is need for teachers to facilitate learning with help of ICT's. The purpose of the study was to investigate the integration of Information Communication Technology (ICT) in teaching and learning processes in secondary schools in Sheema Municipality in Uganda. This study aimed at collecting views, opinions from teachers regarding their use of ICT in teaching and learning processes. The research was guided by the following objectives: to assess the support available in schools towards the integration of ICT in the teaching and learning; to examine the perception of teachers and administrators towards the use of ICT in teaching and learning process; to establish teachers' level of competence required to enhance teaching and learning and; to assess the extent of use of ICT in teaching and learning processes in secondary schools. The researcher adopted the Technology Pedagogical and Content Knowledge (TPACK) theory to guide the study. Based on the pragmatic perspective, mixed method approach was adopted to investigate the phenomena under study. The researcher used concurrent triangulation research design which involved collecting and analyzing qualitative and quantitative data at the same time to answer research questions. Data was collected from four (4) government secondary schools and 142 teachers to inform the study. Stratified sampling was used to select the schools within the municipality while simple random sampling was used to select the 138 teachers. Purposive sampling was used to select the four (4) school administrators or head teachers. Data was collected using a researcher-administered questionnaire and semi structured in-depth interviews. Quantitative data was analyzed using descriptive and inferential statistics with help of T-test and Anova while qualitative data was analyzed using thematic analysis. The study findings revealed that two (2) of the selected schools were equipped with more than 50% of ICT facilities while others were not equipped. Teachers in those schools equipped with ICT facilities attended ICT trainings organized by the school. Across all the sampled secondary schools, 80% of the teachers didn't have ICT skills because it was not part of their teacher training. It was also revealed that there was no significant difference in the mean ICT competences and skills scores for teachers based on their experience where P value was greater than 5% level of significant F(3,134=0.770, P=0.0512). The test also indicated that there was no significant gender difference in the mean ICT competences and skills scores at 5% level of significant t (136)-1.318, P=190 thus fails to reject the hypothesis. It was also found out that there was no statistically significant difference F (3,134) = 0.220, (P=0.882) in the ICT competences and skills scores of the different age categories of teachers. It also emerged from qualitative data that teachers were hesitant to utilize ICT in teaching because they had limited time and lacked government support. In conclusion, despite the fact that some schools are using ICT in their operations, many are yet to fully integrate ICT in teaching and learning process. It is therefore, recommended that all teacher training institutions should integrate ICT in their curriculum to enable teachers that are produced to integrate ICT in teaching and learning. The government should take keen interest in supporting schools and teachers to fully integrate ICT in teaching and learning processes across all secondary schools.

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ABBREVIATIONS AND ACRONYMS

A' level	Advanced Level
AGL	Alliance for Global Learning
CAL	Computer Aided Learning
CD	Compact Disc
DVD	Digital video display
I.T	Information Technology
ICT	Information and Communication Technology
ICT4AD	ICT for Accelerated Development (ICT4AD)
LMS	Learning Management System
MOES	Ministry of Education and Sports
MoEVT	Ministry of Education and Vocational Training
MTN	Mobile Telephone Network
NCDC	National Curriculum Development Centre
NGO	Non-Governmental Organization
NETP	National Educational Technology Plan
O' Level	Ordinary Level
OLPC	One Laptop Per Child
PCK	Pedagogy Content Knowledge
PCK	Pedagogy Content Knowledge
PTA	Parent Teachers Association
REC	Research Ethics Committee
SPSS	Statistical Package for social science
SiDA	Swedish International Development Cooperation Agency
TCK	Technology Content Knowledge

TPACK	Technology Pedagogical and Content Knowledge
TPK	Technology Pedagogy Knowledge
TAM	Technology Acceptance Model
UCC	Uganda Communications Commission
UCE	Uganda Certificate of Education
UNCST	Uganda National Council for Science and Technology
UNEB	Uganda National Examinations Board
USE	Universal Secondary Education
UNESCO	United Nations Educational Scientific and Cultural Organization
USA	United States of America
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Overview

This chapter presents the background to the study, statement of the problem, the purpose of the study, objectives of the study, and research questions. It also provides the scope of the study, the significance of the study, theoretical framework, conceptual framework and definition of key terms.

1.2 Background of the Study

Globally, Information Communication Technology is perceived as the fastest growing industry which every country should embrace to account for its development (Daling, 2018; Newby et al., 2013). Information and Communications Technology (ICT) is an extensional term for Information Technology (IT) that unifies the role of communications and provides access to information through telephone lines, wireless networks, radio, television, and computers (Mua, 2017; Ratheeswari, 2018). The integration of ICT in education transfers learning from content-based learning to student-centered learning. In the education industry, ICT integration involves all technologies that support content delivery during instruction, they include hardware and software components that are on camera, presentation clicker (Logitech), recording hardware or software like microphone, speakers, headphone, flash discs, DVDs and CDs, whiteboard, internet access (Morrison, 2015; Ratheeswari, 2018).

According to UNESCO (2018) the successful integration of ICT in teaching and learning environment will depend on the ability of teachers to structure learning in new ways, to merge technology appropriately with pedagogy, develop socially active classrooms and encourage cooperative interaction, collaborative learning and group work. ICT in education improves student learning and teaching and therefore, some

secondary schools have made it compulsory by utilizing Technology Education which is the cornerstone of any nation, definitely contributes to the development of a nation. This is seen in the area of manpower development, social development, politics, and economic development. It remains a salient factor that enhances the chances of the individual to contribute maximally to nation-building. Formal education constitutes the primary mechanism for economic, social, and political advancement in any society today. The development of any nation depends on the type of education provided and particularly on the teacher who is the hub of the educative process.

According to UNESCO UIS (2014) the integration of ICT in Asia can be seen on two perspectives, first is the reflection to position ICT inputting the "digital divide, reaching the unreached and offering aid to those who can't get admission to integral infrastructure, educated teachers and other satisfactory educational resources". The e-Learning paradigm, on the other hand is a response to the emerging know-how in a culture where approaches of classroom instruction are rapidly evolving to foster learner-centric academic environments. Asian countries like Malaysia, Turkey, China and India have initiated ICT programs like One Laptop Per Child (OLPC) which aims at offering every student with a laptop and Movement of Enhancing Opportunities and improving technology these programs were introduced to improve the quality of teaching and learning in schools (Aydin et al., 2016).

In Malaysia, the ICT policy in education is that all schools and educational institutions must be provided with ICT infrastructure and network connectivity of 4MB speed. According to Ismail et al. (2013) the Malaysian Ministry of education updates the list of schools which don't possess computers and internet connection. This indicated that the Malaysian government has provided ICT facilities to every school. According to Arokiasamy et al. (2014) leadership styles and ICT usage by school principals in

Malaysia indicate that although schools in Malaysia were provided with ICT facilities, school principals use technology purposely for instructional and administrative tasks. Therefore, for ICT to be integrated, principals and teachers must use technology and have knowledge on technology in teaching and learning processes. For the successful adoption of ICT, principals and teachers should have a constructive attitude towards the implementation of ICT in schools and have administrative knowledge to manage their schools effectively (Arokiasamya et al., 2014). There is need to deliver educators who are agreeable for the selection of innovation, instructors who improve their abilities routinely and stay refreshed in the expert advancement (Singh & Chan, 2014). This would be done through broad instructor preparing in the utilization of ICT.

The aim of the European ICT policy in primary and secondary schools is to illustrate change in European regions. In 2012 Flemish Belgium implemented ICT policy and the main goal of the policy was to support the development of competency-based curriculum and increase ICT infrastructures in schools (Ottestad & Gudmundsdottir, 2018). The Czech Republic formulated a strategy for educational policies for 2014-2020 which supports quality teacher training, reduce inequality in education, and supports efficient management of the education system (Ottestad & Gudmundsdottir, 2018).

According to Roy and Sharmin (2015) the Interdisciplinary Social Science Studies 2nd Conference that was held at the University of Cambridge in the United Kingdom. Results from the 2nd conference showed that the introduction of (CAL) Computer-Aided Learning project in rural secondary schools of Bangladesh was one of the important achievement in the technological advancement of teachers and students. To understand teachers' and students' perceptions and attitudes on technology before the implementation of CAL project. It was found out that teachers failed to prepare lesson

plans before going to class and sometimes students helped teachers in operating computers. Henceforth, it is through teachers that students are willing to know various options, skills and want to learn. Therefore, if teachers lack ICT skills and are not capable of instructing learning, learning ends up not being effective, (Roy et al., 2015).

ICT in sub-Saharan countries is seen as a determining factor to improve education results and a few researchers have come up to show their empirical evidence on whether ICT prepares the student for global competition and if it improves student learning (Piper et al., 2015). Ghanaian Education Act of 1987 and 1992 Constitution mandates the government to make education gradually universal and free to all Ghanaians to benefit from Free Compulsory Universal Basic Education (MOES, 2015). In Ghana, the ICT for Accelerated Development (ICT4AD) policy 2003 vision was formulated to transform Ghana into an information-based knowledge society and economy. This development was intended to improve, promote educational systems and ICT that were installed. The main aim of this was to make use of ICT's throughout the entire educational system and across all subject areas for effective learning (Enu et al., 2018).

ICT pedagogical practices can be negotiated when teachers own knowledge, skills, personal dispositions, sensitivities, and aptitudes for effective instruction. In 2012 the Ministry of education in Ghana introduced "teacher laptop and ICT project" where teachers were trained and supplied with laptops to support research in education. As a result, in 2015 the Ministry of education in Ghana implemented policy and program interventions. This policy aimed at "integrating ICT in education, facilitating effective teaching, learning and management. This was ensured through the provision of computer labs, internet and network connectivity to schools, the supply of Laptops to teachers and students and capacity development of teachers". Education Reform, 2007 (as cited by MOES, 2015; Iddrisu, 2019).

Tanzania adopted its national ICT policy in 2003 which incorporated the integration of ICT in pre-primary, primary, secondary and teacher education as well as recognizing the input that ICT can have on education sector (Isaacs, 2015, 2019). In 2005, the Ministry of Education, Science, Technology and Vocational Training (MoEVT) with support from the Swedish International Development Cooperation Agency (SiDA) deployed ICT for teacher education whereby several initiatives were implemented to train teachers and administrators for example; Education for Empowerment Rotary club/UK which provided computers to schools, Rotary club and Barclays Bank provided educational information and resources, Tanzania Education Services provided pedagogically and support to secondary school teachers (Swarts & Wachira, 2010; Hare, 2007).

The Tanzania policy for "basic education addressed priority areas for ICT use improvement as the provision of ICT training to students, teachers and administrators, use of ICT resources in schools and colleges, development and use of ICT as a pedagogical tool in teacher trainees" (Bada et al., 2016). According to Mutisya and Mwania (2017), 200 secondary schools have benefited from MoEVT and other few primary and secondary schools with ICT facilities have either benefited from donations or non-government organizations and private sector companies. Therefore, this means that there was no government initiative to provide ICT facilities to schools. By 2015, the government of Tanzania through MoEVT implemented initiatives and program for the integration of ICT. These initiatives included the National Programme on ICT for Secondary School Teachers, E-Schools Project and the introduction of ICT Curriculum in Secondary schools (Ngeze, 2017). This indicates that ICT is being integrated into education in Tanzania.

According to the Kenya Ministry of Information and Technology in 2016, ICT policy was reviewed since its implementation in 2006. This policy was reviewed to cater for new developments that had taken place in the field of ICT. According to National Information, Communications and Technology (ICT) policy (2019) Kenya's ICT vision 2030 aims to "create a globally competitive and prosperous nation, transforming Kenya into a newly industrialized middle-income country providing a high quality of life to all citizens". The professional development programs that are in place should be part of the cycle of inquiry that supports teachers teaching. Kenya is increasingly embedding ICT in education where ICT is being incorporated into instructional change (Piper, 2015). The NESP has put some activities in place such as the expected national laptop program and digitalizing ICT into the school syllabus (MoEST, 2015). According to Mutwiri et al., (2017) in 2017/2018 Kenya's budget of 550,555 million Kenyan shillings was allocated for ICT infrastructure, and to strengthen ICT integration at all levels of education this is an indication that Kenya has embraced ICT in education.

Uganda's education incorporates international, national policy, and regulatory frameworks. The government of Uganda is determined to transform the country from a low-income country to a middle income country. The national ICT policy 2014 main goals are, human capital development, Promote innovation in economic and social systems; Expand ICT infrastructure and its integration throughout the country; Deepen utilization of ICT services by government, private sector, Non-Government Organizations, and Citizenry; Enhance research and innovation in ICT products, applications, and services; and Improve ICT governance and environment in Uganda to be strengthened to accelerate country's transformation (Lubaale, 2020; Ministry of Information and Communications Technology, 2014). According to the *World Data on Education*, (2010) the education policy review commission report 1992, one of the aims

of national education was to equip individuals with basic skills and knowledge and equip learners with the ability to contribute to building an integrated national economy. Additionally, this report points out that the Ministry of education has the key functions it performs which include, developing and implementing appropriate education policies and ensuring the implementation of all government policies. The potential use of ICT in the classroom demands teachers level of awareness of ICT within the national policies and a teacher who has technical knowledge supports the national ICT policy (CIPESA, 2015). According to the Uganda Education statistical abstract (2009), the total secondary schools were 3149 of which 949 schools were government-aided, 2,200 were non-government aided. The total enrolment of teachers in public secondary school was 65,045 teachers of which 50,575 being male and 14,473 females out of this population 26,396 teachers were registered in government-aided secondary schools. According to (UBOS) Uganda Bureau of Statistics (2018) in 2017 secondary school teacher enrolment decreased to 64,966 of which 15,959 were female teachers and 49,007 being male teachers, 46% of the teachers are graduates and 37% are grade V teachers. The government of Uganda highlighted education as the foundation of development and as a center of the well-being of society.

According to Farrell (2007), Uganda developed its initial ICT national policy in 2003 and with only 106 of its 13,353 primary schools and 2,070 secondary schools were connected to the Internet. Connectivity is much more predominant in urban than rural schools, basically because access to ICT infrastructure for schools mirrors the national rural-urban divide. The more specific factors constraining connectivity in rural areas are the overall poor communications infrastructure, low electricity coverage, and high capital costs involved in setting up a computer laboratory. To fully integrate ICT,

schools must be equipped with ICT facilities and teachers trained to gain technical knowledge.

According to *ICT in Education in Uganda*, n.d. Pilot trials were done in both primary and secondary schools to train teachers in using ICT for pedagogical practices. ICT initiatives have been put in place in education which includes Acacia Initiative, Alliance for Global Learning (AGL), I-Learn and schools Online, School Net Connect-Ed (MOES), Tele-centers Initiatives, Information Infrastructure Agenda, International Institute for Communication and Development, Telematics Applications for Education, Cyber schools (private sector involved in materials development and teachers orientation). The government of Uganda in collaboration with local and international software companies, for example, Badiliko project for British council and Microsoft partnership with British and foreign schools society pilot project which delivered mathematics and science content to secondary schools, MTN E-Learning platform, for example, Samsung solar-powered by internet and E-board at Kololo secondary school for teaching (Namae, 2020b). These initiatives have been set up to improve the quality of education and given the importance of ICT in education, Uganda (MOES) is encouraging teachers to train in information technology to promote computerized teaching in education. Despite all these initiatives in place, Uganda's education is still rooted in the traditional learning approach.

ICT plays an important role complementary within each of the three approaches; technology literacy, knowledge deepening, and knowledge creation. ICT integration needs teachers' ability to construct a learning environment in non-traditional ways, merging technology with new pedagogies. Knowledge creation focuses on teachers' ability to collaborate, communicate and think critically (Hennessy et al., 2010). Mishra and Matthew, (2006) on the TPACK model by Shulman 1986 elaborated that teachers

need to stay updated on how technology and pedagogy are implemented to teach content and lack of teachers competency is linked to the use of ICT, class management knowledge, and skills (Namae, 2020). Given that we are in the 21st century, shifting from convectional teacher-centered learning to student-centered learning, a teacher must be willing to adopt new things associated with technology and also explore technological skills. Additionally in this situation of COVID-19 pandemic, requires administrators and teachers to rethink of how to replace the traditional methods of teaching with student-centered (Tumwesige, n.d.).

Therefore, ICT has the potential to transform education on how teaching is taking place. Various research studies have been conducted on the implementation of ICT in higher institutions (Guma et al., 2013; Lubaale, 2020; Twinomujuni, 2011). Additionally, Habibu & Md. Abdullah-Al-Mamun, (2020); Peace, (2017) investigated challenges faced by school teacher trainees. While Irene et al., (2011) studied management attitude and support. Furthermore, Akampa and Rukia, (2015) looked at the usability of computers in teaching and learning in tertiary institutions. A few research studies that have been done on the integration of ICT in teaching and learning in the secondary school context have looked at accessibility, availability of ICT facilities, and ICT in school systems and management (Irene et al., 2011; Lutalo & Bisaso, 2020). Despite the research studies being conducted on integration of ICT in different parts of the country, a big percentage of these studies were done in higher institutions of learning. Moreover, ICT integration in teaching and learning has consistently been poor in education. The successful integration of ICT depends on the teachers' abilities, competency and support in policies (Thinkers, n.d.) Therefore, there is a need for teachers to facilitate learning and make it meaningful with the help of technology. In response to the available literature, teachers should identify how ICT can be used

pedagogically, be able to use utility and application software to support their professional development, and be able to link the policy with real action in the classroom. It is based on this background that the researcher sought to investigate the integration of ICT in teaching and learning processes in secondary schools in Uganda.

1.3 Statement of the Problem

Information Communication Technology (ICT) is a principal enabler for economic development and social change worldwide. ICT in education has the potential to bring about changes in ways of teaching. In Uganda ICT integration in education is guided by the Uganda ICT policy (Uganda government, 2014). The role of this policy in education is to impart teachers with ICT skills in teaching and learning. To implement this policy the government through Uganda Communications Commission (UCC) provided 1067 (93%) computers laboratories, 634 (62.0%) computers and retooled secondary school teachers with computer skills across the country (Kule, 2021; Lutalo & Bisaso, 2020; Uganda Communications commission, 2014). Despite increased ICT awareness through this policy and the availability of ICT resources in schools, there is still low utilization of ICTs in teaching and learning. Failure to integrate this policy will impact the development of the foundational literacies among them ICT literacy which is one of the core skills for everyday tasks contributing to the emerging 21st century skills that impact globalization. Some studies have come up to show that the integration of ICT in teaching and learning has the potential of developing learning outcomes if well established (Piper et al., 2015; Ngenzi 2017; Ottestad & Gudmundsdottir, 2018). Few studies that have been carried out in Uganda (Edison & Paul, 2020; Juma et al., 2016; Lubaale, 2020; Wanga et al., 2015) on the integration of ICT have looked at the academic performance, teachers' role and attitudes. However, from the review of literature most of these studies have been done in higher institutions of learning.

Minimal research has been done on the availability of ICT resources in secondary schools and teachers' capacity to utilize these facilities. The study findings may be beneficial to teachers, administrators, policy makers, curriculum developers and researchers as they play a big role in the integration of ICT.

1.4 Purpose of the Study

The purpose of this study was to investigate the integration of Information Communication Technology in teaching and learning processes in secondary schools in Sheema Municipality in Uganda.

1.5 Objectives of the Study

i. To assess the support available in secondary schools towards the integration of ICT in the teaching and learning processes.
ii. To examine the perception of teachers and administrators towards the use of ICT in teaching and learning processes.
iii. To establish teachers' level of competency required to enhance ICT in teaching and learning processes.
iv. To assess the extent use of ICT in teaching and learning processes.

1.6 Research Questions

i. What support is available in secondary schools towards the integration of ICT in teaching and learning processes?
ii. How do teachers and administrators perceive the use of ICT in teaching and learning processes?
iii. What is the level of ICT competencies of teachers required to enhance the teaching and learning processes?

iv. To what extent has ICT been applied by teachers in teaching and learning processes?

1.7 Research Hypothesis

$H_0$2: There is no statistically significant difference between teachers' level of ICT competencies and teaching- learning processes.

1.8 Justification of the Study

A teacher plays an important role in the integration of ICT in education. Although some studies that have been conducted on the integration of ICT in secondary schools, teachers' still face challenges in utilizing ICT in teaching and learning. If urgent solutions are not identified, the majority of the teachers and administrators will not utilize ICT in their classes.

In Uganda, few studies were conducted on ICT integration. These are the ones that focused on ICT influence on UCE academic performance in Kasese (Edison & Paul, 2020). Another study by Baharuldin et al., (2019) was carried out in primary school and it focused on teachers' role and teacher ICT competency, Geoffrey, (2010) focused on the implementation of ICT in higher institutions. Moreover, the formulation and implementation of the national ICT policy in 2003 was to offer equal ICT access to teachers and students and integrate ICT in education curricula (Jane, 2012). Most of these studies were carried out in higher institutions (Wanga, 2015; Juma et al., 2016; Lubaale, 2020; Rita, 2015; Twinomujuni, 2011; Orinda, 2015). A few studies done in secondary schools have looked at challenges faced by teachers and the influence of ICT on academic performance and have used qualitative or quantitative approaches (Boaden, 2011; Lutalo et al., 2020; Edison 2020). A few that used mixed method

Musumba, Irene, n.d.; Stephen et al. (2013) were done in other different parts of the country and looked at different aspects.

Based on these studies conducted in Uganda, there is clear evidence that ICT has taken a route in teaching and learning processes. This concurs with the current study in secondary school that postulates teachers and school administrators should have a better understanding on questions of integrating ICT. Therefore, to bridge the contextual, literature, and methodological gap the study was done in secondary schools and utilized mixed methods to understand the reason behind the limited use of ICT in the teaching-learning process in secondary schools.

1.9 Significance of the Study

This study will help teachers and administrators to appreciate the use of ICT facilities by utilizing the available ICT resources effectively and efficiently in teaching, understand the need for change from traditional methods to technology-based, and use ICT in teaching. The study findings will guide administrators on addressing the challenges faced by teachers in integrating ICT in teaching. School management is anticipated to benefit from this study by supporting the already existing strategies in the school and equip teachers in the integration of ICT.

Study findings will also help policymakers to continue seeking long-term solutions that will allow equitable education for all through consultation processes, learning and interaction with stakeholders. The study will be of significance to the policymakers (Ministry of Education and sports, National curriculum Development center) in planning and following ICT policy, allocate enough funds to schools for the smooth running of ICT programs. It will also benefit the curriculum developers at National Curriculum Development Centre in evaluating the curriculum before its

implementation and conduct assessments on how teachers would embrace the curriculum before it is amended in primary and secondary schools.

Finally, this study will also help researchers by serving as a future reference in supporting their study.

1.10 Assumption of the Study

The study was grounded on the following assumptions;

The successful integration of ICT in education depends on the teacher who motivates students in the teaching and learning process. Teacher training institutions have embraced ICT therefore, teachers have skills to operate ICT tools, ICT facilities are made available in schools and teachers are aware of the available ICT tools and mindful of how they should be utilized in teaching and learning processes.

The questionnaire as a data collection instrument precisely mirrored the phenomenon under study. Participants honestly and comfortably provided the necessary information by answering the research questions hence being reliable for the researcher to collect data. Data were normally distributed and the results from the study were generalized beyond the study sample.

1.11 Scope of the Study

This study was conducted in government-aided secondary schools in Sheema Municipality, Sheema District in South Western Uganda. These secondary schools were selected because they had similar characteristics in the utilization of ICT in teaching and learning. This study specifically targeted teachers and administrators because the integration of ICT starts with them thinking about how they can effectively use ICTs available in teaching to meet 21st century needs.

The study was conducted between March and May2021. This was the preferred period because schools were opened in March 2021 due to Covid-19 pandemic following the presidential address and the researcher collected data in school settings.

The content scope focused on the integration of ICT in teaching and learning processes in selected secondary schools in Sheema Municipality in Uganda. The researcher used mixed method approach and used TPACK framework to investigate the phenomenon under study to get solutions and used. The study looked at the support available towards ICT integration, administrators' and teachers' perception of ICT use in teaching; and finally, teachers' level of competency, and utilization of ICT in teaching and learning.

1.12 The Delimitation of the Study

The study was narrowed to investigate the integration of ICT in teaching and learning processes in secondary schools of Sheema Municipality and was limited to only government schools.

The participants in this study were teachers and head teachers, but due to the Covid 19 pandemic, the Uganda ministry of education and sports limited the number of teachers in schools therefore it was difficult to get the exact sampled participants at the station.

Data collection was collected by the use of questionnaires; this meant that data collected depended on respondents' self-report. Some of the respondents were not cooperative in that some participants took with them questionnaires but did not answer all the questions they could leave some questions in unanswered. However, this did not in any way affect the study findings since the response rate was 78.5%.

1.13 Limitations of the Study

The findings of the study were based on participants' views, perceptions on integration of ICT in teaching and learning processes therefore, the findings can be generalized to all secondary schools especially those in urban settings.

1.14 Theoretical Framework

The study adopted PCK (Pedagogy Content Knowledge) Model theory which was developed in 1986 by Lee Shulman (Shulman, 2012). The theory postulates the idea of knowledge in teaching in which teachers set the content of knowledge about a specific subject they are teaching and knowledge about the teaching method. Shulman counters this and says that effective teachers overlap these two knowledge sets, making a set of knowledge about how to effectively teach their subject matter thus calling this pedagogical content knowledge. (As cited in Mecoli, 2020), researchers see PCK as an evaluation and assessment tool for pre-service teachers to know what they do in the classroom. And others see it as a measure of how prospective teacher's knowledge and ability come into play as they begin their journey into teaching. PCK model was later reformulated to TPACK (Technology Pedagogical and Content Knowledge) model by Mishra and Matthew in 2006. This theory explains the best practice for teachers to teach students a subject effectively with the help of technology. TPACK model theory came up after studying teachers at different levels with design experiments to see how their classroom operates (as cited in Julio & Barroso, 2016).

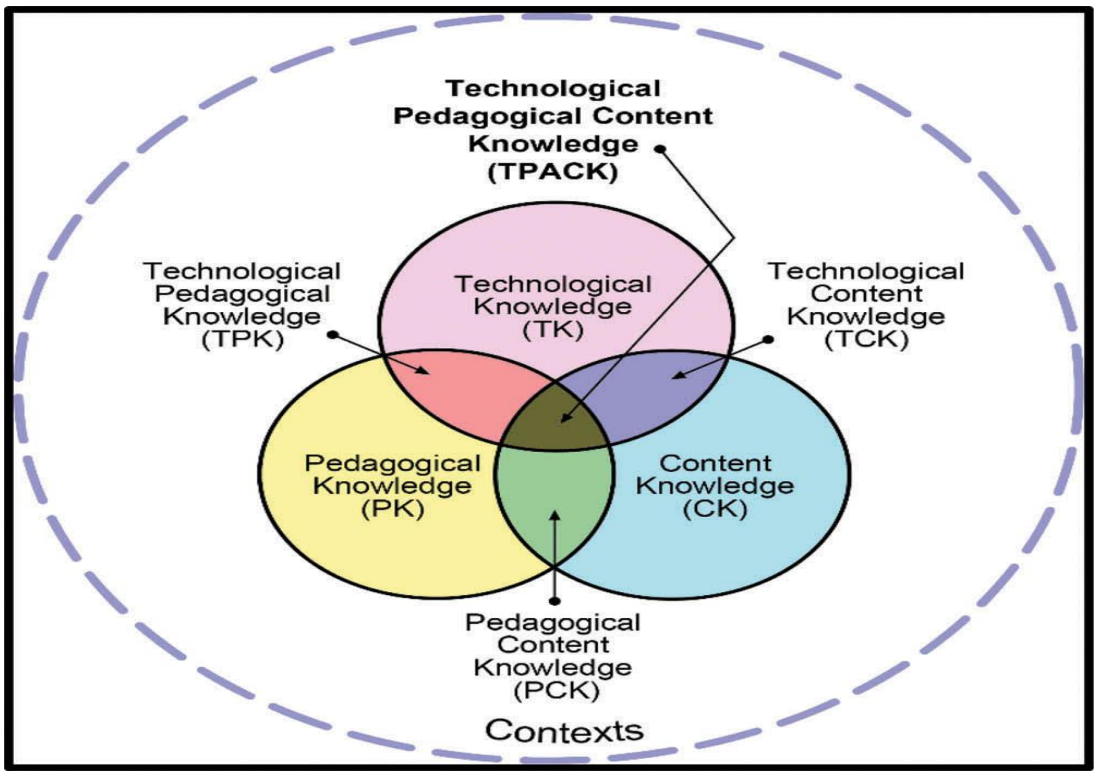

Figure 1.1: Theoretical Framework
Source: http://tpack.org

As cited by Kurt, (2018) there are three types of knowledge, Technological Knowledge (TK) that describes teachers' knowledge and ability to use various technologies within the classroom. Pedagogical Knowledge (PK) describes teachers' knowledge of practices and methods of teaching. Content knowledge (CK) describes teachers' knowledge of the subject matter or approaches of how a teacher passes on information to students. Technology Pedagogy Knowledge (TPK), Technology Content Knowledge (TCK) describes teachers understanding of the technology available and pedagogy content knowledge (PCK) focuses on foundation areas of teaching and learning plus its supportive practices.

Technology pedagogy knowledge (TPK) describes how best the available technologies applied for instruction can achieve a specific learning objective and the ability to choose a particular digital tool that can change student learning practices. Technology content

knowledge (TCK) describes how technological tools support student learning; how they are being used to deliver content and how best students interrelate with it to gain knowledge. Pedagogy content knowledge (PCK) requires teacher understanding of a particular subject matter and how a teacher delivers own knowledge to students in the classroom (Loughran et al., 2012). Pedagogy Content knowledge is crucially important on how subject matter is organized and presented to improve teaching and learning (Mishra & Koehler, 2006). Therefore, TPACK grips teacher knowledge to integrate technology, and how to transmit information to students effectively and efficiently (Matthew et al.,2013).

The implementation of ICT policy is not solely putting technology in the classroom but reflecting on the needs of schools to make ICT integration effective. ICT integration needs teachers' knowledge, skills, and abilities to decide when, where, why, and how to integrate ICT in teaching and to design teaching materials using technology (Ersanli, 2016). Many research studies have been conducted on the application of TPACK model to improve teachers teaching styles (Ersanli, 2016; Kim & Lee, 2018; Masumba & Mulenga, 2019; Ruth et al., 2018; Shulman, 2012) found out that teachers not only need pedagogical knowledge and content but also need to have skills, strategies that can be useful in technology to achieve ICT integration in teaching. Although technology knowledge has increased, teachers still face challenges in integrating ICT in teaching. The teacher needs to teach using pedagogical methods that require them to incorporate technology appropriately to deliver content to students. In this study, TPACK framework was applied to assess teachers' competency, knowledge, and ability to use technology during instruction and how best the instructional strategies used to meet the needs of a lesson plan and learning objectives. Regardless of the technology being transformed into education, a teacher remains a key factor in how ICT is being

integrated into teaching, therefore the use of technology requires the development of teachers to create an environment that motivates students in the disciplines they teach.

1.15 Conceptual Framework

The study focused on the interaction between independent variables which was ICT integration. It involved support available, teacher competence, teachers' perception, and extended use of ICT. The dependent variable which is teaching and learning included student participation, effective teaching using ICT and positive attitude towards integration of ICT.

ICT integration **Teaching and learning**

Independent Variables **Dependent variables**

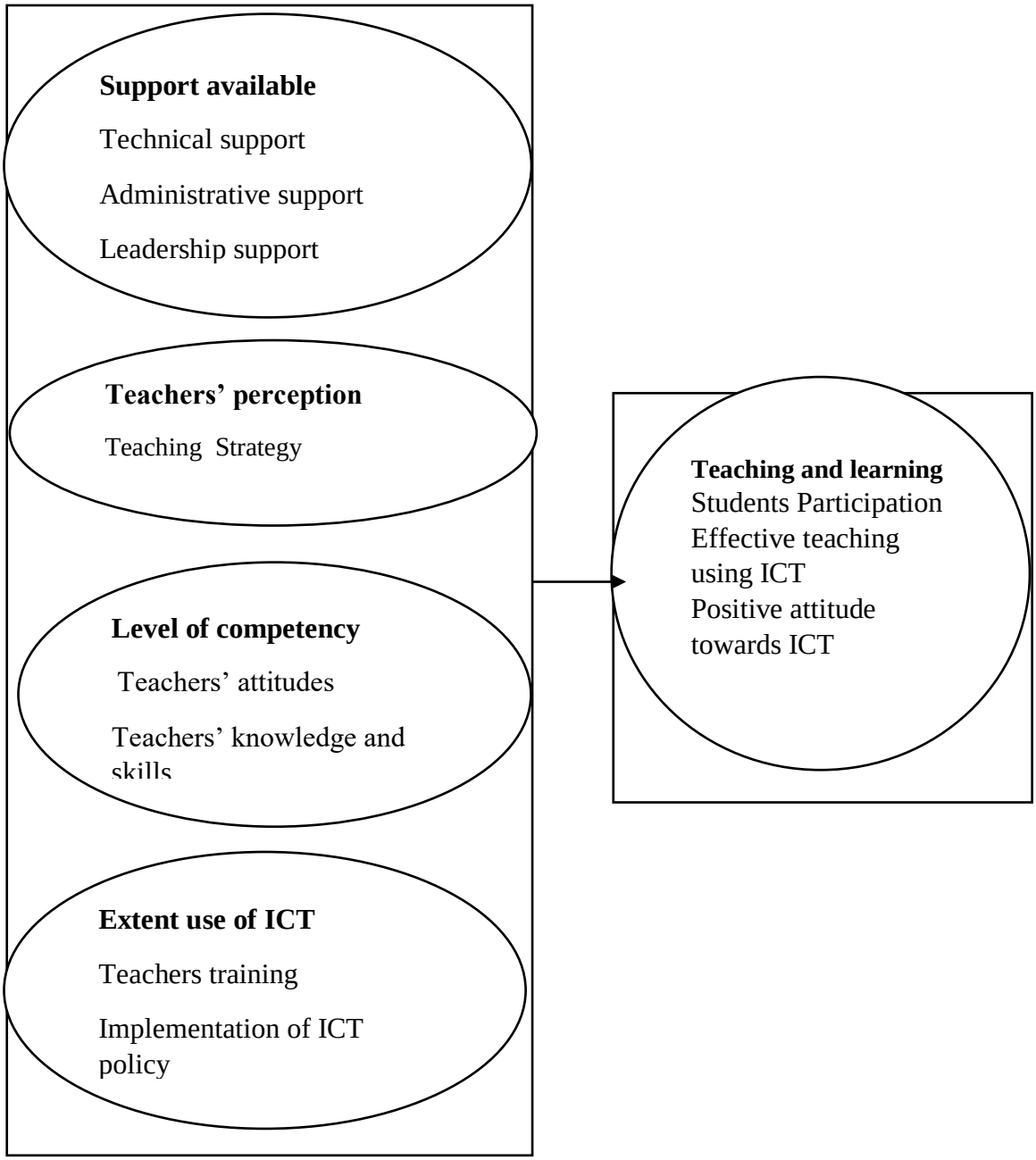

Figure 1.2: Conceptual Framework

1.16 Definition of Terms

Effective teaching; is to strive to motivate and engage learners or students in learning rather than simply accepting that some students can't be engaged and are destined to do poorly. According to this study effective teaching is where the teacher has the deep content knowledge of the subject they teach with the application of technology.

ICT integration; is the use of ICT to introduce, reinforce, supplement, and extend skills with the use or aid of technologies. However, in this study ICT integration means the adoption, technological knowledge, skills, individual attitudes and support available towards the use of technologies like digital whiteboards, television, computers, internet facilities to aid teaching and learning processes.

ICT; Information Communication Technology is an extended term for information technology (IT) that strains the role of unified communications and integration of wireless signals and computers. In this study, ICT refers to electronic devices for example digital projectors, tablets, smart boards and television that can be used to deliver information in teaching and learning processes.

Secondary school; is an organization that provides education. It is an education level where students go after completion of primary school. In this study, secondary school is an institution where learners acquire education. The education system, Uganda in particular secondary school is comprised of two levels that are Ordinary level and Advanced level. O' level is a maximum of 4 years from senior one to senior four and A' level maximum of 2 years from senior five to senior six.

Teacher; is a person who helps students to acquire knowledge, competence, or someone whose occupation is to instruct. According to this study, a teacher is a person who is capable of using ICT tools to instruct and deliver knowledge to learners.

Teaching and learning; working towards achieving the goal and incorporate new knowledge, skills, and behaviours that add a range of learning experiences.

Teaching and learning processes: is the practice that contributes to the development of new skills, where information is assimilated, knowledge is applied correctly. It is also an interaction between teachers and students where teachers transmit knowledge and content to students according to their age, capabilities and skills.

1.17 Chapter Summary

This chapter presented the rationale for investigating on the integration of Information Communication Technology in teaching and learning processes. It has also covered the background to the study, statement of the problem, research objectives and questions which the researcher sought to investigate. Lastly the chapter presented the significance of the study, justification, theoretical framework, assumptions, scope of the study, limitation of the study, conceptual frame work, and definition of terms of the study. The next chapter reviews literature related to the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter covers the reviewed literature related to the topic of the study from previous researchers. In this section, the researcher reviewed and analyzed relevant research studies which were carried out in the context of ICT in education. Literature is reviewed under subheadings; Global ICT integration in education, integration of ICT in Uganda, availability of ICT facilities in schools, utilization of ICT facilities and teacher use ICT facilities. The purpose was to investigate the integration of Information Communication Technology in teaching and learning processes in secondary schools in Sheema Municipality in Uganda.

2.1 Global ICT integration in Education

The advancement of ICT in developed and developing countries has been prioritized to the digital learning environment from traditional methods of learning. USA has been under pressure to see India and China making progress in technology education through investment. For instance, by the year 1996, the USA developed its first National Educational Technology Plan (NETP 1196), where 4% of the USA schools had computers for each student and 9% of schools were connected to the internet. This Technology plan was significant for American students and teachers to get ready for the 21st century, have access to information, access to ICT resources, and have literacy skills. Therefore for the USA to get the full picture of technology it had to involve students in 2003 to get their perception in technology education. The Broadband satellite Transmission Network in China made China move away from its traditional technology to modern technology which also led to the foundation of distance education (Alnuaman et al., 2015). In India a study by Prasad et al. (2015) on barriers of using

ICT in secondary schools indicated that some schools have ICT facilities, while some other schools have computer laboratories with old ICT gadgets which do not function or operate. This is an implication that schools lack funds from the government to maintain the available ICT resources in schools. This is contrary to Pange and Liu (2014) study that was conducted in China on early childhood teacher barriers to ICT integration in teaching which revealed that lack of ICT resources results in a lack of teachers' interest and support.

Indonesia is another country where ICT has been integrated at length, teachers have a optimistic mind towards ICT (Aminah et al., 2018). The integration of ICT is not only used to conduct instruction but also for administration purposes. In Indonesian schools information systems are being used to monitor administrators and teachers in schools, parents review their children's activities at school, the time of entrance into the school and departure from school, grades and positions of children this is vital to avoid absenteeism of teachers, late coming and dodging of classes (Zulfikar & Mirfani, 2020).

According to the Zambia research report (2020), ICT integration in Zambian education system started with the processing of examination. Later Private schools and institutions that were involved in open distance learning also started to utilize computers. In 2007 second-hand computers were utilized in Zambian schools. This means that ICT in Zambia had greatly improved compared to the old days. Although ICT in Zambia is still facing some challenges that need to be addressed for ICT integration such as lack of skills and limited infrastructures there has been an improvement. The government of Ghana in collaboration with the Ministry of Education provides funds to schools for connectivity, maintenance, and repair, to support the ICT education policy (MOE, 2015; Enu et al., 2018).

2.2 Integration of ICT in Uganda

Uganda developed its national ICT policy in 2003, which aimed at integrating ICT into educational curricula and offer equal access for all students. This policy was implemented for teacher education to change student and teacher attitudes towards ICT. The National ICT policy in 2003 left out some areas that were not addressed therefore to address these areas in 2006 the Ministry of ICT was formed to put the ICT sector together. The formation of the Ministry of ICT sector aimed at training teachers, administrators, equipping learners with skills and providing ICT infrastructures to schools with its policy mission to transform Uganda into a knowledge-based society by 2025. In 2014, the national ICT policy 2014 was implemented with its broad policy objectives with the national vision 2040 to improve Uganda's ICT development index. ICT in education from the view of the national policy 2014 imparts teachers with ICT skills in teaching and learning processes (ICT policy, 2014). Although the national policy 2014 objective was to impart teachers with ICT skills, still this objective has not been achieved (Edison, 2020). Most of the ICT resources in Ugandan secondary schools are from donations either from the UK, NGOs, and the World Bank and teachers still lack ICT skills. However, the government of Uganda has put some measures on NGOs and persons who would like to donate ICT facilities in Uganda to be verified first (Lubaale, 2020).

The National Curriculum Development Centre (2020) through the Ministry of Education and Sports amended the lower secondary curriculum which aimed at reducing content overload, fostering learner-centered pedagogy, and a competency-based approach to producing a secondary school graduate with employable skills that are competitive in the job market. Lubale (2020) suggests that the new curriculum for lower secondary should as well be made compulsory in upper secondary to bridge the

gap of the digital divide. According to Ndawula et al. (2013), the victory of ICT education policy in Uganda will be determined by the governments' victory to recruit qualified teachers, provision of ICT facilities.

In 2007, the government of Uganda implemented USE policy to increase access to quality education to susceptible families. The USE program has increased student enrolment in secondary schools (Lisa & Kristof, 2015). Schools under USE program, the government of Uganda funds them but because of the large numbers of students, these schools have been greatly affected by lowering teacher's morale to integrate ICT because of congestion in classrooms. This implies that the government has lived to its budgetary commitment of the education policy to provide funds to USE schools and hence to achieve Uganda's national ICT policies objectives the government has to provide facilities to schools, train teachers and provide infrastructure.

Ugandan private schools compete by the construction of computer labs, purchasing computers to attract large numbers of students through the use of ICT (Julie et al., 2012; Guma et al., 2013). The urban schools in Uganda have increased the use of ICT compared to rural schools regardless of the limited ICT facilities but still a few available are utilized (Ayorekire & Twinomuhangi, 2010).

2.3 The availability of ICT Resources

ICT is substantially becoming the talk of the day in education. Following the literature from previous studies, it has been identified that schools are still in need of ICT facilities so as to integrate ICT. A computer is the commonest ICT tool used in schools by teachers than other facilities (Shah, 2017; Orinda, 2015). There is lack of internet connectivity in schools (Benjamin, 2014; Alenezi, 2015; Geoffrey, 2010; Muhammad et al., 2019; Omariba, 2016; Dambo et al., 2018). Low-level availability of ICTs like

projectors, electronic whiteboards, internet connectivity, automation of lecture rooms (Asiyai, 2014). According to Prasad et al. (2015); Chioma et al. (2018); Prasad et al. (2015) highlighted that some schools have ICT equipment in computer laboratories but they are old. Mavellas et al. (2016) reported that ICT facilities are inadequately available and further noted that available ICTs, utilization is low whereas this is contrary to Siddiquah & Salim (2017) ICT facilities are available in schools and even students own laptops, they can do personal work when they are at home but they only face challenges when they want to scanner and printer their work when at home. This indicates that there are inadequate ICT facilities in schools, and a few schools with ICT equipment are not put into use.

In the 21st century, the use of assistive technologies in teaching children with learning disabilities is dynamic. Adebisi and Liman (2015) highlighted that the availability of assistive technologies helps children with learning disabilities in different aspects which include technologies like spell checks for writing, tape readers that help in listening and reading, talking calculators that help in mathematics, prewriting organizers that assist in organization and memory. Although these assistive technologies are available teachers don't have skills in handling and operating them besides they are not even common, they are scarce in schools and costly when one needs them. Therefore, a need for teachers' training on the use of assistive technologies for children with learning disabilities to benefit from ICT. Special education has been given less attention as ICT integration is concerned. Aksal (2015) studied ICT integration in special education schools. The study results showed that there is a need for intensive ICT integration in special education, but the use of digital resources and educational infrastructures are limited. Therefore it is vital to provide infrastructures, in particular, to support the learning of children in special education schools and to integrate ICT.

However, this is contrary to Ali (2020); Isaboke (2018) who revealed that the ICT integration in education is not determined by availability of ICT facilities.

Technology Acceptance Model (TAM) identifies individual intents of using technology. Fatiha (2015) in the study of investigating IT faculty resistance in learning management system adoption of TAM revealed that LMS is used for sending emails and communication to students. Thus the effective use of a learning management system (LMS) in higher education is low and the study showed that a learning management system is typically used as an administrative tool than as a teaching and learning tool (Fatiha & Muna, 2015). This indicated that ICT in the education sector was not only integrated into teaching and learning but also served other multiple tasks such as administrative purposes, monitoring and evaluation of students attendance, teachers and school workers

However, some studies that were conducted in Nigeria in both private and public secondary schools revealed that inadequate ICT facilities are attributed to the government for not providing these ICT facilities to schools (Asemhe et al., 2019; Fadip & Balarabe, 2018). The arrangement of facilities, ventilation of ICT centers, library or laboratories is vital but less attention is put on repairs, software upgrading, ICT utilization, disposal of damaged facilities, regular checks and monitoring of users was also identified (Etor et al., 2020). This is worth noting as more emphasis was put on ICT library, how to arrange facilities, and leaving other activities that are involved in ICT integration like repair, maintenance, and monitoring. Therefore there should be a balance on how the available facilities are being utilized because they equally go hand in hand.

2.4 Utilization of ICT Resources

The utilization of ICT facilities depends on teachers' access to these facilities. Teachers need access to ICT facilities to integrate ICT into the teaching process (Augustine et al., 2018). According to Geoffrey (2010) ICT infrastructure in schools and institutions is evenly distributed and inadequate, this is because of a large number of students that are being admitted every year and even if some resources are made available within the university, students are not aware that these resources exist within the university because they are not exposed to using them. Low level of ICT utilization in education is caused by lack of maintenance culture, lack of students' interest in ICT application and use, lack of infrastructures, poor telecommunication links, lack of ICT Professional developments of teachers, poor internet connectivity and services, poor development of ICT technical support specialist, lack of ICT skills among teachers; others include poor perception of ICTs among teachers and school administrators, inadequate educational software, poor management on the parts of school administrators and government, inadequate ICT facilities in schools, frequent electricity interruption (Mavellas et al., 2016; Prasad et al., 2015). In Belgium, a study conducted in private and public schools argues that there is a need for teacher ICT capability and skill improvement and more effective ICT training to teachers for successful ICT utilization (Aydin et al., 2016). This implies that without teachers ICT skills, ICT would still be inadequately utilized.

Demo kits are demonstrating objects that assist in enhancing teaching or limited ICT facilities. Peters-richardson (2019) in his study on the use of demo kits strategy for enhancing secondary school students' academic achievement in computer studies argues that the use of demo kits brings students to reality, in most cases Demo kits are used to transfer teaching from conventional teaching methods and also used where ICT facilities are not enough for every student (Peters-Richardson et al., 2019). Even though

teachers are using demo kits in teaching, the government should not relax on providing or funding schools with facilities. The study was limited to a small sample size of form two secondary students. It could have been more illustrative if the scope of the study was broad to get the whole picture on the use of demo kits.

Studies that have been conducted in higher education reveal that E-learning acts as a communication tool between students and lecturers by sending assignments through emails (Arokiasamy et al., 2014). Factors that influence the adoption of e-learning as an instructional material include ICT competence and skills, lack of relevant soft wares, limited access to the internet, self-efficacy, teacher experience, and attitudes (Onovo & Okorie, 2017). The 21st-century students are exposed to using mobile phones but they have not been exposed to ICT tools hence lack ICT skills and knowledge to make them ready for the future (Akuegwu et al., 2011; Surej, 2015).

However, limited ICT use and utilization are attributed to school management stakeholders and government. Kafyulilo et al. (2015) who studied on continuous use of ICT in instruction points out that although schools had ICT tools teachers weren't using them because of lack support from school management this study was limited to a small size sample of only fifteen participants thus the findings cannot be generalized to other school settings.

2.5 Level of Preparedness among Teachers in the use of the Available ICT resources

ICT integration in schools can also be looked at with other aspects such as school leadership, evaluation, and assessment, continuous professional development, and pieces of training. In European regions teachers need both digital and critical skills to determine when to use technology to teach therefore supplementing conventional

teaching methods with ICT is effective as the teacher is the leading teaching and learning resource (Ottestad & Gudmundsdottir, 2018).

2.5.1 Teacher competence and ICT skills

The successfully integration of ICT depends on teachers' ability to use it in teaching therefore, there is no way how ICT will be integrated into school without teacher skills and attitude (Aminah et al., 2018; Chepkorir & Kandiri, 2018). ICT infrastructures or resources cannot integrate ICT alone but teacher readiness, willingness to use ICT is the only determinant for the use of ICT infrastructure that the government provides to schools (Baharuldin et al., 2019). According to Kamaruddin et al., (2017); Omoniyi et al., (2013) teachers have skills and are knowledgeable on using certain applications of ICT like smartphones, computers, and have improved on their knowledge on ICT, teachers utilize the internet to search for instructional materials, connect with learners and parents, monitor and evaluate student performance.

However, this contradicts with Surej (2015); Akarawang et al. (2015) who urged that low levels of teacher ICT skills and knowledge is a major hindrance to ICT implementation in schools. This is because teachers do not have time to plan technology in their lessons. Oladosu (2012) conducted a study on technology teacher awareness and attitude towards the use of ICT from the findings of the study teachers were aware of ICT policy but are not aware of methods to use to acquaint ICT. Omoniyi et al. (2013) found out that teachers in humanities are competent in using ICT than science teachers. Teachers use ICT outside the classroom to prepare lessons but leave the gadgets outside the classroom (Andrea et al., 2017; Chepkorir & Kandiri, 2018). Even though teachers know the importance of technology as a tool for instruction they face some barriers while integrating ICT such as lack of equipment, limited time, limited teacher ICT training, and lack of technical support (LaToya et al., 2017).

Consequently, this implies that ICT has not fully been utilized. Therefore teachers need to have technology pedagogy content for effective ICT integration in schools. The government should equip teachers with ICT tools and technical assistance to enhance their ICT literacy. Teachers and students must be in collaboration with technology for the instruction process to take place and should have access to these ICT resources to have confidence while using them either in class or outside the classroom (Muhammad et al., 2019).

2.5.2 Teacher experience

Teachers' experience is a major factor that determines the use of ICT and its integration in teaching and is a determinant on when to use computers. In India, Technology has been seen as a managerial tool, motivational tool, and a cognitive tool that assists students to understand learning concepts and also improve the teachers' professionalism. Teachers fail to relate technology with pedagogy because some are not prepared to embrace technology as they are preoccupied with personal activities (Alenezi, 2015; Satish & Priya, 2012).

In Malaysia according to Samlichan (2014) in a study which was done in the state of Penang noted that teachers attitude and knowledge on ICT integration vary with the years of experience. Less experienced and moderately experienced teachers are competent in ICT use than more experienced teachers (Kpolovie & Awusaku, 2016; Andrea et al., 2017; Mafang'ha, 2016). Most of the teachers in their ealry days did not attend pre-service trainings (Wright, 2017). However, Osadebe and Ojukonsin, (2018) revealed that there is no significant difference between experienced and less experienced teachers in the integration of ICT. In Uganda, ICT in education still lags because some teachers who were in college or university in the late 1970s when computers had not widely emerged like today lack operational skills to use ICT

equipment (Edison, 2020). However, this does not agree with Iddrisu (2019) who studied the influence of teachers' gender and age on ICT integration and reported that old teachers utilize ICT than young teachers. This implies that ICT integration depends on teachers' ability to connect technology content knowledge with the topic of the subject being taught thus fully utilizing ICT. Adu and Galloway (2015) observed that teachers have to attend ICT workshops and training. Therefore, this calls for attention to administrators and the government to conduct ICT training and workshops for teachers to enable ICT integration.

2.5.3 Integration of ICT in Different Subjects

ICT integration in different subjects is influenced by various aspects, they include student attitude, teachers' experience, level of accessibility, cost of ICT equipment (Agbo, 2015).

The study on computer studies teachers' constraints in the use of ICT revealed that teachers' constraints in using ICT differ on gender, experience, and qualification (Osadebe & Ojukonsin, 2018). Dambo and Umah (2018) revealed that ICT tools for learning business studies are inadequate and students are not aware of the use of ICT, same findings were found in Alma (2016) who studied ICT integration in physics. Olugbemi (2019) studied computer-based instruction in social studies contradicts with a study in business studies, deduced that students are aware of ICT and have a positive attitude towards their use in teaching. The same findings where found by Yen-Chun (2017) a study that was done in National Sun Yat-Sen University revealed that students have positive attitudes towards ICT integration. However, this is contrary to Maxwell et al. (2015) social media and ICT tools assist students in acquiring knowledge and links them to future work but they lack time and support from lecturers. Teachers use ICT to prepare lessons and have a positive attitude towards ICT (Parilah & Joscyln,

(2015); Obiegbu, (2016); Bariham, (2019) but still they have no time for its integration (Naumi, 2019). This means the integration of ICT is pegged on teachers' attitudes and competencies.

Table 2.1: Summary of Empirical Review and Gaps in Knowledge Identified

Source	Topic	Methodology	Knowledge gap
LaToya et al., (2017).	Elementary School Teachers' Beliefs about the Role of Technology in 21st-Century Teaching and Learning.	Qualitative study. Used focused group discussions to collect data. Targeted K12 teachers	The study reviewed was done in USA. The current study used mixed method research approach. Targeted 181 government teachers and administrators.
Baharuldin et al., (2019)	The Role of Teacher Readiness as a Mediator in the Development of ICT Competency in Pahang Primary School	The study was done in Malaysian primary schools. Quantitative design was used, sampled 530 teachers and used questionnaires.	The current study was done in secondary schools in Sheema Uganda. It used stratified simple random and purposive sampling
Bariham, (2019)	Influence of teachers' gender and age on the integration of computer assisted instruction in teaching and learning of social studies among basic schools in tamale metropolis.	Quantitative study, used structured questionnaires. Sample size of 60 teachers from 20 sampled schools	The study was done in Ghana while the current study was done in Uganda and employed mixed method approach. It used semi structured questionnaires and in-depth interviews.
Lubaale, (2020)	Information and Communication Technology in Higher Education of Uganda and Education Implications: A Case of Kyambogo University	The study used mixed research. It used a sample of 87 participants and stratified sample random sampling was used.	The study reviewed was done in higher institutions and looked at the challenges in application of ICT. The current study was done in secondary school with a sample size of 181 using stratified and purposive sampling.
Edison & Paul, (2020)	ICT usage in teaching and its' influence on students' academic performance in Uganda certificate of education (UCE) in Kasese district.	Used quantitative research approach. Sampled 291 respondents and was done in Kasese district in Uganda.	The current study focused on teachers' ICT compentency and skills, their perceptions towards integrating ICT and support available in integrating ICT. It used a mixed method approach, was done in Sheema district in Uganda.

Therefore, since most of the previous studies were based on qualitative methods while other studies have been conducted quantitatively, and a few studies utilized mixed-method design. Most studies in the literature have mainly focused on private and public secondary schools, pre-schools and some studies in universities, some studies were conducted in other countries. A few studies that have been conducted in Uganda, have looked at the availability of ICT resources in higher institutions or universities, difficulties faced by teachers in using ICT. Teacher competency in the integration of ICT has been left and most of these studies have been conducted in the central part of the country and the previous research study findings cannot be generalized in other parts of the country. Therefore, this called for researcher's attention to conduct a study in the western part of the country. It employed a pragmatic approach, used a concurrent strategy to investigate the teacher the integration of ICT in secondary schools in Sheema Municipality in Uganda and mainly focused on public secondary schools.

2.6 Chapter Summary

The chapter has presented literature review under the global integration of ICT in education, integration of ICT in Uganda, availability of ICT facilities and utilization of ICT facilities. The chapter also presented the literature on teachers ICT competence and skills, teachers' experiences and integration of ICT in different subjects in the teaching and learning processes. According to the literature reviewed, majority of the studies have been conducted outside Uganda. A few studies that were conducted in Uganda show that the national ICT policy has been put in place. What is not clear is whether teachers have integrated ICT in the teaching and learning processes. It was therefore important to investigate teachers and administrators' perceptions, teachers ICT competence and skills, the support that is available in schools towards the integration of ICT and the extent use of ICT in teaching and learning to fill the literature gap.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter presents the procedures and methods, which guided data collection. It also captures the research design, location of the study, target population, sample design, sampling procedures, data collection instruments, validity and reliability of research instruments, and ethical issues related to the study.

3.2 Research Paradigm

A paradigm is “a philosophical way of thinking”. Paradigms discuss people's shared beliefs, values and how they understand the world they live in (Kivunja & Ahmed, 2017). “Worldview” is a synonym for paradigm (Kaushik & Walsh, 2019). A paradigm consists of elements which include epistemology which is concerned with “how we know the truth” and how we can deepen our understanding, ontology is concerned with the assumptions we make to believe if something is real. Methodology articulates the methods, procedures the researcher applies to understand the research problem, and axiology which refers to the ethical issues the researcher considers to get data from the participants to address the research problem (Kivunja & Ahmed, 2017).

The Interpretivism paradigm believes that the world is produced and reinforced by human beings through action and interaction (Goldkuhl, 2012). Interpretisists also believe that true knowledge can only be obtained by a deep understanding of the subject (Rahi, 2017). A core belief of the interpretive paradigm is that reality is socially constructed and explores to understand meanings of individual groups to get insight and in-depth information (Thanh et al., 2015). This study investigated to understand the perception and teachers experiences on ICT integration, therefore, a qualitative method

was a suitable method to provide information on teachers' perception on the integration of ICT in teaching and learning.

The study employed a pragmatic world view, which means a set of beliefs that guide action. Pragmatism originated from the United States in the 19th century, it can be an assumption about the world. According to Kivunja & Ahmed, (2017) pragmatists "believe that it is not possible to find the truth using one scientific method" therefore utilizing the best approaches to gain knowledge by using every method helps to discover knowledge about the phenomena under investigation. According to Rahi (2017), the pragmatism paradigm aims at finding the weakness of the study, to strengthen it with a mixed approach and true knowledge is obtained by a mixed approach. Quantitative paradigm was used to identify differences between study variables in ICT integration and qualitative paradigm was used to obtain comprehensive information about variables basing on the experiences participants to get a deeper insight of the phenomenon. The core assumption of using pragmatic is that it provided a complete understanding of the research problem than either utilizing one paradigm. This paradigm was used because it allowed the researcher to blend characteristics of both quantitative and qualitative methods be combined to investigate a concrete solution to effective utilization of ICT facilities in teaching and learning.

3.3 Research Approach

According to Creswell (2014) research approach is determined by the research problem. Shannon-baker (2016), points out that mixed methods are a "type of inquiry that is philosophically grounded where an intentional mixture of both quantitative and qualitative are used in a single research study". The study employed a mixed-method approach to combine data and provide a more complex understanding of a phenomenon that would otherwise not have been accessible by using one approach alone (Meissner

et al., 2011; Thanh et al., 2015). The core assumption of this research approach is that the combination of qualitative and quantitative methods provide a more complete understanding and addresses the research problem than utilization of one method or any other approach Tashakkori and Teddlie, 1998 as cited in (Kaushik & Walsh, 2019).

Data collection of both quantitative and qualitative data compares the two databases to determine if there are merging or difference of data and to develop a more complete understanding of the problem. Qualitative methods was used because much of the data that was collected included the use of ICT, attitudes and perceptions from participants are qualitative hence best collected and analyzed by qualitative methods. Similarly, quantitative methods was used because most of the data necessary for the study, including data about the availability of technologies was collected using quantitative and, therefore, amenable to be collected and analyzed by use of the quantitative method.

3.4 Research Design

This study adopted a concurrent triangulation mixed-method design. Concurrent triangulation design is to "converge or merge data" and combine the quantitative and qualitative data (Ishtiaq, 2019; Meissner et al., 2011). Triangulation refers to the use of two or more data sources, methods, theoretical perspectives and approaches to analyze a research problem in a single study and then validating the congruence among them. The major goal of triangulation is to overcome personal biases of the researcher (Brink, 1993). A concurrent triangulation was a preferred design because quantitative and qualitative data was collected at the same time, analyzed separately and compared the results to make comparisons between the two data collection methods. Triangulation was deemed appropriate because, given the nature of the data that was collected, a single data collection method could not be adequate to collect enough data to render the

study valid and useful, therefore, the two methods selected were meant to supplement one another.

3.5 Study Location

This study was conducted in Ankole western sub-region in Sheema Municipality, Sheema district in Uganda. Statistics, 2018 show that Sheema lies on Mbarara-Ishaka road 33 kilometers from Mbarara and 29 kilometers from Ishaka district. It is bordered by Buhwenju in the north, Mbarara in the east, Ntugamo in the south and Ishaka in the west. Sheema district was created on 1st July 2010, with 27 secondary schools both government-aided and private aided. This study was carried out in Sheema municipality because it is one of the municipalities which was later created and has grown very fast in the western region compared to other municipalities created on the same date. Sheema is the largest municipality in Sheema district with many government schools compared to other towns within the same district. Therefore, the researcher identified Sheema Municipality as a place of interest because it has secondary schools with the same characteristics and the researcher has the lived experiences thus having access to Sheema.

3.6 Target Population

A population is a group of individuals or subjects where a sample is derived from Taherdoost and Group (2017); Etikan (2019) defines a population as a group of people, items with shared characteristics. The accessible population was 348 teachers comprising of both male and female aged 25 to 65 in the six selected government-aided secondary schools in Sheema Municipality in Uganda. The study targeted teachers and school administrators. Sampling frame was taken from all teachers teaching in government selected secondary schools. The researcher targeted 181 teachers as unit of analysis for the study.

3.7 Sampling Design and Size Determination

Sampling design is the process of selecting a survey sample of people or units from a large population of the researchers' interest so that the results can be generalized to the whole population (Etikan, 2019). According to Krejcie and Morgan (1970) formula for sample size determination to represent a given population. This study used a formulated table by Krejcie and Morgan (1970) to determine the sample size of the population. Therefore, using Krejcie and Morgan table of sample size determination, based on a Confidence Level = 95%, and a Margin of Error = 5% a sample size of 181 respondents was derived for this study.

3.8 Sampling Procedure

Sampling is getting a subset from a sample frame or target population (Rahi, 2017; Taherdoost & Group, 2018). This study applied both probability and non-probability sampling techniques to select the sample. In probability sampling, stratified sampling was used to divide schools in the municipality to get a sample frame. In the study, the researcher divided the schools into subgroups based on their characteristics such as location (A), schools with ICT facilities (B), schools with limited ICT facilities (C). After each stratum simple random was used to get a survey. Strata A had a population of 145 with 75%, strata B had population of 126 with 66% and strata C had 77 with 40%. Simple random sampling was administered to get a total sample population of secondary schools teachers. The researcher used simple random sampling technique because every individual or member had an equal chance of being selected. Additionally, all teachers have similar characteristics regarding the integration of ICT thus in position to give relevant information. Purposive sampling is based on the researchers' knowledge of selecting the needed sample from the population (Etikan, 2019). The researcher took a sample of 181 participants, where 175 teachers and 6 head

teachers who were purposively sampled. The researcher purposively sampled head teacher to seek in-depth knowledge on the integration of ICT in teaching, their perception on ICT use and this is because they are the only head teachers of the sampled government-aided secondary schools in Sheema municipality.

The results of purposive sampling are usually expected to be more accurate and cost-effective than those achieved with an alternative form of sampling. This was done without bias because the data that was obtained from the population was almost homogeneous. These methods of sampling were preferred by the researcher because they excluded people who were unsuitable for the study and remained with the most suitable respondents. They were less time consuming and reduced the costs for carrying out data collection and data generated with probability sampling techniques can be generalized. The researcher accessed participants at break time or lunch break depending on the agreed time with the participants as indicated in the consent forms.

3.9 Data Collection Method and Instruments

The data collection method is always guided by research questions. Data was collected using teacher questionnaire and interview guide. A questionnaire is a research instrument consisting of a series of questions to gather information from respondents (Bremer, 2017). The primary benefit of utilizing questionnaires is that an enormous number of individuals can be reached relatively easily. It gives reliable information that is accurate and in a valid manner. The survey provides quantifiable responses for a research topic and after quantifying data can be used to compare and contrast the research (Bremer, 2017).

An interview is an instrument used to collect data where participants may not freely express their views openly for example when a researcher is dealing with a sensitive

aspect (Peersman, 2014). An interview is one way of collecting data from a small number of people to gain knowledge on a subject. Data collection using the interview involves listening to responses and recording.

3.9.1 Teacher questionnaire

The researcher designed a questionnaire that was administered on teachers to collect data on the support of ICT, level of ICT competence and extended use of ICT in secondary schools. The study used close-ended questions to collect quantitative and open-ended questionnaires to collect qualitative data. In close-ended questions, the respondents' answers were limited to only the provided options, by answering yes or no and using a rating scale. Open-ended questions are questions that give the respondent the freedom to answer.

Questionnaires were distributed by the researcher with the help of research assistants to teachers because teachers covered a large sample and had consented to take part in this research study. The questionnaire was made up of four sections namely; section A which covered the demographic characteristics of participants, section B covered the use of ICT in teaching and learning, 14 items measured on a five point Likert scale with 1= Strongly Disagree and 5 Strongly Agree and another 14 items on a single answer question No/Yes that checked on the availability of ICT infrastructure, section C with 11 items covered teachers opinions regarding the support available in school, also measured on a five point Likert scale section. Section D with 13 items asked on teachers ICT competency in the integration of ICT while another 6 items on a Semantic differential scale with extremities ranging from Excellent to Poor measured teachers' ability to use computer applications. Section E covered the extent use of ICT in teaching and learning had 32 items measured on a five-point Likert scale. A questionnaire was preferred in this study because it collected a large amount of data and can be used to

collect data from a large audience and covered all aspects related to the availability of ICT, level of ICT competency and the extended use of ICT.

3.9.2 Interview

An interview can be structured or semi-structured regarding the type of data the researcher needs. A semi-structured interview was used in this research study because it's a two-way communication and it allowed the interviewee to answer questions freely (Coughlan, 2016). Interviews allow comprehensive probing which leads to the generation of more information and clear expression of opinions, feelings, and attitudes by the respondents that may not be captured by the questionnaire. The researcher conducted individual interviews to collect qualitative data which was administered on head teachers. The researcher interviewed head teachers because they were considered to be the immediate supervisors, inter medias between the Education Ministry and teachers on ground to give perceptions of ICT use. Interview schedule were in the form of open-ended questions to permit probing where the interviewer and interviewee needed clarity on the issues or questions that were raised by the participants. Interviews were conducted in the participants' workplace during working hours basing on their suggestions and consent. An interview was preferred because participants give their views, perceptions without being influenced by their fellow participants.

3.10 Validity and Reliability of Instruments

Validity and reliability are techniques used to measure the consistency and accuracy of data (Creswell, 2014). Validity and reliability increase the transparency of data and decreases the researchers' bias. According to Taherdoost and Group, (2017) validity is how well the collected data covers the actual area of investigation and measure what it is intended to measure. Validity in qualitative research is concerned with the

truthfulness of findings. Lincoln and Guba (1985) points out that there can be no validity without reliability.

3.10.1 Validity of Questionnaire

The appropriateness of a study is measured through validity and reliability. Validity is the extent to which a concept is accurately measured (Heale & Twycross, 2015). In this study four approaches to establishing validity were used: face, content, construct and internal validity were examined (Heale & Twycross, 2015; Hamed, 2016; Haaradhan, 2017). Face validity is the extent to which an instrument looks valid. Face validity was tested by research assistants and the supervisor by scrutinizing with research instruments to ensure a high degree of validity. Content validity is the level to which an instrument covers a whole content of a construct that it was designed to measure. To ensure content validity the formulated instruments were adequately covering the research questions this was done by conducting a pilot study to test whether questions formulated covered the research objectives. Construct validity is how well the researcher translates or transforms an idea that is a construct into a functioning and operating reality, the operationalization (Taherdoost & Group, 2017). Construct validity was ensured by the researcher together with research assistants by comparing the content of the questionnaire and interview questions in the research objectives to check for variables that were measured. According to Personal and Archive (2017), internal validity is ensured through triangulation application of several data collection methods to confirm results.

3.10.2 Validity of interviews

Qualitative research is based on the fact that validity involves trustworthiness. Trustworthiness alludes to the “degree of confidence in data, interpretation, and methods used to ensure the quality of a study” (Connelly, 2016), therefore, to ensure

trustworthiness the researcher considered credibility, confirmability, transferability and dependability that the researcher put in place to conclude research study based on the information got from research instruments (Benkharafa, 2013). Therefore, the researcher ensured trustworthiness using the following criteria;

According to Cope 2014) credibility refers to the "truth of the data or the participant views and the interpretation and representation of them by the researcher". Credibility is the truth of participants views and interpretation by the researcher (Lincoln & Guba, 1985; Shenton, 2016). To ensure that the study yielded credible results, the researcher used probing questions when handling interviews to seek clarity from the interviewee.

Transferability refers to findings that can be applied to other settings (Cope, 2014). According to Lincoln and Guba (1985) points out that the researcher should provide sufficient information on the research process and findings. Therefore, to ensure transferability the researcher recorded interviews to allow readers associate results with their own experience and whether the findings can be justifiable to other settings.

Confirmability refers to the researcher's ability to demonstrate that data represents participants responses, not the researcher's bias invalid source specified (Cope, 2014; Connelly, 2016). The researcher demonstrated confirmability by describing how conclusions were drawn and simplifying how findings were derived from data. The researcher also kept all notes and decisions on data analysis, this was ensured by member checking, sending back results and interpretation to participants. Member checking was done to allow participants to make comments on the findings to ensure the instrument valid. The researcher asked experts and conduct sessions of peer-debriefing that are familiar with the subjects to examine research data findings to prevent bias from one perspective on this research.

3.10.3 Piloting of Research Instruments

The researcher piloted research instruments in the neighboring city of Mbarara which has the same characteristics as the area of study Sheema municipality. The instruments were administered in 6 selected secondary schools to teachers and administrators. In this study, the researcher divided the schools into subgroups based on their characteristics after dividing the schools into subgroups, simple random sampling was used to randomly select respondents from each strata. Head teachers or administrators were purposively selected. Using Krejcie and Morgan, (1970) table, the population size of the targeted area was 348 but the researcher took a sample of 181 participants. The researcher accessed participants at break time or lunch break depending on the agreed time with the participants as indicated in the consent forms.

3.10.4 Reliability

Reliability is the consistency of a measure or an instrument (Roberta & Twycross, 2015). Reliability is important but it is insufficient without validity and for a test to be reliable, it should be valid (Hamed, 2016). Reliability measures precision, consistency and repeatability of research. Stability as an attribute of reliability was tested using test-retest reliability. According to Haradhan (2017) reliability is also called internal consistency, when items are constructed to measure a certain construct, there should be a high degree of similarity among them since they are supposed to measure one common construct.

The researcher used Cronbach's alpha to measure reliability of the instruments. Cronbach's alpha (α) is based on inter-item correlations and it normally varies between 0 and 1, where 0 indicates no relationship among the items on a given scale, and 1 indicates absolute internal consistency (Haradhan, 2017). Alpha values above 0.7 are generally considered acceptable and satisfactory, above 0.8 are usually considered

moderate consistency, and above 0.9 are considered to reflect exceptional internal consistency Cronbach, (1951), as cited in (Haradhan, 2017). If the items strongly correlate with each other, they are considered to have high internal consistency and the alpha coefficient is close to one (1). If the items do not strongly correlate the alpha is close to zero. Situations where values of 0.8 or 0.7 may be acceptable while values lower than 0.6 are looked upon as unacceptable. The general rule is that reliability greater than 0.8 are considered as high.

Therefore, the researcher conducted a pilot study to trial the research instruments. Then used Cronbach-alpha to test consistency by calculating alpha value using SPSS software version 20. The questionnaire was considered as the most accurate and quick tool in the collection of data, therefore, the researcher administered a questionnaire on the same participants more than once to ensure its consistency as a data collection instrument.

Table 3.1: Cronbach Alpha values

Variables	Number of items	Cronbach alpha	Status
Ability to use ICT facilities	14	.711	Reliable
Support available in school for ICT use	11	.693	Reliable
Teachers' ICT competency and skills	11	.865	Reliable
Technical support	7	.654	Reliable
Teachers' use of ICT	26	.711	Reliable

3.11 Data Collection Procedures

The researcher got an introductory letter from Moi University allowing me to collect data, then applied for ethical clearance from Research ethics committee (REC) in Gulu University in Uganda to get clearance to conduct research in Uganda. Then applied for

research permits form Uganda National Council for Science and Technology. And after getting clearance from Education officer at Sheema Municipality headquarters, presented permission letter from the Education officer to school administrators for the schools that participated in the study. The researcher visited the sampled schools and administered the questionnaires to teachers and waited for the questionnaires to be filled. Oral interviews were conducted with the head teachers, and the researcher found the head teachers in their respective offices within the selected secondary schools. The instruments were administered depending on participant's schedule

3.12 Data Analysis

3.12.1 Quantitative Data Analysis

According to Peersman (2014) a mixed-method approach improves the credibility of data when there is the convergence of data from different sources. Data analysis is the process of transforming data into information. Data was analyzed using descriptive statistics with help of Statistical Package for Social Scientists (SPSS) software version 20. Descriptive statistics involved percentages, frequencies tables, mean, standard deviations and Pearson's product moment correlation between independent variable were computed. Results got from the questionnaire were tabulated in frequency tables for ease of interpretation to easily visualize the various results as given by the respondents.

3.12.2 Qualitative data analysis

According to Braun and Clarke (2006) thematic analysis "describes patterns across qualitative data". Data is analyzed in phases where the researcher familiarizes with data, generate codes, search for themes, review themes, define and name themes and interpret themes to what each entails. Objective two being qualitative, data gotten from open-ended questions and interview schedules were analyzed by thematic analysis i.e. an

analysis of the main themes as found in the study. According to Vaismoradi et al. (2016) thematic is a process of coding, examining and describing data using a set of techniques to analyse textual data and elucidate themes.

Qualitative data were captured using a voice recorder field notes. The researcher transcribed the recordings and prepared the data for analysis. Data analysis began with checking for transcription errors and cleaning the transcripts to ensure all data is ready for thematic analysis.

According to Braun and Clarke (2006) thematic analysis "describes patterns across qualitative data". Data was analyzed in phases where the researcher familiarized with data by reading through the transcripts several times. She then generated codes and searched for categories and themes. The themes were then reviewed, defined and interpreted to arrive at the findings.

3.13 Ethical Issues

According to Georgia and Marianna (2011), in their study on major ethical issues in conducting research points out that research ethics involves protecting informants' dignity and rights. Additionally, Dooly et al. (2017) says that education research includes human subjects, the researcher has to prepare adverse effects that may arise in the study on participants. Research involves the collection of data from people, it is therefore the work of the researcher to develop trust with participants, protect their voices, identity and promote integrity (Creswell, 2014). Social science research involves human participation where the researcher has to observe ethical guidelines to protect the rights, safety and dignity of participants (Parveen & Showkat, 2017).

Therefore, the following ethical guidelines were observed when carrying out this research. The researcher sought approval from Gulu university Research ethics

Committee and then sought for permission from Sheema Municipal Education officer. Then sought permission from head teachers of the secondary schools under study. First introduced myself, I then informed the participants about the objectives, benefits and impacts of the research study, explained what it entailed to participate in this research study and were no risks of taking part in study. Then participants signed a consent form to account for their participation and this acted as an agreement for participation in this study. Participants had a right to have enough information on this study and decided whether to take part or not.

Siti (2018) points out that in anonymity the researcher protects participants' identity while Paul (2007) illustrates that to observe confidentiality the researcher has to protect interests of informants from being exposed to others. Anonymity was observed by the researcher through safeguarding information given by the participants. The researcher used codes instead of using participants names when dealing with instruments in data collection, data analysis and reporting of the study findings, the participants names were not mentioned anywhere in this study to ensure that participants identities were not revealed, had a clear understanding with participants and results from one group of participants was not used as an advantage to another group, their voices and identities remained confidential.

Researchers' interaction with participants in this study was based on trust and respect, participation was based on their will to participate and to answer, respond to research instruments willingly without any force, bribe from the researcher or any other person. Participants had a right to decline or withdraw their participation when the study had already started or was still going on. Therefore, no force was put on those participants who chose not to participate or continue participating in this study.

In the questionnaire the researcher included description of herself as well as interviews. All data gathered was kept secretly with the researcher alone and to safe guard against plagiarism the researcher used proper citation in referencing.

3.14 Risk Management Plan

Within the current COVID-19 situations, data collection required having a comprehensive risk management plan to protect the participants as well as the researcher from contracting the virus. Several standard operating procedures have been prescribed by the World Health Organization (WHO) and the Ministry of Health in Uganda. Therefore the researcher used face masks and hand sanitizer for herself and the study participants. The researcher also ensured social distancing of at least 2 metres between participants as presented by the ministry of health. Additionally, the temperature monitors were used to screen all research participants including the researcher and her assistants. In situations where the participants had no masks, the researcher provided to participants considering the budget for masks, sanitizer, and temperature gun. Prior sensitization orientation of participants on preventive measures for COVID-19 and standard operating procedures was done by the researcher before face-to-face engagements of the data collection process.

3.15 Chapter Summary

This chapter presented the methodology that was used in the study. This study used a mixed-method approach, pragmatic paradigm, and concurrent triangulation research design. The chapter also provides the target population, the sampling techniques, and the procedures that were used to get a sample for this study. It continues to give an overview of the data generation methods that were used. Quantitative data were analyzed by descriptive statistics and inferential statistics while qualitative data was

analyzed thematically. This chapter also describes the ethical issues that were considered during the study.

Table 3.2: Methods used to test objectives

Objective	**Data collection Method**	**Data analysis**
Support available	Close- ended questionnaire	percentages, mean
Teachers and administrators perception	Semi-structured in-depth Interviews	Thematically
ICT competencies	Close and open ended questionnaire	T-test and Anova
Extent use of ICT	Close-ended questionnaire	Mean, frequencies

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION, AND DISCUSSION OF FINDINGS.

4.1 Introduction

This chapter deals with the presentation, analysis, interpretation and discussion of the research findings. This study aimed at investigating the integration of information communication technology (ICT) in teaching and learning processes in secondary schools in Sheema municipality. The study focused on the support available, teachers' and administrators' perceptions on ICT use, teachers' skills and competency, extent use of ICT in teaching and learning to answer the research questions.

This study applied a mixed-method approach collecting both quantitative and qualitative data. The key findings presented and discussed in this chapter emerged from the analysis of quantitative data and qualitative data. Quantitative data was analyzed using descriptive and inferential statistics with help of SPSS software version 20, while qualitative data was analyzed using thematic analysis. Data gathered from the questionnaire was complemented with data that emerged from interview schedules to answer the following research questions.

i. What support is available in secondary schools towards the integration of ICT in the teaching and learning processes?
ii. How do teachers and administrators perceive the use of ICT in teaching and learning?
iii. What is the level of ICT competencies of teachers required to enhance the teaching and learning processes?
iv. To what extent has ICT been applied by teachers in teaching and learning?

4.2 Data Processing, Preparation, and Screening

Data preparation is the process of manipulating and organizing data prior to analysis (Abdallah & Webb, 2017). After data collection, the researcher sorted, coded and manually entered data into computer into Statistical software package SPSS version 20. The researcher further checked for data accuracy by spot checking randomly on the data entered. Later, data was cleansed to remove outliers and filling in the missing values. For example the data collected contained an error on age and the teaching experience. Where by respondents of the questionnaire age was not corresponding with the years of teaching experience thus showing inconsistency of data.

On item reversal, the researcher used Likert scale ranging from strongly disagree (1) and strongly agree (5) for the questionnaire. Taking an example, on item D7 "I always use the computer in my classroom" if the respondent strongly agrees he/she will put 5 and this value is high esteem. Considering an item "It is difficult for me to be skilful in using technology" if the respondent agrees with this item this value will be low esteem. Therefore, to compare these two items, the researcher reversed scored one of the item and transformed. In order words the negatively worded item was reverse coded to be consistent in direction with the rest of the variables. Finally, the researcher prepared data for analysis and interpretation as presented below.

4.3 Response Rate

The researcher targeted 181 respondents but administered 175 questionnaires and conducted 4 interviews to participants who had consented to participate in this study. Out of 175 questionnaires administered 138 were effective and 37 were declined. Four (4) in depth interviews were conducted and 2 declined. The response rate was 78.5% which lies in large confines of large sample size ($n \geq 30$). This is a good response rate as recommended by Fincham (2008) that 60% response rate is expected . Hence return

rate did not in any way affect the quality of data nor the conclusion thereof as it still adequately represented the target population.

Table 4.1: Response rate

Response	No. of participants consent	Declined	Percentage %
Effective Questionnaires	138	37	74
Interview guide	4	2	66.7
Total	142	39	78.5

Source: Research data (2021)

4.4 Demographic Characteristics of Participants.

Table 4.2 below shows the number of participants that answered the questionnaire and interviews. In this study, out of 142 participants, 134 consented to answer the questionnaire and 4 responded to the semi structured in-depth interviews.

4.4.1 Quantitative and qualitative data analysis of demographic profile of participants

Table 4.2: Demographic profile of participants

Variable	Category	Frequency	Percentage %
Gender	Male	90	63.4
	Female	52	36.6
Total		142	100
Age	25-29	44	31.0
	30-34	45	31.7
	35-39	28	19.7
	40 and above	25	17.6
Total		142	100
Employment status	Full time	93	65.5
	Part time	49	34.5
Total		**142**	**100**
Education	Diploma	29	20.4
	Degree	111	78.2
	Masters	2	1.4
Total		**142**	**100**
Experience	1-5 years	32	22.5
	5-10 years	61	43.0
	10-15 years	39	27.5
	More than 15years	10	7.0
Total		**142**	**100**
Employer	Government	70	49.3
	P.T.A	72	50.7
Total		**142**	**100**

Source: survey data (2021)

The results indicated that 90 (63.4%) were male and 52(36.6%) were female. This confirms the earlier findings in the background that more male teachers were employed in the teaching profession than females. Similarly, it indicates that more male teacher participated in the study than female (Uganda Bureau of Statistics, 2018). The age distribution of participants indicated that 44(31.0%) were in the age bracket of 25-29 years, 45(31.7%) were aged from 30-34years, 28(19.7) were between 35-39years and 25(17.6%) aged 40 and above. An indication that teachers aged 40 years and above constituted a smaller proportion of the teachers in schools.

There were more full-time teachers 93(65.5%) than were part-time teachers 45(34.5%) in the sampled schools. This showed that in government schools most of the teachers are employed on a full time basis. The education level of respondents displayed in the demographic profile showed that 29(20.4%) are teachers with diploma, 111(78.2%) were degree holders and 2(1.4%) teachers had masters. This implies that most of the teachers were degree holders.

On teaching experience, out of 138 respondents, 32(22.5%) had experience of between 1-5years, 61(43.0%) between 5-10years, 39(27.5%) were in the range of 10-15 years and 10(7.0%) had more than 15years of teaching experience. Teachers with between 10 to 15 years of teaching were fewer compared to those of 5 to 10 years. For the employment status of respondents, 63(45.4%) were permanently employed and 79(55.6%) were on contract. 72(50.7%) were employed by Parent Teachers Association (PTA) and 70(49.3%) were employed by the government. The difference in employment percentage between PTA and government is very small 1.4% and data collected from government schools, indicated that PTA employs more teachers than the government.

4.4.2 Distribution of respondents by subjects taught

Table 4.3 below shows the subjects taught by respondents in the sampled schools. Mathematics teachers took a bigger percentage of 15% compared to teachers of fine art take at 1.4% percent. This means that more mathematics teachers participated than any other subject teachers. The table also shows that most of the teachers who participated in this study were science teachers taking a percentage of 62% and art teachers taking 33.2%.

Table 4.3: Distribution of respondents by their teaching subjects

Variable	Frequency	Percentage %
Mathematics	21	15.2
History	15	10.9
Geography	14	10.1
Computer studies	10	7.2
English	15	10.9
Physics	11	8.0
Entrepreneurship	8	5.8
Kiswahili	6	4.3
Chemistry	11	8.0
Biology	9	6.3
Commerce	6	4.3
Fine art	2	1.4
Agriculture	6	4.3
Literature	3	2.2
Others	1	0.7
Total	138	100

Source: survey data (2021)

4.3 Presentation of results.

4.4.3 Establishing the support available towards ICT integration in teaching-learning

The first objective of this study was to assess the support available in secondary schools towards the integration of ICT. This section covers the analysis, presentation and interpretation of quantitative and qualitative findings with respect to the support that is available in schools for the integration of ICT. The study variables were measured using Likert scale ranging from strongly disagree (1), disagree (2), non-committal (3), agree (4) and strongly agree (5). Scores of SA and A are grouped to represent Agree, scores of D and SD are grouped to represent Disagree, and N to represent respondents who were not sure.

Table 4.4: Administrators support towards ICT integration

Code	Item	SD %	D %	NC %	A %	SA %	Total %	Mean	St. dev
B1	Government has a good policy to improve the present condition of ICT in secondary schools	15.2	10.9	10.1	52.9	10.9	100	3.333	1.257
B2	Leadership is strongly related to teachers use of computer technology in teaching	13.8	35.5	10.9	31.2	8.7	100	2.855	3.000
B3	The government supports teachers and administrators in ICT training	15.9	33.3	12.3	34.8	3.6	100	2.758	3.000
B4	Training workshops in ICT need to be improved if the integration of ICT in teaching is to be achieved	3.6	11.6	2.4	37.7	44.2	100	4.224	4.000
B5	Administration does not support teaching using ICT	20.3	44.9	8.0	18.1	8.0	100	2.507	2.000
B6	I am aware of Uganda national policy on information communication technology	13.0	23.2	18.8	36.2	8.4	100	3.311	3.000
B7	There is an ICT Lab in my school	2.2	12.3	8.7	54.3	22.5	100	3.826	4.000
B8	ICT lab has all the equipment that I require to teach with	3.6	18.8	15.2	57.2	5.1	100	3.413	4.000

Table 4.4 shows the quantitative data responses from the questionnaire regarding the support available in schools. With respect to the administrative support, most of the respondents 73 (52.9%) agreed that the government has a good ICT policy. Similarly, majority of the respondents indicated that they were aware of the ICT policy. Further, 88 (63.8 %) of the respondents (strongly agreed and agreed) concurred with the statement that government has a good policy in improving the present situation of ICT in secondary school compared to those who strongly disagree and disagreed 36 (26.1%) and those who were not sure about the statement . From these comparisons, it can be

seen that respondents largely agreed that the government has a good policy to improve ICT.

The lowest, negatively rated item with a mean of 2.507 and standard deviation of 2.000 was B5 “Administration does not support teaching using ICT” while the highest, positively rated item with a mean of 4. 2246 and a standard deviation of 4.000 was B4 “Training workshops in ICT need to be improved if the integration of ICT is to be achieved”. The rating of the remaining six items on administrators support towards ICT integration fell between the two response extremes. Therefore, administrative support was found to be available in fostering digital skills among teachers hence supported teachers in the integration of ICT in teaching and learning. This concurs with Ottestad (2018) who argued that school leadership and school administration supports teachers teaching practices. Additionally, Kafyulilo et al., (2016) asserts that school management is very critical in teachers continued use of ICT in the teaching and learning processes.

Item B6 in the table above revealed that respondents agreed that they were aware of the Uganda national policy on information communication technology with 61 (44.2%) agreeing (strongly agree and agree) while 50 (36.2%) disagreed. The difference between those who agreed and disagreed with the statement is 8.2%. This indicated that although 44.2% agreed, respondents' disagreement in this statement is also relatively high which showed that a large number of teachers are not aware of national ICT policy. This is contrary to findings of Ndawula et al. (2013) who concluded that the success of ICT education policy depends on the government's effort and teachers' awareness. Despite the enormous progress made to make teachers aware of national policy on information communication technology, still there is lack of awareness among teachers regarding the national ICT policy. With respect to the government support to teachers

and administrators on ICT training, almost 50% of the respondents disagreed with the statement that government regularly supports them on ICT training.

Findings from qualitative analysis revealed that participants supported the integration of ICT in teaching and learning. One of the participant was of the view that he was really in support of ICT integration and said this:

> *"I am really in support for ICT integration but the government has not fully supported ICT in teaching".....*

It is shown that findings from qualitative data concurred with findings from the quantitative data that teachers and administrators support the integration of ICT. However, from the same quotation above, the participant added that they lack government support. This confirms that most of the teachers are supporting ICT integration in teaching but the government has not fully supported this integration. Additionally, it is further affirmed by results of quantitative analysis reflected on item B5 which stated that the administration does not support teaching using ICT, and where 90(65.2%) of respondents disagreed with this statement. This is a clear indication that school administration supports the integration of ICT in teaching. Therefore, it is shown that administration and teachers are in support of integrating ICT in teaching but government support is lacking.

On item B7 majority of the respondents, 75 (54.3%) indicated that there was an ICT lab in school and B8 showed that 79 (57.2%) agreed that ICT labs were equipped with ICT facilities, implying that schools have ICT facilities in place. Results from the qualitative analysis also indicated that participants concurred with quantitative data findings but at the same also disagreed. This is evident from this participant quotation;

> *"Even if the head teacher equips the school with all facilities, I have no time to use them in my class".....*

The statement from one of the participants revealed that the administration has supported ICT integration by equipping the school with facilities. But again indicated that whether ICT facilities are available in school or not available, teachers are not willing to use them in class because the use of ICT in class takes a lot of time. This is also supported by Kafyulilo et al., (2015) who concluded that teachers face a lot of challenges when using technology. Lack of time is one factor that hinders teachers' ICT use in teaching. Therefore, it can be concluded that even though there is an ICT policy in place, and teachers are aware of this policy, while administrators have managed to equip schools with necessary ICT support facilities there are still huddles to ICT integration in teaching. There is still limited support from both the government and teachers. If the teachers don't create time to use ICT in teaching then there is no integration taking place in teaching.

4.4.4 Technical support available towards ICT integration

The availability of technical support is an important aspect of ICT integration. Figure 4.1 below shows frequencies, percentages of respondents' views regarding the support available towards integration of ICT.

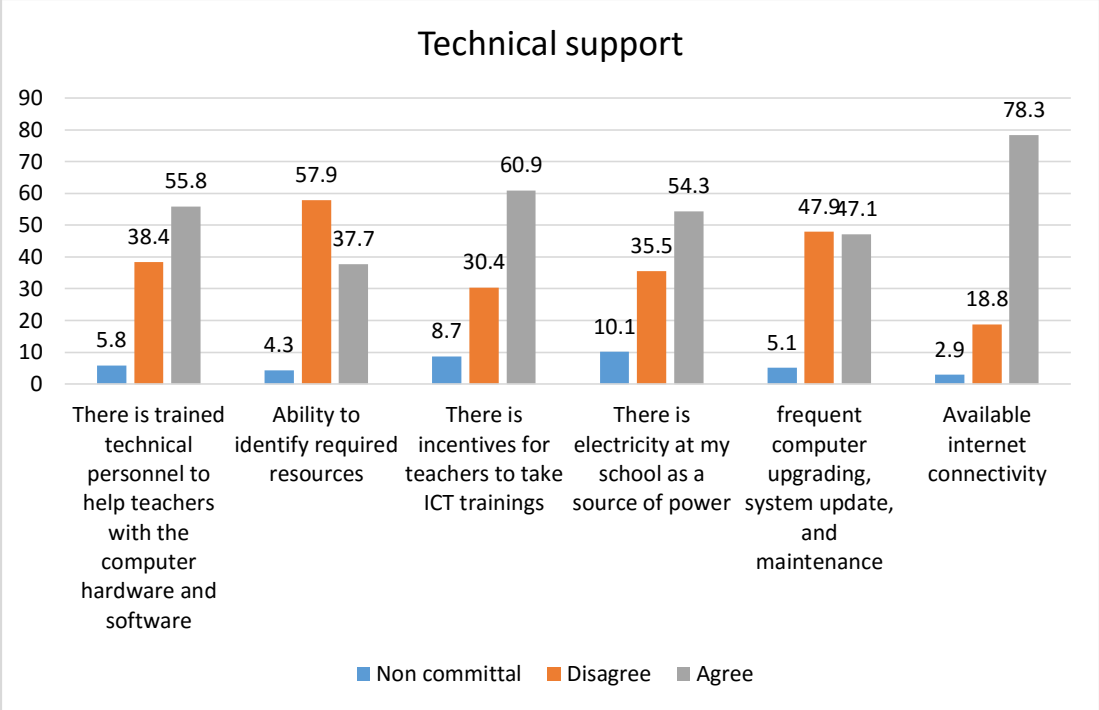

Figure 4.1: Available technical support

Results reflected on Figure 4.1, shows that schools were connected to the internet. Respondents indicated 108 (78.3%) that they agreed that the schools had an internet connection, 26 (18.8%) disagreed, 4 (2.9%) were not sure if the schools were connected to the internet or not. This indicates that schools are in position to carry out research and to teach using internet resources. This concurs with Wambura (2017) who argued that most schools have access to the internet. However, this contradicts findings by Muhammad et al., (2019) who reported that internet facilities in schools were not available. Additionally, Omariba, (2016);Orinda, (2015) reported that although schools had limited access to internet connectivity available internet facilities were not fully utilized. 57.9% of the participants disagreed that they had no ability to identify the required resources, 37.7% of the participants agreed to have the ability to identify the required resources. 47.1% of the participants agreed that the computers are upgraded, updated and maintained while 47.9% of the participants disagreed with the same

statements. 5.1% of the participants were undecided whether the computers in their schools were frequently upgraded and system updated.

More than half, 75 (54.3%) of respondents agreed that they have electricity as a source of power in their schools. Responses on trained technical personnel whose role is to help teachers with the computer hardware and software showed that 77 (55.8%) agreed that they had trained technical personnel in schools, 53 (38.4%) disagreed while 8 (5.8%) were not sure. Therefore, technical support was found to be available in schools to assist teachers when they face a problem related to ICTs use. Technical support is critical for ICT integration and similar sediments are echoed by Baharuldin et al., (2019) who reported that technical assistance is necessary and should be provided in schools for ICT integration to succeed. However, in schools where ICT facilities were reported to be available, participants indicated not to utilize the ICT facilities because they had limited time. The utilization level of ICT facilities was found to be limited because of time. More than a third, 52 (37.7%) of respondents agreed that they could identify required ICT resources while 80 (57.9%) disagreed. Although there was a technical personnel in schools, teachers revealed that they could not identify ICT resources while teaching. This is revealed from the participant response that,

> ……*even during the course of teaching. You reach somewhere you find, if you don't have the technical knowledge, then you require the knowledge of that technical person*…. (Interview, line 61, page 2, {March 2021}).

From this response, it is clear that technical personal in schools plays an important role in ICT support by managing the available ICT systems. In schools where there was a technical person, it was identified that teachers lacked skills to operate ICT facilities. Furthermore, in schools where they lacked technical personnel, it was identified that even when teachers want to incorporate practical sessions with the use of ICT they lacked technical assistance and hence end up not utilizing ICT. This is in agreement

with Salehi & Salehi, (2012) who argued that schools lack support from technical personal. Item B11 there are incentives for teachers to take ICT training 84 (60.9%) agreed, 42 (30.4%) disagreed, 12 (8.7%) were not sure whether there were incentives for teachers to take ICT training. With the statement being agreed on with 60.9% indicated that schools had organized ICT workshops and training for teachers. Qualitative data in response to ICT training for teachers in school, a participant quoted that;

> *…It is done several times, even now as you were in the staffroom you heard the class monitor in charge of ICT, reminding teachers to go for training. We normally have our training on Tuesdays and Thursdays.* (Interview, line 32-33, page 1, {March, 2021})

From the above narration, the participant described that teachers often have ICT training two days a week. The findings on technical support revealed that it is important to train teachers to integrate ICT in their teaching. This consonant with Solomon, (2011) found out that the integration of ICT needs trained people who can install, maintain and support the available systems. Additionally, teachers need to be trained in basic ICT skills and ICT basic teaching methods so that they feel comfortable while incorporating ICT in teaching. Effective use of ICT is based on training, workshops, and fresher courses for teachers' effective usability of ICT (Khaliq, 2020). However, this doesn't concur with Wambura, (2017) findings that teachers lack technology training. Therefore, technical personnel, internet connection, power supply, and ICT training are fundamental aspects in the integration of ICT.

4.4.5 Available ICT facilities in schools

Respondents were asked to indicate yes if the ICT facility is available and No if the ICT facility is not available in school. Figure 4.2 shows these findings.

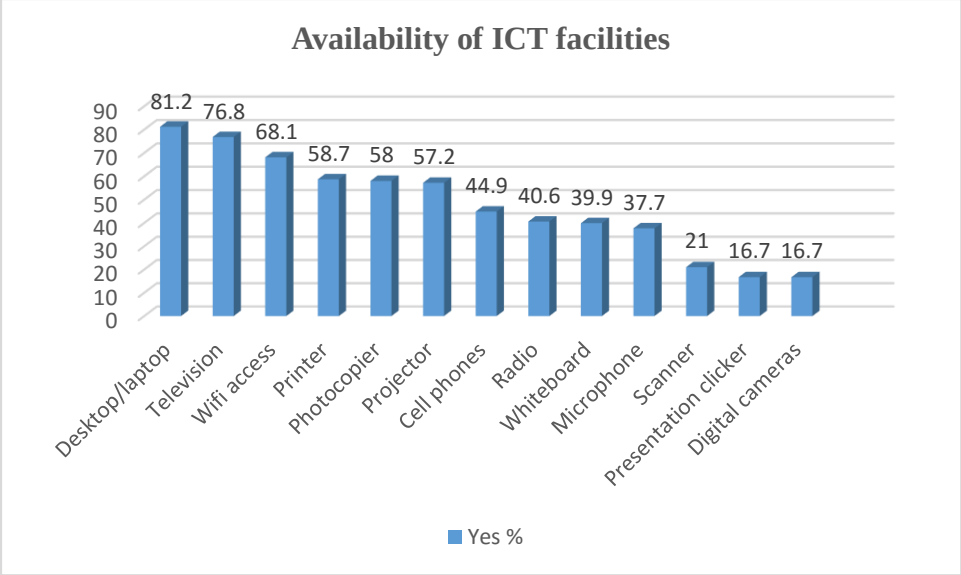

Figure 4.2: Available ICT facilities

In figure 4.2 above shows the ICT facilities that are available in schools. This figure reveals that majority of the schools 129 (93.5%) had printers, projector 119 (86.2%), photocopier 120 (87.0%), television sets 106 (92%), desktop/laptops 127 (92%), Wi-Fi access 108 (78.3%), whiteboard 86 (62.3%) and other ICT facilities 109 (79%). The response rate in percentage indicated that printers, projector, photocopier, television, radio, desktop/laptop, whiteboard, and Wi-Fi were available in schools with more than 60%. However, there were limited provision of presentation clicker, scanner, microphone, and digital cameras. Results collected from respondents indicated that secondary schools had most required ICT facilities for teaching while others reported inadequacy of these facilities in their schools. This indicated that most of the schools had ICT facilities. In support of this, qualitative data revealed that schools had received ICT facilities from MOES, donors, and NGOs. One of the participants reported;

> *…. most of the computers were supplied by the government" …*
> (interview, line 56, page 3 {February 2021})

In the quotation above the participant reported that most of the computers that they have at school were supplied by the government. This indicated that the government has

supported schools by providing ICT facilities like computers that can be used by teachers and learners in the teaching and learning process. These findings confirm what Moses, (2009) concluded that schools have available ICT resources and receive support from the government.

Another participant reported that

> *……" see the labels, different donors including the government have given us computers and have given us different facilities that improve on the use of ICT"……. (Interview, line 58-59, page 3 {February 2021})*.

Based on the participants' quotation above, it can be noted that despite the government providing ICT facilities, schools have also received ICT facilities from a donation. The quotation above provides evidence that schools had ICT facilities either from the government or from donors. Participants also indicated that inadequate ICT facilities in schools were due to certain schools receiving ICT facilities from different ministries and organizations as donations while others did not lobby for such donations. This was also based on Figure 4.2 where the majority of the respondents answered yes, this indicated that schools had ICT facilities readily available in schools.

Previous research studies also indicate similar findings Chioma (2018); Mohammed and Ahmed (2013) found out that ICT facilities are available in schools. Additionally, Baharuldin et al., (2019) urges that ICT infrastructure plays a great role in integrating ICT in the classroom. However, this is contrary to Enu et al., (2018); Etor et al., (2020); Mwanaszumbah and Magoma (2016) findings that ICT facilities in schools are inadequate and there should be an adequate supply of ICT facilities in secondary schools for effective utilization by teachers. This implied that although ICT facilities seem to be inadequate in certain schools there was no school without any ICT facility available. Henceforth, adequate ICT facilities in schools is a global issue but it varies

among countries (Garba et al., 2015). The availability of ICT facilities in the classroom is a critical factor that affects the integration of ICT in education. While Ali (2020); Isaboke (2018) noted that the availability of ICT facilities in school doesn't lead to the integration of ICT.

4.4.5 Distribution of respondents by opinion on utilization of available ICT facilities

Figure 4.3 below, participants were asked to indicate YES if they have used the available ICT facilities in school and indicate NO if they haven't used the ICT facilities, it is revealed that majority of participants had not used most of the ICT facilities in schools.

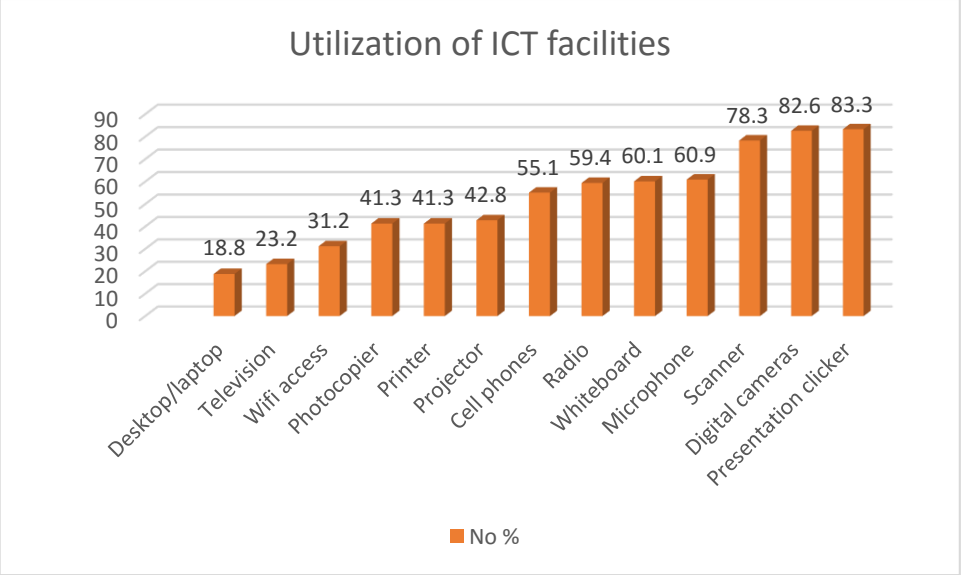

Figure 4.3: Utilization of available ICT facilities

According to responses on use of ICT facilities majority of the participants indicated that they had least used presentation clicker 115 (83.3%), digital cameras 114 (82.6%), scanners 108 (78.3%), whiteboards 83 (60.1%), radios 82 (59.4%). This means that teachers hardly integrated the use of critical ICT facilities in their teaching. The computation of percentages helped the researcher to judge that ICT use in teaching is limited in schools. The qualitative data also confirmed that while ICT facilities are

available in schools teacher utilization is low because teachers have no time. This is evident from the respondent comment in table 4.4 above.

Therefore, it could be averred from the analysis that there was a positive response that ICT facilities are available in secondary schools though teachers are not utilizing them because the use of ICT in teaching takes a lot of time. It was also revealed that teachers teaching timetable allocated 80minutes for a double lesson and 40minutes for a single lesson making it difficult to utilize ICT facilities in teaching. This concurs with Namae (2020a) who argued that Uganda National Curriculum Development Centre needs to extend and add more time to teachers to allow ICT utilization in teaching and create time for students to explore it. It can also be noted that time is not the only factor why teachers have not utilized ICT but there are other factors. According to Ali, (2020) schools may have ICT facilities but having facilities does not mean ICT has been implemented or integrated but there are other supportive factors like teacher readiness to integrate ICT. Therefore, the utilization of ICT was found to be uneven where some schools were found to be utilizing ICT in teaching than others not. This shows that schools with limited ICT facilities were being left behind. Inequality in access is determined by many factors such as availability, reliability of ICT infrastructures, skills in use and motivation of users. Although, some schools were equipped with ICT facilities, they lacked an ICT policy, maintenance and upgrading of the software and hardware of these ICT facilities.

4.5 Objective 2: Teachers' and Administrators' Perceptions Regarding ICT Integration in Teaching and Learning

During semi-structured interviews, participants were asked to share their perceptions regarding the integration of ICT in teaching and learning in their schools. The following themes emerged from the thematic analysis of interview data.

Table 4.5: Theme and categories from qualitative data

Theme	Category
Theme 1 understanding and relevance of ICT integration in teaching and learning	• Understanding of ICT integration • Relevance of ICT in teaching and learning
Theme 2 Challenges and practices for ICT integration in teaching in learning.	• Practices on the use of ICT • Challenges faced in integrating ICT in teaching and learning • Contribution of the school to the development of ICT

4.5.1 Theme 1: Understanding and relevancy

This theme presents the key findings regarding participants' perceptions and views on their understanding of ICT integration and its relevance in teaching and learning. From the analysis of the data, two categories emerged namely: Our understanding of ICT integration and the relevance of ICT integration in teaching and learning. The findings on these are presented below:

4.5.2 Our understanding of ICT integration

During interviews, different participants gave their perceptions on their understanding of ICT integration in teaching and learning. Some understood it as a way of using modern technology in teaching such as the use of a computer while others looked at it as the use of ICT materials in place of using chalkboards during classroom instruction. One of the participants said:

> *….. Well, my understanding is that this is the way we can use modern technology in teaching and learning and most especially where we use computers, projectors in our teaching-learning process….. (Interview, line 15 18, page 1, {March 2021})*

Another participant reported that;

> *……when we talk of integration one can say they are ICT materials that a teacher or instructor can use. ICT integration is the use of technology, instead of a teacher using a chalkboard he or she can*

> *decide to use PowerPoint when teaching*…. (Interview, line 13.15, page 1{May 2021}).

The above quotations indicate that participants view ICT integration in terms of using modern technology instead of the traditional learning materials like chalkboards etc. in the teaching and learning processes. Participants noted that when a teacher uses PowerPoint instead of chalkboard means one has integrated ICT. Additionally, with the use of ICT in teaching and learning, students are attracted and are active in class than when using traditional methods of teaching. Another participant noted that;

> *.....Integration is a tool that attracts more attention, invites students' activeness in the classroom ... (interview line 11, page 1, {April 2021}).*

4.5.3 Our views regarding the relevance of ICT in teaching and learning.

With respect to the participants' views on the relevance of integrating ICT in teaching and learning, participants reported that it eases work and arouses the interest of learners to learn and actively participate in the learning process. One of them argued:

> *……It is very relevant because one, it eases the work, two It creates the interest that is, if you introduce it properly, it even cultivates the interest of learners. For example, when it comes to the sciences here, we have different programs, for example, we have a program of Cyber School Solutions. So, in that program, we designed different experiments. These experiments, even without the teacher, a student can go to the lab, they switch on the computer, then they put on, start watching, For example, preparation of oxygen ammonia, then the experiment is done on the screen and the student picks up the interest to go to the lab and then manipulate the apparatus on her own to prepare what she has seen….. (Interview, line 35-43, page 2{march, 2021}).*

In the excerpt above, the participant explains that integration of ICT eases work for the teachers and motivates the learners to fully and actively participate in learning. This is related to what Juma et al., (2016) opined when they reported that ICT is relevant in gathering and disseminating information. In this case, the teachers can collect information that they can use in teaching and therefore ease their work. The participant

goes on to cite an example of using ICT in the teaching of science subjects where learners will be engaged in experiments where they use computers. In this process, the learners are excited to switch on the computers and therefore use their senses to learn including their sight and hands. This leads to active and participatory learning as well as promoting cooperative learning among students or learners. This is in line with Onanuga (2019) who contends that the use of demo kits brings students to reality. However, Namae (2020a) claims that, teachers who are non-users of technology don't identify it as being applicable in their teaching.

4.5.4 Theme 2: Challenges and practices

This theme explored participants' perspectives and views regarding the challenges and practices for ICT integration in teaching and learning. Challenges signify conditions that make it difficult for teachers and the school to integrate ICT while practices in this context relate to how ICT is being integrated into teaching and learning processes in schools, and what is needed to integrate ICT effectively. Participants reported that the schools and teachers utilize ICT differently and in many ways. But also face different challenges when integrating ICT in the teaching and learning process. Three categories emerged from the analysis of data namely; practices on the use of ICT in teaching and learning; challenges faced in the integration of ICT and; the contribution of schools in the development of ICT. Each of these is explained below:

4.5.5 Practices on the use of ICT in teaching and learning

Participants perceived practices as a way in which ICT is applied and utilized in the teaching and learning process. They explained that with the use of ICT in teaching, one can get information through the internet. One participant narrated that there is a lot that a teacher can teach him/herself when equipped with computers. Teachers can download information from the internet and use it in teaching. Two school administrators said:

> *.....if you have the computer with you and constantly you do practice there is a lot you can teach yourself. ICT itself is a source of information. For example, when you go to the Internet, you can download a lot of information in your subject area and even here in-office… (Interview, line 65- 66, page 3, {April 2021}).*
>
> *…currently, most of the learning is on the Internet as an example… (Interview, line 40-41, page 2 {march, 2021}).*

These voices from participants provide evidence that the internet is being utilized in schools. The participants argued that with the internet, teachers can learn a lot and therefore be well informed to teach students in their various subjects. The internet is a source of information that supplements what is written in the traditional textbooks they have been using for years.

Another participant narrated how ICT is used in the registration process of students in school. The participant emphasized that ICT makes work easier and faster. He reported:

> *……. these days when am registering students online I don't do it manually and very first after entering the data, when I have read through and the students have accepted, I just click the work becomes faster….interview, line 38-40, page3, {April 2021})*

There are other ways of integrating ICT which were identified from participants' narration. One of them was the retooling of teachers. Some participants highlighted that ICT training is conducted two days a week, monthly and others indicated yearly. They also indicated that ICT training help teachers to have skills and gain confidence in its use. One reported:

> *….you heard the class monitor in charge of ICT, reminding members to go for training. We normally have our training on Tuesdays and Thursdays… (Interview line 32-33, page 1, {April 2021}).*

Another participant quoted that,

> *……..we do workshops, we do seminars, we train them….. (Interview, line 70-71, page3 {March 2021}).*

Another participant with the same view pointed out

> *…We normally encourage teachers to utilize these facilities in school……. (Interview, line 17, page 1, {May 2021}).*

While another participant noted that

> *…….as I had said earlier the municipality has tried to organize workshops and even here at school we have training and workshops for teachers…. (Interview, line 60-61, page2, {May 2021}).*

The above data revealed that ICT in schools is utilized mostly through the internet. To fully utilize ICT in teaching participants indicated that ICT training; workshops have to be carried out. One of the participants indicated that the government has supported ICT integration through organizing workshops. This concurs with Kafyulilo et al., (2016) who noted that teachers gain ICT skills and knowledge through professional programs. Additionally, findings revealed that even schools which organized ICT trainings and workshops for teachers, many teachers still lacked technology skills to operate ICT facilities. This is in line with Namae (2020a) urged that more attention should be focused on training teachers to integrate ICT effectively. This confirms what LaToya et al., (2017) opined that low utilization of ICT is attributed to the lack of training of teachers.

4.5.6 Challenges in ICT integration

Participants identified different challenges they normally face while integrating ICT in teaching and learning. They also suggested possible solutions. The challenges faced in the integration and utilization of ICT in classroom teaching and learning stem from the lack of or inadequacy of digital and critical skills (Ottestad & Gudmundsdottir, 2018). Among the challenges that came up during the analysis were limited ICT skills among teachers, limited ICT facilities, limited time, breakdown of computers, and teachers' hesitation to use ICT. Although schools had some ICT facilities to use in teaching, the number of students in school outnumbered the available facilities thus limiting utilization. Some of the participants reported;

> *……I will start with where we are seated right now. This is our computer lab. We have a school of one thousand one hundred plus girls. Now, imagine we are bringing them here to demonstrate a certain concept. Automatically, you see the ratio of the computer to the students, or the learner is not friendly. So the congestion and availability of facilities are one. Two, most of us when we are training, ICT was not a big issue. So to change from that kind of life up to now becomes a little bit difficult….(interview, line 19-24, page 1, {3rd May 2021}).*

Another participant noted that

> *…..our resources are limited, I can't say that we have no facilities but those available are not enough for us. We have around 1000 students and 60 plus teaching staff. So if let's say we put one class in the lab, they will not fit even if you allow stream by stream they cannot fit in this lab…..(Interview, line 26-29, page 1, {13th May 2021}).*

The above participants' quotations indicated that schools had limited ICT facilities. A large number of students resulted in congestion which became a challenge for ICT integration to take place. Participants reported that, to minimize congestion classes were divided into two or more streams. Even with streams, students were still many for the available ICT resources. This is in agreement with Geoffrey (2010) who noted that ICT facilities are inadequate and institutions have a large number of students being admitted every term. Based on the interview with school administrators some noted that the available limited facilities require maintenance but there was lack of technical support. At the time of the study most of the ICT facilities especially computers in some schools computer labs, required update and upgrading. In some other schools, computers in the lab were covered with dust and many were not functioning compared to the ones which were working. This concurs with Prasad et al., (2015) noted that there is inadequate ICT facilities in school. However, Siddiquah & Salim, (2017) noted that ICT facilities are available even students have personal computers. However, it is contrary to Mohammed & Ahmed, (2013); Chioma (2018) noted that schools are equipped with ICT facilities. Therefore based on this study and the available literature it can be

identified that most of the schools have many students and there is limited use of ICT facilities in teaching.

Participants reported that teachers lack skills during the integration of ICT in teaching. One said:

> *....another challenge skills, we lack skills to operate these gadgets. It is not only in teaching where we have no skills even using our desktops in the office. I personally normally face challenges with my laptop, it has difficult windows for me to operate, so whenever it fails to work I ask for assistance from the IT department. And whenever this IT guy comes to work on it he says ooohhh deputy the problem is not so much, it's so simple….. He touches there, there, and there and then it works. So imagine if it fails to work when there is no IT person around. So we still lack skills but at least I know how to use a smartphone, and for computer am learning slowly by slowly I will reach there. (Interview, line31-38, page 2{13th may, 2021}).*

It was also evident from another participant who noted that*;*

> *….. one of the barriers, is manipulating these gadgets. ICT gadgets, because you find a person cannot even connect a projector to the computer. That means if he or she wants to use the projector, she has to first go and look for the person who is skilled in that area to come and connect it….(interview, line, 56-59, page 3{march, 2021}).*

While another participant expressed his view that;

> *……..Now, when you go to the staffroom, you find a few teachers with smartphones, which is a simple gadget that would help in teaching and learning, it would help teachers access most of the ICT concepts but skills……(interview, line76-78, page3{march,2021}).*

The quotations above showed that teachers have limited skills to use ICT tools in teaching. Participants indicated that when using ICT resources there are always technical support available to assist. They also reported that it is not only in teaching where ICT is used but also in management activities in the school. This concurs with Akarawang et al., (2015) who reported that teachers have limited levels of ICT skills which affect their ability to fully integrate them in teaching and learning. However, some studies reported that teachers have the skills to use ICT materials in their daily

activities, but they leave them outside the classroom (Chepkorir & Kandiri, 2018; Ibieta et al., 2017).

The success of ICT use in teaching in any educational institution relates to the attitudes of teachers involved (Augustine et al., 2018). Participants pointed out that teachers' hesitation to utilize ICT is the biggest challenge that hinders ICT integration in teaching. One said:

> *There is also a challenge for teachers. Some don't want to listen, some even don't want to attend workshops and ICT training. Take an example… last week the municipality education officer organized an ICT training workshop in our municipality. Each secondary school had sent two representative teachers, at this school we also chose the two teachers who went for the workshop. You know when the workshop is done, you share with the rest of the teachers what you learned in the workshop. So here we invited the two teachers at break time to share with us surprisingly, one of the teachers who had gone for training said those who want to know maybe I can give you my handbook and read by yourselves. From the teachers' statement you can see that teachers are not serious with ICT integration… (Interview line 39-47, page 2 {May 2021}).*

From the above narration, it is clear that teachers had not taken ICT as an effective approach to teaching. Full integration of ICT will depend on the teachers' willingness to embrace and utilize it during teaching. Teachers were still rigid for not willing to adjust to new methods of teaching thus indicating the reasons to lack of ICT competence. It was also identified that teachers who had no skills had attended training institutions in the early days before the ICT revolution. This, therefore, makes it difficult for them to use ICT in teaching since it was not part of their training. One participant was quoted saying:

> *.....So some of us who have no skills when we were studying at university, we never had ICT …. (Interview, line 54, page 2{may, 2021})*

Another participant reported that

> *……..we are arranging workshops, such that people who did not study ICT during their training in their higher institutions can also benefit from these workshops….. (Interview, line 53, page3 {March 2021}).*

While another participant noted that

> *…..as a school we also look for teachers of the computer. This is not easy because most training institutions, teacher training institutions, are not producing ICT teachers. So what we normally do when we go out and go to universities, we get students who have trained in ICT though they are not professional teachers….. (Interview, line 50.53, page 2, {March 2021}).*

The quotation above provides evidence that teachers' limited skill is attributed to the lack of ICT training during their teacher training especially in earlier years before the ICT revolution. This is in line with Edison & Paul (2020) who reported that teachers who went to college in the late 1970s lack ICT skills because the teacher training curriculum didn't cover this aspect. Most of the teachers who lack skills did not receive pre-service training (Wright, 2017). Teachers with no skills should attend ICT workshops and training to acquire skills (Adu & Galloway, 2015). Teachers who have experience in teaching are believed to be less competent in using ICT (Kpolovie & Awusaku, 2016; Mafang'ha, 2016). However this is contrary to Namae (2020a) who noted that even when teachers go for ICT trainings they are still not prepared to use ICTs during instruction. She further noted that they are trained with skills that they already have which expose them on how to use Microsoft word which is a common application. The study findings clearly showed that most of the people teaching ICT in schools have not been trained in teaching. Furthermore, teacher training institutions in Uganda do not produce ICT teachers (teachers who have trained to teach ICT), and that most of the schools were responsible for looking for trained personal (who now are called teachers though not trained in teaching) to guide in the use of ICT. However,

their willingness to learn and attend training indicates a positive response towards the integration of ICT.

Different scholars have categorized challenges faced by schools trying to integrate ICT in teaching and learning as intrinsic and extrinsic problems. According to Habibu et al., (2020) explained these challenges as extrinsic problems are first order while intrinsic are second order problems. Finger (2016) identified intrinsic challenges as teacher confidence, professional development, attitudes and values of technology while extrinsic challenges are: lack of resource and time; quality of professional development. Another researcher Jamil & Jamil, (2016) identified intrinsic challenges such as teaching method and fear of using ICT facilities while extrinsic were poor infrastructure, limited accessibility of ICT tools and old curricula. Similarly, Liu & Pange, (2015) identified first order challenges as lack of hardware, lack of teaching materials and lack of pedagogical models while second order challenges are lack of teachers interest and support. However, Garba et al., (2015) argues that teachers' negative attitudes, limited ICT infrastructures and teachers' low level of ICT knowledge are no longer issues in Malaysia. But rather indicates that limited knowledge of TPACK and fast emerging technology are the challenges being faced by Malaysian teachers in utilizing the available ICT facilities in teaching and learning.

The above mentioned challenges congruent with the findings of this study. The findings revealed several challenges that hinder the integration of ICT in teaching and learning. These included: limited ICT skills among teachers; limited ICT facilities; limited time; teachers' hesitation to use ICT facilities and; breakdown of computers as the major challenges. In this study, intrinsic challenges include teachers' hesitation to use ICT, limited skills among teachers while extrinsic challenges were identified as limited ICT facilities, limited time and computer breakdown. Consistent with a number of studies

although teachers face these challenges when integrating ICT, they had appositive attitude towards its use and development (Habibu et al., 2020; Isaboke, 2018; Petko et al., 2017). It was noted that the almost all the schools experienced the same challenges.

4.5.7 Contribution of school to the development of ICT

Participants were asked to share their views and perspectives regarding the contribution of their schools to the development of ICT. Contribution relates to what the school has done to improve the state of ICT in teaching and learning. Participants noted that schools continue to significantly promote ICT in teaching and learning through various ways including buying computers and quipping computer labs at schools, connecting the schools to the internet, and retooling teachers in ICT skills. Some of the participants reported:

> *…….One is like what we are doing now, to exchange ideas and everybody appreciates, this is very necessary. And after that everybody has appreciated, then you need resource and resources majorly is resource capital to start with, to ensure that if we have a thousand girls here, we increase the number of computers we increase on space. And if possible, every subject and every learning experience includes an element of ICT integration. And that one majorly is determined by the resource envelope of which is capital. And if capital is available and all those catered for, I think learning will be much easier…… (Interview, line 50-58, page 3{February 2021}).*

Another participant noted that the school has contributed to ICT integration through the exchange of ideas with other schools. In her own words, she said:

> *…….well, one we buy computers. And this is an ongoing process because, you know, with the electronics, one you buy the following day, it is off and it has to be replaced, so that is the responsibility of the school…. (Interview, line 47-49, page 2. {March 2021}).*

The above quotation indicated that schools buy computers not necessarily waiting for donations. They also fix the broken-down computers so that they can still be used. This shows how schools are committed to the integration of ICT in teaching and learning. It

was also indicated that most of the schools engage resource persons to guide teachers and learners in the use of ICT. Another participant indicated that:

> *.....we have some associations within the school…. For example, we have an Old boy association that connects all boys that have passed through this school. So they provided laptop computers to every class teacher in this school, they have connected the school to wireless internet. Teachers are being retooled I think at this pace we are moving to integration…… (Interview, line 60-63, page2, {May 2021}).*

From the above quotation, it was evident that schools have contributed to the development of ICT in teaching and learning. It was also identified that through Old students Associations, schools have been able to install and get connected to the internet. Additionally, many schools have been engaged in retooling teachers in ICT. All these are initiatives have been done by individual schools to integrate ICT in teaching and learning processes.

More so, participants suggested possible solutions to the challenges they face in the integration of ICT. They suggested that schools and the ministry of education should organize ICT workshops and trainings for teachers so that they get exposed to the required skills in the integration of ICT. They also suggested that more time should be created on the time for ICT, allocate more funds to support ICT integration and facilities to be made available in schools. This is in line with Adu & Galloway, (2015) who confirms that teachers should acquire skills through training. Also Namae (2020a) asserts that more time should be allocated to teachers and ICT facilities made available for effective integration of ICT. Therefore, if these suggestions are worked on and more emphasis put on training teachers gain ICT knowledge and skills related to classroom. The utilization of ICT in teaching and learning would also increase and be appreciated by teachers to solve the problem of hesitation among themselves.

4.6 Objective 3: Teachers' ICT Skills and Competence in Enhancing Teaching and Learning

There is no statistically significant difference between teacher's ICT competencies in the teaching and learning. (T-Test and ANOVA results) An independent-samples t-test and ANOVA tests were run to determine if there was a mean difference between Teachers' ICT skills and Competences in enhancing teaching and learning and a number of teacher characteristics that included gender, age, nature of employment, level of education, teaching experience, employment status and type of employment. The statistical significance threshold is at $P<0.05$. ICT competence is one of the other components that impact the usage and ease of ICT in instruction. One is considered to be competent in case he or she knows to operate ICT facilities well. In response to the research question three (3) of this study regarding teachers' ICT competency, respondents were asked to rate and state the extent to which they agree or 4 disagree with the statements. The variables were measured on a Likert scale ranging from strongly disagree (1), disagree(2), non-committal (3), agree (4), and strongly agree (5).

4.6.1 Gender and ICT competence and skills among teachers

The t-test for equality of means results in Table 4.6 indicated that the difference in the mean ICT competence and skills score for male and female teachers was not statistically significant at the 5% level of significance t(136)-1.318, p=0.190. The test indicated that there is no significant gender difference in the ICT competence and skills score. The researcher fails to reject the hypothesis that the mean ICT competence and skills score for male and female is not different. This concurs with Mahdi & Al-dera, (2013) who found out that there is no difference between male and female teachers regarding ICT competence and skills among teachers. This is probably due to the fact that both sexes have equal access to available ICT facilities and have equal work load within the

schools. Additionally, the growing pressure from the Ministry of education and sports that require incorporation of ICT in teaching and learning has contributed to the above scenario. However, this contradicts with findings of Richard (2018) who asserts that male teachers and students are more skilled in ICT than female teachers. And further contradicts findings of Iddrisu (2019) who found that male teachers had higher ICT competences and skills than female teachers.

Table 4.6: T-test for Equality of Means for gender

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
-1.318	136	0.190	-0.164	0.125	-0.410	0.082
-1.335	109.247	0.185	-0.164	0.123	-0.408	s0.079

4.6.2 Age and ICT competence and skills among teachers.

The study findings in Table 4.7 indicate that there is no statistically significant difference F (3, 134) =0.220, (p=0.882) in the mean ICT competence and skills scores of the different age categories of the teachers. This is because the use of ICT in teaching is a compliance issue. There is no age difference, whether young or old, one has to use ICT in teaching and learning. Additionally, the national ICT's policy aims at imparting ICT skills to teachers therefore, teachers are expected to be competent and skilled in ICT use. This concurs with Mazoya et al., (2005) who found out that there is no difference between teachers age in the utilization of ICT resources. However, this contradicts Tarazi, (2017) who pointed out that teachers ICT skills are significantly different because of gender and years of experience.

Table 4.7: ANOVA of Age and ICT competence and skills score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.337	3	0.112	0.220	0.882
Within Groups	68.328	134	0.510		
Total	68.664	137			

4.6.3 Employment status and ICT competence and skills among teachers

The findings in Table 4.8 show that the mean ICT competence and skills score for full-time and part-time employment was not statistically different (P>0.05). The results indicated that although the mean ICT competence and skills score for teachers who were on full-time employment was lower than that of those who were on part-time employment, the difference was not significant. The researcher thus fails to reject the hypothesis that the mean ICT competence and skills score for full-time and part-time employment is not different. This is because both full-time and part-time teachers have the same responsibilities within the school for example work load, supervision of school activities. This contradicts with Namae (2020a) who opined that teachers employed on part-time basis have less ICT skills because they have less time to attend ICT trainings organized in schools.

Table 4.8: T-test for Equality of Means for employment

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
-0.283	136	0.777	-00.037	0.129	-0.292	0.219
-0.298	99.287	0.766	-.037	0.123	-0.280	0.207

4.6.4 Education and Teachers' ICT competence and skills

The findings in Table 4.9 indicate that there is no statistically significant difference in the teachers' mean ICT competence and skills scores by the different levels of education

attained by the teachers (p=0.430). This is because most of the higher institutions of learning have integrated ICT in their teaching processes. This is also due to the change in the lower secondary curriculum in 2020 that made ICT compulsory to increase teachers' ICT and skills and close the digital divide. This concurs with Lubaale (2020) who indicated that all lecturers in higher education institutions are encouraged to attend ICT trainings and acquire ICT skills.

Table 4.9: ANOVA of Education and Teacher's ICT competence and skills score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.853	2	0.427	0.849	0.430
Within Groups	67.811	135	0.502		
Total	68.664	137			

Source: Survey (2021)

4.6.5 Experience and Teachers' ICT competence and skills

The findings in Table 4.10 indicate that the p-value was greater than the 5% level of significance F =0.770, p=0.504. Thus, there was no significant difference in the mean ICT competence and skills scores for the different categories of the teachers based on their experience. The findings are in contrast with Osadebe and Ojukonsin, (2018) who found out that there is no significant difference between experienced and less experienced teachers in the integration of ICT. Consistent with the literature, this is due to a number of ICT trainings and workshops organized by the schools administrators and Ministry of Education and Sports that teachers attend. However, results from this study contradicts with some of the previous studies. For example Namae (2020a) found out that teachers are trained with ICT skills that they already acquired when they were at the university. On contrary, Edison and Paul (2020) points out that teachers who were in colleges and universities in early 1970's have no ICT skills because by that time, ICT had not emerged like it is today. Furthermore, Andrea et al., (2017); Mafang'ha

(2016) revealed that, less experienced teachers are more competent and skilled in ICT than experienced teachers.

Table 4.10: ANOVA of Experience and Teacher's ICT competence and skills score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.164	3	0.388	0.770	0.512
Within Groups	67.500	134	0.504		
Total	68.664	137			

Source: survey (2021)

4.6.6 Type of employer and ICT competence and skills among Teachers

The results in Table 4.11 indicate that the mean ICT competence and skills score for teachers employed by government was lower than that of their counterparts employed by PTA (mean difference of 0.248). Furthermore, the results indicate that mean ICT competence and skills score for government employees and PTA employees was statistically different at the 5% level of significance t (136) = -2. 081, p=0.039. This implied that teachers who were employed by PTA were competent and skilled in ICT use than those employed by government. This harmonizes with results in table 4.11 above which showed that teachers employed on contract were competent with ICT and had ICT skills than teachers who were permanently employed. This can be due to the fact most teachers employed on PTA are part time teachers and they are much exposed to ICT resources because they move from school to school. This contradicts Tarazi (2017) who pointed out that teachers ICT skills are significantly different because of gender and years of experience.

Table 4.11: T-test for Equality of Means of scores for employer

T-test for Equality of Means						
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
-2.081	136	0.039	-0.248	.119	-0.483	-0.012
-2.078	134.207	0.040	-0.248	.119	-0.484	-0.012

Source: Survey data (2021)

4.6.7 Teachers' ability to use computer applications

Table 4.12 shows teachers' ability to accomplish their work using computer applications in teaching, this was rated by respondents as indicated below.

Table 4.12: Teachers' ability to use computer software applications

Code	Item	Response	Frequency	Percentage	Mean
D14	Database (e.g. MS access)	Excellent	32	23.2%	2.702
		Good	26	18.1%	
		Fair	34	24.6%	
		Poor	43	33.3%	
	Total		135	100%	
D15	Word processor (e.g.MS word	Excellent	48	34.8%	2.318
		Good	37	26.8%	
		Fair	21	15.2%	
		Poor	25	18.11%	
	Total		131		
D16	Presentation (e.g.MS PowerPoint)	Excellent	35	25.4%	2.478
		Good	38	26.8%	
		Fair	33	23.9%	
		Poor	28	20.3%	
	Total		134	100%	
D17	Spreadsheets (e.g.MS Excel	Excellent	28	19.6%	2.456
		Good	73	38.4%	
		Fair	25	18.1%	
		Poor	30	21.7%	
	Total		156	100%	
D18	Graphic design (e.g adobe)	Excellent	8	5.8%	3.260
		Good	23	15.2%	
		Fair	32	23.2%	
		poor	75	54.3%	
	Total		138	100%	
D19	Internet search tools e.g Google	Excellent	72	52.2%	1.695
		Good	44	31.9%	
		Fair	14	10.1%	
		Poor	8	5.8%	
	Total		138	100%	

Source: survey data (2021)

The results in table 4.12 above show that respondents were competent regarding using computer applications in their teaching. More than half of the respondents (52.2%) indicated that they were excellent in using internet search tools while 34.1% indicated that they were excellent in using Microsoft word. This shows that respondents were exposed to internet search tools and word processors than any other computer application as shown by the least mean scores (1.6957 and 2.3188 respectively) on these items. This is also evident by Kisirkoi (2019) who noted that teachers were able to manage computer applications in teaching and learning.

Additionally, some 35(25.4%) of the respondents agreed with the statement that they could use Microsoft PowerPoint while a smaller number 28(19.6%) indicated they could use spreadsheets. The table also shows that nearly one quarter 32(23.2%) of the respondents agreed that they could use the database. Although respondents could use PowerPoint, spreadsheet, and database the table above continues to show that a significant number of the respondents could not use these applications. For example, 33.3% of respondents indicated their use of a database was poor while 24.6% indicated that they can fairly use the database. With respect to using spreadsheets, 21.7% indicated poor use while and 18.1% indicated fair use. Finally, 20.3% indicated poor use of PowerPoint while 23.9% indicated fair use of the same application. It was also established that majority of the respondents were not competent in using PowerPoint, spreadsheet, and database as shown by the mean values.

The Table 4.12 further shows that a small proportion 8% of the respondents were excellent in using graphic design but 54.3% indicated poor use of graphic design. This means that more than half of the respondents could not use graphic design at all. This confirms that respondents were not competent in using graphic design whereby it had the highest mean value of 3.2609. These study findings are similar to those of Kaur &

Singh (2014) who pointed out that teachers were competent on certain computer applications such as Microsoft word and internet browsing. Similarly, Garba et al. (2015) reported that teachers can use computers and ability to access online information and resources. However, this is contrary to İmer (2016) who points out that teachers lack ICT skills to operate computers. Additionally, Muhammad et al., (2019) noted that schools lack internet facilities.

Despite a series of ICT training and workshops organized by different stakeholders, there are still some issues concerning teachers' ICT skills and competencies. From the findings, it was revealed that teachers in secondary schools have an interest to use ICT but did not have ICT skills to coordinate the available ICT tools in teaching. Additionally, the problem is in approaching the accessible ICT tools at the period of scarcity where there is a long line of teachers waiting to utilize the limited ICT tools this has disappointed teachers to resign to their traditional method of teaching.

4.7 Objective 4: The extent use of ICT by teachers in teaching and learning processes

This section presents data related to objective four of the study. Responses were based on a Likert scale ranging from strongly disagree (1), disagree (2), non-committal (3), agree (4), and strongly agree (5). The results are summarized below

Table 4.13: The extent of Teachers' use of ICT in teaching and learning

Code	Item	SD %	D %	NC %	A %	SA %	Mean	StD
E1	Computers make work more interesting	4.3	3.6	1.4	51.4	39.1	4.137	.958
E2	Teachers enjoy teaching using technologies	26.8	26.1	13.8	27.5	5.8	2.594	1.299
E3	Teachers prefer preparing my lesson using computers	8.7	23.2	20.3	36.2	10.9	3.175	1.168
E4	My school has enough teaching and learning ICT facilities	8.0	24.6	5.1	52.2	10.1	3.318	1.183
E5	Technology increases teachers efficiency	4.3	8.7	5.8	64.5	16.7	3.804	.965
E6	Teachers use technology to analyze student achievement	15.2	24.6	5.1	45.7	8.7	3.080	1.295
E7	Use technology for administration and classroom management	6.5	33.3	11.6	43.5	5.1	3.072	1.111
E8	Use technology for information presentation for example PowerPoint	12.3	24.6	18.1	34.8	10.1	3.058	1.224
E9	Teachers make errors frequently when using computers	21.0	36..2	10.9	26.8	5.1	2.587	1.230
E10	ICT facilities are difficult to use	21.0	48.6	10.1	15.9	3.6	2.321	1.090
E11	It is difficult for me to be skilful in using technology	27.5	44.2	3.6	19.6	4.3	2.442	2.198
E12	Teachers want to learn more about using technology	15.2	17.4	2.9	47.8	15.9	3.321	1.350
E13	ICT helps me to learn many new things	0.7	2.2	4.3	47.1	45.7	4.347	.731
E14	frequently play around with technology	15.2	24.6	6.5	35.5	18.1	3.166	1.385
E15	Teachers think the use of ICT in teaching is a waste of time	68.1	11.6	3.6	10.1	6.5	1.753	1.288

Source: survey data (2021)

Table 4.13 above indicated that the mean scores were in the range of 4.3478 to 1.7536, the standard deviation was in the range of 2.19827 to .73148. Scores of SA and A are grouped to represent Agree, scores of D and SD are grouped to represent Disagree, and

N to represent respondents who were not sure. The majority of the respondents 128 (92.8%) agreed that ICT helps them to learn new things. This is evident since it has the highest mean of (4.3478). It was also established that, 125(90%) of the respondents agreed that computers make work more interesting while 11(7.9%) disagreed and 2(1.4%) were not sure about the statement. This implies that majority of the respondents were aware of computer functions. From the findings, 86 (62.3%) of respondents agreed that schools had enough teaching and learning ICT facilities while 45(32.6%) disagreed. More than half of the respondents 73(52.9%) disagreed that they enjoy teaching using technologies while 46(33.3%) agreed with the same statement.

Despite, respondents agreeing to statements that computers make work more interesting, schools had enough teaching and learning ICT facilities and prepared lessons using computers, many disagreed with the statement that they enjoy teaching using technology. Therefore, findings have shown that teachers recognized ICT as a key tool for teaching and learning and that they have the skills and competencies required to use it. However, ICT is not fully utilized in these schools because of the negative attitude among teachers in using the same to teach.

Additionally, 110(79.7%) of the respondents disagreed that the use of ICT in teaching is a waste of time. This is the only statement that had the lowest mean value (1.7536) compared to other statements in the table. More than half of the respondents 96(69.6%) disagreed that ICT facilities are difficult to use, while 99(71.7%) disagreed that it is difficult to be skillful in using technology. The lowest, negatively rated item with a mean of 1.753 and standard deviation of 1.288 was E15 “I think the use of ICT in teaching is a waste of time” while the highest, positively rated item with a mean of 4.347 and a standard deviation of 0.731 was E13 “ICT helps me to learn many new

things". The rating of the remaining thirteen items on the teachers' extent use of ICT in teaching and learning fell between the ranges.

With respect to the use of ICT, in teaching and learning, there seems to be a contradiction between the findings in the first objective and those of this objective. From the findings of the first objective, respondents agreed to the statement that the use of ICT in teaching takes a lot of time while findings on this objective disagreed with a similar statement. This shows inconsistency among participants. According to Agbo, (2015), lack of time is the most significant factor that hinders teachers' use of ICT in the classroom. From the qualitative data, (refer to findings in the second objective) teachers felt that they lacked time on the scheduled timetable to use computers and practice on how to use other ICT gadgets. Therefore this shows that even though it was easy for the teachers to be skillful in using technology, the utilization of ICT in teaching was based on teacher's time.

4.7.1 Teachers teaching strategy when Integrating ICT

Responses were based on a Likert scale ranging from strongly disagree (1), disagree (2), non-committal (3), agree (4), and strongly agree (5). The results are summarized in the table below.

Table 4.14: Teachers teaching strategies when integrating ICT

Code	Item	SD %	D %	NC %	A %	SA %	Mean	StD
E16	Teachers' relationship with students	6.5	12.3	8.7	44.2	28.3	3.753	1.182
E17	Teachers' use of chalk and board in explaining the lesson	3.6	8.0	3.6	52.2	32.6	4.021	1.007
E18	Teachers' use of textbooks as an instructional material	3.6	10.9	2.2	50.0	33.3	3.985	1.060
E19	Teachers' use of PowerPoint presentation while teaching	29.0	32.6	9.4	18.8	10.1	2.485	1.352
E20	Updated with present trends relevant to the subject matter	5.8	6.5	6.5	53.6	27.5	3.905	1.059
E21	Teachers' support towards student centered-learning	16.7	12.3	3.6	44.9	21.7	4.724	3.723
E22	Teachers' encouragement to student the creativity	0.7	2.2	1.4	63.0	32.6	4.246	.659
E23	Critical thinking and problem-solving are important skills for students	0.7	2.9	5.1	61.6	29.7	4.166	.710
E24	Teachers' use more than one strategy while teaching	48.6	26.8	7.2	12.3	5.1	1.985	1.232
E25	Teachers' provision of student-centered lessons that are based on the real world	0.7	6.5	2.2	56.5	34.1	4.166	.815
E26	Teachers' belief that ICT can improve my teaching practice	2.2	2.2	5.1	52.2	38.4	4.224	.819
E27	Can select technologies to use in my class that enhance what I teach, how I teach, and students learn	24.6	55.4	7.2	30.4	11.6	2.920	2.092

Source: Survey data (2021)

Results in Table 4.14 above rated respondents' teaching strategies through applying ICT in teaching and learning processes. The majority of the respondents 92 (66.6%) agreed that they "support student-centered learning" this was the highest, positively rated item

E21 with a mean of 4.724 and a standard deviation of 3.723. Item E24 “use more than one strategy while teaching” was the lowest, negatively rated item with a mean of 1.985 and standard deviation of 1.232. This indicated that most of the teachers are normal users of ICT, they are updated, they support student-centered learning and many more indicated that they frequently use ICT for their work rather than using it in the classroom for teaching and learning purposes. This is evident on item E24 which was negatively rated with a low response rate, with 24 (17.4%) agreement and 104 (75.4%) disagreement. This showed that respondents use one strategy while teaching.

The rating of the remaining ten items on the teachers’ teaching strategies when integrating ICT fell between to the two lower and upper response limits. More than three quarters 112 (81.1%) of the respondents agreed that they were “Updated with present trends relevant to the subject matter”. Despite respondents' agreement that they were update with the relevant trends relevant to the subject matter, 84.8% of respondents still use chalk and board in explaining the lesson, and 83.3% of respondents use textbooks as instructional material. This concurs with Ghavifekr et al., (2012); Ibieta et al., (2017) who noted that teachers use ICT outside the classroom frequently for class preparation. However, more than half of the respondents believed that ICT can improve their teaching practice, and yet 84.3% of teachers still use chalk and board method in teaching this implied that teachers had not applied ICT in their teaching practices.

Additionally, 85(61.6%) of respondent’s disagreed that they use PowerPoint presentations while teaching, and 40(28.9%) agreed with the same statement. This implied that respondents hardly use PowerPoint in their teaching practices. Findings indicated that it was rare to find teachers using PowerPoint presentations to demonstrate a concept. This can be concluded that several teachers were not competent in preparing

and delivering lessons using ICT resources especially PowerPoint projectors. Lastly, 69(50%) of the respondents disagreed that they can select technologies to use in their class that enhance what they teach, how they teach, and students learn while 58 (42%) agreed that they can select technologies in class to enhance teaching. This is indicated that respondents seldom use ICT in class. Consequently, some respondents reported that it was difficult to select the relevant technologies to use in the classroom. It was also reported that teachers use ICT facilities to prepare lessons and schools had some ICT facilities though they were not enough.

In this study, one of the assumptions was that teachers have the skills to utilize ICT facilities. From the findings, teachers have been provided with computer training and therefore, it was expected that they would use ICT in the teaching and learning process. Contrary to this assumption there was an increase in the use of computers and the internet by teachers but not during classroom teaching. Orinda (2015) asserts that teachers use ICT facilities mostly in teaching which is contrary to the findings of the current study. Teachers were found to be active in using the internet through their smartphones mainly for personal use rather than for teaching and learning.

4.7.2 The influence of teaching experience on ICT integration

Respondents provided their experiences towards the integration of ICT in teaching and learning processes.

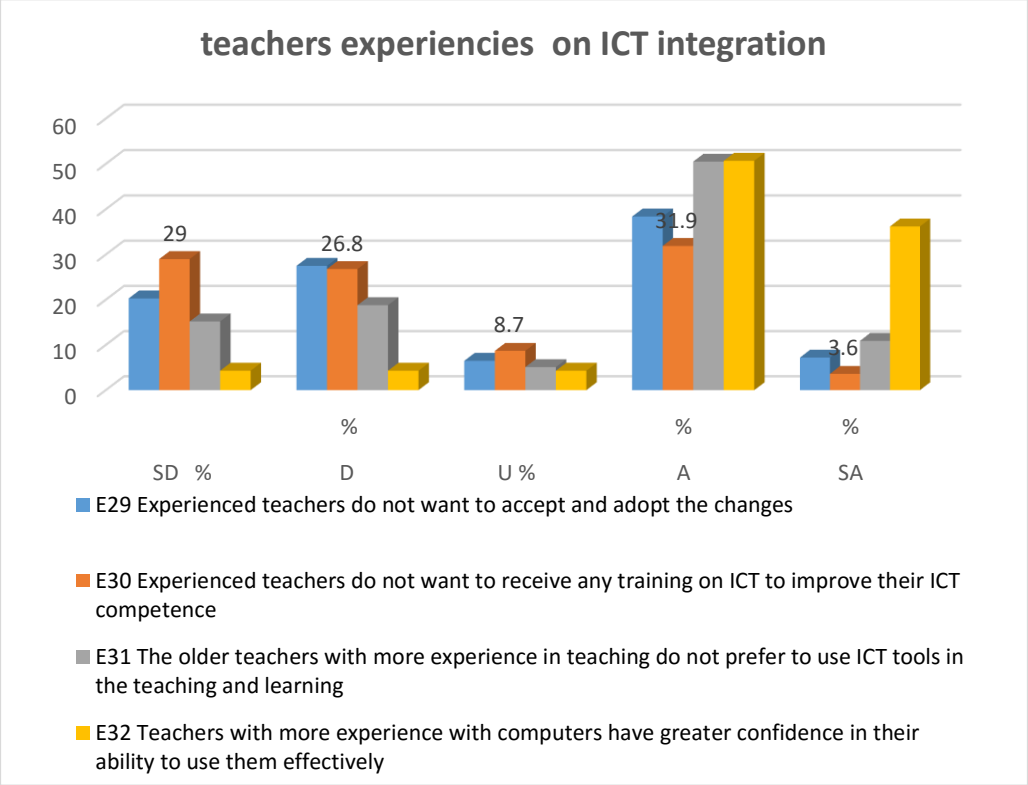

Figure 4.4: Teachers experience on ICT integration

Study findings as represented in Figure 4.4 revealed that the majority of the respondents agreed with most of the statements. Out of 138 respondents who answered the questionnaire, show that teachers with experience have greater confidence and ability to use computers effectively. This was confirmed by a high percentage rating of 70 (50.7%) agreement. From the findings, respondents indicated that teachers with more teaching experience don't prefer using ICT tools in teaching and learning. However, 77 (55.8%) of the respondents disagreed that experienced teachers do not want to receive any training on ICT to improve their ICT competence. This means that ICT use in teaching doesn't depend on the teachers' experiences but rather on teachers' attitudes toward ICT use. Therefore, ICT literacy skills and competence are no longer a challenge

to many teachers in secondary schools. The main challenge is their attitude and lack of initiative towards using ICT in teaching and learning. In the study, participants indicated that teachers with more experience in computers were found to be confident in using ICT in teaching and learning. However, teachers who have spent more than 10 years in teaching disclosed that they do not prefer to use ICT in their classrooms. This contradicts with Ibieta et al., (2017) who urged that teachers with less experience utilize ICT facilities. They also indicated that it was too late for them to change from the traditional ways of teaching. Hence, teacher experiences had no influence on ICT integration in teaching and learning processes.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSION, AND RECOMMENDATION

5.1 Introduction

The purpose of the study was to investigate the integration of Information Communication Technology in teaching and learning processes in secondary school in Sheema municipality. This chapter covers the summary of the study findings, conclusions, and recommendations.

5.2 Summary of the Findings

This section provides a summary of findings generated from both qualitative and quantitative data following the stated research questions.

5.2.1 Support available in secondary schools towards the integration of ICT in the teaching and learning

The findings indicated that half of the respondents 50(36.2%) were not aware of the National ICT policy and secondary schools lacked an ICT policy. Administrative and technical support were found to be available. However, more than 50% of the respondents agreed that they lacked government support in the integration of ICT in the curriculum. Findings further showed that schools were equipped with ICT facilities while other schools had limited ICT facilities with 40%. This was due to schools receiving ICT facilities from different organizations and donations. Therefore, some secondary schools still lagged in the availability of ICT facilities which led to uneven utilization of ICTs in teaching and learning. The findings showed that 60% of the ICT facilities that were available in schools, they included: Projectors, printers, photocopiers, desktop/laptop computers, and television set were most available ICT facilities in secondary schools.

Data analysis showed that 80% of the teachers used computers for their activities than using them in teaching thus computer was the most utilized ICT tool among teachers. Further, findings revealed that most of the schools 78.3% had internet connectivity which helped teachers in research. It was also found out that ICT saves time during teaching but the use of ICTs also requires teachers' efforts and time. Therefore, the low utilization level of ICT facilities was attributed to lack of time on teachers teaching timetables and low access to ICT facilities.

5.2.2 Teachers and administrators perceptions towards ICT integration.

The study indicated that participants had different perceptions on the understanding of the integration of ICT in teaching and learning. Some perceived it as a way of using modern technology in teaching while others narrated that it attracts students' activeness in the classroom. The findings indicate that ICT integration was relevant in teaching and learning processes. The study also found out that the use of ICT eased teachers' work in teaching and learning especially in science lessons. It was also noted that the school administration organized ICT training and workshops for teachers. On this note, participants indicated that even though these workshops were being organized, teachers' skills were still limited. It was also noted that the internet played a vital role in assisting teachers to download, upload, and share information to teach themselves to become skilled in using technology.

Further findings revealed that teachers faced some challenges while integrating ICT in teaching and learning processes. These challenges included: limited skills among teachers; limited ICT facilities in school; limited time on teachers time table; teachers' hesitation to use ICT facilities and; breakdown of computers. The narratives from participants confirmed that even the available limited ICT facilities require repair and maintenance. It was also revealed that schools lacked technical support to keep

inspecting these ICT facilities for upgrading and updating. Furthermore, it was discovered that the number of students and teachers outnumbered the available ICT facilities in schools which made computer laboratories congested thus affecting the proper utilization of these ICTs in teaching.

5.2.3 Teachers ICT competencies in teaching and learning processes

The study revealed that 83.1% of the teachers were competent in using the internet and could search for information. It was also revealed that majority of the schools had internet connectivity and it was being utilized by teachers. Even though internet connectivity was available in schools, 84.1% of the teachers used it for personal use than using it in the teaching and learning processes. Additionally, 61.6% of the teachers had skills to use Microsoft word than any other computer applications like Microsoft Power point, excel and database. Furthermore, majority of the teachers knew how to use computers however, 60.1% of the teachers could not use computers to prepare lessons. The t-test for Equality of mean ICT competence and skills score for male and female teachers was not statistically significant at the 5% level of significance. The test indicated that there is no significant gender difference in the ICT competence and skills score ($p=0.190$). Therefore, the hypothesis was rejected that the mean ICT competence and skills score for male and female is not different. Findings also indicated that there was no statistically significant difference ($p=0.882$) in the mean ICT competence and skills scores of the different age categories of the teachers. The mean ICT competence and skills score for full-time and part-time employment was not statistically different ($P>0.05$). The study thus fails to reject the hypothesis that the mean ICT competence and skills score for full-time and pat-time employment is not different. There was no significant difference in the mean ICT competence and skills scores for the different categories of the teachers by their experience.

The study revealed that ICT training and workshops were taking place in schools. Although these ICT trainings and workshops were being carried out, teachers still had limited skills to utilize ICT in teaching and learning. It was also revealed that there was no significant difference in the mean ICT competence and skills scores for the different categories of the teachers by their experience

5.2.4 The extent to which ICT has been applied by teachers in teaching and learning processes

The study revealed that more than half of the respondents (52.9%) did not enjoy using technologies during instruction because use of ICTs in class required much time. Some respondents 92.8% reported that technology made work more interesting and helped them to learn new things while others reported that it was difficult to select relevant technologies to use in the classroom. It was found out that 84.8% of respondents use chalk and board in explaining lessons to learners and 83.3% use textbooks as instructional material in teaching and learning processes. This was because there were limited ICT tools in secondary schools to be utilized by more than one teacher at the same time. The narratives of respondents confirm that teachers still use the traditional methods in delivering lessons to learners during instruction. Furthermore, findings revealed that teachers who had more than 15 years of experience in the teaching profession do not prefer using technologies in teaching and learning processes. This was because these teachers did not undergo ICT training in their training institutions.

5.3 Conclusion

Based on the findings of the study, it is concluded that there was lack of government support towards the integration of ICT in teaching and learning. Additionally, some secondary schools were equipped while other schools had limited ICT facilities. Though ICT training and workshops were being conducted and organized by the

schools, teachers lacked ICT competence and skills while integrating ICT in teaching and learning.

From the findings of this study, the information gathered indicated that it is not necessarily limited ICT facilities that are impeding the integration of ICT in teaching and learning but rather limited time on teachers teaching timetables, teachers' hesitation and lack of government support.

Lastly, for a teacher to effectively integrate ICT in classroom, he/she should poses the three types of knowledge and understand how they interact with one another based on the TPACK framework theory. Findings revealed that 83.1% respondents had ability to use internet but had less ability to use computer applications and ICTs especially in teaching and learning processes. This indicated that teachers had moderate skills to incorporate ICT in the teaching and learning processes. The implication of this is that, teachers have content and pedagogical knowledge but lack technological knowledge. In this case, more emphasis should be put to improve teachers' skills and competences through ICT training to enable them have technological knowledge that corresponds with the curriculum.

Therefore, we have to embrace ICT in our teaching practices and be assured that ICT changes our lives. Even if policies and strategies put in place are implemented and sufficient attention is not provided on ICT the integration will not take place in our teaching and learning processes.

5.4 Recommendation

Based on the empirical evidence in the study, the researcher made the following recommendations,

Findings revealed that some secondary schools were equipped with ICT facilities while others were not equipped. The curriculum for lower secondary was changed to foster student centered learning. Therefore, there is need for the Ministry of Education and Sports to provide, set up educational technology centers to increase access and availability on how to acquire ICT facilities like computers, whiteboards, and internet connectivity across all schools and other teaching and learning materials in the schools.

Findings showed that teachers had limited time on their teaching time table to allow them utilize ICT in their teaching and learning process. The allocation of 40 minutes for a single lesson and 80 minutes for a double lesson is not enough to utilize ICT in their teaching and learning processes. Therefore, the National curriculum Development Centre (NCDC) through the Ministry of Education and sports should allocate more adequate time for instance, 60 minutes for a single lesson and 120 minutes for double lesson. This will give teachers enough time to utilize ICT in teaching and learning processes. This will also help teachers to utilize ICT, develop new skills and explore their integration in teaching practices if ICTs are to be used effectively in teaching and learning processes.

Findings showed that teachers were not aware of the national ICT policy which aims at expanding ICT infrastructure, deepening ICT utilization throughout the country. Teachers' awareness is critical towards the implementation of any education reform initiative. Therefore, the Ministry of Education and Sports, school administration should sensitize and disseminate information about ICT policy and how instruction practices correspond with the curriculum in secondary schools. This can be done by considering social networks such as public social networks like face book, emails, whatsap as the fast way of disseminating information to teachers to improve ICTs use

in teaching and learning processes. This will also help to manage, organize the school's ICT and also help teachers to link policy with real action in the classroom.

If ICT is to be fully integrated in teaching and learning processes teacher ICT training is vital. It was clear from the findings that teachers' trainings were still wanting given that teachers who had more than 15 years of teaching experience lacked ICT skills and competence in using ICTs in their teaching practices. Therefore, the researcher recommends that all teacher training institutions should integrate ICT in their curriculum. They should include ICT courses throughout the Education programs for pre-service and in-service teachers to prepare and make them ready with ICT skills.

It emerged from the findings that secondary schools get less government support in the integration of ICT in teaching and learning processes. Therefore, there is a need for the government to support secondary schools by providing ICT facilities not only to secondary schools in the study municipality but all secondary schools in Uganda. This can be done to overcome challenges of congestion while utilizing ICTs and lack of government support.

Findings on teachers' perceptions revealed that teachers were hesitant to adapt to the use of ICTs in teaching and learning. Therefore, teachers should change their negative attitudes and hesitation to shift from traditional methods to modern teaching methods. This can be done when the Ministry of education and sports, school administrators and government agencies should follow up and add in more efforts in inspecting and monitoring schools on the use of ICTs in teaching and learning processes.

5.5 Areas for Further Research

Several issues concerning the integration of ICT emerged that require attention and further research. These include;

1. Findings revealed that teachers have less ICT training right away from their training institutions. Therefore, there is need to investigate pedagogical approaches on integration of ICT in teacher training institutions.
2. A comparative study can be conducted between government and private schools to understand the development of Technology Pedagogical content and knowledge in teaching and learning processes.
3. It was recommended by the respondents that ICT integration should start from lower primary therefore, a study can be conducted on primary teachers' perception on integration of ICT in teaching and learning.

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APPENDICES

Appendix 1: Research Ethics Committee Approval

GULU UNIVERSITY

P.O. Box 166, Gulu (U)
Website: www.gu.ac.ug
Email: gurec@gu.ac.ug

Tel: +256 471 432 096
Fax: +256 471 432 913
Mob: +256 772 305 621
+256 776 812 147

RESEARCH ETHICS COMMITTEE

24/08/2021

To: MIRIAM KATUSIIME

MOI UNIVERSITY
+256775992162

Type: Initial Review

Re: GUREC-2021-52: Integration of Information Communication Technology in teaching and learning processes. A case of selected secondary schools in Sheema Municipality in Uganda., version 2.0, 2021-07-31

I am pleased to inform you that at the **74th** convened meeting on **15/04/2021**, the Gulu University REC, committee meeting, etc voted to approve the above referenced application.
Approval of the research is for the period of **24/08/2021** to **24/08/2022.**

As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the REC for re-review and approval **prior** to the activation of the changes.
3. Reports of unanticipated problems involving risks to participants or any new information which could change the risk benefit: ratio must be submitted to the REC.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by participants and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Continuing review application must be submitted to the REC **eight weeks** prior to the expiration date of **24/08/2022** in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by Gulu University REC:

No.	Document Title	Language	Version Number	Version Date
1	Risk Management Plan	English	version 2.0	2021-07-31
2	Informed Consent forms	English	version 2.0	2021-07-31
3	Informed Consent forms	English	version 2.0	2021-07-31
4	Data collection tools	English	version 2.0	2021-07-31
5	Data collection tools	English	version 2.0	2021-07-31
6	Protocol	English	version 2.0	2021-07-31

Yours Sincerely

Dr. Gerald OBAI
For: Gulu University REC

Appendix 2: Municipal Education Officer Permission

MOI UNIVERSITY
Office of the Dean School of Education

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

P.O. Box 3900
Eldoret, Kenya

REF: M. EDR/4190/20 DATE: 9th February, 2021

To the Municipal Education Officer
Box 160
KABWOHE, SHEEMA, UGANDA

Permission granted

Municipal Education Officer
Sheema Municipal Council
Date 17/2/2021

Dear Sir/Madam,

RE: RESEARCH PERMIT IN RESPECT OF KATUSIIME MIRIAM – M.EDR/4190/20

The above named is a 2nd year Master of Education (M.Ed) student at Moi University, School of Education, Department of Educational Management & Policy Studies, School of Education.

It is a requirement of her M.Ed Studies that she conducts research and produces a thesis. Her research is entitled:

"Integration of Information Communication Technology in Teaching and Learning Processes: A Case of Selected Secondary Schools in Sheema Municipality in Uganda."

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

Yours faithfully,

MOI UNIVERSITY
SCHOOL OF EDUCATION
Sign.....
P.O. Box 3900-30100, ELDORET

PROF. J. K. CHANG'ACH
DEAN, SCHOOL OF EDUCATION

(ISO 9001 – 2015 Certified Institution)

Appendix 3: Consent form for schools

MOI UNIVERSITY

P.O BOX, 3900

Eldoret, Kenya

RE: REQUEST FOR PERMISSION TO CARRYOUT RESEARCH IN YOUR SCHOOL

Dear sir/madam

I am a postgraduate student at Moi University pursuing masters of an educational research degree. I am writing to seek your support in researching your school on the topic **integration of information communication technology in teaching and learning processes. A case of selected secondary schools in Sheema municipality in Uganda.** This research in your school is surveying teachers and administrators as the participants. The survey will last for 30 minutes and would be arranged in the time convenient to the teacher's schedule and will arranged with break and lunch time. Participation in this research is entirely voluntary and there are no known risks to the participants in this study. I, therefore, kindly request that you allow me to undertake the study in your school.

Participant's responses will be only used for the purpose of the study. The identity of participants will remain confidential to the researcher and the name of the school will not appear anywhere in a thesis or any publications resulting from this research unless agreed to. After data analysis, if you're interested in the details of the findings from this research study, a soft copy or hard copy can be made available to you. Kindly if you agree, sign below acknowledging your consent and permission for me to conduct this study in your school. I hope that this request will merit your favourable approval.

Thank you in advance

Yours faithfully,

…… ..……

Katusiime Miriam (Researcher) Headteacher

Appendix 4: Consent Form for Teachers

Informed consent form for the questionnaire for teachers

Title of the study: INTEGRATION OF INFORMATION COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING PROCESSES. A CASE OF SELECTED SECONDARY SCHOOLS IN SHEEMA MUNICIPALITY IN UGANDA.

Investigator(s): KATUSIIIME MIRIAM

Institution(s) MOI UNIVERSITY

Introduction

The investigator is a student at Moi University, pursuing a masters of education in research. This informed consent explains the study to you. After the study has been explained, any questions you may have are answered, and you have decided to participate in the study, you will be asked to sign a consent, which you will be given a copy to keep. This study is designed to investigate the integration of information communication technology in teaching and learning processes in selected secondary schools in Sheema municipality in Uganda.

A brief description of the sponsors of the research project

This study is sponsored by CERM-ESA project which is funded by the German Academic Exchange Service (DAAD) with funds from the German Federal Foreign Office. It is a joint partnership project between the, University of Oldenburg (Germany), Uganda Management Institute (Uganda), Nelson Mandela Metropolitan University (South Africa), University of Dar es Salaam (Tanzania) and Moi University (Kenya).

Purpose:

The purpose of the study is to investigate the integration of information communication technology in teaching and learning processes in selected secondary schools in Uganda. The findings of this study will help schools to appreciate the use of ICT by utilising the resources available to teach effectively and efficiently. The findings of this study will help teachers and administrators to understand the need for change to technology based learning. The findings of this study will be of great value to school administrators on addressing the challenges faced by teachers in integrating Information Communication Technology in teaching and provide solutions. This study will also be relevant to government in planning, following ICT policy, allocate enough funds to schools for the

smooth running of ICT programs. Findings will again benefit curriculum developers in evaluating the curriculum before it is implementation, conduct assessments on how teachers are would embrace the curriculum before it is amended in schools. Finally it will help researchers by serving as future reference and researching the related topic.

Procedures:

Your participation in this study involves ticking the most appropriate response that corresponds to the statement in the questionnaire and also involves responding by writing your views about the structured questions total time taken to fill the questionnaire will be 30mins. Questionnaires will be administered during break time and lunch time and any other time as agreed with participant's schedule.

Who will participate in the study?

You have been chosen to participate in this study because you are a teacher of this school and thought to be having the right information required for this study. Filling your answers in the questionnaire will last for approximately 30 minutes. One hundred eight participants will take part in this study.

Risks/discomforts:

There is no foreseeable risk of harm or discomfort that will arise from your participation in this study. The only risk or discomfort will be the inconvenience in terms of time spent during the interview. The COVID-19 cases detected with in the study participants will be reported to the Sheema COVID-19 task force or referred to the nearest health centre for better management.

Benefits:

You will get feedback on findings and progress of the study, and any new information that affects the study participants (including incidental findings) will be made available to research participants. The research findings could be used to address challenges facing teachers' participation in Information Communication Technology integration.

Confidentiality:

Your identity will not be revealed to any one as we shall only use codes to identify participants. Information obtained will only be accessible by the research team. Soft copies of the data will be protected by password and hard copy files will be kept under lock and key. Confidential information will only be accessed by the principal investigator. All information provided will be treated confidentially, your names will not appear anywhere in this research or in any publications resulting from this research.

Alternatives:

You do not have to participate in this study if you are not interested. You will not lose any benefit in case of no participation.

Cost:

There will not be any additional cost incurred as a result of participating in this study.

Questions:

If you have any questions related to the study as a research participant, you can contact the investigator, Katusiime Miriam on telephone number +256775992162 / +256756346340 / +254741672429 or via email on katusimemiriam@gmail.com

The supervisors of this research project Dr, Joyce Kanyiri on jwacukah17@gmail.com Moi University, and Prof. Boit Mugun on jmugunboit@gmail.com Moi University.

Statement of voluntariness:

Participation in the research study is voluntary and you may join on your own free will. You have a right to withdraw from the study at any time without penalty.

If you have any issues pertaining to your rights and participation in the study, please contact the Chairperson, Gulu University Research Ethics Committee, Dr. Gerald Obai Tel: No., 0772305621; email: lekobai@yahoo.com/lekobai@gmail.com; or the Uganda National Council for Science and Technology, on plot 6 Kimera road, Ntinda, Kampala on Tel 0414705500.

Statement of consent

.....has described to me what is going to be done, the risks, the benefits involved and my rights as a participant in this study. I understand that my decision to participate in this study will not affect me in any way. In the use of this information, my identity will be concealed. I am aware that I may withdraw at any time. I understand that by signing this form, I do not waive any of my legal rights but merely indicate that I have been informed about the research study in which I am voluntarily agreeing to participate. A copy of this form will be provided to me.

Name……Signature of participant ……Date……

Name…….Signature of researcher……Date……...

Appendix 5: Informed Consent Form for Head Teachers

Title of the study: INTEGRATION OF INFORMATION COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING PROCESSES. A CASE OF SELECTED SECONDARY SCHOOLS IN SHEEMA MUNICIPALITY IN UGANDA.

Investigator(s): KATUSIIIME MIRIAM

Institution(s) MOI UNIVERSITY

Introduction

The investigator is a student at Moi University pursuing a masters in educational research and the study. This informed consent explains the study to you. After the study has been explained, any questions you may have are answered, and you have decided to participate in the study, you will be asked to sign a consent, which you will be given a copy to keep. This study is designed to investigate the integration of information communication technology in teaching and learning processes in selected secondary schools in Sheema municipality in Uganda.

A brief description of the sponsors of the research project

This study is sponsored by CERM-ESA project which is funded by the German Academic Exchange Service (DAAD) with funds from the German Federal Foreign Office. It is a joint partnership project between the University of Oldenburg (Germany), Uganda Management Institute (Uganda), Nelson Mandela Metropolitan University (South Africa), University of Dar-es- Salaam (Tanzania) and Moi University (Kenya).

Purpose:

The purpose of the study is to investigate the integration of information communication technology in teaching and learning processes in selected secondary schools in Uganda. The findings of this study will help schools to appreciate the use of ICT by utilising the resources available to teach effectively and efficiently. The findings of this study will help teachers and administrators to understand the need for change to technology-based learning. The findings of this study will be of great value to school administrators in addressing the challenges faced by teachers in integrating Information Communication Technology in teaching and provide solutions. This study will also be relevant to the government in planning, following ICT policy, allocate enough funds to schools for the smooth running of ICT programs. Findings will again benefit curriculum developers in

evaluating the curriculum before it is implementation, conduct assessments on how teachers are would embrace the curriculum before it is amended in schools. Finally, it will help researchers by serving as future reference and researching the related topic.

Procedures:

Your participation in this study involves providing an appropriate response that corresponds to the answer the questions in the interview which will take 30mins. Interviews will be conducted in time convenient for the participants break time, lunch time and after class time.

Who will participate in the study?

You have been chosen to participate in this study because you are a headteacher of this school and thought to be having the right information required for this study. Answering the semi-structured questions will last for approximately 30 minutes. One hundred eight participants will take part in this study.

Risks/discomforts:

There is no foreseeable risk of harm or discomfort that will arise from your participation in this study. The only risk or discomfort will be an inconvenience in terms of time spent during the interview. The COVID-19 cases detected with in the study participants will be reported to the Sheema COVID-19 task force or referred to the nearest health centre for better management.

Benefits:

You will get feedback on the findings and progress of the study, and any new information that affects the study participants (including incidental findings) will be made available to research participants. The research findings could be used to address challenges facing teachers' participation in Information Communication Technology integration.

Confidentiality:

Your identity will not be revealed to anyone as we shall only use codes to identify participants. Information obtained will only be accessible by the research team. Soft copies of the data will be protected by password and hard copy files will be kept under lock and key. Confidential information will only be accessed by the principal investigator. All information provided will be treated confidentially, your names will not appear anywhere in this research or any publications resulting from this research.

Alternatives:

You do not have to participate in this study if you are not interested. You will not lose any benefit in case of no participation.

Cost:

There will not be any additional cost incurred as a result of participating in this study.

Questions:

If you have any questions related to the study as a research participant, you can contact the investigator, Katusiime Miriam on telephone number +256775992162 / +256756346340 / +254741672429 or via email on katusimemiriam@gmail.com

The supervisor of this research project Dr. Joyce Kanyiri on jwacukah17@gmail.com Moi University and Prof. Boit Mugun, jmugunboit@gmail.com Moi University.

Statement of voluntariness:

Participation in the research study is voluntary and you may join on your own free will. You have a right to withdraw from the study at any time without penalty.

If you have any issues about your rights and participation in the study, please contact the Chairperson, Gulu University Research Ethics Committee, Dr. Gerald Obai Tel: No., 0772305621; email: lekobai@yahoo.com/lekobai@gmail.com; or the Uganda National Council for Science and Technology, on plot 6 Kimera Road, Ntinda, Kampala on Tel 0414705500.

Statement of consent

..... has described to me what is going to be done, the risks, the benefits involved and my rights as a participant in this study. I understand that my decision to participate in this study will not affect me in any way. In the use of this information, my identity will be concealed. I am aware that I may withdraw at any time. I understand that by signing this form, I do not waive any of my legal rights but merely indicate that I have been informed about the research study in which I am voluntarily agreeing to participate. A copy of this form will be provided to me.

Name ……Signature of participant……Date …….

Name……. Signature of interviewer……..Date……..

Appendix 6: Consent for Audio recording

Study Title: Integration of information communication technology in teaching and learning processes: A case of selected secondary schools in Sheema municipality in Uganda.

Audio Recording

During the interview, your voice will be recorded with a digital voice recorder for accuracy during translation, and transcription for coding and theme analysis. Voice-recordings will be stored on a password protected computer. You will be offered to receive a copy of the audio-recording. Your voice recording will not be shared among anyone outside of study team and will not be used for any other activity besides this study. All audio recordings will be destroyed after 3 years.

Statement of Consent to be audiotaped

I understand that audio recordings will be taken during the study. *(For the statement below, please choose YES or NO and **insert your name and initials** in the relevant space)*

- I agree to be audio recorded **Yes** ☐

No ☐

Name of Participant (please print) Signature Date

Katusiime Miriam

Name of researcher Obtaining Consent Signature Date

Appendix 7: COVID-19 Preventive measures

Measures for the Prevention and control of risk of spread of COVID-19 during the implementation of research.

Study Title: Integration of Information Communication Technology in Teaching and Learning Processes: A Case of Selected Secondary Schools in Sheema Municipality

Principal Investigator (s): Miriam Katusiime

Introduction:

The novel Coronavirus is transmitted from human to human through droplets and direct or close personal contact with an infected individual.

Novel Coronavirus signs of infection include respiratory symptoms, fever, and cough, shortness of breath and breathing difficulties. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death

The government of Uganda has since March 2020 issued guidelines and imposed restrictions that are intended to prevent the spread of COVID 19. Although travel restrictions have been eased, they remain in place. Further, Uganda National Council for Science & Technology (UNCST) issued guidelines to researchers/investigators on how best research can be conducted in the country in line with the ministry of Health guidelines on prevention of COVID-19 and without compromising the rights, welfare and safety for both research participants and research teams

Implementation of the prevention and control measures

In the implementation of the research activities, the researcher will be committed to ensure the safety of its research team, research participants and communities where the study will be conducted. The study team will comply with the Standard Operating Procedures issued by the Ministry of Health, and presidential directives to mitigate against the risk of infection of COVID-19, rapidly detect and effectively respond to any COVID-19 case that may occur in the process of carrying out the study, screening, face covering, physical distancing, and good hand hygiene.

Procedures to be followed during the implementation of the research.

Prior to data collection and Training

1. **Health guidance:** The researcher and research team will carry out training sessions dedicated for COVID-19 sensitization and awareness, to equip themselves research with knowledge of signs and symptoms of the COVID-19, and preventive measures such as hand hygiene before placing and removing the mask, as well as storage of the mask, social distancing. The research team will circulate notices, posters, charts on common signs and symptoms of COVID-19 as provided by the Ministry of Health, and develop and/or use existing plan for the appropriate referral pathway for identified and/or suspected cases.
2. **Personal Screening:** All researchers, research assistants, research participants and any other individuals engaged in research activities will be screened temperature daily for fever. Screening for temperature will be carried out during planning meetings, trainings, community outreach. Any individual found with COVID 19 symptoms will be withdrawn and referred to the COVID – 19 task force for further assessment and management. The withdrawn individual will be allowed to return only if they present a valid certification of their COVID-19 status showing negative result
3. **Wearing face coverings:** All researchers and research assistants and any other individuals engaged in research activities that require interaction with fellow researchers or research participants or the community member will have to wear a face mask that fully covers the mouth and nose at all times. The study will provide face masks for individuals who do not have.
4. **Physical Distancing:** There will be social distancing during the training, meetings, community outreach of at minimum of 2 metres. During breaks, the team will not be allowed to congregate in common areas.
5. **Good hygiene:** All team members will be required to wash their hands or use hand sanitizers before and after entering the training room, and other common areas. Hand washing equipment shall be supplied and made available at all times. All surfaces and equipment shall be sanitised frequently.

During data collection

1. **Personal Protective Equipment (PPE):** All research assistants involved in tracing of respondents and in in-person interviews and research participants will

use PPE including a properly fitted face mask. Enumerators/Researchers and research participants will wash hands with soap and water or use hand sanitizer prior to the interview. Handshakes and hugging are prohibited. Physical distancing of at least 2 metres in all research related activities shall be observed.

2. **Focus group discussions:** The research team shall carry educational materials on prevention of COVID-19 in a language understood by the participants. These materials shall also have visual images to support understanding. Enumerators/Researchers and research participants will wash hands with soap and water or use hand sanitizer prior to the interview. Screening for temperature will be carried out prior to conducting meetings
3. **Consent Process:** The Researcher /Research assistants will observe social distancing when taking consent (while 2 metres apart) upon arrival to the participant. Enumerators/Researchers and research participants will wash hands with soap and water or use hand sanitizer prior to the interview. Participant will then be sensitized on covid-19 and presented with preventive measures.
4. **Equipment sanitization:** shared devices used to record or capture data shall be sanitized regularly.

During Dissemination/Community engagement

1. **Community Engagement:** The research team shall carry educational materials on prevention of COVID-19 in a language understood by the participants. These materials shall also have visual images to support understanding. Enumerators/Researchers and research participants will wash hands with soap and water or use hand sanitizer prior to the interview. Screening for temperature will be carried out prior to conducting community engagements.
5. **Equipment sanitization:** shared devices used during community engagements to shall be sanitized regularly.

The preventive and control measures will continuously be reviewed based on new information and guidelines communicated by the Ministry of Health

Appendix 8: Questionnaire

TEACHERS' SURVEY QUESTIONNAIRE

Integration of information communication technology in teaching-learning. A case of selected secondary schools in Sheema municipality in Uganda.

I am a student at Moi University, pursuing a masters in educational research. I kindly request you to assist me with some information by filling this questionnaire. The information you will give will be treated with the utmost confidentiality and will be used for study purposes only. Do not write your name or institution name. Please answer the questions as honestly and truthfully as possible by following instructions indicated as per section.

Section A: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS (tick the most appropriate response (✓)

1. **1. Gender:** (1) Male (2) Female
2. **Age**

(1) 25 - 29 (3) 35 - 39

(2) 30-34 (4) 40 and above

3. **Type of employment?**
   (1) Full-time
   (2)Part-time
4. **Level of education?**
   (1) Diploma (3) Masters
   (2) Degree (4) PhD
5. **Teaching experience?**
   (1) 1-5 years (3) 10-15 years
   (2) 5-10 years (4) More than 15 years
6. **How long have you taught in this school?**
   (1) 1-3 years (3) 7-10 years
   (2) 4-6 years (4) more than10 years

7. **Terms of employment as a teacher?**
    1) Permanent employment (payment with no fixed end-point)
    2) Fixed-term contract (PTA employment)

8. Who is your employer?

(1)Government (MOES)

(2) Parents teachers Association (PTA).

9. **Area of specialization (** ✓ tick the subjects you teach)

(1) Mathematics	(5) English	(9) Chemistry	(13) Fine Art
(2) History	(6) Physics	(10) Biology	(14) Agriculture
(3) Geography	(7) Entrepreneurship	(11) Commerce	(15) Literature
(4) Computer studies	(8) Kiswahili	(12) French	(16) others

SECTION B: Opinion of teachers regarding the support available for ICT to make teaching-learning effective. How do you strongly agree or agree with the following statements. SD= strongly disagree (1), D= disagree (2), NC= Non-committal (3), A= Agree (4), SA= strongly agree (5)

S/N	Description	SD 1	D 2	NC 3	A 4	SA 5
B1	Government has a good policy to improve the present condition of ICT in secondary schools					
B2	Leadership is strongly related to teachers‟ use of computer technology in teaching					
B3	The government supports teachers and administrators in ICT training					
B4	Training workshops in ICT need to be improved if the integration of ICT in teaching is to be achieved.					
B5	Administration does not support learning using ICT					
B6	Aware of Uganda national policy on information communication technology					
B7	There is an ICT Lab in my school					
B8	ICT lab has all the equipment that I require to teach with					

b. Teachers views on the Technical support available in school.

What is your view on the technical support available in school? **SD= strongly disagree (1), D= disagree (2), NC= Non-committal (3), A= Agree (4) SA= strongly agree (5)**

S/N	Description	SD 1	D 2	NC 3	A 4	SA 5
B9	There is trained technical personnel to help teachers with the computer hardware and software					
B10	Ability to identify required resources					
B11	There is incentives for teachers to take ICT trainings					
B12	There is electricity at my school as a source of power					
B13	There is frequent computer upgrading, system update, and maintenance					
B14	Available internet connectivity					

Which of the following ICT facilities do you have at school? Provide a tick if the facility is available and N/A if it's not available.

S/N	**ICT facilities**	It is available		If so, have you used it?	
		Yes	No	Yes	No
B15	Scanner				
B16	Projector				
B17	Printer				
B18	Photocopier				
B19	Microphones				
B20	Presentation clicker				
B21	Radio				
B22	Digital cameras				
B23	Television				
B24	Desktop/laptop computers				
B25	Cell phones				
B26	Whiteboard				
B27	Wi-Fi access				
B28	Others				

Section C: Teachers perception towards ICT integration

Concerning your perception towards the use of ICT in teaching and learning indicate whether you agree or disagree with the following statements by providing a tick. **SD= strongly disagree (1), D= disagree (2), NC= Non-committal (3), A= Agree (4) SA= strongly agree (5)**

S/N	Description	SD 1	D 2	NC 3	A 4	SA 5
C1	Use of ICT can help make difficult topics easy to understand					
C2	Use of ICT will make the work of teacher easier					
C3	Use of ICT motivates students to learn more					
C4	Use of ICT makes the lessons more interactive					
C5	Use of ICT makes learning student-centred with the teacher being the facilitator					
C6	ICT needs to be used by newly graduated teachers only					
C7	Student performance can improve if I use ICT tools when teaching					
C8	The use of ICT will make me a more effective teacher					
C9	Given an opportunity, I will make an effort to upgrade my ICT skills					
C10	Use of ICT is relevant in teaching					
C11	Use of ICT in the class is very frustrating					

SECTION D: Teachers level of competency in enhancing ICT in teaching and learning

For your teaching skills indicate whether you know using ICT in teaching and learning. **SD= strongly disagree (1), D= disagree (2), NC= Non-committal (3), A= Agree (4) SA= strongly agree (5)**

S/N	Description	SD 1	D 2	NC 3	A 4	SA 5
D1	I know computers and its functions					
D2	I repair my computer					
D3	I search for teaching aids from the Internet					
D4	I can create teaching aids with the computer					
D5	I use the computer to prepare lesson plans					
D6	I install software on my own					
D7	I always use the computer in my classroom					
D8	I use the Internet in the computer lab with my students					
D9	I always look for the latest additional information through the Internet					
D10	I use the Internet in the computer lab with my students					
D11	I use the Internet in the computer lab with my students					
D12	I use the Internet for my personal use					
D13	I have knowledge on Microsoft windows and operating system					

b. Teachers' ability to use computer applications.

What is your ability to use the following computer applications?

S/N	Computer applications	Excellent	Good	Fair	Poor
D14	Database (e.g. MS access)				
D15	Word processor (e.g.MS word				
D16	Presentation (e.g. MS PowerPoint)				
D17	Spreadsheets (e.g. MS Excel)				
D18	Graphic design (e. g adobe)				
D19	Internet search tools (e. g Google)				

Has there been ICT training for teachers? If yes, how often …….

If No, why……..…….

Section E. Teachers extent use of ICT in teaching and learning

Provide a tick to show the level of agreement with the following statements. **SD= strongly disagree (1), D= disagree (2), NC= Non-committal (3), A= Agree (4), SA= strongly agree (5)**

S/N	Description	**SD 1**	**D 2**	**NC 3**	**A 4**	**SA 5**
E1	Computers make work more interesting					
E2	I enjoy teaching using technologies					
E3	I prefer preparing my lesson using computers					
E4	My school has enough teaching and learning ICT facilities					
E5	Technology increases teachers efficiency					
E6	I use technology to analyze student achievement					
E7	Use technology for administration and classroom management					
E8	Use technology for information presentation for example PowerPoint					
E9	I make errors frequently when using computers					
E10	ICT facilities are difficult to use					
E11	It is difficult for me to be skilful in using technology					
E12	I want to learn more about using technology					
E13	ICT helps me to learn many new things					
E14	I frequently play around with technology					
E15	I think the use of ICT in teaching is the waste of time					

Provide a tick to the following statements regarding the teaching strategy you use while teaching to integrate ICT. **SD= strongly disagree (1), D= disagree (2), NC= Non-committal (3), A= Agree (4) SA= strongly agree (5)**

S/N	**Description**	**SD 1**	**D 2**	**NC 3**	**A 4**	**SA 5**
E16	Do you have a good relationship with students					
E17	Use chalk and board in explaining the lesson					
E18	I use textbooks as an instructional material					
E19	I use PowerPoint presentation while teaching					
E20	I understand the subject matter					
E21	Updated with present trends relevant to the subject matter					
E22	I support student centered-learning					
E23	I encourage the creativity of students					
E24	Critical thinking and problem-solving are important skills for students					
E25	I use more than one strategy while teaching					
E26	I provide student-centered lessons that are based on the real world					
E27	I believe that ICT can improve my teaching practice					
E28	I can select technologies to use in my class that enhance what I teach, how I teach, and students learn					

c. Indicate the extent to which the following statement regarding the influence of teaching experience on the integration of ICT. SD= strongly disagree, D= disagree, U= undecided, A=agree, SA=strongly agree, SA=strongly agree

S/N		SD	D	U	A	SA
E29	Experienced teachers do not want to accept and adopt the changes					
E30	Experienced teachers do not want to receive any training on ICT to improve their ICT competence					
E31	The older teachers with more experience in teaching do not prefer to use ICT tools in the teaching and learning					
E32	Teachers with more experience with computers have greater confidence in their ability to use them effectively					

THANK YOU FOR YOUR PARTICIPATION

Appendix 9: Interview

INTERVIEW GUIDE FOR HEAD TEACHERS

I am a student at Moi University, pursuing a masters in educational research. I am researching on the integration of information communication technology in teaching and teaching processes in secondary schools in Sheema municipality. The purpose of this interview is to seek your views about teachers' readiness in the utilization of ICT resource to enhance the teaching and learning process. Your responses will be for this study while your identity will be treated with confidentiality.

How do teachers and administrators perceive the use of ICT in teaching and learning in selected secondary schools in Uganda?

1. Please tell a little about what it takes to be a teacher or head of school?
2. What is your understanding of integrating ICT into the process of teaching and learning?
3. What difficulties do you encounter as a headteacher when trying to access ICT facilities?
4. Has the administration communicated to teachers to integrate ICT in teaching?
5. What training and continuing professional development opportunities exist to enable teachers integrate ICT?
6. Do you think this technology is being relevant and supported?
7. How have the school contributed to development and integration of ICT in teaching?
8. As an administrator what challenges do you get as you implement government policy on ICT?
9. How can these challenges be addressed at school level?
10. What is your view on effective integration of ICT in education in Uganda?

THANK YOU FOR YOUR PARTICIPATION

Appendix 10: Sample size determination

Krejcie & Morgan (1970) table for sample size determination

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*

Appendix 11: A Map of Uganda

Derived from: http://www.google.com