INFORMATION AND COMMUNICATION TECHNOLOGY MANAGEMENT AND ITS PEDAGOGICAL USE IN SELECTED SECONDARY SCHOOLS IN NAKAWA DIVISION, KAMPALA DISTRICT

BY

NAKAGGWA PROSSCOVIA-SSEMPIJJA

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DECLARATION

I, Nakaggwa Prosscovia Ssempijja, declare that the work written in this dissertation has never been produced in any university, institution or any other college for any award.

Signature

..... Date.....

Nakaggwa Prosscovia Ssempijja

DEDICATION

I dedicate this dissertation to my parents.

APPROVAL

This dissertation titled 'Information Communication Technology management and its pedagogical use in selected secondary schools in Nakawa, Kampala District' has been carried out under our supervision. We now recommend it for examination by relevant boards.

Supervisor

Signature…….. Date……

Dr. Ndawula Stephen

Supervisor

Signature…….. Date……

Dr. Ejuu Godfrey

LIST OF ABBREVIATIONS/ACRONYMS

CECA: Center of Excellence for Computer Applications.

CMI: Conventional Methods of Instructions.

ICT: Information and Communication Technology.

TAM: Technology Acceptance Model.

TRA: Theory of Reasoned Action.

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All the success I owe it to God the Almighty.

May God bless you all!

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ABSTRACT

The study investigated information and communication technology management and its pedagogical use in selected secondary schools in Nakawa division, this study was guided by the following objectives; To establish how teachers' knowledge of ICT affect the frequency in pedagogical use of ICT in secondary schools, To establish the different pedagogical practices ICT teachers are currently using in secondary schools, To establish how teachers' access to ICT resources affects their pedagogical use of ICT in secondary schools and To establish strategies of improving ICT management and the Teachers' pedagogical use of ICT.In this study, a cross-sectional survey research design was adopted where both qualitative and quantitative research approaches were used. The target groups were secondary school teachers and Head teachers. Stratified random sampling technique was used to select samples that were drawn independently and randomly from the stratum of secondary schools in Nakawa Division, Kampala District. Proportionate stratified random sampling technique was used to select 130 respondents from selected secondary schools in Nakawa Division, Kampala District.The findings showed that the teachers of the schools had the ability of using word processing for classroom purposes, were well versed with spreadsheet for class room purposes, had ability of conducting lessons using power point for presentations, could design instructional materials using publisher, had the ability of exchanging academic messages using ICT, had sufficient ICT skill, teachers could use ICT for student's assessments, teachers did not have the ability to assemble ICT components for classroom purposes, teachers could prepare lessons using ICTs, teachers never had access to ICTs laboratory, teachers had access to ICTs in the staffroom, teachers never had access to ICTs in classroom, most teachers did not have access to personal digital assistants, teachers did not have access to ICT devices in their homes, schools were building ICT infrastructure, recruiting trained ICT teachers, recruiting ICT laboratory school technicians, frequently servicing of ICT devices and maintaining of ICT physical infrastructure. The researcher recommends the

following; The schools should build and equip all the ICT laboratories in their schools so that teachers can teach their students, Most teachers were found to be with basic knowledge of ICTs, therefore, schools should help their teachers acquire other knowledge in ICTs such as Adobe, SPSS, Quick books among other soft wares. The schools should also increase on the numbers of computers in their laboratories.This study was conducted in selected secondary schools and had a limited scope, although carried out systematically; Other studies should be done on it either in the same schools or in different schools in order to test the relevance of the research questions, The study was centred on ICT management and teachers' pedagogical use of ICT in selected private schools in Nakawa division Kampala district and The researchers' findings revealed that most schools much as they were teaching ICT, they did not have laboratories and therefore, an investigation into the impact of ICT on improvement of teachers' use of ICT.

CHAPTER ONE

Introduction

1.0 Background of the study

This chapter presents the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, scope of study, significance of study and the conceptual frame work.

1.1 Historical Perspective

During the past decade there has been an exponential growth in the use of technology which has pervasive impacts both on society and on our daily lives. It is thus not surprising to find increasing interest, attention and investment being put into the use of technology in education all over the world. In addition to the effort to employ technology to improve learning, the emergency of knowledge economy has also brought about much greater emphasis on education in responding to the impact of technology in education.(Hoyles, 2001).

Many important changes have occurred in the last few years in the education systems, which require teachers and school leaders to up grade and refine their technology skills. Some of these changes are due to changes in government policies related to the use of ICT in schools while others are due to developments in state of the art pedagogical practices. As technology flows faster into the schools, many school leaders are facing a range of difficult on management issues.

1.2 Contextual Perspective

Today millions of people are using technology in industries, offices and homes: to produce and store useful information about all aspects of businesses, scientific research, government

facilities. Technology has also become one of the fastest, reliable means of communication. The pressures placed on our society as it changes from a manufacturing to an informational and technological economy are well documented. Industries and businesses are hard pressed to stay ahead of the learning curve with regard to staying competitive. Technology is one of the main tools driving this change to an information age. It is within this climate that teachers are asked to prepare students for the next century by training the next generation of information "hunters and gatherers". Nationally, the push to integrate technology into our classrooms comes from government, business, and industry. There must be an initiative to provide children with access to modern computers, classrooms connected to each other and the world, software that is an integral part of the teaching and learning.

Government, business, industry and educational leaders at the state level are placing new pressures on teachers to teach children to be knowledgeable technology users, this is why the school system administrators and teachers are expected to go about the task of educating children technology. As much as purchasing computers and hardware is a major problem facing school board members who have to contend with limited financial resources, human factors dealing with the use of those technologies are often just as important. There must be an initiative to provide children with access to modern computers, software that is an integral part of the teaching and learning. What then causes one teacher to embrace the use of technology for instruction while another teacher resists any introduction of technology? Infusing technology into classroom instruction is a major change, business and industrial leaders have expressed the need for computer-literate graduates ready to enter the workforce (U.S. Department of Labor, 1992).

The decision often made by many board members and funding agency staffs to approve budget expenditure for computers and technologies are made without understanding

Teachers' pedagogical use of technologies. Yet technologies are such popular "buzz words" compelling school board members to spend such massive amount of money because of the specific benefits.

1.3 Conceptual Perspective

According to Webb & Cox (2004) technology-enhanced classroom or computer-enhanced classroom or technology-Integrated Classroom can refer to ICT-enhanced classroom teaching, Technology Integrated into Learning and Teaching, ICT in schools, Pedagogy related to ICT etc. Alternatively, it also can just refer to equipment used in a classroom: for instance, classrooms that have a minimum amount of hardware (e.g. 2-3 PCs for learners and an overhead projector) classrooms that have specific devices (e.g. an electronic whiteboard or lots of PCs plus some control station for the teacher).Mburu and Chemwa (2012) state that the integration of computers and telecommunication facilities for the purpose of communication is referred to as information and communication technology(ICT).

Watkins and Mortimore (1999) in a review of research literature on pedagogy, asserts that the models of pedagogy held by researchers and academics have become more complex over time. In the CECA (1988) study, researchers used such precise categories to explain pedagogy as simulation, computer-aided instruction, problem solving, data analysis graphics, multi-use, word processing, report writing. Kirby (1988) broke pedagogy into the following areas: drill and practice, instructional games, reward or leisure activity, teaching content, teaching computer operation, teaching problem solving, teaching word processing, running simulations, programming, computer history, role and impact of the computer in society, data processing, and computer careers.

A search of the literature regarding use of computers reveals a wide variety of definitions and three main components involved with the definition of the use of computer in pedagogy:

frequency of use, amount of time used, and purpose. Use is often defined as a frequency of use, shown as either actual number of occurrences or percentage of use Henderson (1994). Field Research Corporation (1995) researchers measured use as a percentage of time (hours) computers were used in a typical week. The research staff at the Center of Excellence for Computer Applications (CECA) (1988) used the number of hours per student per semester as a measure of computer use at the college level. Field Research Corporation (1995) researchers utilized the following concepts to explain use in the classroom: direct instruction, student monitoring, and other school activities. Researchers utilized multiple ways of measuring use. These researchers looked at use as a measure of frequency of use and number of minutes in use with regard to four categories of instruction: drill and practice, whole-class instruction, student-directed instruction, and computer skills instruction.

1.4 Theoretical Considerations

This study will be based on the technology acceptance model (TAM), introduced by Davis, which is an adaptation of theory of reasoned action (TRA). This model provides an explanation about user acceptance of a technology. TAM suggests that specific behavioral beliefs, perceived ease of use (EOU) and perceived usefulness (U), determine an individual's knowledge toward using. Perceived usefulness is the degree to which a person believes that using a technology will increase his or her performance, while perceived ease of use is the degree to which a person believes that using a technology will be free of effort, and perceived usefulness is influenced by perceived ease of use. As postulated in the TAM, usage of technology will be positively influenced by attitude toward using as well as perceived usefulness and computer self-efficacy has a significant effect on perceived ease of use Venkatesh and Davis's (1996). This provided a basis for the current study.

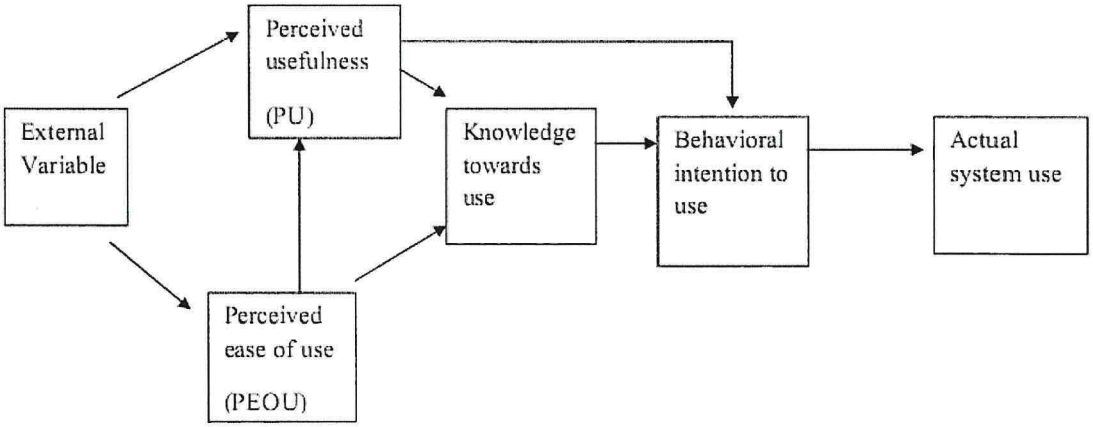


Figure 1. Technology Acceptance Model (TAM) Source: Davis et al., 1989

The TAM model of information systems success relies on Fishbein's (1980) theory of reasoned action to assert that two factors are primary determinants of system use:

Perceived Usefulness (PU) is defined as the user's subjective probability that using a specific technology will increase his or her job performance within an organizational setting (Davis et al., 1989); and Perceived Ease of Use (PEOU) is the user's assessment that the system will be easy to use and require little effort. Straub, Keil and Brenner (1997) suggest that perceived usefulness of computers has a positive effect on the adoption of IT (Information Technology). Nelson, and Todd (1992) and Davis (1989) reported that perceived usefulness affects both attitudes and actual computer use. While Hu et al. (1999) suggest perceived usefulness to be a significant determinant of attitudes and intention. This provides a theoretical basis for this study.

Expectancy-value theory has emerged as a model for understanding and predicting behavior in the process of adopting innovations. Models of expectancy- value have been largely applied to industrial and occupational settings (Vroom, 1964; Mitchell, 1977), and have been found to be an accurate predictor of productivity (Kopelman, 1979).

Building on Shepherd's model of productivity within groups, the Expectancy-value theory is applied to construct a model of the diverse issues involved in a teacher's decision to integrate computer technologies in their teaching. Shepperd believes that such a model may offer a more parsimonious as well as predictive model of teacher integration and use of technology for instruction. According to this model, innovations are more likely to be adopted if the perceived value of the innovation and the likelihood (or expectancy) of success are high, as well as if these benefits outweigh the perceived costs of implementation. That is to say, teacher's decisions to use an innovation, such as computer technology, in the classroom relate to: how highly they value the innovation, how successful they expect their application of the innovation to be and how highly they perceive the costs of implementation and use to be.

The processes of planning, teaching, assessing and evaluating, and the knowledge needed for these processes, are described in Shulman's model of pedagogical reasoning Shulman,(1987). Shulman focuses on knowledge rather than ideas and beliefs. According to Shulman, teachers' knowledge base, include the following categories of knowledge:

General pedagogical knowledge (knowledge related to general teaching issues, for example, teaching approaches and classroom management), curriculum knowledge (knowledge about the 'tools of the trade', schemes of work, resources, and so on), pedagogical content knowledge: 'that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding, knowledge of learners and their characteristics, knowledge of educational contexts: groups, classes, the school and the wider community, knowledge of educational ends, purpose, values and their philosophical and historical grounds.

This study, therefore, utilizes the ideas of these scholars to investigate technology management and teachers' pedagogical use of technology in secondary schools in Nakawa

Division, Kampala District. These factors form the theoretical framework for the present study. Each factor is treated as an independent variable that would promote or hinder the process of integration of technology in classroom instruction in secondary schools in Nakawa Division, Kampala District. The factors of the framework are reflected in the research questions and objectives of this study.

1.5 Statement of the problem

Technology in general has advanced greatly in the last decade. More ICT and other curricular materials related to the use of technology are being planted in schools. It is largely through the production of ever-more marvelous machines that we redeem the promise of a better tomorrow, confirm the world's perfectibility, and reabsorb some to ourselves and to our institutions Hodas (1993).

During each budgetary allocation, board members across schools in the country make decisions about spending money in an effort to increase computers in schools. Huge sums of money are spent acquiring computers and the accompanying software, repairing computers, providing staff development for teachers, hiring computer support personnel, providing telephone lines, and upgrading old equipment. Regardless of the investments in instructional technologies, teachers are not fully utilizing technologies during teaching. This stimulates a research to establish the impact of ICT management and teachers' pedagogical use of the media or Technologies.

1.6 Purpose of the Study

The purpose of the study was to investigate ICT management and teachers' pedagogical use of ICT in selected private schools in Nakawa division Kampala District.

1.7 Objectives of the Study

i. To establish how teachers' knowledge of ICT affect the frequency in pedagogical use of ICT in secondary schools.

ii. To establish the different pedagogical practices ICT teachers are currently using in secondary schools.

iii. To establish how teachers' access to ICT resources affects their pedagogical use of ICT in secondary schools.

iv. To establish strategies of improving ICT management and the Teachers' pedagogical use of ICT.

1.8 Research Questions

i. What is the impact of teachers' knowledge of ICT on the frequency in pedagogical use of ICT in secondary schools?

ii. What are the different pedagogical practices ICT teachers are using in secondary schools?

iii. How does teacher' access to ICT resources affect their pedagogical use of ICT in secondary schools?

iv. What are the strategies of improving ICT management and the Teachers' pedagogical use of computers?

1.9 Scope of the study

This includes both content scope, time scope and geographical scope;

1.9.1 Content scope

The study included; Teachers' knowledge of ICT affect the frequency in pedagogical use of ICT in secondary schools, Different pedagogical practices ICT teachers are currently using in secondary schools, How teachers' access to ICT resources affects their pedagogical use of ICT in secondary schools and strategies of improving ICT management and the Teachers' pedagogical use of ICT.

1.9. 2 Time scope

The period of data to be considered in the organization was from 2012-2014 and period of body of knowledge in reviewing literature was from 2000-2014, while the study was carried out from January to November 31st 2014.

1.9.3 Geographical Scope

The study was carried out in ten secondary schools in Nakawa Division, Kampala District and was specifically to establish the impact of ICT management and the teachers' pedagogical use of computers plus the strategies put forward in improving teachers' pedagogical computer use in secondary schools.

1.10 Significance of the Study

The present study may, therefore be a great contribution towards implementing teachers' pedagogical computer use in secondary schools. It will establish/identify the barriers/problems encountered by teachers in the implementation of pedagogical use of computers in secondary.

The findings from this study may help increase awareness for future planning for the new and emerging technology, such as provision of trained teachers in computers, hardware and soft ware, computer laboratories.

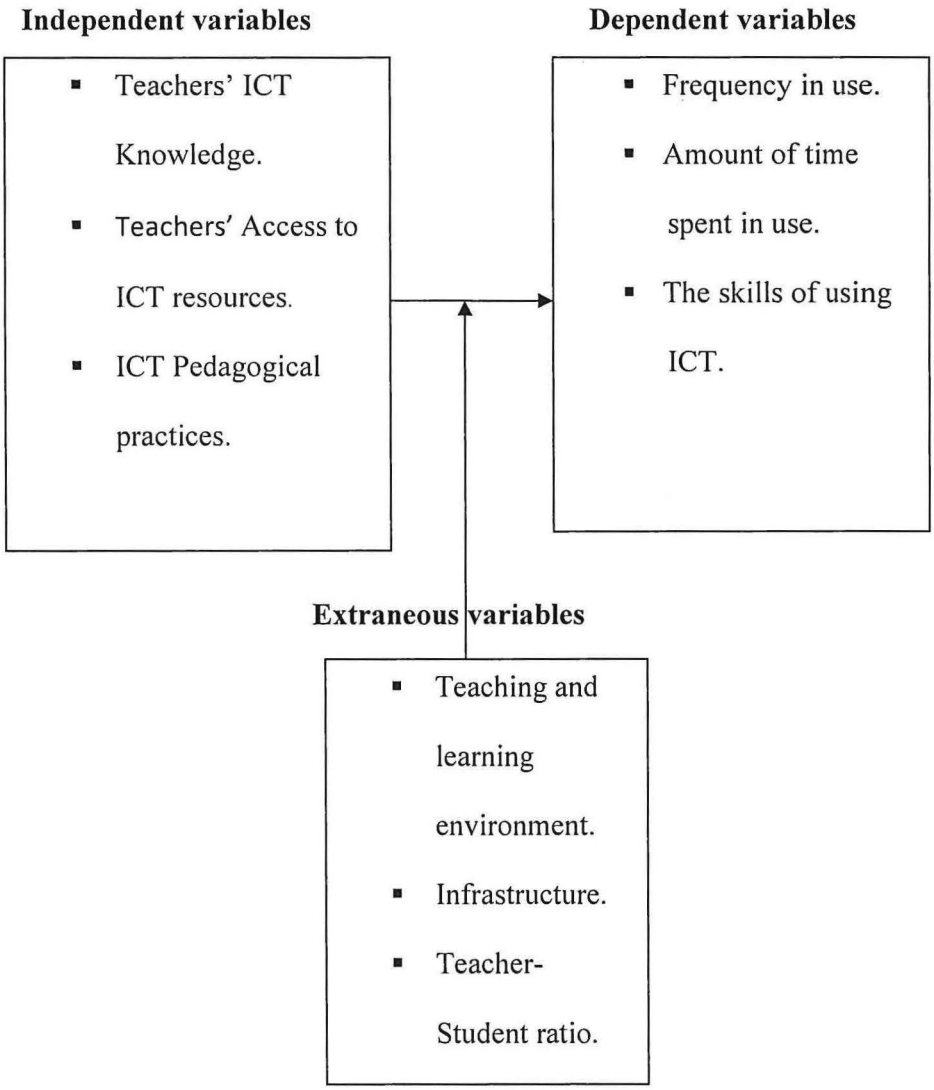
The study is envisaged to establish some ground work to enable discussions and considerations of how national policy makers in education could improve on the level at which to introduce computers in the teaching and learning process.

The Ministry of education may wish to adopt some of the suggestions to be made from the study. Thus it is hoped that the school personnel and other educators will benefit from this study since they are likely to get additional guidelines to selecting and designing educational media with regard to computer use.

1.11 Conceptual Framework

A conceptual frame work is, therefore, designed to guide the study. It is intended to show the relationship the independent variables and the dependent variables, Kothari C.R (2004). The conceptual frame work drawn below explains how the independent variables which are teachers' ICT knowledge, teachers' access to ICT resources and pedagogical practices of the teacher using ICT affect the dependent variables which are: frequency in use, amount of time spent in use and the skills of using ICT in selected secondary schools in Nakawa Division, Kampala District.

A Conceptual framework showing ICT management and teachers' pedagogical use of ICT



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the impact of teachers' ICT knowledge on the frequency in pedagogical use of computers in secondary schools, the different pedagogical practices of the teacher using ICT in secondary schools, how access to ICT resources affect the amount of time of their pedagogical use of computers in secondary schools and the strategies of improving ICT management and the teachers' pedagogical use of computers.

2.2 Teachers' ICT Knowledge and Frequency in use

According to Abbott (2001) the way ICT is used in lessons is influenced by the teachers' Knowledge about their subject and how ICT is related to it. Some teachers choose ICT resources that relate to a particular topic, while others use ICT to present the students' work in an innovative way, without any direct application to the topic. The evidence shows that when teachers use their Knowledge of both the subject and the way students understood the subject; their use of ICT has a more direct effect on students' attainment.

In spite of teachers often being limited by the ICT resources available to them, there are many examples in the literature of teachers having a good understanding of a particular resource. However, very few teachers have a comprehensive knowledge of the wide range of ICT resources now available in education. This means that their pupils are not given all the learning opportunities which ICT could provide. Russek (1991)described some barriers to implementation as a person's knowledge of necessary, but technical and mundane, issues such as the operating system of the computer, the cables the computer needs to connect with and other equipments, such as printers to lack of knowledge. Researchers at Field Research

Corporation (1995), in a survey of 1,000 elementary teachers, found that many teachers (40%) are self-taught with regard to using computers, but 64% of the teachers surveyed considered themselves comfortable or sophisticated users. The Office of Technology Assessment (1995) report added, "Currently schools spend much more on hardware (55percent) and software (30 percent) than they do on training (15 percent)". Training is unmistakably on the minds of teachers and is related to the way in which they integrate knowledge of computer into their classroom instruction. Clark (2003) stated that one reason that new teachers do not use technology is that during the student-teaching stage they do not have mentors who were well trained in the use of the technology. Teachers need a wide range of training about the affordances of ICT in addition the knowledge they always have needed. Teachers' but beliefs about the value of ICT for learning are important in their pedagogical reasoning (it's not enough).

Educational technology is often considered, erroneously, as synonymous with instructional innovation. Technology, by definition, applies current knowledge for some useful purpose. Therefore, technology uses evolving knowledge (whether about a kitchen or a classroom) to adapt and improve the system to which the knowledge applies (such as a kitchen's microwave oven or educational computing). In contrast, innovations represent only change for change sake. Given this distinction, it is easy to argue that educators are correct to resist mere innovation, but they should welcome educational technology. Unfortunately, the history of educational technology does not support this hypothesis (Saettler, 1990).Teachers' perception of the nature of technology and its role in the teachers' pedagogical beliefs is also a barrier to the use of ICT (Ertmer and Hruskocy, 1999). Several research findings about perceptions can be summarized into two major categories: experience with integration and knowledge about integration. Teachers who grew up learning in the traditional methods tend to question the role of technology and feel insecure in the integrated form of teaching using technology

(Hazzan, 2000). Slough and Chamblee (2000) also reported that teachers who have positive experience in using technology to help their work tend to teach their students with technology. Many teachers did not grow up learning technology and do not have often experience personally the helpfulness of technology. This lack of experience becomes a barrier. Teachers' knowledge about technology also affects their perception of integration which in turn affects their decision to use it.

Attitude about technology; In other words, teachers who have higher awareness of technology tend to have better attitudes toward using technology (Coffland, 2000). However, the lack of knowledge about hardware and software is a common barrier in the literature (Weber, 1996).Lack of knowledge of technology is only part of the problem. Many teachers report their lack of knowledge of methods to integrate technology and the lack of knowledge about mathematics curriculum as the reasons for the little use of technology in their classrooms (Manouchehri, 1999). A research study by Ertmer, Addison, Lane and Ross (1999) found that teachers' perception of the role of technology (what it should do in the classroom) is closely related to how the teacher uses the technology. They also found that a teacher's knowledge of technology does not always match his or her perception of technology's role, making it difficult to use technology in the classroom. Another barrier is the perception of technology as something unstable and always changing (Slough and Chamblee, 2000). When perceiving technology as such, teachers are less likely to integrate technology with math curriculum. Teacher self-efficacy refers to a teacher's belief about him or her self ability to make a difference or to be effective as a teacher. In the context of technology integration, self-efficacy can be interpreted as "how effective am I as a teacher when using technology to teach?" A study by Kellengerger (1996) showed that teacher self-efficacy is determined by achievement-beliefs such as "can I do these tasks" and "how well have I done these tasks in the past". It is immediately obvious then, that teachers" past

experience in using technology affects their beliefs about themselves as effective teachers. The experience in both learning with technology and teaching with technology greatly affects the teachers' confidence on integrating technology (Hsiung, 2001). Confidence is highly related to technology use (Molebash and Milman, 2000).

2.3 Pedagogical Practices and the skill of Using ICT

The use and associated pedagogical practice can be described in the following categories Abbott (2001) notes there is little research into the effects of internet use on teachers' pedagogies and pupils' attainment in mathematics at primary level, although there are early suggestions that websites dedicated to mathematics could encourage more effective teaching (Jones and Simons, 1999). More data specific to the pedagogy of teaching secondary mathematics when using such websites is needed. New research should examine both the students' and teachers' use of such a resource for both teaching and learning, and its effectiveness in positively affecting learning outcomes.

The evidence from experimental studies shows that various aspects of achievement can be improved by integrating simulations into topics that student find conceptually difficult. The activities set by the teacher involving simulations are often problem solving and enquiry tasks, in which students interact with each other as well as with the teacher. Although these studies rarely consider pedagogy in detail, they do suggest that the collaboration between students was an outcome that was encouraged, but not specifically designed, by the teachers, and that the collaboration is one of the factors that lead to improved attainment. Computer simulations of experiments are often used in short episodes in existing curricula. For example, Huppertetal(1998), conducted an experimental study of the effect of using computer simulations on 10^{th}-gradepupils' (year 11 in the UK) ability to apply their knowledge to the growth curve of micro-organisms.

The use of simulations allowed the pupils to carry out investigations more quickly and focus on analyzing the results and hypothesizing. The structure of the course helped to create a collaborative learning atmosphere, with pupils comparing results and exchanging ideas. These aspects resulted in gains in cognitive learning. Tao and Gunstone (1999) investigated the use of computer simulations integrated into 10 weeks of physics instruction for one class in an Australian high school. The simulations were specifically developed to confront pupils' alternative conceptions in mechanics. The classroom study investigated whether and how collaborative learning using computers fosters conceptual change. The programs provided the pupils with many opportunities for the co-construction of knowledge. During the process, pupils complemented and built on each other's ideas and incrementally reached shared understandings. Their interactions led to conceptual change. Although this study did not directly address the role of the teacher, it does suggest the desirability of providing opportunities for collaborative learning.

Another important aspect of ICT in science at both primary and secondary levels is modelling, in which pupils build their own models by identifying relevant factors and variables and hypothesizing relationships. Most of the research in this area focuses on learning and attainment, but large projects such as the London Mental Models project Mellar (1994), have also studied the role of the teacher in the classroom when pupils are building scientific models. This study and others have shown that although primary school pupils could investigate existing models and hypothesis relationships, it was more difficult for them to build their own model without the guidance and support of the teacher. They tended to build very basic models, and could not decide on strategies for further work without being told about the goals which they were trying to achieve. Jarvis et al. (1997), for instance, evaluated the effect of collaboration by email on the quality of 10- to 11-year-old pupils' investigative skills in science in six rural primary schools. Although the children

demonstrated a variety of scientific skills, in particular observing and recording, and developed some general computer skills, there was no indication that the use of email enhanced their learning in science. The influence of the teacher was recognized as a crucial element. When teachers provided limited supervision and guidance there were often periods of unproductive activity. Teachers with more confidence in science tended to monitor activities more closely and intervene more, as a result of which pupils extended their scientific skills. Dori and Barak (2001) used a combination of physical and virtual modelling to support the development of conceptual understanding. They conducted an experimental study with 276 pupils from nine high schools in Haifa and the northern part of Israel using a new teaching method that combined physical and virtual three-dimensional molecular models. The pupils in the experimental group gained a better understanding of the concepts illustrated by the model and were more capable of defining and implementing new concepts. They were more capable of mentally traversing across four levels of understanding in chemistry: symbol, macroscopic, microscopic and process. Students in the experimental group were more capable of applying transformation from two-dimensional representations of molecules, provided by either a symbolic or a structural formula, to three-dimensional representations, to a drawing of a model, and of applying reverse transformations. The researchers found that the enquiry based learning tasks encouraged understanding of organic compounds.

One of the most widely researched areas of ICT in mathematics is programming and using micro world's .Many studies using the programming language Logo with primary school children have been reported. The use of Logo has been shown to improve children's estimation of distance (Campbell et al., 1991) and improve their ability to create accurate sets of instructions to plot a path through a maze Johnson and Kane(1992).In a meta-analysis, Clements (2000) described a number of ways in which the appropriate use of Logo

programming has been shown to help pupils. These include the development of higher levels of mathematical and especially geometric thinking, and problem-solving kills Au and Leung(1991), and enhanced social Interaction Yelland (2003).

Michel et al (1999) suggest that allowing pupils to make video clips can develop their powers of observation and open new perspectives for their understanding of scientific concepts. This is because pupils need to think about exactly what should be recorded in order to explain concept. This type of enquiry-based teaching involves pupils in deciding which problems to investigate, searching for alternative solutions, collecting and tabulating data, reporting conclusions, and suggesting new related problems for further investigation. The technology also gives teachers the flexibility to demonstrate scientific concepts through a method other than a live demonstration. In one example from this study, a high school biology teacher produced a CD-ROM of short clips digitized from tapes made by pupils during along-term experiment to grow various plants. The pupils later incorporated the clips into scientific presentations. Reid et al.(2002), in an evaluation of a pilot study of digital video in 50 schools in the UK, reported that teachers found that filming and editing a video about forces helped pupils to assimilate scientific concepts more effectively, quickly and substantially than would have been achieved with handouts or textbooks.

Barton (1997), in a review of research on data logging, concluded that the main benefit is the time saving, but suggests that the important factors of interaction with peers and intervention by the teacher need further research. Linn and Hsi (2000) found that pupils are much better at interpreting the findings of their experiments when they use real-time data collection than when they use conventional techniques for graphing their data, and that this greater understanding is carried over to topics where they have not collected the data.

McKinnon and Nolan (2000) describe a distinction course on cosmology for secondary-aged gifted and talented pupils in a 'learning community' supported by ICT largely replaced the traditional role of the teacher. Instead the course co-coordinator and astronomers acted as learning facilitators, mentors and discussion partners. This allowed pupils to manage their own learning.

2.4 Teachers' Access to ICT Resources and Pedagogical Use of ICT

Abbott (2001) points out that an important influence on the use made of ICT in subjects and classes is the amount and range of ICT resources available to the teachers. Where there are limited numbers of computers in a class, mostly in primary schools, this limits their impact, because each individual pupil is only able to use the computer for a few minutes. Whole-class use of an electronic whiteboard has both positive and negative effects. It promotes pupils' debate sand helps them visualize difficult concepts and processes.

Access to technology, as defined in the OTA report, has multiple connotations: computers in the classroom, ratio of students to computers, computers at home, current hardware and software, and location of computers. Reilly (1996) stated, "There are enough computers in schools in the United States to provide at least one for each classroom, but the reality is that the technology is not evenly distributed and much is already old".

The researchers of Field Research Corporation (1995) surveyed 1,000 elementary (K-6) teachers in the United States and found access to computers to be distributed unequally. Many teachers (76%) have one computer in their classroom, but the number of teachers with more than one computer (36%) per classroom drops drastically. Obviously, for teachers to use computers in classroom instruction, they must have access to computers. While great strides have been made in placing computers in classrooms, there are still some great inequalities of access. Russek (1991) found a barrier that affected implementation of

computers in classroom instruction to be the "difficulties with the whole-class demonstration format". This barrier is often related to teaching in a one-computer classroom.

Many computers are too old to use current software, but, politically, it is not wise to throw out something that looks like a computer. The type of access is an issue because teachers find signing up for the use of a lab cumbersome and inconvenient. Teachable moments do not often allow the luxury of signing up for the computer lab. The researchers at the Center for Applied Special Technology (1996) pointed out that schools are rapidly acquiring computers and networks, but that acquisition (access) is only the beginning.

Access as one of the barriers of Teachers' pedagogical computer use is associated with problems which include limited equipment, lack of access to educational software and difficulties in scheduling the computer lab to fit curriculum (Wetzel, Zambo and Buss, 1996). Parr (1999) reported that a school training program that provides both access of computer for personal use (laptops for each teacher) increased the pedagogical use of computers by Teachers. Computer technology use depends first of all on whether there are enough computers.

As revealed in the literature, access to computer technology at both workplace and at home influences the individual of the technology. Therefore, there must be improved has and tremendous investment in building computer technology infrastructure in order to ensure that there are enough hardware and software resources available in schools. However, the sole availability of infrastructure does not guarantee actual usage in daily routines. It is also very important to understand key motivational variables in the computer technology use of individual end users.

2.5 The Strategies of Improving ICT Management and the Teachers' Pedagogical Use of ICT.

Becker (1988) has pointed all the viewpoints by delineating the following philosophical and educational considerations, which surround the justification for the inclusion of computers in the school curriculum: Computers in education must reflect the belief that computer literacy is a fundamental requirement for participation in the society of tomorrow. Computers in education must reflect the power to compute as a prerequisite for the success in higher education and subsequent careers. Computers in education must be grounded in the belief that programming computers or using certain programs might develop more generalized intellectual capabilities. Computers in education must maximize the productivity gains by integrating computer applications (e.g. spreadsheet, word-processing software) into the existing curriculum.

Many papers recommend training in order to increase the use of technology from teachers (Cooper, 1998; Matthews, Davis and Hamilton, 1996). Fazio and Polsgrove (1989) have conducted a study that found that training of technology integration for special education teachers effectively increase the use of computers in classes. However, the lack of training at pre-service stage (Wetzel et al, 1996) and the lack of in service support (Ertmer and Hruskocy, 1999) are two reasons that teachers do not integrate technology in classes. A systematic training program increases teacher confidence and actual use of technology (Gilmore, 1995). Ertmer and Hruskocy (1999) found that with a well-planned training and support program, teachers increased the uses of technology for professional tasks such as record keeping, creating instructional materials.

They also increased using technology for instructional purposes such as using CD-ROMS for Science lessons and asking students to use word processor and Hyper Studio to make reports.

However, training and support are not readily available everywhere for pre-service and in-service teachers. Committee for Economic Development (1995) and OTA (1995) stated that one reason that new teachers do not integrate technology is that they did not have, during the student-teaching stage, mentors who were well trained in technology. Furthermore, because student teachers are placed in a wide range of schools with different technological and training resources, it is difficult to prepare all teachers to integrate technology in the field placement. To solve this problem, Ertmer and Hruskocy (1999) studied the impact of a university-elementary school partnership in supporting technology integration for both the mentor and the student teacher and found that such partnership is highly effective.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presented the methodology to be used in the study. It included; Research design, population and sample of techniques, Target/Accessible population, Sample, Sample Techniques, data collection, quality control, data analysis, assumptions and limitations.

3.1 Research Design

A research design is a plan of how the researcher will conduct the study (Kothari 2004). In this study, a cross-sectional survey research design was adopted where both qualitative and quantitative research approaches were used. This design was useful as it was the most appropriate way to gather data from a large population at a particular time (Amin, 2005). Qualitative methods were used to collect, present, interpret and analyze verbal data (descriptive and narrative). Whereas quantitative methods were used to interpret and analyze numerical data and this was done inform of tables, frequencies and percentages. The design was chosen because it generates quick self-reports from the participants under the study, (Creswell, 2005). Also, cross sectional survey design was chosen because the study involved collecting data from a relatively large number of respondents in its geographical setting, cheaply and in a short time (Elliot 1999). This design is also chosen because of the nature of the study as it requires cutting across a representative sample of all respondents in the study population.

3.2 Population and Sampling Techniques

According to Mugenda (1999) population is a large group of people or objects from which a number of individuals are selected for a study. The target population for this study, were

teachers and head teachers of secondary schools because head teachers are directly involved in the management of ICT and teachers are involved in the use of ICT. This study involved 120 teachers and 10 teachers of the selected secondary schools in Nakawa Division, Kampala District.

3.2.1 Sampling Procedure

Sampling is the process of obtaining information about an entire population by examining only part of it (Mingers, 2005 & Myers, 1997). The target groups were secondary school teachers and Head teachers. Stratified random sampling technique was used to select samples that were drawn independently and randomly from the stratum of secondary schools in Nakawa Division, Kampala District. Proportionate stratified random sampling technique was used to select 130 respondents from selected secondary schools in Nakawa Division, Kampala District.

3.2.2 Target/Accessible Population

This study was conducted in ten secondary schools in Nakawa Division Kampala district. These selected schools provided the necessary information on ICT management and pedagogical use in selected secondary schools in Nakawa Division Kampala District. It was necessary to select Nakawa Division because a number of schools have the necessary infrastructure for ICT implementation but have failed to use ICT in classroom instruction in their teaching and learning process. The formidable problem currently facing education in the Division is the need to improve students' performance by addressing ICT management and its pedagogical use in selected secondary schools in Nakawa Division in Kampala district. The dominant mode of instruction was conventional and this called for the need to explore ICT management and its pedagogical use in selected secondary schools in Nakawa division in Kampala district.

3.3 Information Sources

Both primary and secondary sources of information were used by the researchers. A primary source of data is the one in which an individual describes an occurrence by actual observation while a secondary source of data is any publication written by an author who is not direct participant in the study described (Mugenda, 1999). Primary data included information from questionnaires and interview while the secondary data included data from text books, educational journals, internet, news papers and magazines.

3.4 Research Instruments

Researcher used methods that provide high accuracy, generalizability and explanatory power, with low cost, rapid speed and maximum management demands and administrative convenience (Warwick and Lininger, 1975). Basing on this fact, a combination of the following research instruments was used in this study for complementary purposes: questionnaires and interview schedule.

3.4.1 The Questionnaire

Kakinda (1995) asserted that questionnaire is a set of related questions designed to collect information from respondents. The Questionnaires were used to get information from the teachers. Questionnaires were preferred because they are appropriate tools through which many respondents can be reached. The questionnaire made it possible to obtain a wide variety of responses and to draw more reliable conclusions from the responses of teachers. Questionnaires facilitated easy and quick derivation of information within a short time (Borg and Gall, 1983).

3.4.2 The Interview Schedule

Verd (2004) defines interview guide as oral and vocal questioning technique or discussion. The interview schedule was prepared and used to collect qualitative in-depth data. The interview schedules provided the researcher with greater opportunity to explain the purpose of the study (Stone and Harris 1984). This instrument was used to obtain data from the head teachers. The items in the head teachers' interview schedule sought information on ICT management that affects the teachers' accessibility to ICT resources, the different Pedagogical practices of ICT and the strategies of improving ICT management. In the development of the interview schedule, open-ended formats of items were used to avoid limiting the respondents' response and to facilitate guidance and probing for further clarification. The questions were designed on the basis of the objectives of the study, the research questions and the theoretical framework stated in chapter one.

3.5 Quality Control

The instruments were validated before their use in actual data collection. For the research instrument to be considered valid the content selected and included in the questionnaire must also be relevant to the variables being investigated. Validity for this study was done through consultations with experts from the faculty of education, Kyambogo University. This was done to assess the relevance of the content in the research tools in relation to the objectives of the study.

3.5.1 Reliability of the Research Instruments

Reliability is the extent to which the measuring instrument produces consistent scores when the same groups of individuals are repeatedly measured under the same conditions (Amin, 2004).

For consistency of research results from the study instrument, the researcher used Cronbach's alpha method with the help of SPSS as indicated below, so as to determine reliability of this instrument.

Table 3. 1 Showing reliability of research instrument

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.968	.966	27

According to Amin (2005), a perfect reliable instrument has a coefficient alpha of 1.00, meaning that all values close to 1.00 are reliable. Since cronbach's alpha is 0.968 which is very close to 1.00, then the instruments were considered reliable.

3.5.2 Validity

Validity of instrument means that the instruments are serving the purpose for which they are intended (Keeves,1988;Sarantokos,1997).This is the ability to produce findings that are in agreement with theoretical or conceptual values or to produce accurate results and to measure what is supposed to be measured. The researcher ensured content validity of the SAQs by ensuring that questions in it conform to the study's research objectives and conceptual framework. The research experts and with the help of the supervisor independently judged the validity of the items in the questionnaire, interview guide in relation to research objectives. The Content Validity (CV) was computed to determine the validity of the set of SAQs using the formula;

CVI=Total number of items rated as valid

Total number of items on the instrument

The variables should have a CVI of above 0.70 or 70% as the recommended value for the instruments to be considered relevant (Amin 2005, p.286). The instruments for this study were valid to be used since they had a C.V.I of 0.83

Using the formula;

Content validity=100/120*100=0.83, whereby 100 are the fully completed and returned questionnaires and 120 was the number of questionnaires distributed.

Therefore the total = 83%

3.6 Data Analysis

This is because the research instruments yielded both qualitative and quantitative data. Qualitative data was edited on a continuous basis to ensure that it is complete. It was put into categories according to the variables. Content analysis was done. Conclusions were made from that type of data

3.7 Research Procedure

The researcher obtained a letter of introduction from the Dean of the faculty of education of Kyambogo University. She then went to the schools and used the introductory letter to get permission from the head teachers and make arrangements of days and time to administer the questionnaires and to conduct interviews. The researcher then personally delivered the questionnaires and conducted interviews in the schools.

3.8 Ethical Consideration

During the research, integrity and confidentiality were considered. This was done through seeking consent from the respondents and acknowledgement of the authors. The findings were used for academic purposes only. To ensure confidentiality, Pseudonyms A,B,C,D,E,F,G,H,I and J were to represent the names of the ten selected schools in Nakawa

division, Kampala district.

3.9 Limitations of the Study

The study has various dimensions such as ICT management and its pedagogical use that included teaching, learning process and the evaluation process. This study will focus on the use of ICT as an instructional tool by specifically looking at some of the factors which affect the integration and utilization of ICT in instruction as perceived by teachers in secondary schools of Nakawa Division Kampala District. These include: Teachers pedagogical practices, access to resources, teachers' knowledge of ICT therefore the conclusions made in the study will be solely based on the responses of the sample population.

CHAPTER FOUR

DATA PRESENTATION, INTERPRETATION AND ANALYSIS OF FINDINGS

4.0 Introduction

This chapter presented data collected using questionnaires, interview schedule and observation checklist described in Chapter three above. The corresponding interpretations also followed each presentation. The results of the study were presented according to the objectives and research questions.

The findings in this chapter were also arrived at by analyzing and interpreting the available data using SPSS. All the responses were presented in terms of frequencies and percentages which were displayed in tables. Each question was treated separately and was presented in subsequent subsections one by one.

The statistical data from the quantitative part of the questionnaires was then supported by the qualitative data of the study from interviews.

Therefore this chapter presented the response rate, the background of characteristics of respondents and results on substantive study objectives.

4.1 Response Rate

Table 4.1: The response rate results from this study

Total number of teachers in sample	Total Number of responses	Unresponsive	Response rate
120	100	30	83%

Source: Primary data

A sample size of 120 teachers and 10 head teachers were set for the study. The researcher distributed 120 questionnaires to the respondents and 100 were returned fully completed, yielding 83% response rate. The researcher purposively selected 10 key head teachers for interview in order to supplement data from questionnaires. A response rate of 70% and above is generally considered very good according to Mugenda and Mugenda (2003). The 83% response rate obtained in this study being well above 70% was considered generally acceptable.

4.2 Results on the Background Characteristics of respondents

This information was about the respondents' school name, position of responsibility, age range/group, gender, marital status, level of education, how long they had been in the school and how long the respondents had been using ICT in teaching. These were presented in the next subsection one by one. The background information of the respondents was considered necessary because the ability of the respondents to give satisfactory information on the study variables may be affected their background. Ten schools were used and for purposes of confidentiality, the names of the schools were not used and instead pseudonyms A, B, C, D, E, F, G, H, I and J, were employed throughout the study.

Table below showing schools studied;

Table 4.2 Category by schools name

Schools	Frequency	Percentage
A	12	12
B	14	14
C	6	6
D	7	7
E	9	9
F	8	8
G	3	3
H	18	18
I	13	13
J	10	10
Total	100	100

Source: Primary data

Findings from table 4.2 shows that the majority of the respondents were from school H with 18%, School B with 14%, I with 13%, A with 12%, J with 10%, E with 9%, F with 8%,D with 7%, C with 6%, and school G with 3%. This implies that data on the subject of study was collected from a fairly representative sample of schools in the division.

The findings were used in analysing the subsequent tables.

Table below shows positions of the respondents

Table 4.3 Distribution by position of responsibility of respondents

Responsibility	Frequency	Percentage
Head teacher	10	10
Teacher	90	90
Total	100	100

Source: Primary data

Findings from the table 4.3 above shows that the majority of the respondents were teachers with 90% and the remaining 10% were head teachers. This was so because the researcher wanted both the school heads and teachers to ascertain whether there is information management.

Results from table below show age of respondents

Table 4.4 Show distribution by age range of teachers

Age range	Frequency	Percentage
26-30 years	10	10
31-35years	20	20
36-40years	30	30
41-45years	15	15
46-50years	5	5
51-55years	17	17
56-60years	3	3
Total	100	100

Source: Primary data

Findings from table 4.4 shows that 30% were within the age range of 36-40years, 17% were in the age range of 51-55years, 15% were in the age group of 41-45years, 20% were in the age range of 31-35years, 10% were in the age range of 26-30years, 5% in the 46-50years age range and the remaining 3% were in 56-60years age range. This shows that all age groups were considered and the information provided were vital in the compilation of the findings.

Results from table below show respondents' gender

Table 4.5 Shows distribution of respondents by gender

Sex	Frequency	Percentage
Male	60	60
Female	40	40
Total	100	100

Source: Primary data

Findings from table 4.5 above shows that the majority of the respondents were male with 60% and the remaining 40% were female.

Results from table below show respondents' marital status

Table 4.6 Shows distribution on respondent's marital status

Marital status	Frequency	Percentage
Single	**20**	**20**
Married	**70**	**70**
Widowed	**10**	**10**
Total	**100**	**100**

Source: Primary data

Findings from table 4.6 shows that 70% of the respondents were married, 20% were single and the remaining 10% were widowed.

Results from table show respondents' education level.

Table 4.7 Shows distribution on respondent's level of education

Education level	Frequency	Percentage
Bachelor's degree	60	60
Masters	40	40
PHD	0	0
Other	0	0
Total	100	100

Source: Primary data

Findings from table 4.7 shows that the majority of the respondents were degree holders with 60% and the remaining 40% were master holders.

Results from table below show respondents' years in service

Table 4.8 Shows distribution on how long respondents had been in the service

Years in service	Frequency	Percentage
Less than a year	30	30
1-2 years	35	35
3-4years	20	20
Above 5 years	15	15
Total	100	100

Source: Primary data

From table 4.8, the majority of the respondents had taught in their respective schools for 1-2 years with 35%, the other 30% had taught for less than a year, 20% had taught for between 3-4years and the remaining 15% had taught for above 5 years.

The table below showing how long teachers had been using ICT

Table 4.9 Shows distribution on how long teachers and head teachers had been using ICT to teach

Years	Frequency	Percentage
Less than a year	50	50
1-2 years	20	20
3-4 years	16	16
Above 5 years	14	14
Total	100	100

Source: Primary data

Table 4.9 shows that the majority of the respondents had taught using information communication and technology for less than a year with 50%, followed by 20% who said that they had taught using ICT for between 1-2 years, the other 16% said that they had taught using ICT for between 3-4years and the remaining 14% said they had taught using ICT for above 5 years.

4.4 Results on Substantive objectives

4.4.1Descriptive Results

This section deals with descriptive results of the four study objectives that is to say; To establish how teachers' knowledge of ICT affect the frequency in pedagogical use of ICT in

secondary schools, To establish the different pedagogical practices ICT teachers are currently using in secondary schools, To establish how teachers' access to ICT resources affects their pedagogical use of ICT in secondary schools, To establish strategies of improving ICT management and the Teachers' pedagogical use of ICT . These are presented in the next subsections.

Objective One: How teachers' knowledge of ICT affect the frequency in pedagogical use of ICT in secondary school

The first objective of the study was to establish how teachers' knowledge of ICT affects the frequency in pedagogical use of ICT in secondary schools. It was subdivided into the ability to use word processing for class room purposes, teachers in this school are well versed with the concept of spreadsheet for class room purposes, I have the ability to conduct lessons using power point presentations and teachers in this school can design instructional materials using publisher.

4.4.2 Results on teachers' ability to use word processing for class room purposes.

Table 4.10 Shows distribution on whether teachers have the ability to use word processing

Ability	Scale	Frequency	Percentage	Mean
I have ability to use Word processing for classroom purposes.	Strongly disagree	13	13	
	Disagree	17	17	
	Undecided	0	0	
	Agree	50	50	
	Strongly agree	20	20	3.5

	Total	**100**	**100**	

Source: Primary data

Table 4.10 shows that the majority of the teachers could use word processing to teach in classrooms with 70% who agreed compared to 30% who disagreed that teachers did not have the ability to teach using word processing. This was in line with mean value of 3.5 which showed that teachers could teach using word processing. This could be attributed to the fact that most institutions of higher learning these days encourages practical basic knowledge of computers skills, that is why most respondents interviewed had knowledge of word processing.

Table shows whether teachers were well versed with the concept of spreadsheet.

Table 4.11 Shows distribution on whether teachers are well versed with the concept of spreadsheet

	Scale	**Frequency**	**Percentage**	**Mean**
Teachers in this school are well versed with the concept of spreadsheet for classroom purposes.	Strongly disagree	0	0	4.5
	Disagree	10	10	
	Undecided	0	0	
	Agree	60	60	
	Strongly agree	30	30	
	Total	**100**	**100**	

Source: Primary data

Findings from table 4.11 shows that the majority of the respondents agreed that teachers had the ability of using spreadsheet for classroom purposes with 90% compared to 10% who disagreed that teachers had ability of using spread sheet. This was in line with mean of 4.5 which showed that the respondents agreed the teachers could use spreadsheet.

Table shows teachers' ability to use power point.

Table 4.12 Shows distribution on whether teachers have ability of using power point for presentations

	Scale	**Frequency**	**Percentage**	**Mean**
I have the ability to conduct lessons using power point presentations.	Strongly disagree	0	0	4.8
	Disagree	4	4	
	Undecided	0	0	
	Agree	40	40	
	Strongly agree	56	56	
	Total	**100**	**100**	

Source: Primary data

Findings from table 4.12 shows that the majority of the respondents agreed that they could use power point for presentations with 96% compared to 4% who disagreed that they had the ability of using power point for presentation. This was in line with mean of 4.8 which showed that respondents could use power point for presentation.

Table show whether teachers use materials using publisher

Table 4.13 Shows distribution on whether can design instructional materials using publisher

	Scale	Frequency	Percentage	Mean
Teachers in this school can design instructional materials using publisher.	Strongly disagree	2	2	4.9
	Disagree	0	0	
	Undecided	0	0	
	Agree	48	48	
	Strongly agree	50	50	
	Total	**100**	**100**	

Source: Primary data

The mean of 4.13 shows that most likely every teacher could use publisher to design instructional materials with 98% compared with only 2% who disagreed. This shows that most teachers could use publisher much as there may be some gaps.

Objective Two: Establishing the different pedagogical practices ICT teachers are currently using in secondary schools

The second objective was to establish the different pedagogical practices ICT teachers are currently using in secondary schools. The objective was subdivided into teachers in this school can exchange academic messages using ICT, the teachers in this school have sufficient ICT skill, teachers in this school are able to use ICT for student's assessments, teachers have

the ability to assemble ICT components for classroom purposes and teachers have the ability to prepare lessons using ICTs.

4.4.3 Results on teachers' ability to exchange academic messages using ICT

Table 4.14 Shows distribution on teachers ability to exchange academic messages using ICT

	Scale	Frequency	Percentage	Mean
Teachers in this school can exchange academic messages using ICT.	Strongly disagree	6	6	4.2
	Disagree	10	10	
	Undecided	0	0	
	Agree	70	70	
	Strongly agree	14	14	
	Total	**100**	**100**	

Source: Primary data

Table 4.14 above shows that the majority of the respondents agreed that they could exchange academic messages using ICT with 84% compared to 16% who disagreed. This was in line with mean of 4.2 which showed that the respondents could exchange academic messages using ICT.

4.4.4 Results on whether teachers have sufficient ICT skills

Table 4.15 Shows distribution on whether teachers have sufficient ICT skills

	Scale	Frequency	Percentage	Mean
The teachers in this school have sufficient ICT skill.	Strongly disagree	0	0	3
	Disagree	40	40	
	Undecided	0	0	
	Agree	50	50	
	Strongly agree	10	10	
	Total	**100**	**100**	

Source: Primary data

Findings above in tale 4.15 show that the majority of the respondents agreed that the teachers had sufficient ICT skills with 60% compared to 40% who disagreed. Much as the 60% were the majority, the other 40% shows that there are still some gaps that the proprietors of these private schools should put in place in order for their teachers to be update with technology. The low mean of 3 shows that the teachers do have some knowledge about ICT but it is not sufficient.

4.4.5 Results on teachers' ability to use ICT for students' assessments

Table 4.16 Shows distribution on teachers' ability to use ICT for students' assessment

	Scale	Frequency	Percentage	Mean
Teachers in this school are able to use ICT for students' assessments.	Strongly disagree	0	0	4.25
	Disagree	15	15	
	Undecided	0	0	
	Agree	60	60	
	Strongly agree	25	25	
	Total	**100**	**100**	

Source: Primary data

Findings from table 4.16 shows that the majority of the respondents agreed that teachers had the ability of using ICT for students' assessments with 85% compared to 15% who disagreed. This was inline with mean of 4.25 which showed that the respondents had the ability of using ICT for students' assessments.

4.4.6 Results on teachers' ability to assemble ICT components for class room purposes

Table 4.17 Shows distribution on whether teachers have the ability to assemble ICT components for class room purposes

	Scale	Frequency	Percentage	Mean
Teachers have the ability to assemble ICT components for classroom purposes.	Strongly disagree	25	25	3
	Disagree	15	15	
	Undecided	0	0	
	Agree	60	60	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Findings in table 4.17 above shows that the majority of the respondents agreed that teachers had the ability of assembling ICT components for class room purposes with 60% compared to 40% who disagreed. This was also in line with mean of 3 which showed that respondents could assemble ICT components for class room purposes. However, the low mean of 3 which shows that the respondents still have areas in order for them to be fully perfect in assembling ICT for classroom purposes.

4.4.7 Results on teachers' ability to prepare lessons using ICT

Table 4.18 Shows distribution on teachers' ability to prepare lessons using ICT

	Scale	Frequency	Percentage	Mean
Teachers have the ability to prepare lessons using ICTs.	Strongly disagree	0	0	3.5
	Disagree	30	30	
	Undecided	0	0	
	Agree	70	70	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Table 4.18 above shows that the majority of the teachers had the ability of preparing lessons using ICT with 70% of the respondents agreeing compared to 30% who disagreed. This was in line with mean of 3.5 which showed that the teachers could prepare lessons using ICT.

Objective Three: how teachers' access to ICT resources affects their pedagogical use of ICT in secondary schools

The third objective was to establish how teachers' access to ICT resources affects their pedagogical use of ICT in secondary schools. The objective was subdivided into teachers

have access to ICT laboratory, teachers have access to ICT in the staffroom, teachers have access to ICT in the class room, teachers have access to personal digital assistants (PDA) and teachers have access to ICT devices in their homes.

4.4.8 Results on whether teachers have access to ICT laboratory

Table 4.19 Shows distribution on whether teachers have access to ICT laboratory

	Scale	**Frequency**	**Percentage**	**Mean**
In this school, teachers have access to ICTs laboratory.	Strongly disagree	15	15	3.5
	Disagree	55	55	
	Undecided	0	0	
	Agree	10	10	
	Strongly agree	20	20	
	Total	**100**	**100**	

Source: Primary data

Findings from table 4.19 shows that the majority of the respondents disagreed that they had access to ICT laboratory with 70% compared to 30% who agreed that they had the laboratory. The mean of 3.5 also showed that the schools did not have access to ICT laboratories.

4.4.9 Results on whether teachers have access to ICTs in the staffroom

Table 4.20 Show distribution on whether teachers have access to ICT in the staffroom

	Scale	Frequency	Percentage	Mean
In this school, teachers have access to ICTs in the staffroom.	Strongly disagree	0	0	3.5
	Disagree	30	30	
	Undecided	0	0	
	Agree	70	70	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Results from table 4.20 above shows that the majority of the respondents agreed that teachers had access to ICTs in the staffroom with 70% compared to 30% who disagreed. This was also in line with mean of 3.5 which showed that teachers had access to ICT in staffroom in the schools.

4.4.10 Results on whether teachers have access to ICT in classroom

Table 4.21 Show distribution on whether teachers have access to ICTs in the classroom

	Scale	**Frequency**	**Percentage**	**Mean**
In this school, teachers have access to ICTs in the classroom.	Strongly disagree	85	85	4.25
	Disagree	0	0	
	Undecided	0	0	
	Agree	15	15	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Findings from table 4.21 above shows that the majority of the respondents disagreed that the schools had ICT in classrooms with mean of 4.25 which means that it is likely that the schools do not have ICT .

4.4.11 Results on whether teachers have access to Personal Digital Assistants (PDA)

Table 4.22 Shows distribution on whether teachers have access to personal digital assistants

	Scale	Frequency	Percentage	Mean
In this school, teachers have access to personal digital assistants (PDA devices).	Strongly disagree	96	96	4.8
	Disagree	0	0	
	Undecided	0	0	
	Agree	4	4	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Results from table 4.22 above shows that the majority of the respondents never had access to personal digital assistants or devices with mean of 4.8. Much as the majority never had personal digital assistants, there were few teachers who had them.

4.4.12 Results on whether teachers have access to ICT devices in their homes

Table 4.23 Shows distribution on whether teachers have access to ICT devices in their homes

	Scale	Frequency	Percentage	Mean
Teachers in this school, have access to ICT devices in their homes.	Strongly disagree	98	98	4.9
	Disagree	0	0	
	Undecided	0	0	
	Agree	2	2	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Results from table 4.23 above shows that most teachers do not have access to ICT in their homes with mean of 4.9.

Objective Four: Strategies of improving ICT management and the Teachers' pedagogical use of ICT

The fourth objective was to establish strategies of improving ICT management and the Teachers' pedagogical use of ICT. It was subdivided into building ICT infrastructure in your school, recruiting trained ICT teachers, recruiting ICT laboratory school technicians, frequent

servicing of ICT devices in your school and proper maintenance of ICT physical infrastructure in your school.

4.4.13 Results on building ICT infrastructure in your school

Table 4.24 Shows distribution on whether schools are building ICT infrastructure

	Scale	**Frequency**	**Percentage**	**Mean**
Building ICT infrastructure in your school.	Strongly disagree	0	0	4.65
	Disagree	7	7	
	Undecided	0	0	
	Agree	43	43	
	Strongly agree	50	50	
	Total	**100**	**100**	

Source: Primary data

Results findings above shows that the majority of the respondents agreed that their schools were building ICT infrastructure with mean of 4.65.

4.4.14 Results on whether schools are recruiting ICT trained teachers

Table 4.25 Shows distribution on whether schools are recruiting trained ICT teachers

	Scale	Frequency	Percentage	Mean
Recruiting trained ICT teachers.	Strongly disagree	11	11	4.45
	Disagree	0	0	
	Undecided	0	0	
	Agree	60	60	
	Strongly agree	29	29	
	Total	**100**	**100**	

Source: Primary data

Results from table 4.25 above shows that the majority of the respondents agreed that the schools were recruiting trained ICT teachers with mean of 4.45.

4.4.15 Results on whether schools are recruiting ICT laboratory technicians

Table 4.26 Shows distribution on schools are recruiting laboratory technicians

	Scale	Frequency	Percentage	Mean
Recruiting ICT laboratory school technicians.	Strongly disagree	10	10	4.5
	Disagree	0	0	
	Undecided	0	0	
	Agree	90	90	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Results from table 4.26 above shows that the majority of the respondents agreed that their schools were recruiting ICT laboratory technicians with mean of 4.5. However, there were some few who said that their schools were not recruiting ICT laboratory technicians.

4.4.16 Results on whether schools service their ICT devices frequently

Table 4.27 Shows whether schools service their ICT devices frequently

	Scale	**Frequency**	**Percentage**	**Mean**
Frequent servicing of ICT devices in your school.	Strongly disagree	0	0	3.25
	Disagree	35	35	
	Undecided	0	0	
	Agree	65	65	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Results from table 4.27 above shows that the majority of the respondents agreed that the schools were servicing their ICT devices frequently with mean of 3.25.

4.4.17 Results on whether there is proper maintenance of ICT physical infrastructure in the schools

Table 4.28 Shows distribution on whether schools have proper maintenance of ICT physical infrastructure

	Scale	Frequency	Percentage	Mean
Proper maintenance of ICT physical infrastructure in your school	Strongly disagree	38	38	3.1
	Disagree	0	0	
	Undecided	0	0	
	Agree	62	62	
	Strongly agree	0	0	
	Total	**100**	**100**	

Source: Primary data

Results above in table 4.28 shows that the majority of the respondents agreed that their schools had proper maintenance of ICT physical infrastructure with mean of 3.1. This may be due to the fact there are many ICT savvy personnel whom the schools can hire to maintain their ICT infrastructure.

Interviews

The study employed a sample both categories of the respondents from the schools selected. These included teachers and head teachers of the schools; thus a sample of 10 head teachers was interviewed. In order to choose the sample, stratified sampling was used. The following are the sample results of the interview review.

According to interviews carried out on 10 head teachers, head teachers said that:

Competence of ICT in schools

Competence of ICT depends on many factors among others; financial ability of individual schools to purchase computers, ability of teachers to teach ICT. There was common view among the head teachers interviewed that the above factors limit the competence of a school to have good ICT infrastructure.

> *"We have improved on the competence of ICT in our schools through buying of more computers in the lab and give refresher courses to our teachers who are teaching ICT, install the desired software in the few computers we have, install CCTV camera to prevent theft of our ICT devices and for teachers get to know about them".*

Ways teachers use ICT for class room purposes

The ability of a teacher to use ICT for different class room purposes depends entirely on the competence of the teacher to comprehend ICT, therefore, a teacher's ability is premised on their competence in ICT.

> *"Our teachers are using IT for presentation in classes, we also use ICT when examination need a rise that is to say typing examinations,*

teach students how to design a website but their ability to use ICT depends on whether they can comprehend other programs. we also use the internet for research purposes, we also listen to radio programs and the teachers watch television to get updated on what is going on in the country, use ICT to know what is happening on social media for instance social networks globally".

Servicing ICT devices

"We service our ICT devices frequently through recruiting of ICT laboratory technicians and enough teachers in our schools. These staff members keep on checking the devices regularly."

When asked to comment about the proper maintenance of ICT physical structure in their schools and how often they service ICT device and recruiting ICT personnel:

"We have to wait for the financial committees to sit and pass the school budgets but really allocate funds towards ICT because there is always no enough funds to run the schools except the cleaning of the ICT rooms supervised by teachers on duty".

When asked about whether teachers have accessibility to ICT in their schools, they said that:

"Our teachers have limited access to ICT in this school because of the limited funds allocated to ICT development in the schools yet it is noted that there is more technical support needed to train them to learn how to use ICT devices, in addition we need more supervision particularly in the ICT rooms during training for security purposes".

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the discussion of the findings that were obtained in the study, conclusions and recommendation based on results and suggesting areas for further research.

5.1 Discussion of the findings

This section presents the discussion of the findings obtained on the study which were presented according to the objectives of the study one by one. The discussed findings were empirically got from the field using a self- administered questionnaire and interview guide.

5.2 Teachers' knowledge of ICT and the frequency in pedagogical use of ICT in secondary schools

The study findings showed that the majority of the teachers could use word processing to teach in classrooms, teachers had the ability of using spreadsheet for classroom purposes, the respondents agreed that they could use power point for presentations, teacher could use publisher to design instructional materials. This could be attributed to the fact that most institutions of higher learning these days encourages practical basic knowledge of computers skills, that is why most respondents interviewed had knowledge of word processing, spreadsheet, power point for presentations and publisher. The findings agree with Abbott (2001) who said that the way ICT is used in lessons is influenced by the teachers' Knowledge about their subject and how ICT is related to it. Some teachers choose ICT resources that relate to a particular topic, while others use ICT to present the students' work in an innovative way, without any direct application to the topic. The findings further agree with Russek (1991) described some barriers to implementation as a person's knowledge of necessary, but technical and mundane, issues such as the operating system of the computer,

the cables the computer needs to connect with and other equipment, such as printers to lack of knowledge.

5.3 The different pedagogical practices ICT teachers use in secondary schools.

The findings showed that the majority of the respondents agreed that they could exchange academic messages using ICT, the teachers had sufficient ICT skills, teachers had the ability of using ICT for students' assessments, teachers had the ability of assembling ICT components for class room purposes, the teachers had the ability of preparing lessons using ICT. However, much as the teachers had sufficient ICT skills in all the areas asked, there were some gaps that the proprietors need to do in order to impart knowledge into the teachers so that they will ably teach the learners. The findings agree with Abbott (2001) who noted that there is little research into the effects of internet use on teachers' pedagogies and pupils' attainment in mathematics at primary level, although there are early suggestions that websites dedicated to mathematics could encourage more effective teaching (Jones and Simons, 1999). The findings further agree with Huppertetal (1998) conducted an experimental study of the effect of using computer simulations on 10^{th}-grade pupils' (year 11 in the UK) ability to apply their knowledge to the growth curve of micro-organisms. The use of simulations allowed the pupils to carry out investigations more quickly and focus on analyzing the results and hypothesizing. The structure of the course helped to create a collaborative learning atmosphere, with pupils comparing results and exchanging ideas. These aspects resulted in gains in cognitive learning. Findings further agreed with Tao and Gunstone (1999) who investigated the use of computer simulations integrated into 10 weeks of physics instruction for one class in an Australian high school. The simulations were specifically developed to confront pupils' alternative conceptions in mechanics. The classroom study investigated whether and how collaborative learning using computers fosters conceptual change. The programs provided the pupils with many opportunities for the co-construction of knowledge.

5.4 How Teachers' access ICT resources and their pedagogical use of ICT in secondary schools

The findings showed that the majority of the respondents disagreed that they had access to ICT laboratory, teachers had access to ICTs in the staffroom, disagreed that the schools had ICT in classrooms, never had access to personal digital assistants or devices, showed that most teachers do not have access to ICT in their homes. This could be attributed to the fact that most people more so the educated ones, much as they could be having access to ICT at their work places, they cannot afford to have one at their homes since it is expensive.

The findings agree with Abbott (2001) who pointed out that an important influence on the use made of ICT in subjects and classes is the amount and range of ICT resources available to the teachers. Where there are limited numbers of computers in a class, mostly in primary schools, this limits their impact, because each individual pupil is only able to use the computer for a few minutes. The findings further agree with the OTA report which defined Access to technology in multiple connotations: computers in the classroom, ratio of students to computers, computers at home, current hardware and software, and location of computers.

5.5 Strategies of improving ICT management and the Teachers' pedagogical use of ICT

Results findings showed that the majority of the respondents agreed that their schools were building ICT infrastructure, the schools were recruiting trained ICT teachers, the schools were recruiting ICT laboratory technicians, schools were servicing their ICT devices frequently, had proper maintenance of ICT physical infrastructure. This may be due to the fact there are many ICT savvy personnel whom the schools can hire to maintain their ICT infrastructure and because computer studies have been introduced as compulsory subject at advanced level and it is likely to be made compulsory at lower level. The findings agree with Becker (1988) who pointed all the view points by delineating the following philosophical and

educational considerations, which surround the justification for the inclusion of computers in the school curriculum: Computers in education must reflect the belief that computer literacy is a fundamental requirement for participation in the society of tomorrow. Computers in education must reflect the power to compute as a prerequisite for the success in higher education and subsequent careers.

5.6 Conclusion of the findings

In conclusion, the findings showed that the teachers of the schools had the ability of using word processing for classroom purposes, were well versed with spreadsheet for class room purposes, had ability of conducting lessons using power point for presentations, could design instructional materials using publisher, had the ability of exchanging academic messages using ICT, had sufficient ICT skill, teachers could use ICT for student's assessments, teachers did not have the ability to assemble ICT components for classroom purposes, teachers could prepare lessons using ICTs, teachers never had access to ICTs laboratory, teachers had access to ICTs in the staffroom, teachers never had access to ICTs in classroom, most teachers did not have access to personal digital assistants, teachers did not have access to ICT devices in their homes, schools were building ICT infrastructure, recruiting trained ICT teachers, recruiting ICT laboratory school technicians, frequently servicing of ICT devices and maintaining of ICT physical infrastructure. However, much as the schools surveyed were found to be having some few computers, there is still a lot that needs to be done such as increasing on the computers and the teachers could also be helped to acquire more ICT knowledge.

5.7 Recommendation of the findings

In light of the above findings, the researcher recommends the following;

The schools should build and equip all the ICT laboratories in their schools so that teachers can teach their students.

Most teachers were found to be with basic knowledge of ICTs, therefore, schools should help their teachers acquire other knowledge in ICTs such as Adobe, SPSS, Quick books among other soft wares. The schools should also increase on the numbers of computers in their laboratories.

The Ministry of education and Sports should increase on supervision of these schools and those that are found lacking the basic facilities, be encouraged to improve.

The district management should also improve on their supervision.

5.7.1 Areas for further research

This study was conducted in selected secondary schools and had a limited scope, although carried out systematically.

Other studies should be done on it either in the same schools or in different schools in order to test the relevance of the research questions.

The study was centred on ICT management and teachers' pedagogical use of ICT in selected private schools in Nakawa division Kampala district.

The researchers' findings revealed that most schools much as they were teaching ICT, they did not have laboratories and therefore, an investigation into the impact of ICT on improvement of teachers' use of ICT.

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APPENDIX 1

QUESTIONNAIRE

My name is Nakaggwa Prosscovia Ssempijja, a student at Kyambogo University, pursuing a Masters in Education Policy, Planning and Management. I am carrying out research on **'INFORMATION COMMUNICATION TECHNOLOGY MANAGEMENT AND TEACHERS' PEDAGOGICAL USE OF ICT IN SELECTED PRIVATE SCHOOLS IN NAKAWA DIVISION KAMPALA DISTRICT'.**I kindly request you to provide me with information which I will treat confidential and for academic purposes only.

SECTION A

1. Name of the School.....
2. Position of responsibility.....
3. What is your age range (please tick only one)

Age range	26-30 years	31-35 Years	36-40 Years	41-45 years	46-50 years	51-55 years	56-60 years

4. Gender

(i) Male ☐ (ii) Female ☐

5. Marital Status

(i) Single ☐ (ii) Married ☐ (iii) Widowed ☐

6. Highest level of Education attained (please tick only one).

Qualification	Diploma	Bachelors' Degree	Masters	PHD	Any other (specification)
Attained					

7. How long have you been employed in this school?

(i) Less than a year ☐ (ii) 1-2 years ☐ (iii) 3-4 years

(iv)above 5 years ☐

8.For how long have you been using ICT in teaching?

(i) Less than a year ☐ (ii) 1-2 years ☐ (iii) 3-4 years ☐

(iv) above 5 years ☐

SECTION B

TEACHERS' KNOWLEDGE OF ICT AND PEDAGOGICAL USE OF ICT

For each of the following statements, please indicate by ticking the extent to which you agree or disagree with using the following scale; (strongly **agree, agree, undecided, disagree and strongly disagree**).

Statements	**Strongly Agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
1. I have ability to use Word processing for classroom purposes.					
2. Teachers in this school are well versed with the concept of spreadsheet for classroom purposes.					
3. I have the ability to conduct lessons using power point presentations.					
5. Teachers in this school can design instructional materials using publisher.					

SECTION C

THE DIFFERENT PEDAGOGICAL PRACTICES ICT TEACHERS ARE CURRENTLY USING.

For each of the following statements, please indicate by ticking the extent to which you agree or disagree with using the following scale; **(strongly agree, agree, undecided, disagree and strongly disagree**).

Statements	**Strongly Agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
1. Teachers in this school can exchange academic messages using ICT.					
2. The teachers in this school have sufficient use of ICT skills.					
3. Teachers in this school are able to use ICT for students' assessments.					
4. Teachers have the ability to assemble ICT components for classroom purposes.					
5. Teachers have the ability to prepare lessons using ICTs.					

SECTION D

TEACHERS' ACCESS TO ICT RESOURCES AND PEDAGOGICAL USE OF ICT

For each of the following statements, please indicate by ticking the extent to which you agree or disagree with using the following scale; **(strongly agree, agree undecided, disagree and strongly disagree).**

Statements	**Strongly Agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
1. In this school, teachers have access to ICTs laboratory.					
2. In this school, teachers have access to ICTs in the staffroom.					
3. In this school, teachers have access to ICTs in the classroom.					
4. In this school, teachers have access to personal digital assistants (PDA devices).					
5. Teachers in this school, have access to ICT devices in their homes.					

SECTION E:

STRATEGIES OF IMPROVING ICT MANAGEMENT AND TEACHERS' PEDAGOGICAL USE OF ICTs

Which of the following strategies can best improve teachers' use of ICTs in this school?

(For each of the following avail a tick on which you think applies)

Statements	**Strongly Agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
1. Building ICT infrastructure in the school.					
2. Recruiting trained ICT teachers.					
3. Recruiting ICT laboratory school technicians.					
4. Regular servicing of ICT devices in the school.					
5. Proper maintenance of ICT physical infrastructure in your school					
6. Regular on job training in ICT skills.					

APPENDIX II

INTERVIEW GUIDE FOR HEAD TEACHERS

1. To what extent has your office improved ICT competence in your school?
2. Mention ways teachers in your school use ICT for classroom purposes.
3. Comment on the accessibility of teachers to ICT in your school.
4. How often do you recruit trained ICTs personnel in your school?
5. How often do you service ICT devices in your school?
6. Comment on the proper maintenance of ICT physical structure in your school.

END

Thank you very much for your time and cooperation