

**THE APPLICATION OF ICTS AND ITS RELATIONSHIP WITH THE  
IMPROVEMENT IN TEACHING AND LEARNING: A CASE OF  
SELECTED SECONDARY SCHOOLS IN MUMBWA DISTRICT OF  
ZAMBIA**

**By**

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A dissertation submitted in partial fulfilment of the requirements for the Masters of  
Engineering in Information and Communication Technology, Policy and  
Regulation Management

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**November, 2017**

## DECLARATION

I, Bvute Cornelius, the undersigned hereby declare that this dissertation is my own work and has not been submitted for any assessment or any other purposes in any other institution. All sources that I have used or quoted have been acknowledged by complete references.

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## APPROVAL

This dissertation by Cornelius Bvute is approved as fulfilling the requirements for the award of the degree of Master of Engineering in Information and Communication Technology, Policy and Regulation Management of the University of Zambia.

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## **DEDICATIONS**

This study is dedicated to my late father, Agrippa Bvute and the Bvute family for the strong foundation they set for me in life. My dear friend Chila Nampemba for the spiritual and emotional support, my friends for the support they rendered to me during my school period. Last but not the least, I thank the Almighty God for giving me life, otherwise I wouldn't have been where I am today.

## **ACKNOWLEDGEMENTS**

First and foremost, I would love to give thanks to the Almighty God for giving me the strength and guidance during this period of writing dissertation.

Secondly, I would love to give thanks to my supervisor Dr. D. E. Banda for various discussions and the exceptional guidance and encouragement on this research report and my course coordinator/lecturer Dr. S. Tembo and Dr. Besa for the lectures in research without whom the knowledge of formulating this dissertation could have been practically impossible.

Thirdly, my appreciation goes to the Secondary schools where the research was conducted from for providing me with primary data. Without them, this dissertation could have been incomplete.

Fourthly, I thank the University of Zambia lecturers in the School of Engineering, Department of Electrical and Electronics who worked tirelessly by ensuring that we assimilate the knowledge in information and communication technology, policy and regulation management.

Last but not the least, I thank my course mates for the wonderful time we shared together as a class and more importantly being more like one family. To the unmentioned, I cherish the contributions you made in the diverse aspects of my school life.

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## **ABBREVIATIONS**

BAED:	Bachelor of Art with Education
EFA:	Education for All
DEBS:	District Education Board Secretary
DEE:	Department of Electrical and Electronics
GDP:	Growth Domestic Product
IICD:	International Institute for Communication and Development
ICT:	Information and Communication Technologies
MOESVTEE:	Ministry of Education Science Vocational Training and Early Education
MEng:	Master of Engineering
MOFNP:	Ministry of Finance and National Planning
MOST:	Ministry of Science and Technology
NGO:	Non-Government Organization
ODEL:	Open and Distance E-Learning
NICTP:	National Information and Communication Technology Policy

SPSS:	Statistical Package for Social Sciences
SOE:	School of Engineering
TPCK:	Technological, Pedagogical Content Knowledge
UNESCO:	United Nations Educational Scientific and Cultural Organization
UIS:	UNESCO Institute for Statistics
UNDP:	United Nations Development Programme
UNZA:	University of Zambia
ZRA:	Zambia Revenue Authority
NGO:	Non-Government Organization

## **ABSTRACT**

The purpose of the study was to investigate the application of ICTs and its relationship with the improvement of teaching and learning in selected secondary schools in Mumbwa District. A sample comprising of 58 participants (12 ICT teachers and 46 non ICT teachers) was drawn from six secondary schools in Mumbwa District. The study was qualitative and quantitative and used a case study design. Information was obtained from participants using questionnaires and focus group discussion guides.

In order to achieve the study objectives, focus group discussions were used to establish the types of ICTs in schools and also ascertain whether the application of ICTs in schools can help prepare learners to be self – reliant after school. Focus group discussions were also used to establish whether the use of ICTs can improve the performance of school going children. Questionnaires were used to establish the types of ICTs found in the schools and also find out whether the application of ICTs can prepare learners to be self-reliant after school.

The study revealed that computers, laptops, internet and printers were some of the ICTs used in schools. The study also revealed that the use of ICTs can help transform the learning into one that is learner centred. It was also revealed that the Application of ICTs can prepare learners to be self- reliant after school. The study recommends that schools with the help of the Ministry of Education should buy many types of ICTs to meet the demands of learners and thus improving the performance of learners.

## CHAPTER ONE: INTRODUCTION

### 1.1 Background

Information and Communication Technologies (ICTs) have had an impact on the Zambian society and have changed the way people live, learn, work and play. Zambia has initiated the integration of ICTs in many sectors of national development. For instance, the Zambia Revenue Authority (ZRA) introduced online tax-payers system which makes it easier to collect tax revenue. Another example is where most banks in Zambia now have e-banking, mobile banking and internet banking facilities. Furthermore, Open and Distance Learning (ODL) through e-learning has relatively grown in many Zambian education institutions. This revolution demands for basic ICT knowledge for some careers in order for one to be competitively functional in the Zambian society today. However, this project endeavors to research on the application of ICTs in relationship with the teaching and learning in selected secondary schools in Mumbwa District.

Hattie (2009) defines ICTs as those technologies that can be used to interlink information technology devices such as personal computers with communication technologies such as telephones and their telecommunication networks. The PC and laptop with e-mail and Internet provides the best example. Michiels and Van Crowder (2001:5) defined ICTs

*“as a range of electronic technologies which when converged in new configurations are flexible, adaptable, enabling and capable of transforming organizations and redefining social relations.”*

Isaacs (2007) reviewed that the penetration levels of ICTs in Zambia’s education institutions remains low, with those schools that are equipped mostly utilizing second-hand and refurbished computers. The integration of ICTs in teaching and learning practice has been limited, although

the introduction of computer studies as a school study subject has begun to change this. The adoption of a national ICT policy, as well as the development of a draft ICT policy for education and an associated implementation framework, provides an enabling policy environment to promote far greater access and use of ICTs across all sectors of Zambia's education system. These include a system for enhancing education management, administration, teaching and learning. While the goals and targets set in the policy documents seem realistic. Besides, realizing them within the established time frames remains a challenge (Chibomba, Koopman and Stanton, 2009).

The future of Zambia will be dependent on the size and quality of its human capital. Therefore, it is the duty of our education system to equip learners with relevant ICT skills at all levels.

*“Gone are the days when Information Communication Technology (ICTs) was a luxury. The current times have called for an integration of education with ICTs which are creating new learning and teaching possibilities.” (Sichone, 2011:9).”*

MOTC (2006) reviewed that for developing countries like Zambia to make major progress in social and economic development, there is need to invest significant effort and resources in the education system. Zambia's education system is currently under-resourced; with a substantial section of the population without access to high school and tertiary level education as well as professional training. Therefore, a significant percentage of the population is without educational attainment required for meaningful contribution to national development.

The Ministry of Education in Zambia has developed a Strategic Plan that works towards achieving the Education for All (EFA) goals, as agreed upon at the World Education Forum in Dakar in 2000, and the Millennium Development Goals. It aims to achieve universal access to

quality primary education and gender equality for both boys and girls. Chibomba et al (2009) revealed that access to primary schools has improved in Zambia and enrolment has increased to 92%. But growth in access to upper basic (grade 8-9) and secondary school (grade 10-12) has been limited in the last decade due to rising costs faced by students, deepening poverty, and limited formal job opportunities for parents to enable them to send their children to secondary school. Enrolment at secondary school level is only 30%. There are also widespread concerns about the quality and relevance of core subjects and electives for grades 8-12. Overall pass rates in Zambia are still too low and have remained at the same level since 1996. Rural schools score lower than urban schools, and statistically more boys continue their education than girls.

In May 2003, the International Institute for Communication and Development (IICD) held a Round Table (RT) workshop in Ndola, Zambia to talk about Information and Communication Technology (ICT) in the Education sector. The main objective of the RT was to bring together a team of key players from Zambia's education sector as well as ICT specialists to discuss educational challenges and explore possibilities and opportunities for overcoming some of them with ICT (Chibomba et al, 2009).

A number of challenges were identified and corresponding ideas on how they could be addressed were also suggested. One of the challenges identified during the RT workshop was ineffective and inappropriate teaching materials. While some subjects have access to reasonably good materials, it was pointed out that there was an acute shortage of satisfactory teaching materials for other subjects that had a national dimension such as Civic Education, Geography, and national History. In schools where such materials were available, the content and examples used render them largely incomprehensible in the Zambian context. The main reasons cited for such

ranged from a lack of publishing capacity to a failure to involve teachers in producing their own teaching materials (Chibomba et al, 2009).

A look at the education statistical bulletins for the country after 50 years of independence reveals that efficiency in our education system was below satisfactory levels. In terms of learners transitioning to a higher level, it was noted that there were still larger percentages of pupils who were not able to progress beyond grade seven or grade nine and grade twelve to tertiary education because of the kind of education style which has not adopted current new styles of the education system but of that of the old model (MOE, 2015). Therefore, low rates of repetition by learners and a reduction in drop-out rates were some measures of how efficient an education system was, being delivered and valued in the country. If most learners were able to progress through school unhindered by whatever circumstances, then an education system was seen to be efficient.

Lack of capacity to keep all children in school until grade 12 was a factor which translated into our education system being inefficient. This inefficiency may also be indicative of the social and economic hardships of people at household level. The education system should continue to strive to ensure all children remain in school till grade 12 until they had access to tertiary education.

Nevertheless, education as a sector which functions as a springboard for development of skilled human resource, education in Zambia has continued to attract a lot of interest from various sections of society. Since Zambia's attainment of political independence more than 50 years ago, the government, individuals, as well as many local and international organisations have taken keen interest in policies that have been formulated to ensure that many Zambians access high levels of education. For more than 50 years now, emphasis has been on increasing access to

education, raising the quality of education offered at various school levels, including offering of education which is not only relevant but also affordable to most people. But due to various factors, this has not been achieved.

According to MOFNP (2013), the Zambian government expenditure on education over the years has been increasing and huge capital projects by way of construction of schools, colleges and universities have continued to be undertaken. Human resource development in the education sector through teacher education and recruitment has also been receiving attention. Against this background is the question of how efficient our education system is in terms of teaching and learning and what new strategies have been put in place that can help in improving the teaching and learning system in regard to education achievement. What is known as that internal efficiency in education will indicate to us how well we have been doing as a nation in ensuring that as many pupils as possible, who get enrolled in school, progress up to as high a level as their potential can allow them.

Kwando (2007) noted that at the dawn of the 21st century education delivery should not continue to be as business as usual because the traditional three Rs-literacy (**R**eading, **W**riting, and **A**rithmetic) is challenged by an unprecedented rapid creation and dissemination of knowledge and information hence the move from an Industrial Society to a Knowledge Society. The Knowledge Society is the society that knows how to use information. For the effective use of information, one needs more than traditional reading, writing, and arithmetic skills.

The new kinds of activities to be learned and new learning activities lead inevitably to a drastic revision of the idea of literacy, considered for many centuries the main goal of primary education. The traditional notion of literacy (including so-called numeracy) was based on the

Three Rs (Reading, wRiting, and aRithmetic), together with accurate handwriting (preferably calligraphic), and memorizing certain excerpts from textbooks and classical poetry by heart. Now, we see an urgent need for a *new literacy* that is ICT-based and can be presented in three components corresponding to the traditional Three Rs: [Reading] – finding information by searching in written sources, observing, collecting, and recording; [Writing] – communicating in hypermedia involving all types of information and all media; and [Arithmetic] – designing objects and actions.

Many strategic reports have argued that societies are changing from industrial societies into ‘information societies’, in which the formation and distribution of knowledge is of paramount importance (ERT, 1997). They contend that, in order to combat social exclusion and to maintain competitiveness in a global economy, education must go beyond the framework of initial schooling in order to prepare and support citizens for lifelong learning (European Commission, 1995; ERT, 1997; PCAST, 1997). Accompanying this argument is the belief that ICT can play an important role in reshaping education to respond to contemporary information society needs. Furthermore, it is believed that ICT in education will reduce the gaps that exist between socioeconomic realities and the outputs of education systems.

Today, from the time we awaken in the morning to the time before we sleep, we are surrounded by media, such as newspapers, radio, television, and computers. Sometimes we are not even aware that we are surrounded by these media. All these media come under the overall umbrella of what are known as today’s ICTs. Knowing and using ICTs is important in today’s fast changing knowledge society, but we very often are confused about what these media are.

According to UNESCO (2005) information and communications technology (ICT) is an umbrella term that includes any communication or application which encompassing radio, television, cellular phones, satellite systems, computer and network hardware or software and so on. ICT is the study of technology used to handle information and aid communication (Watson, 2001). Nowadays, ICT is rapidly developing in many of countries which due to the globalization and technological change. Recently, ICT is widely used in many areas or sectors such as education, economy, politics and social. Especially for education, many countries now regard understanding ICT as part of the core of education, alongside writing, reading and literacy.

While definitions of ICTs are varied, it might be useful to accept the definition provided by United Nations Development Programme (UNDP): which states that ‘ICTs are basically information-handling tools a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. They include the ‘old’ ICTs of radio, television and telephone, and the ‘new’ ICTs of computers, satellite and wireless technology and the Internet. These different tools are now able to work together, and combine to form our ‘networked world’ – a massive infrastructure of interconnected telephone services, standardized computing hardware, the internet, radio and television, which reaches into every corner of the globe’.

When we talk of ICTs, we refer not only to the latest computer and Internet based technologies, but also to simple audio visual aids such as the transparency and slides, tape and cassette recorders and radio; video cassettes and television; and film. These older and more familiar technologies are referred to under the collective heading of “analogue media” while the newer computer and Internet based technologies are called the “digital media.”

ICT is an automatic means of capturing, processing, storing communicating information. The use of ICT in the classroom teaching-learning is very imperative for it delivers opportunities for teachers and pupils to maneuver, stock, operate, and retrieve information, encourage independent and active learning, and self-responsibility for learning such as distance learning, motivate teachers and pupils to continue using learning outside school hours, plan and prepare lessons and design materials such as course content delivery and facilitate sharing of resources, expertise and advice. This multipurpose instrument has the proficiency not only of engaging students in instructional activities to increase their learning, but of helping them to solve complex problems to enhance their cognitive skills (Jonassen, and Reeves, 1996).

The introduction of ICTs into schools is a world –wide marvel, not only among the technologically advanced countries, but also among unindustrialized countries. In the previous decades, this was an option that technologically advanced countries took, but today it has become a need for all schools. ICT has emerged as an obligatory tool for teaching and learning as well as a lever that helps to bring about change in schools (Venezky, 2002). Nations that lag behind in its adoption and use become marginalized and vulnerable to the negative currents of globalization. The integration of low income countries, therefore, serves to bring the larger population into a global family that is at ease with the dynamics of an information-led knowledge society.

Under the right conditions, it is believed that ICT can have a monumental impact on the expansion of learning opportunities for greater and more diverse populations, beyond cultural barriers, and outside the confines of teaching institutions or geographical boundaries (Haddad and Draxler, 2002). Technologies can improve the teaching/learning process by reforming

conventional delivery systems, enhancing the quality of learning achievements, facilitating state of the art skills formation, sustaining lifelong learning and improving institutional management.

The reality in our societies and more so in Zambia is that through ICT, the natural resource poor country has everything to gain from educating its citizens in the use of ICT in everyday life. In particular, the performance of learners in communication skills, foreign languages, mathematics and science remains lackluster. Through the introduction of ICT in schools, the acquisition of effective skills in their use, the infusion of new teaching and learning methods using ICT and community involvement, there is trust that performance in these areas is bound to improve (Tikly et al (2003), Wagner, Day and Joseph (2004), Isaacs (2002), Gerster and Zimmermann, 2005).

Information and communication technologies must be harnessed to support EFA goals at an affordable cost. They have great potential for knowledge dissemination, effective learning and the development of more efficient education services. This potential will not be realized unless these technologies serve rather than drive the implementation of education strategies. To be effective, especially in developing countries, ICT should be combined with more traditional technologies such as books and radios and be more extensively applied to the training of teachers (Earle, 2002).

Wang and Woo (2007) revealed that integrating ICT into teaching and learning is not a new concept. It may be as old as other technologies such as radios or televisions. They further describe integration as having a sense of completeness or wholeness by which all essential elements of a system are seamlessly combined together to make a whole. Earle (2002) also supports the position when he claims that integration does not only mean the placement of

hardware in classrooms. He further contends that technologies must be pedagogically sound and go beyond information retrieval to problem solving.

According to Earle (2002), education must reflect the diversity of needs, expectations, interests and cultural contexts. This poses particular challenges under conditions of globalization given its strong tendency towards uniformity. The challenge is to define the best use of ICT for improving the quality of teaching and learning, sharing knowledge and information, introducing a higher degree of flexibility in response to societal needs, lowering the cost of education and improving internal and external efficiencies of the education system.

The rapid progress of information and communication technologies is considered as one of the key factors of change in human society (Albirini, 2006). Today, the rapid progress of information and communication technologies has been combined with different aspects of life, including its effect on education, health, research and communications. Progress and development in information and communication technology are considered as positive elements of change in higher education and internet and network technology are also used extensively in educational fields on the Earth (Hawkins, 2005).

Miller et al (2000) recognize that technology-based teaching may not be essential in all classes but generally it is most facilitative as a result of providing relevant examples and demonstrations; changing the orientation of the classroom; preparing students for employment; increasing flexibility of delivery; increasing access; and satisfying public demands for efficiency because whole purpose of using technology in teaching is to give better value to pupils. This better value should also impact the learners or pupils' performance as it focuses on effective utilizations of

new technologies in education. This is done through both “assimilation” and “accommodation” processes between the existing and novice pedagogical culture.

ICT can create new, open learning environments. More than any other previous technology, ICT are providing learners access to vast stores of knowledge beyond the school, as well as with multimedia tools to add to this store of knowledge. ICT are largely instrumental in shifting the emphasis in learning environments from teacher-centered to learner-centered; where teachers move from being the key source of information and transmitter of knowledge to becoming guides for student learning; and where the role of students changes from one of passively receiving information to being actively involved in their own learning (Newpher, 2006).

Even though ICTs play significant roles in representing equalization strategy for developing countries, the reality of the digital divide the gap between those who have access to, and control technology and those who do not, make a huge difference in the use of ICTs. This means, that the introduction and integration of ICTs at different levels and various types of education is the most challenging undertaking. Failure to meet the challenges would mean a further widening of the knowledge gap and deepening of existing economic and social inequalities among the developed and the developing countries.

With the various challenges and shortcomings cited in the usage of ICTs in the education system, it was the reason that this research paper ventured to assess the application of ICTs and its relationship with the improvement in teaching and learning by realizing benefits and the impact of ICT use in education. It further explored the enhancement of student learning and experiences of some secondary schools in Mumbwa District. In order to encourage policy makers, school administrators, and teachers pay the required attention to integrate technology in their education

systems. In so doing, it highlighted the benefits of ICT in education, existing promises, and the limitations and challenges of integration to the education systems.

## **1.2 Statement of the Problem**

The educational sector in Zambia is currently faced with series of changes and reforms as well as challenges in gathering up-to-date information during the teaching and learning process. Therefore, it is imperative to reflect on matters concerned with the improvement in teaching and learning in schools. According to National ICT Policy (2006), the education sector in Zambia is faced with a lot of challenges, which includes; lack of adequate infrastructure, dilapidated infrastructure, inadequate staffing and over enrolment of the pupils which is affecting the overall performance. To that effect, many learners in secondary schools find it difficult in grasping what they are taught by their teachers. Mere delivery or echoing of words alone in a learning process to communicate ideas, skills and attitude to educate learners is almost futile, hence leading to pupil's poor performance.

Even if the Zambian Government through the MOESVTEE in 2013 introduced the use of ICTs in the school curriculum, many Zambian teachers have been unable to have access to the use of ICTs in their classrooms. It is unclear to whether the relevance of the application of ICTs and its relationship with regards to the improvement of teaching and learning is taken care of by the curriculum designers and implementers. It is therefore, in the above context that, this study sought to assess the Application of ICTs in Relationship with the Improvement in Teaching and Learning in selected Secondary Schools in Mumbwa District.

## **1.3 Aim**

The study aimed at assessing the application of ICTs and its relationship with the improvement in teaching and learning in the secondary schools in Mumbwa District.

## **1.4 Objectives**

The study was guided by the following objective, to:

- i. find out the types of ICTs used in the secondary schools of Mumbwa District;
- ii. determine how the use of ICTs can help transform the learning environment into one which is learner centered;
- iii. establish how the use of ICTs can help improve the academic performance of school going children; and
- iv. ascertain whether the application of ICTs can help prepare learners to be self-reliant.

## **1.5. Research Questions**

The study answered the following research questions.

- i. What are the types of ICTs used in the secondary schools of Mumbwa District?
- ii. How can the ICTs help transform the learning environment into one which is learner centred?
- iii. How can ICTs help improve the academic performance of school going children?
- iv. How can ICT application help prepare learners to be self-reliant?

## **1.6. Significance of the Study**

The study findings may help the stakeholders such as curriculum planners to adopt new interventions basing on researched findings. It may help the Ministry of Education to realize the need to produce enough materials that can help transform the learning environment into one that is learner-centered. The findings would help the Teachers trained in ICTs to adjust their teaching methods with the aim of improving the teaching and learning process by the use of ICTs. The

study may also add value to the existing body of knowledge and raise interest for further studies in the area.

### **1.7 Research Outline**

Chapter one focused on the background, statement of the problem, Main aim of the study, objectives, significance of the study and the definitions of terms. Chapter Two contained Literature Review. In this chapter, relevant literature on the application of ICTs in relationship with the Improvement in Teaching and Learning was reviewed. Chapter Three looked at the Methodology which was employed in the study in detail. It began with the description of the research design that was employed, target population, sample size, sampling procedures and research instruments. It also described the data collection procedures and how this data was analyzed in order to answer the research questions. It further describes the ethical considerations that were made during data collection. Chapter Four Presented the Findings of the study. Chapter Five discussed the Findings in relation to the literature reviewed. Chapter Six gave recommendations and suggested areas of further research based on the findings of the study. Then References, Questionnaires and Appendices were at end of the dissertation.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Global Studies on ICTs in Education**

There are few studies that have been done on the application of ICTs in relationship with the teaching and learning specifically in Zambia and non in the secondary schools in Mumbwa District. However, there are many studies that have been conducted in the area of ICTs and education in general around the world. The past few decades have shown an increasing recognition globally of the role of ICTs in development efforts (McNamara & Wallace, 2002). Some have referred to this trend as the ‘information revolution’. Others have referred to what is called a ‘knowledge economy’, an economy in which knowledge and ideas promptly provided, lead to development of products, economic growth, and hence progress (Castells, 2001).

In addition, this rapid development of these new technologies coupled with the world-wide challenge to educate all children has led to a global reform and development of teacher education (Moon, 2004). The global reform and development of teacher education has motivated educational institutions to redesign and restructure their teaching methods such as to enable

learners equip themselves for the future. This global reforming education is apparent in North America, South America, Antarctica, Asia, Australia, Europe as well as Africa.

A study conducted by Light (2009) on “the role of ICT in enhancing education in developing countries” had some findings worthy noting. The study was conducted in three countries namely, India, Turkey and Chile. The case studies were on the introduction of the Intel® Teach Essentials Course, a professional development program focused on integrating information and communication technologies (ICT) into project-based learning in six schools in Chile, India, and Turkey. The findings of the study indicated that the shift in using ICT and pedagogy must not involve the teachers only, but must involve the whole education system alongside sustainable investment in infrastructure, human resource, circular frameworks and assessment. The point of departure with this study has been the research site. As much as the study by Light (2009) was carried out in three countries, this study was conducted in Mumbwa district in Zambia.

Another scholar Akbaba-Altun (2006) conducted a study on “Complexity of integrating computer technologies into education in Turkey.” The study was conducted in the primary schools of rural Turkey. He used qualitative methods of data collection. His findings were that ICT was a complex subject because teachers needed to be trained at all levels in the education system. He also pointed out challenges like lack of reliable power to enable learners be exposed to the internet throughout the week and term. These finding cannot be generalized to the Zambian context because the study was conducted on the primary school going children. This study was conducted in the secondary schools hence the findings might be more reliable than the findings for Akbaba-Altun.

In Chile, Claro, Nussbaum, López and Díaz, (2013) conducted a study dubbed, “Introducing 1 to 1 in the classroom: A large-scale experience in Chile.” The study was meant to understand how the Mobile Computer Labs were integrated into the 3<sup>rd</sup> and 4<sup>th</sup> grade teaching practices. The study also employed a survey and classroom observations conducted in the two grades, the findings revealed that the classroom observations did not reveal any innovative teaching strategies, related to the use of this new technology. The study showed that amongst the main reasons for this traditional and sporadic use of the MCL are a lack of targeted teacher training and preparation time, and insufficient technical and pedagogical support during the phases of implementation and integration to the pedagogical practices. The difference with this study is that this study employed a case study design and its population were the secondary school learners in Mumbwa District of central province.

One interesting and not uncommon observation from global studies is that knowledge of ICTs makes the learners better able to participate with and relate to classmates and society in general, meaning that they were not being left behind. However, and conversely, the potential for ICTs to provide access to inappropriate information or images, and contact with undesirable others is a strong and common negative belief relating to ICTs use. The next generation of students often referred to as the ‘Net Generation’, are expecting the integration of Web technologies into their learning and teaching programmes (Thompson, 2007).

In schools today, learners all over the world are carrying mobile electronic devices and if they do not have one they want one. They use them to communicate with friends and parents; texting and online chatting is a way of life for this generation, and through this medium, they are communicating with purpose like never before. Through the internet and mass media, they are creating a paradigm shift and a challenge for teachers worldwide. For teachers, the challenge of

facing the 21st century learner are not a laughing matter; learners are more disengaged and non-receptive to the traditional classroom settings; learning is no longer about pen and paper as they demand to be plugged into ICTs and to work in an engaging, collaborative manner. Learners want access to information and technology devices such as phones, iPods, notebooks, palmtops, laptops, and internet.

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) policy on ICT holds that ICTs can help strengthen democratic and transparent education planning and management. Communications technology can expand access to learning, improve equality and ensure inclusion. Where resources are scarce, judicious use of open-source material through technologies can provide the means to bypass the bottleneck of textbook production, distribution and updating (UNESCO, 1995).

The global studies on ICTs in education are important to this study in that they describe a similar trend in teaching and learning patterns that exists in Zambia today; teaching and learning patterns where ICTs are increasingly the order of the day in the classroom. These global studies on ICTs in education also offer a platform on which this study will build.

Drent and Meelissen (2008) reviewed that “we need tools and ever since the dawn of human history, people have been inventing and using tools – stone axes and hammers, potter’s wheels and furnaces, levers, and pulleys – to process food and materials and to harness the energy needed for their physical survival and well-being. As a wise man noted centuries ago, neither a bare hand nor an intellect alone can get jobs done”. Similarly, people have used tools for information processing and communication exchange. The invention of language made our far-off ancestors capable of processing and controlling their own thoughts, feelings, and behaviour.

Words can be considered as the tools of our mental activities, and the first and foremost of the latter is the activity of learning.

Historically, information processing and communication have been major school activities. These occurred mainly between the teacher and a pupil with the very modest external support of pencil, paper, and chalkboard. Now, the extensive use of computers, with versatile sensors, peripherals and extensions, allow teachers a whole new degree of sophistication and flexibility (Hattie, 2009).

Hattie (2009) reviews that during the last two decades, the application and implementation of ICT in education has become an important topic in research on educational reform. Research findings over the past two decades provide some evidence as to the positive effects of the use of information and communications technology (ICT) on pupils' learning. Sanyal (2001) states that "there are four ways ICT can support basic education: (i) supporting education in schools, (ii) providing non-formal education for out-of-school children and adults, (iii) supporting pre-service distance education of teachers and their in-service professional development, and (iv) enhancing the management of schools".

Watson (2001) reviewed that modern civilization is characterized by the growing pace of change. The economy now undergoes a radical transformation (including the structure of the labour market and requirements for job qualifications) within a single generation. That is because of the enormous difficulty in understanding, appreciating and even surviving change, we talk about the impact of these changes as future shock. On the other hand, these fundamental shifts do not appear suddenly, as bolts from the blue: they are always a part of a longer historical evolution, in which technological development plays a part. The introduction of ICT resources to schools as

according to UNESCO (2005) is one of the most significant developments around the world during the last 20 or so years; and the expectation that Information and Communication Technology (ICT) has the most benefits for learners when they are working more autonomously.

Michiels and Van Crowder (2001:p8) points out that the range of technologies is increasing all the time and ‘there is a convergence between the new technologies and conventional media’. This rapid and ongoing convergence means that devices such as digital cameras, digital video cameras and players, personal digital assistants, slide projectors and mobile telephones are also compatible with more traditional media such as radio (digital, satellite), television (cable, digital, satellite) and all these mentioned above are all under the umbrella of ICTs.

UNESCO (2002) recognized ICTs as a major factor in shaping the new global economy and producing rapid changes in society. It also recognized that ICTs have the potential to transform the nature of education—where and how learning takes place and the roles of pupils and teachers in the learning process and furthermore, UNESCO (2005) reviewed that “Modern society needs educated citizens who can make decisions and implement them in a rapidly changing world. Individuals, organizational structures such as corporations and governments, and educational institutions, should be prepared for life-long learning.

Information processing and communication are becoming major activities in daily life, and effective citizens and leaders of the 21st century will be required to understand and fluently use the latest sophisticated tools to manage an enormous amount of data, information, and messages. Therefore, lifelong learning will be the normal state for a modern individual” (Chibomba et al, 2009).

The growth of information and communication technologies (ICT) has dramatically reshaped teaching and learning processes in higher education. ICT for education is more critical today than ever before since its growing power and capabilities are triggering a change in the learning environments available for education (De Corte et al, 2003). The use of ICT offers powerful learning environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self-directed and constructive way.

According to Voogt (2003) ICT is considered as an important means to promote new methods of instruction (teaching and learning). It should be used to develop students' skills for cooperation, communication, problem solving and lifelong learning, although computers and technology are prevalent throughout our society, developing countries are far from reaping their benefits because of certain barriers.

ICT allows many people to generate and disseminate information, thus playing an active role in the process of interaction between professionals, learners, policy makers, peers and so forth as De Corte et al (2003) pointed out that four main elements can be taken into consideration about ICT in education; ICT as an object that refers to learning about ICT, an assisting tool, a medium for teaching and learning and finally a tool for organization and management in schools.

Since the introduction of ICT in education in many other developed countries like Zambia as pointed out by Chibomba et al (2009), one of the most discussed policy questions has been its impact on educational outcomes. This explains why almost all existing data on ICT use in education are derived from sample-based international comparative assessments that rely on students, teachers and schools for descriptions and analysis of educational inputs, processes and outcomes.

However, the application of ICTs into education has been assumed as the potential of the new technological tools to revolutionize an outmoded educational system (Albrini, 2006). In the last 20 years, initiatives, projects and implementations related to use of Information and Communication Technologies (ICT) into education motivate teachers to gain necessary knowledge and skills in using ICT in their instruction. Pelgrum (2001:2) noted that ICT is "not only the backbone of the Information Age, but also an important catalyst and tool for inducing educational reforms that change our students into productive knowledge workers".

Over the past three decades, governments and education systems around the world have regarded the use of information and communications technologies (ICTs) as an important issue for improving the effectiveness of teaching and learning (Plump, Anderson, Law, & Qualex, 2009). As more and more technologies, such as net books, interactive whiteboards, smart phones and digital video recorders, have become more available and affordable, coupled with the rapid expansion of computer networking capability in educational system, there have been continued research efforts in investigating how teachers can use ICT to facilitate student learning (Lebanon, Robinson, & McDonough, 2009; Newhouse, Trinidad, & Clarkson, 2002).

Many models for measuring ICT integration in teaching and learning have been proposed through the years. These models can be grouped into the four categories: learning micro models, ICT-oriented micro models, system models, and population models (Newhouse, Trinidad, & Clarkson, 2002).

## **2.2 Literature on ICTs in Africa**

With regards to the global trends, African education lags behind in many aspects such as education delivery, curriculum design, teaching methodologies, teaching and learning tools and

resource libraries. ICT penetration in schools in Africa remains extremely limited. Access to ICTs remains highly uneven within countries and across the African continent an extension of the developmental disparities that have characterized the region for decades Al-Oteawi, S. M. (2002). Natural and human-made disasters and conflicts have placed extreme pressure on African educational systems, many of which are built on weak physical and institutional bases. In addition, many countries in Africa have been victims of austere structural adjustment programmes, which, among other consequences, have led to cuts in educational expenditure.

A report from the UNESCO (2014) Institute for Statistics (UIS) dabbled “Teaching ICT for Development in Africa,” found that, despite the development of Information and communications technology (ICT) in education policies, the integration of technology in classrooms across sub-Saharan Africa remains insufficient to meet the needs of the 21st century labour market. The study was a survey made in different African countries. Further findings revealed that ICT in education was widely accepted as both enabling learning and preparing students for employment in a technology-rich workplace. As for the sub-Saharan Africa, barriers including; a lack of effective policies, basic infrastructure (that is; electricity, Internet, computers and mobile devices), financing and teacher training. The use of ICT in education is still at an embryonic stage in most countries. Since the conclusions were made by comparing a number of African countries, it was significant to establish how the use of ICT can improve the academic performance of learners in the secondary schools of Mumbwa District.

A similar study which looked at “The application of Information and Communication Technologies (ICT) and its Relationship with Improvement in Teaching and Learning” was done by Ahmadi, Keshavarzi and Foroutan. A questionnaire was used to collect data from respondents. Some of the findings were that the most pervasive barrier in African schools was

the lack of electricity, especially in remote, rural areas. Computers are more likely to be found in urban schools, where access to electricity and the Internet enable computer-assisted instruction and on-line learning. The study further found that in Guinea and Madagascar more than 500 pupils or more on average share a single computer. In other words, time on task using technology is negligible for most children. Where the infrastructure exists, secondary schools are more likely to be equipped than primary schools. This is understandable given that in many countries, policies to support ICT integration favour investment in higher levels of education. There was need to determine how the use of ICT can help transform the learning environment into a learner centred on in the secondary schools of Mumbwa District.

Studies have seen the potential which ICT has in the ensuring that learners use ICT effectively in their learning environment. A study by Selwyn (2011) Schools and schooling in the digital age: a critical analysis. The findings indicated that the use of ICT was increasing access and improving relevance and quality of education in developing countries especially in Africa. ICTs are making dynamic changes in society especially the influences are felt more and more in the education system because teachers became instructor while learner learnt on their own. Despite the study being carried in secondary schools, these schools were not in Zambia hence there was need for this study to be done.

Some authors maintain that technology has the power to change the ways students learn and teachers teach. A study conducted by Kozma (1999) in Angola which centred on, “Designing and developing effective educational software.” The findings suggested that technology can “revolutionize” the learning process. In other words, ICT extend teachers’ and students’ capabilities, and their well determined use can transform roles and rules in the classroom. The study was a quantitative one with a sample of university students and lecturers. Many people

recognize ICTs as catalysts for change; change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, and in accessing information. Lecturers could use ICT to facilitate learning, critical thinking and peer discussions thereby making the learners be independent. the reviewed study was done amongst the college students and lecturers while this study was conducted in the secondary schools of Mumbwa District. The findings were different looking at the level of ICT application in the preparation of children for self-reliant.

A study by Wagner (2001) on “ICT teaching in African schools” stated that ICTs are being considered a major tool for improving accessibility to and efficiency of education in developing countries. ICTs are also being viewed as a “flat world” enabler by providing access to the latest educational content developed all over the world. However, despite many promising efforts, there is still a significant digital divide between educational institutions located in developing and developed countries. This includes policy and infrastructure gaps, lack of training facilities and trained maintenance personnel, limited community participation, gender related issues, and ICT access issues. With such lapses in other countries, it was significant to find out the types of ICT which were in the secondary schools of Mumbwa District and how they were used to promote learner centred atmosphere in class.

In a similar study was conducted by Schroll (2007) entitled “Examining what influences a teacher’s choice to adopt technology and constructivist principles in the classroom learning environment.” The study employed a quantitative design and drew conclusion from the data collected using a questionnaire in primary schools. one recommendation made was that stakeholders of educational policy in African governments should redesign and reconstruct their educational systems based on the new educational paradigms so that both teachers and students

benefit from the application of ICTs in schools in order to develop the necessary knowledge and skills sought in this digital age. Hence, most countries in Africa are focusing on approaches to the application of ICT in relation with the teaching and learning to improve the quality of education by emphasizing competencies such as critical thinking, decision-making, and handling of dynamic situations, working as a member of a team and communicating effectively. How the secondary schools were transforming the learning environment into a learner centred one was what the study sought to establish in the secondary schools of Mumbwa District.

Reports by UNESCO (2005) regarding ICT teaching in schools stated that the application of ICTs in teaching and learning in schools make natural tools in education in developing countries especially in Africa because of the simple and fundamental fact that learning is largely based on dealing with information which is used in listening, reading, writing, reassuring, talking, synthesizing, evaluating and analysing, solving mathematical problems, and memorizing verses and state capitals, are all examples of off-computer information processing. Even more importantly, ICT can be used for other types of information processing, formerly marginal in the traditional school, but now becoming more and more essential, like project planning, or the search for new information outside school textbooks, as well as in the processes of so-called creative writing (drawing, constructing). Zambia was not among the countries in which the report was based hence there was need to conduct this study in selected secondary schools of Mumbwa District.

A report by UNESCO (2005) on “Education in Africa” discussed a number of issues regarding integrating ICT in the teaching and teacher training. Despite the many challenges faced by African governments, in many other school activities in Africa (such as sport, for example), different kinds of interaction between students and teachers can gain from using ICT. The human

dimensions of ICTs manifest themselves in providing powerful means to open dialogue, fruitful interaction, and synergy between a teacher and a student or, rather, between Master and Apprentice, as well as among apprentices themselves whether in close contact or by long-distance. The report was not certain regarding the country in which it directed its findings. Therefore, this study determined how the use of ICTs can help improve the academic performance of school going children in Mumbwa District of Zambia.

In Uganda, Ali, Haolader and Muhammad (2013) investigated, “The Role of ICT to Make Teaching-Learning Effective in Higher Institutions of Learning in Uganda.” The study employed classroom observations, focus group discussions and interviews to teachers and pupils in the secondary schools. The findings cited innovations that ICT has brought in teaching learning process to include: E-learning, e-communication, quick access to information, online student registration, online advertisement, reduced burden of keeping hardcopy, networking with resourceful persons, etc. However, the presence of all these factors increased the chance of excellent integration of ICT in teaching-learning process. It was not clear how the application of ICT in the secondary schools of Mumbwa District improved the academic performance of pupils.

A study conducted by Tearle (2003) looked at, “ICT Implementation: what makes the difference.” The study used a qualitative approach on college students in the South Africa. The results suggested five important reasons for teachers to use technology in education: (1) motivation, (2) distinctive instructional abilities, (3) higher productivity of teachers, (4) essential skills for the Information Age, and (5) support for new teaching techniques.’ In order to use technology in the classroom effectively, teachers’ attitude toward technology should be positive and they should be trained in using the modern technologies in the field of education. Whether

the application of ICTs can help prepare learners to be self-reliant after school in the Zambian communities was what the study worked to establish.

Based on the premise of a study conducted by Becker (2001) named, “The application process should strengthen learning of students,” there is a need to present an integrated point of view in the application of these processes and to develop some concrete examples for teachers. A mixed methods approach was used to collect and analyse data from a sample which included college students and lecturers. The conclusions drawn from the study were that the effective use of ICT in lessons depends on the awareness of teachers of the potential of ICT in teaching and learning processes. Further conclusions were that there was need for appropriate selection of materials for their students, effective contemplation of their lessons and carrying out class management rules while overcoming the difficulties encountered during lessons in which technology supported learning environment. These requirements are assessed within the framework of “5W1H” questions and a detailed model is suggested. Instead of conducting a study on college students in Uganda who were able to purchase a computer, the study dwelled on the secondary school students in the secondary schools of Mumbwa District in central province.

### **2.3 Literature in ICTs in Zambia**

The history of ICTs in Zambia goes back to 1913 when the first manual phone was installed in Livingstone the then capital of Northern Rhodesia. Until the country’s reversion to liberalism in 1991, the provision of ICTs was solely the monopoly of the state. However, since 1991, Zambia, like other Sub-Saharan African countries, has been integrating ICTs in various sectors of its economy.

Zambia as has put in place an ICT policy (MOTC, 2006) that aims to improve the livelihoods of Zambians by ensuring the availability of accessible, efficient, reliable and affordable ICT services in most of the government institutions. The national information and communication technology policy document addresses several sections, among them includes; Information technology, Broadcasting, telecommunications and Postal services. However, it is the section on information technology that sets out the objectives and strategies pertaining to ICT and education.

The relevant objective in this section according to MoTC (2006) states that government will encourage: "...the use of ICT in schools, colleges, universities and other educational institutions in the country so as to improve the quality of teaching and learning." While the Ministry of Education's decision to introduce ICT as a compulsory subject in secondary schools may be a step in the right direction, its implementation may prove beyond the capabilities of those involved. This is because many schools including those in urban areas have little or no access to computers that can form a strong base on which Information and Communication Technology (ICT) will be taught in a classroom.

According to Williams (2011) constraints such as inadequate technical infrastructure, limited human skills to use available networks and services, the relatively high cost of communications equipment, and poor policy and regulatory environments have hampered the development of ICT in Zambia.

Nevertheless, the newly-introduced ICT subject in Zambian schools provides strong evidence that policymakers in the country's education sector have recognised the importance and value of technology for learning and teaching in secondary schools.

Additionally, it is indisputable that the ICTs are increasingly important in achieving development goals and promoting citizen participation not only in Zambia but across borders.

Apparently, experts suggest that the advent of the new growth theories means that technology change has been indigenised and linked up more closely to education, health and other such inputs that enhance human development. This could have instigated Zambia's policymakers to introduce ICT as a compulsory subject in secondary schools (Williams, 2011).

While ICT continues to advance in western and Asian countries, African countries still experience a lag in its implementation, and that continues to widen the digital and knowledge divides. In a recent study by Kiptalam et.al (2010), observed that access to ICT facilities is a major challenge facing most African countries, with a ratio of one computer to 150 students against the ratio of 1:15 students in the developed countries.

Whereas results indicate that ICT has penetrated many sectors including banking, transportation, communications, and medical services, the Zambian educational system seems to lag behind. Further, recent report by the National Council for Science and Technology (2010) indicated that computer use in Zambian classrooms is still in its early phases, and concluded that the perceptions and experiences of teachers and administrators do play an important role in the use of computers in Zambian schools.

Specifically governments especially in developing countries have tried to improve their national programs to integrate ICT into education. According to Benzie (1995), national programs have not been so successful to implement ICT into educational systems because they were formulated in non-educational realms and they were not supported with educational research.

According to Williams (2011) effective and successful application of ICTs in schools there is need to first of all consider Teacher Training and Professional Development. It is a well-known fact that professional teacher development is a key to successful application and the integration of ICT in teaching and learning process. Teachers remain the gatekeepers for pupils' access to educational opportunities afforded by technology: They cannot and should not be ignored. Moreover, providing technical skills training to teachers in the use of technology is not enough. Teachers also need professional development in the pedagogical application of those skills to improve teaching and learning process.

Watson and Watson (2011) pointed out that the starting point of a digital classroom is a teacher. Teachers must be trained to effectively use the technology for planning student instruction. The role of the teacher has subtly shifted from being the sole 'provider' of knowledge to being a facilitator as the student explores for himself, the expansive world of knowledge. From being a 'sage on the stage', to being a 'guide by the side'. In today's world, lifelong learning has become a critical determinant of success. Hence, more than mastering various competencies, the key skill required is learning how to learn. The Learning Management System (LMS) harnesses the potential of technology to improve learning outcomes and to prepare students for the accelerated changes in the world in which they live.

According to UNESCO (2002) Teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change. For education to reap the full benefits of ICTs in learning, it is essential that pre-service and in-service teachers have basic ICT skills and competencies. Teacher education institutions and programmes must provide the leadership for pre-service and in-service teachers and model the new pedagogies and tools for learning. They must also provide leadership in determining

how the new technologies can best be used in the context of the culture, needs, and economic conditions within their country. To accomplish these goals Williams (2011) reviewed that teacher education institutions must work closely and effectively with teachers and administrators, national or state educational agencies, teacher unions, business and community organizations, politicians and other important stakeholders in the educational system. Teacher education institutions also need to develop strategies and plans to enhance the teaching-learning process within teacher education programmes and to assure that all future teachers are well prepared to use the new tools for learning.

To prepare successful students for the 21st century, there is a general consensus among researchers that the learning standard should shift from teacher-centered instructive approach to pupil-centered learning approach where learning is possible anytime, anywhere, anyway and anyhow as earlier alluded. The vision of learning that will prepare students to face the challenges of the 21st century will be one that is active, participatory, deep, and personalized. Teachers will be facilitators, motivators, and analysts of learning who have the knowledge and skills to design the necessary conditions in the learning environment to bring about the desired learning for our students.

One of the major changes in education can be described as a general shift from teaching to learning. This does not mean that the teacher is becoming any less important. Rather, the teacher's role is increasingly to assist students to become good learners. At the same time, teachers must help create stronger relationships between the subjects of study and concrete reality, putting them in a more relevant context for students. In many cases, this implies an integration of disciplines and cooperation among teachers of different subject areas.

As is the case for other sectors of the wider economy and society, education will need to come to terms with the new technologies. This could require substantial public and private sector investments in software research and development, purchase of hardware, and refurbishment of schools. It will be difficult for national policy-makers to resist finding the necessary resources, whatever their sensibilities for expenditure on education, although without international co-operation and assistance the poorest countries could fall still further behind. Parents and the public at large, in the industrial countries at least, are unlikely to accept for too long the notion that education should be less well equipped with the new technologies than other areas of social and economic activity (UNESCO, 1998, pp. 19-20).

The dilemma which arises in providing educational technology stems from a lack of financial resources and a limited distributive capacity. In addition, many African countries have not been able to employ teachers, and provide resources to keep up with this demand. This brings about compromised quality of education. Further, many African governments face the predicament of educational expansion that corresponds with economic development. Despite the setbacks, access to education is a strong focus of most governments (Tearle, 2003).

According to Pelgrum (2001) ICT can play a significant role in equalizing opportunities for marginalized groups and communities. But the paradox is that for those groups that are unable to cross the technology divide, ICT is yet another means to further marginalize them. Education has a major role to play in resolving this problem. Thus, unless ICT becomes part of both the delivery and content of education, the disadvantage will deepen and development will suffer.

But the failure to use ICT is itself a result of the digital and knowledge divides that exist, and their causes are deeply embedded in the complex historical and socio-cultural context of the

country. Fortunately, with the Vision 2030 goals, the Zambian government has begun to implement strategies that will address these paradoxes.

By adopting ICT, we can offer high quality education. Ehrmann (1994) identified four distinct faces of quality education, which can be supported by ICT: learning by doing, real time conversation, delayed time conversation and directed instruction, thereby taking this into consideration the use of ICT could improve performance, teaching, and administration, have a positive impact on education as a whole, and develop relevant skills in the disadvantaged communities - helping in liberation and transformation. The Dakar Framework for Action (World Education Forum, Dakar, Senegal, 2000) also stressed the use of ICT for achieving 'Education For All' (EFA) goals and recommended, "ICT must be harnessed to support EFA goals at an affordable cost as earlier alluded. These technologies have great potential for knowledge dissemination, effective learning and the development of more efficient education services."

### **A Unified Model of Application and Integration of ICT into Teaching and Learning Process**

This model is not a linear model, but a cyclical model. That is to say, whereas questions on "who", "why" and "how" are the primary questions to be answered in the integration process, "how" questions should be answered within the context of "what", "where" and "when". All the structures formed under the guidance of the questions in the model are taken into account, both individually and as a whole.

- 1. Why should ICT resources and applications be used?* The answer to this question should focus on the learning of students in terms of pedagogy, technology, and contents'

coherence. Therefore, Technological, Pedagogical Content Knowledge (TPCK) framework is defined as: *“TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that utilize technologies in constructive ways to teach content.*

On this basis, the answer given to the question “What is the purpose of the integration process?” becomes important. Teachers should be trying to strengthen students’ learning by combining appropriate pedagogical approaches and ICT applications and resources in direction of acquisitions of topic.

The answers to “*why*” question should be looked for within the framework of ICT resources and applications: Strengthening the learning process of students; Carrying out acquisitions of field of subject matter; Developing high level learning skills and supporting individual differences of students.

**2. For whom shall ICT resources and applications be used?** The subject of the integration of ICT into teaching and learning process is students or, in other words, they are the learners who are subjected to the integration. For this reason, it is important to determine the characteristics of learners who are the target group of the integration process. Therefore, it is necessary to designate for whom ICT resources and applications shall be used and to identify the characteristics of these users. In addition to cognitive, affective, social, and physiological characteristics of learners, ICT literacy should be taken into consideration. The answers given to “*who*” questions should be looked for in: ICT literacy of learners; Interests and necessities of learners; Individual differences of learners; Individual characteristics of learners; Learning strategies of learners

**3. How will ICT resources and applications be used?** In order to prepare and carry out learning environment which is appropriate to the purpose and the characteristics of the target group, the question “*How shall ICT resources and applications be used with appropriate teaching methods and learning strategies?*” becomes important.

It is also necessary to determine via “*how*” questions where and when to use the ICT resources and applications in accordance with the teaching methods and learning strategies selected as being appropriate to the content. That is why “*how*” questions should be taken into account with “*what*”, “*when*” and “*where*” questions and their answers: Which ICT resources and applications shall be used? Where will selected ICT resources and applications be used? When shall selected ICT resources and applications be used?

**a. Which ICT resources and applications should be used?** Answering the question “*Which ICT resources and applications would pupils and teachers benefit from?*” is important and for the selection of ICT resources and applications necessary and appropriate for use by teachers in this process. The answer to “*what*” or “*which*” questions should be carefully looked for in selecting ICT resources which are appropriate to: Learning strategies; Teaching methods; Evaluation processes and the individual characteristics of students.

**b. Where will ICT resources and applications be used?** The place where ICT resources and applications are used in the teaching and learning process may be the classroom or laboratory as well as any place out of school such as home, library, scientific centres, museums or on-line environments. It is more important to prepare the appropriate environment for the integration of ICT into teaching and learning process. Therefore, it is important to find an answer to the

question “*Where shall ICT resources and application be supplied from and where shall they be used?*”

It is important to provide guidance services and support as part of ICT resources and applications. The physical conditions of the environment is crucial, in addition to its user-friendliness and the availability of technical support. The environment where ICT is used should be (a) pedagogically, (b) technically, (c) physically and (d) managerially appropriate.

The answers to “*where*” questions should be looked for in: *Where* to supply ICT resources and applications from; *Where* to use supplied ICT resources and applications; *Where* to provide support for the use of ICT resources and applications; *Where* students can access ICT resources and applications as well as the necessary support

c. *When should ICT resources and applications be used?* The answer of the question “*When ICT resources and applications should be used?*” It is critical for effective lesson-planning and so the applicability of the plan during the integration process of ICT into teaching and learning process. The answers to “*when*” question should be looked for in: Time and duration of use of ICT resources and applications; Which ICT resources and application to use and when to use them in accordance with the characteristics of learners and Time of the use of ICT resources and applications in the evaluation process.

Technology should be used as a tool to support educational objectives such as skills for searching and assessing information, cooperation, communication and problem solving - which are important for the preparation of children for the knowledge society (Drent and Meelissen, 2008) carried out a study examining the factors relating to the uptake of ICT in teaching. The results showed that the teachers who are already regular users of ICT have confidence in using

ICT, perceive it to be useful for their personal work and for their teaching and plan to extend their use further in the future.

The factors that have been found to be the most important to teachers in their teaching through the application of ICTs in the teaching and learning process is: making the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable. Additional, more personal, factors such as: improving presentation of materials, allowing greater access to computers for personal use, giving more power to the teacher in the school, giving the teacher more prestige, making the teachers' administration more efficient and providing professional support through the Internet.

ICT enhancements improve education standards in a number of ways some among the following: It enables the effective storing/sorting of information, and can offer new fast ways of communication; It enables the reduction of information quantity towards a higher quality and better structure; It can be integrated into teaching and learning strategies – and used to support relative learning theories; and ICT (computers, Inter and Intranet) can be used to create new types of interactive learning media for improved quality, equity, and access in higher education (Rosswall, 1999).

## **2.4 Summary**

Extensive literature related to the factors affecting the application of ICTs in relation with teaching and learning in secondary schools in Mumbwa district has been reviewed. However, there is still knowledge gap on the factors affecting application of ICTs in relation with teaching and learning in secondary schools in Mumbwa district. In addition literature does not show the

extent to which the application of ICTs in relation with teaching and learning in secondary schools in Mumbwa district and the beneficiaries of these services.

## **CHAPTER THREE: METHODOLOGY**

### **3.1. Research Design**

Research design is defined as a plan used to study a problem or questions. In the same line, Orodho (2003) defines a research design as the scheme, outline or plan that is used to generate answers to research problems. Meanwhile, Msabila and Nalaila (2013:27) points out that, "...a research design is a plan on how a study will be conducted or a detailed outline on how an investigation will take place." The study adopted a case study research design and employed mixed methods in data collection. Kombo and Tromp (2014: 72) write that, "...a case study seeks to describe a unit in detail, in context and holistically. It is a way of organizing educational data and looking at the objects to be studied as a whole." A case study design was chosen for this study because it enabled the researcher to interact with the respondents in their natural environment so as to understand the problem in totality.

Mugenda (1999) explain that a mixed method combines both qualitative and quantitative methods of data collection and merge them at some point. Creswell (2003) adds that mixed method studies need to have both qualitative and quantitative research questions and instruments of data collection. The qualitative part allowed the researcher to carry out an in depth investigation using focus group discussions so as to understand the whole phenomenon as it existed in the schools. The quantitative method was used and administered a questionnaire to teachers of ICT in the secondary schools of Mumbwa District.

### **3.2. Universe Population**

Universe population refers to the total number of the items or units in any field of inquiry or the total number of items about which information is desired (Kothari, 2004). Target population is also defined as the population from whom the findings will be realized (Msabila and Nalaila,

2013). Universe population is the entire mass of objects set for observation in a given study. The sample observations provide only an estimate of the population characteristics (Singh, 2006). With regards to this study, the universe population was all teachers in the selected secondary schools of Mumbwa District.

### **3.3. Sample Size**

Sidhu (2014) defines sample as a small proportion of the population selected for observation and analysis. Sample size is defined as the number of participants selected from the universe, (Kasonde-Ng'andu, 2014). The sample for the study comprised a total of six (6) secondary schools, 14 ICT teachers and other 46 teachers in the selected schools. The total sample was 60 respondents.

### **3.4. Sampling Criteria**

With regards to Ng'andu (2014), sampling technique is that part of the research plan that indicates how objects are to be selected for the study. Sampling technique or procedure is the process of selecting units from the universe population of the researcher's interest (White, 2003). Two sampling techniques were used in order to come up with the sample for the study. The study employed random (other teachers) sampling and purposive (specifically for ICT teachers) sampling techniques.

#### **3.4.1. Random Sampling Technique.**

A definition by White (2003) says that simple random sampling technique is a selection technique that provides each population or element with an equal chance of being included in the sample. Leary (2004) note that it is argued that sampling is a process by which the researcher selects a group of individuals for the study from the population of interest. DeVos (2000) adds that in random sampling, each individual case has an equal chance to be selected for the sample.

In relation to this study, random sampling was used to select the respondents (teachers) from the 6 secondary schools from Mumbwa District and to come up with number of teachers for a focus group discussion.

### **3.4.2. Purposive Sampling Technique.**

Scholars like Singleton et al (1988) note that purposive sampling is a type of sampling which is based entirely on the judgment of the researcher. In this technique, a sample is composed of elements which contain the most characteristic, representative of typical attributes of the population. White (2003) observes that purposive sampling is based on the researchers' knowledge of the population and a judgment is made about which subjects should be selected to provide the best information to address the purpose of the research. Msabila and Nalaila (2013) add that purposive sampling involves nothing but purposely handpicking individuals from the population based on the authority or the researcher's knowledge and judgment. With regards to the study, purposive sampling was used to come with teachers of ICT in the selected secondary schools of Mumbwa District. These were purposively sampled because they were the ones who taught ICT in the selected secondary schools.

### **3.5. Data Collection Instruments**

Research instruments according to Ng'andu (2014) are the tools that the researcher uses in collecting the necessary data. This study used two research instruments to fulfil the stated objectives namely; a focus group discussion guide and a questionnaire.

#### **3.5.1 Focus Group Discussion**

Focus group discussion is "...a way of collecting qualitative data, which essentially involves engaging a small number of people in an informal group discussion (or discussions), 'focused' around a particular topic or set of issues" (Wilkinson 2004: 177). The researcher used focus

group discussions to collect qualitative data from teachers in the secondary schools who were not teaching ICT. Subjective responses in the focus group provided more information through certain gestures and expressions regarding the teaching of ICT in the secondary schools of Mumbwa District.

### **3.5.2. Questionnaires**

A questionnaire is a research instrument type which has a listed number of printed questions used for data collection (Ghosh, 2013). In the view of Brown (2001:6), questionnaires are "any written instruments that present respondents with a series of questions or statements to which they are to react to either by writing out their answers or selecting them among existing answers." This research used an open ended questionnaire in the collection of data. Gass and Mackey (2005) say that open-ended questionnaire items, on the other hand, allow respondents to express their own thoughts and ideas in their own manner, and thus may result in more unexpected and insightful data. An open ended questionnaire was used in this study used to collect data from the teachers of ICT in the secondary schools of Mumbwa District.

### **3.6. Data Collection Procedures**

Before commencing the research, the researcher sought permission from the offices of the District Education Board Secretary (DEBS) for Mumbwa District. The list of schools and distances from the BEBS' office was also collected. A ruffle draw was conducted to pick the 6 secondary schools. This was followed by appointments with sampled secondary schools in Mumbwa District by presenting the letter of permission. Another ruffle draw was conducted in every secondary school to pick the teachers to take part in the focus group discussion.

### **3.7. Data Analysis Procedures**

Data analysis refers to the practical application of formal mathematical procedures to the analysis of social science data. It is concerned with sensitizing social researchers to the use, interpretation and evaluation of relevant data (Rose and Sullivan, 1993). The data collected in this research was analyzed using Microsoft Excel 2007 to generate charts. Analysis involves categorizing, ordering, manipulating and summarizing them before describing data using meaningful terms. Qualitative data was analyzed using thematic analysis. Common themes were categorized and put together under each research question.

### **3.8 Ethical Considerations**

A study of this nature requires that the safety, rights, needs, values and interests of participants are protected and respected. There are various factors to be considered by the researcher. Some of which are informed consent, confidentiality and protection of individuals and sites where this research was conducted from any form of intimidation. In all, ethical issues are looked at as a matter of sensitivity to the rights of others and respect for human rights (Catell, 1966).

In carrying out this research, therefore, the researcher sought permission from all stake holders. These included; introductory letter from the University of Zambia and District Education Board Secretary (DEBS) for Mumbwa District. Participants were also informed that they had the right to withdraw from participation if they so wished. Persuasion and coercion of any form was avoided. Participants, therefore, took part on their own free acceptance and willingness.

### **3.9 Limitations of the Study**

The study was limited to the secondary schools of Mumbwa District of central province in Zambia. This meant that the findings cannot be generalized to the whole district, province and

country as a whole. The sample was also not sufficient enough to enable the study findings be generalized to other parts of the country.

## **CHAPTER FOUR: PRESENTATION OF FINDINGS**

### **4.0. Introduction**

The methodology which was adopted in this study was discussed in the previous chapter. The findings of the study are presented in this chapter. The chapter will first present the demographic characteristics of the respondents and their qualifications. Thereafter, the findings of the study are presented in accordance with the research objectives. These were to:-

- i. Find out the types of ICTs used in schools.
- ii. To determine how the application of ICTs can help transform the learning environment into one that is learner-centered.
- iii. To establish whether the application of ICTs can help in improving the performance of school going children.
- iv. To determine whether the application and use of ICTs can help prepare learners to be self-reliant after school

### **4.1.1 Demographic Characteristics of Respondents**

The table below shows the demographic characteristics of respondents.

**Table 1: Percentage Distribution of Gender of Respondents**

	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Male	41	70.7	70.7	70.7

Female	17	29.3	29.3	29.3
Total	58	100.0	100.0	100.0

Table 1 above shows that this study had a total number of 58 respondents. In terms of gender, **70.7%** of the respondents were male while the remaining **29.3%** were female. More male teachers participated in the study than female teachers.

#### 4.1.2 Qualifications of Teachers

	Frequency	Percent	Valid Percent	Cumulative Percent
Graduate in B.Ed.	10	17.2	17.2	17.2
Graduate in B.A.Sc.	14	24.1	24.1	24.1
Diploma in Education	34	58.6	58.6	58.6
Total	58	100.0	100.0	100.0

**Table 2 below shows the qualification of teachers who participated in the study.**

As shown in Table 2 above, eleven respondents (10) respondents representing **17.2%** had bachelor's degrees in education, fourteen (14) respondents representing **24.1%** had Bachelor of Science degrees and thirty five (34) respondents representing **58.6%** had diplomas in education.

## **2.2 Types of ICTs used in schools**

The first research question sought to find out the types of ICTs used in schools. To answer this question, focus group discussions were conducted with teachers. The focus group discussions were recorded and transcribed. Questionnaires were also used to get answers from teachers on the types of ICTs used in schools. Questionnaires were used for purposes of triangulating the information given by teachers during interviews.

### **(a) Findings from Focus Group Discussions with Teachers on Types of ICTs in Schools**

Many respondents in the focus group discussions said that the schools they were teaching from had some ICT equipment while a few indicated that they did not have ICT equipment. One of the respondents among those that agreed said, “Our school has a few ICT equipment. We have two desktops, a laptop, a printer and a land phone but this equipment is in the heads office.” Another respondent interviewed from another school said:

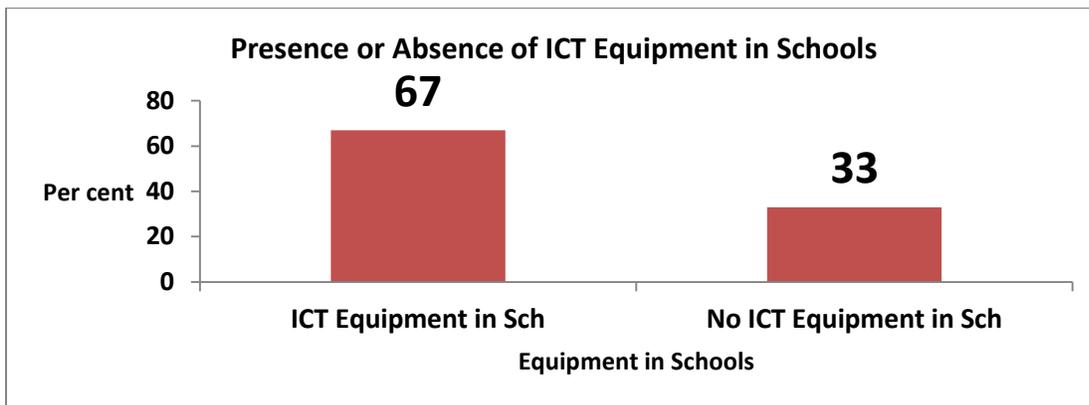
*‘This school has some ICT equipment such as desk tops, fax machine, printers, T.V, mobile phones and laptop. However, this ICT equipment is not enough to meet the number of pupils in school. For example, we have 150 pupils in Grade 9 against 12 desk tops in our computer lab. This has made it very difficult to teach pupils in ICT because it is now a compulsory subject at junior level.’*

Another respondent from another focus group discussion mentioned that the school she was teaching from had ICT equipment such as a television set, a printer, a satellite dish and 3 desk tops. She mentioned however, that the ICT equipment was mostly used by the head teacher and deputy head teacher. She further mentioned that the ICT equipment was only shown to pupils during demonstrations a situation she called a bad.

As mentioned earlier, there were a few respondents from focus group discussions that mentioned that they were not using any ICT equipment in their schools. One of the respondents in one focus group discussion said, " We do not have ICT equipment in school and this is making teaching difficult. Our school was just upgraded to a secondary school and the school has not yet purchased the ICT equipment." Another teacher who participated in a focus group discussion conducted at another secondary school mentioned that the school had no equipment for ICT. He mentioned that the few Grade 8 and 9 pupils at the school were few and paid very little money making it difficult to buy ICT equipment that could be used for learning purposes. He further mentioned that it was even going to be difficult to conduct exams in ICT because the school lacked equipment.

**(b). Findings from Questionnaires**

**The figure 1 below shows the absence and presence of ICT equipment in schools.**



Eight out of twelve respondents (67%) who answered questionnaires mentioned that their schools had ICT equipment while four respondents (33%) said that they did not have ICT equipment in their schools. Many of the respondents, who agreed, wrote that the schools they were teaching from had ICT equipment such as desktops, laptops, printers, mobile phones,

television sets and satellite dish. However, many respondents indicated that the ICT equipment which was in these schools was not enough to meet the population of the pupils in school. Many of the respondents mentioned that the schools they were teaching from did not have money to buy ICT equipment at once.

33% of the respondents who answered questionnaires mentioned that they did not have ICT equipment in schools. Some of the teachers mentioned that it was now when the schools they were teaching from had started planning to buy the equipment especially that ICT was a compulsory subject.

#### **4.3 How the use of ICTs can help transform the learning into one that is learner centered**

The second question sought to determine how the use of ICTs can help transform the learning into one that is learner centered. In order to get this information, focus group discussions were conducted with teachers at each school.

All respondents in focus group discussions mentioned that the use of ICTs help transform the learning into one that is learner centered. One of the participants in the focus group discussion mentioned that the use of ICTs in schools expands access to education thus enabling learners to have access to materials 24 hours per day. He further mentioned that as learners use the internet through phones and laptops, they are able to research and get information on their own thus making their learning learner centered. Another teacher commenting on the same said:

*“Because of ICT, my teaching task is very easy because it is not me who does most of the work but I ask learners to research as well. Normally, I ask them to use the internet and look for information on the topic in history which I want to teach. While, our school does not have a lot of computers, almost all the pupils in the class I teach have phones which*

*connect to the internet. Once, learners have gathered the information, I ask them to present the tasks assigned to them in groups and this makes them be actively involved in the learning process.”*

The other aspect which was mentioned in another focus group discussion on how the use of ICTs can help transform learning into one that is learner centred is that ICT raises education quality and connects learning to real life situations. One of the participants in the focus group discussions, a teacher for geography mentioned that the use of internet made it easy for him to teach about certain animals and places which are distant through the use of pictures. He said:

*” I was teaching learners on the fishing industry in Zambia and did not have teaching aids to use. I wanted the learners to connect this learning to a real life situation and therefore, connected to the internet and downloaded a lot of pictures on the fishing industry. I further gave learners an exercise on the effects of using bad fishing methods. The learners used the internet and came back with good answers. To me, the use of ICTs such as phones and laptops enables learners to actively participate in learning through research.”*

One of the participants in the study also mentioned that the use of ICTs can help transform learning into that which is learner centred through the use of computers. One of the participants in a focus group discussion mentioned that as learners work with computers, they begin to construct or build new knowledge through accessing, selecting, organising and interpreting information and data. She mentioned that as learners work with ICTs such as phones and computers, they begin to learn how to access the information they need as well as select and

organise information. As they continue using the laptop or phone in getting the information, they learn and develop the skills on their own without anyone teaching them.

Another participant in one of the focus group discussions said that involving learners in ICT classrooms helps them to make decisions and plan thus making them independent learners. He said that the use of ICTs makes learners independent as they are exposed to a variety of information which they can use during the learning process.

#### **4.4 Use of ICT and improvement of the performance of school going children**

The third question sought to establish whether the use of ICTs can help improve the performance of school going children. In order to answer this question, focus group discussions were conducted with teachers in the six schools. The focus group discussions were recorded and transcribed and the findings are presented below.

Most of the participants in the focus group discussions agreed that the use of ICTs can help improve the performance of school going children. One of the respondents in the focus group discussion said that the use of ICT by learners enabled them to store a lot of information on computers easily. He further said that this information can easily be retrieved and used for studying purposes thus leading to the improvement in the performance of learners. Another participant in the focus group discussion said, *'My performance at college improved because I stored a lot of information on my laptop. This made it easy to access my notes and read through. This helped me to get good results.'*

Another theme which came out from the study was that learners who use ICT can easily find relevant information related to the subject they are learning thus improve their performance. One participant in the focus group discussion mentioned that learners who use ICTs such as laptops

and internet can easily access relevant information which even teachers might not have. This access to information makes such learners to be ahead of their friends because of not only relying on the information given by the teachers. He stated that this improved the performance of such learners because they had access to a lot of information. Another respondent said:

*If our learners can use ICTs such as phones to access notes on the internet, it can lead to the improvement in their performance. There are good notes on the internet in all the subjects. Procedures of certain experiments are also shown on you tube and pupils can learn on their own even if the teacher has not taught. Access to electronic notes through the use of ICTs can definitely improve the performance of the learners'*

Another participant in one of the focus group discussion also mentioned that the use of ICTs by learners leads to the growth in their knowledge. He mentioned that as learners used ICTs, their knowledge improved and grew because of the exposure to multiple sources of information. This he said leads directly to the improvement in their performance.

#### **4.5 Application and use of ICT by learners after school.**

The fourth question was aimed at ascertaining whether the application of ICT can help prepare learners to be self- reliant after school. In order to get this information, focus group discussions were conducted with teachers in all the six schools. The focus group discussion were recorded and transcribed. Further, teachers of ICT were given questionnaires to answer the question too. The twelve did not participate in focus group discussions. The findings presented below are from focus group discussions and questionnaires.

##### **(a). Findings from Focus Group Discussions**

Most of the people who participated in the focus group discussions said that application of ICTs can help prepare learners to be self-reliant after school. One of the teachers who participated in a focus group discussion mentioned that ICT as a subject can equip learners in schools with skills which can help them survive after they leave school. He mentioned that through the use and application of ICTs, learners can learn how to install software programmes and also hard ware repair. These skills can be utilised after leaving school when they repair and install programmes for a fee. One of the participants in the focus group discussion said:

*“I know one pupil who love working with computers. He acquired skills in repairing computers and installing programmes through interacting with people who owned the computers. I was surprised to learn that he earns a living through installing programmes on computers.”*

Another important aspect that was mentioned in the focus group discussion was that the application and use of ICTs can help learners get employed. One participant mentioned that through the application of ICTs, learners were acquiring a lot of skills such as typing, graphic designing, programme installation and many more. When they complete school, learners can use the same skills to acquire employment as graphic designers in these internet cafes. Another participant in the focus group discussion said that ICT had created a lot of employment in Zambia and the world in general and many learners who acquire ICT skills have a lot of employment opportunities waiting for them. One respondent in one of the focus group discussions said:

*“One of my pupils has been employed in Solwezi by Kansanshi Mine in the security department because of knowing how to use a computer. Kansanshi Mining PLC wanted school leavers to work in the security office by monitoring all mine activities on CCTV*

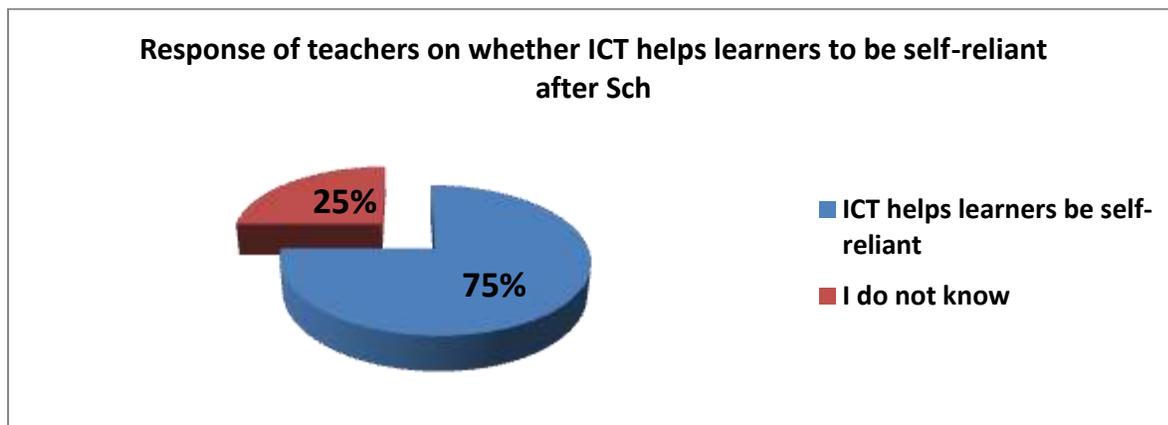
*cameras. My pupil had some knowledge in using a computer even before ICT was made a subject in school and when he was tested during interviews, he did extremely well and is currently working for Kansanshi Mine''.*

Another important aspect that was brought out in the focus group discussion was that the application of ICT can help learners create employment after they leave school. One participant in the focus group discussions said that the application and use of ICTs can help learners set up businesses such as internet and printing services in the areas they live. He said that as long as school leavers had acquired the necessary skills.

#### **(b). Findings from Questionnaires**

The figure below presents findings from teachers of ICT on whether the application and use of ICT can help prepare learners to be self –reliant after school.

**The figure 2 below shows the Response of teachers on whether ICT helps learners to be self-reliant after School**



**Figure 2: Responses of teachers on whether ICT prepares learners to be self- reliant after school**

As shown in figure 1 above, nine out of 12 respondents (75%) who were given questionnaires mentioned that the application and use of ICT could help prepare learners to be self-reliant after school. They mentioned that the skills which are acquired in in ICT can make them be employed as well as employ themselves by providing services such as typing to the community. Three (3) respondents (25%) however, stated that they did not know if the use of ICT would help prepare learners to be self-reliant after school.

## **CHAPTER FIVE: DISCUSSION OF FINDINGS**

### **5.1 Introduction**

The purpose of the study was to establish the application of ICTs and its relationship with the improvement of teaching and learning. The previous chapter presented findings of the study. This chapter discusses the findings of the study. The discussion was guided by the research objectives which were:

- i. To find out the types of ICTs used in schools.
- ii. To determine how the use of ICTs can help to transform the learning environment into one which is learner centred.
- iii. Establish whether the use of ICTs can help improve the performance of school going children.
- iv. To ascertain whether the application of ICTs can help prepare learners to be self-reliant after school.

## **5.2 The types of ICTs used in schools**

The study revealed that computers, mobile phones, printers, television sets and desktops were some of the types of ICTs used in schools. It was also revealed in the study that not all schools had ICT equipment. Some participants in the focus group discussion and four teachers of ICT mentioned that the schools they were teaching from had no ICT equipment. The majority of the respondents who mentioned the types of ICTs found in the schools they were teaching from also said that the few ICTs they had were in the offices of administrators and not labs where most of the pupils can access them. Further, out of the six schools which were sampled for the study, only one was connected to the internet. Computer and internet skills are very important tools for getting information and are necessary in schools.

A number of lessons can be drawn from these findings. The first one being that the types of ICTs used in the six schools were not adequate to meet the demands of the learners. The population of learners in the schools by far outnumbered the available types of ICTs used in these schools. The implication of the findings is that learners are not exposed to a variety of ICTs thus not fully benefiting from them. This finding is not in line with what Wagner (2001) states that ICTs are a major tool for improving accessibility to and efficiency of education in developing countries.

Secondly, the types of ICTs found in the schools were too basic for learners to realise their full potential in terms of learning. Desk tops and phones were the commonest types of ICTs and the desk tops were found in schools which had no internet connectivity. This meant that the few learners who accessed them only managed to learn basic skills such as typing and saving files. These ICTs found in these schools were not adequate and are not in line with Michiels and Van Crowder (2001) who states that devices such as digital cameras, digital video cameras and

players, slide projectors ,mobile phones and traditional media such as radio(digital,satelite) and television all fall under the umbrella of ICTs.

It was also revealed in the study that some schools did not have ICTs. This means that learners were not learning ICT despite the government of the Republic of Zambia introducing the subject in schools. UNESCO (2005) states that the introduction of ICT resources in schools is one of the most significant developments around the world during the last 20 or so years because it has the most benefits for learners and it helps them work independently. It can be deduced from the assertion made by UNESCO that because of the lack of ICTs in schools, learners were not benefiting from the vast knowledge which could be derived from ICTs.

### **5.3 How the use of ICT can help transform the learning into one that is learner centred.**

The results of this investigation showed that the use of ICTs such as internet expanded access to education thus enabling learners to have access to learning materials 24 hours a day. Most of the respondents mentioned as learners interacted with various types of ICTs such as phones and computers, they can access any information they need without the active participation of the teacher. The acknowledgement of teachers that the use of ICTs expands access to education thus enabling learners have access to learning materials has some implications. Firstly, many teachers were going to have a positive attitude towards the use of ICTs since they know that their teaching was made easier. Secondly, the teachers were going to advocate for the improvement and purchase of ICTs in the schools they teach since they wanted their learners to access learning resources on their own.

It was also revealed in the study that the use of ICTs can raise education quality and connect learning to real life situations. It was revealed in the study that the use of ICTs made it easy for

teachers to teach since ICTs such as projectors and television make it easy to present both visual and audio aids thus connect learning to real life situations. This means that the use of ICTs can help learners cement their understanding of the concepts since they are tied to real life experiences. Since ICT is considered as an aid to learning, it is in line with De Corte et al (2003) who stated that ICT is an assisting tool, a medium for teaching and learning and finally, a tool for organizing and management in schools.

The study also found that as learners work with computers, they build new knowledge through accessing, selecting, organising and interpreting information and data. The skills of organising and interpreting can only be developed if learners actively participate in the learning process. As learners are involved in ICT classrooms, they also learn to make decisions and plan.

#### **5.4 Use of ICTs and improvement of the performance of school going children**

It was revealed in the studies that the use of ICTs can help improve the performance of school going children. Many participants in the focus group discussions mentioned that ICTs such as lap tops and desktops enable learners to store a lot of information for the purposes of studying. It was further revealed that ICTs such as computers and the internet made it possible for learners to access information which may be left out by teachers but relevant to the subject.

Educational materials that could not be made available by schools and teachers could be made available through the use of ICTs and as Wagner (2001) stated that ICTs are being considered a major tool for improving accessibility to and efficiency of education in developing countries. Further, he mentioned that ICTs are also being viewed as a “flat world” enabler by providing access to the latest educational content developed all over the world.

Since the findings of the study showed that there were some schools that did not have ICTs, it means that the performance of learners in these was going to be affected. .

### **5.5 Application of ICT among learners to prepare them to be self-reliant after school**

Nine out of the twelve respondents (75%) who answered the questionnaire revealed that the application and use of ICT prepared learners to be self-reliant after school. The respondents also explained how the application of ICT can make one self –reliant. A number of conclusions can be drawn from the finding. Firstly, the mere knowing of teachers that the application of ICT can prepare learners to be self-reliant after school is a motivation factor to use a variety of ICTs in the teaching process. Secondly, the views of teachers which reflects their perceptions can make them encourage the learners to actively use and apply ICTs as they learn. Most of the teachers mentioned that the use and application of ICTs can result in learners getting employed after they leave school. This is also in line with Wagner (2001) who mentions that in Africa, IT skills were essential for young people to access paid jobs.

While it has been agreed that the application and use of ICT can create employment, the National Council for Science and Technology (2010) reports that even though ICT has penetrated many sectors such as banking, transportation, communication and medical services, the Zambian education system lags behind because its use in Zambian classrooms is still in its early phase. This state of affairs raises worry because even though teachers view the application and use of ICT as something that can create employment after school, this cannot happen if learners are not using ICTs.

There were also 3 teachers (25%) who answered questionnaires and mentioned that they did not know if the application of ICT can help learners to be self-reliant after school. It was also noted

that all these teachers were coming from schools that did not have ICTs. Further, most of these schools were not electrified. By not being sure, there is a possibility that these teachers were not going to encourage their learners to use and apply ICTs since they did not see any benefits. Such teachers need to be sensitised and trained so that they encourage their learners and this is in line with Williams (2011) who states that for effective and successful application of ICTs to take place in schools, there is need to first consider teacher training and professional development. Watson and Watson (2011) also mention that teachers must be trained to effectively use the technology for planning student instruction.

It was also revealed in focus group discussions that the use and application of ICT can help prepare learners to be self-reliant after school through the creation of self-employment. Many respondents said that the skills acquired by learners whilst in schools can help them survive after they leave school. They can provide a service to the community in exchange for money.

## **5.6 Summary of Chapter Five**

In this chapter, the findings regarding the application of ICTs and its relationship with the improvement of teaching and learning in selected secondary schools in Mumbwa district of Zambia was discussed. To recap the salient points thus far:

Some secondary schools were using ICTs such as desktops, internet, printers and phones while other secondary schools did not have implying that learners in these schools were not fully benefiting from the rich education resources from ICTs. Since ICTs transforms learning into one that is learner centred, the few ICTs in the schools is a hindrance to learner centred learning.

The application of ICTs among learners prepared them to be self – reliant after school in that with the skills acquired by learners, they were able to look for employment as well as be self-employed.

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

### **6.0. Introduction**

The previous chapter discussed the findings of the study. This particular chapter presents the conclusions drawn from the research. It further makes recommendations and proposes areas for further study based on the findings of the study.

### **6.1. Conclusion**

A number of conclusions can be drawn from the discussion of the findings with regard to the application of ICTs and its relationship with the improvement in teaching and learning. Using the research objectives and questions, the following are the conclusions of the study.

**6.1.1** The types of ICTs used in schools included desk tops, printers, internet, laptops and mobile phones. Even though the schools had ICTs, they were inadequate to meet the requirements of the learners and most of these ICTs were only used by the school authorities for administration purposes only. Some of the schools did not have any ICTs

because of having challenges of electricity as one of the schools was not electrified despite the making of ICT compulsory at junior secondary by the Ministry of General Education. Further, the types of ICTs found in school were basic.

**6.1.2** The use of ICTs can help transform the learning into one that is learner centered because as learners work with computers for example, they build new knowledge through accessing, selecting, organization and interpreting information. Secondly, the use of ICTs expands access to education thus enabling learners to access learning materials all the time thus enabling learners to interact with these materials all the time. Further, ICT lessons demand practice and therefore, learners are actively involved in the learning process as they make decisions and plan throughout the learning process.

**6.1.3** The use of ICTs can improve the performance of school going children as learners can use ICTs such as a computer and internet to access learning materials which some teachers may not present to learners. Access to these learning materials by learners can improve the performance of learners. Further, the use of ICTs enables learners to store and search for information which can be used for learning purposes.

**6.1.4** The application of ICTs can prepare learners to be self-reliant after school because the skills acquired in ICT can make learners get employed as IT specialists. Further, learners who are skilled in ICT can be self-employed in the communities they live.

### **6.2.0 Recommendations**

The recommendations arising from this study are based on the conclusions discussed above and are as follows:-

- 6.2.1** Although many schools had ICTs such as computers, mobile phones satellite dishes, the study concluded that the type of ICTs were basic and not enough to meet the number of children. Following this finding, it is recommended that schools should buy many types of ICTs so that learners can have a variety at their disposal for purposes of learning. Further, it is recommended that the Ministry of General Education should buy some ICTs and donate to schools that do not have any.
- 6.2.2** It was revealed in the study that the use of ICTs can help transform the learning environment into one which is learner centered. It is recommended that Continuous Professional development Meetings in schools should encourage the use of ICTs during lessons.
- 6.2.3** The study revealed that the application of ICTs can help prepare learners to be self-reliant after school. It is therefore, recommended that the Ministry of General Education and the school administrations should promote the teaching of ICT in schools.

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## APPENDIX: 1

### SCHOOL OF ENGINEERING

#### DEPARTMENT OF ELECTRICAL AND ELECTRONICS

#### **TEACHERS QUESTIONNAIRE**

The questionnaire aims at getting your opinion pertaining to the **application of information and communication technologies and its relationship with the improvement in teaching and learning in selected schools in Mumbwa district.**

The information you give **is for research purpose only**. You may not write your name otherwise your identity will remain confidential. Feel free to give opinions in your responses.

Please complete the following questionnaire by answering the questions and placing a **tick** (✓) in the appropriate block (only one block). Be honest as much as possible.

=====

## **PART 1 BACKGROUND INFORMATION**

### **General information**

#### 1. Teachers characteristics.

a) Gender: Male [  ]      Female [  ]

#### b) Teachers' professional qualification. Qualification **Tick** (✓)

1. Graduate in B.Ed.	<input type="checkbox"/>
2. Graduate in B.A.Sc.	<input type="checkbox"/>
3. Diploma in Education	<input type="checkbox"/>
4. Certificate	<input type="checkbox"/>

#### 2. How long have you been teaching in your current school? **Tick** (✓). Where applicable:

Between 1-3 years [  ]

Between 4-5 years [  ]

Between 6-9 years [ ]

10 and above years [ ]

3. Which grades do you teach? **Tick (√)**

1	Grade 12	
2	Grade 11	
3	Grade 10	
4	Grade 9	
5	Grade 8	

4. Name of your school. **Tick (√)**

1. Kalilwe Secondary school [ ]

2. Sanje Secondary school [ ]

3. Mumbwa Secondary school [ ]

4. Nambala Secondary school [ ]

5. Nalusanga Secondary school [ ]

6. Bulungu Secondary school [ ]

## PART II INFORMATION ABOUT THE SCHOOL

5. Does your School have any of the following ICT equipment?

1. Mobile Phone
2. Landline Phone
3. Laptop
4. Desktop Computers
6. Scanner
7. Edu Pads
8. Satellite Dish
9. TV
10. Projectile

6. Does the above ICTs help you in teaching activities?

1. Yes [ ]
2. No [ ]

7. Does the learners learn computer lessons at school?

1. Yes [ ]
2. No [ ]

8. Do you have teachers that are trained to teach computers studies at you school?

1. Yes [ ]
2. No [ ]

9. If yes to Q. 6, how many?

1. One [ ]
2. Two [ ]
3. Three [ ]
4. More than five [ ]

10. Do you have a computer lab at your school?

1. Yes [ ] 2. No [ ]

11. If yes to Q. 8 Does it have enough furniture?

1. Yes [ ]

2. No [ ]

12. Do you think the application and use of ICTs can help prepare learners to be self-reliant

after school? 1. Yes [ ] No [ ]

13. Can the application of ICTs help in improving the performance of school going children?

1. Yes [ ] 2. No [ ].

a) If Yes, how-----

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14. Do you think the application of ICTs can improve the quality of education system in Mumbwa District?

1. Yes [ ] No [ ]

15. Does your school face school challenges with the introduction of computer studies in all schools by the Ministry of education?

1. Yes [ ] 2. No [ ]

a) Yes, what are the challenges? -----  
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-

16. Is your school administration having plans of sending some teachers to do computer trainings?

1. Yes [ ] 2. No [ ]

*Thank you for your participation*

## **APPENDIX: ii**

### **Focus Group Discussion Guide for Teachers**

1. How can the application of ICTs help in improving the performance of school going children?
2. In what ways can the application and use of ICTs help prepare learners to be self-reliant after school?
3. What challenges does your school have in handling computer classes?

4. How can the application of ICTs at your school help transform the learning environment into one that is learner centred?
5. How are the teacher's and the school administration looking at the introduction of computer lessons by the Ministry of education in all the School?

*Thank you for your participation*