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Negative Factors Affecting ICT Implementation in Selected Secondary Schools in Chipata District

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ABSTRACT

The purpose of study is to investigate the negative factors affecting the implementation of ICT in selected Secondary Schools in eastern province of Zambia, Chipata. The studies done in other countries have shown that this ICT is very good as it lays a good foundation for the development of the nation. ICT is a foundation to economic growth as it brings efficiency in organizations and industries. ICT in schools is not only good to teachers but also to learners as it helps them store data, retrieve information, search data on the net, process data accurately and quickly. ICT if well used helps learners to learn other courses easily as it is a source of information in all subjects. ICT implementation for all comes as a solution to all problems that can be encountered and helps bring equality in development and education in the nation. The children learn a lot at primary level to make them self dependent when they grow up and help develop the nation. When introduced to ICT at this level learner get more exposed to the world they live in and thus be very important tools of development in the areas where they live.

ICT has a lot of advantages to learners and the society at large but its implementation needs much preparation. Research findings across the country have revealed that there are ICT facilities in the secondary schools such as computers, computer laboratories, internet connections, alongside the traditional methods of telecommunication. Further research has revealed that projects involving ICT use and integration in the secondary schools have both internal and external challenging factors leading to weak implementation of these ICT projects. The study was done in secondary schools in Chipata Zambia. The purpose of study was to investigate and establish the negative Factors affecting ICT implementation in selected secondary schools in Chipata district in eastern province of Zambia. The objectives of the study were to assess the impact of ICT education implementation on pupils' performance in Chipata district, to establish factors that would lead to successful implementation of ICT policy in Chipata district in Zambia, to identify challenges of ICT education implementation policy in Chipata District in Zambia, to assess the impact of ICT infrastructure and computer resources on implementation of ICT selected secondary schools in Chipata District.

Non-experimental descriptive survey design was used to establish the factors that influence the implementation of ICT projects in secondary schools in Chipata, Zambia. The research paper discovered that a lot of schools were not ready to implement ICT because they were not connected to the nation grid, had no ICT teachers, books, computers and other devices used in ICT. The preparation need to be done by the government in the area of training materials(books and ICT devices), school laboratories, ICT teachers and psychologically convince the learners the benefits of the new subject ICT. Most importantly schools must be connected to the national grid before implementation of ICT takes place because computer use electricity to operate.

Implementation of ICT needs a good strategy by the government for example piloting it in a village set up and see the results then start implementing step by step to the whole nation until it is nationally implemented. It is recommended that the government make sure that it has enough ICT teachers, ICT training materials, Computer laboratories, and computers before implementation of ICT to be successful. Infrastructural facilities like construction of computer laboratories should be provided to facilitate the implementation ICT projects in the region. Electrification should be diversified in the rural areas as well as in all the corners of the county to enhance the use of computers. Alternative sources of energy can be used in the remote places where it is very expensive to provide power adequately.

The school administration should familiarize themselves with the national ICTs policies and especially in education in order for them to develop school ICT policy that would enable them integrate use of ICTs in teaching and learning in class. The administrators too should be induced into ICT projects through various seminars so to understand the importance of integrating ICT in their day to day operations in their schools. Both the national government and county government should invest heavily in ICT projects in schools by providing adequate number of computers in schools and also enhance internet connection in the schools to ensure easy access to teaching learning materials in the web.

The government also, should make available avenues in which the schools can acquire computers at a reduced cost. This can be done through tax waiver on computers meant for learning in the secondary schools. The Ministry of Education should develop pre-service and in-service staff training programmes that are tailored to the school programmes to keep teachers up to date with the technological changes which will promote proper integration of ICTs in teaching and learning. More teachers should be deployed to the schools to train the students on the use of computers to increase the confidence when learning using ICTs.

Keywords: *ICT implementation, negative factors affecting ICT, Challenges*

1.0 Introduction

This paper will endeavour to discuss the negative Factors affecting ICT implementation in selected secondary schools in Chipata district. ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries. The term is somewhat more common outside of the United States.

ICTs stand for information and communication technologies and are defined, for the purposes of this primer, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony.

In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings. But ICTs are more than just these technologies; older technologies such as the telephone, radio and television, although now given less attention, have a longer and richer history as instructional tools. For instance, radio and television have for over forty years been used for open and distance learning, although print remains the cheapest, most accessible and therefore most dominant delivery mechanism in both developed and developing countries. The use of computers and the Internet is still in its infancy in developing countries, if these are used at all, due to limited infrastructure and the attendant high costs of access.

Moreover, different technologies are typically used in combination rather than as the sole delivery mechanism. For instance, the Kothmale Community Radio Internet uses both radio broadcasts and computer and Internet technologies to facilitate the sharing of information and provide educational opportunities in a rural community in Sri Lanka. Similarly, the Indira Gandhi National Open University in India combines the use of print, recorded audio and video, broadcast radio and television, and audio conferencing technologies.

In modern society ICT is ever-present, with over three billion people having access to the Internet. With approximately 8 out of 10 Internet users owning a Smartphone, information and data are increasing by leaps and bounds. This rapid growth, especially in developing countries, has led ICT to become a keystone of everyday life, in which life without some facet of technology renders most of clerical, work and routine tasks dysfunctional. The most recent authoritative data, released in 2014, shows "that Internet use continues to grow steadily, at 6.6% globally in 2014 (3.3% in developed countries, 8.7% in the developing world); the number of Internet users in developing countries has doubled in five years (2009-2014), with two thirds of all people online now living in the developing world.

However, hurdles are still at large. "Of the 4.3 billion people not yet using the Internet, 90% live in developing countries. In the world's Least Connected Countries (LCCs), which are home to 2.5 billion people, access to ICTs remains largely out of reach, particularly for these countries' large rural populations." ICT has yet to penetrate the remote areas of some countries, with many developing countries dearth of any type of Internet. This also includes the availability of telephone lines, particularly the availability of cellular coverage, and other forms of electronic transmission of data. The latest "Measuring the Information Society Report" cautiously stated that the increase in the aforementioned cellular data coverage is ostensible, as "many users have multiple subscriptions, with global growth figures sometimes translating into little real improvement in the level of connectivity of those at the very bottom of the pyramid; an estimated 450 million people worldwide live in places which are still out of reach of mobile cellular service."

Favorably, the gap between the access to the Internet and mobile coverage has decreased substantially in the last fifteen years, in which "2015 is the deadline for achievements of the UN Millennium Development Goals (MDGs), which global leaders agreed upon in the year 2000, and the new data show ICT progress and highlight remaining gaps deadline for achievements of the UN Millennium Development Goals (MDGs), which global leaders agreed upon in the year 2000, and the new data show ICT progress and highlight remaining gaps." ICT continues to take on new form, with nanotechnology set to usher in a new wave of ICT electronics and gadgets. ICT newest editions into the modern electronic world include smart watches, such as the Apple Watch, smart wristbands such as the Nike+ FuelBand, and smart TVs such as Google TV. With desktops soon becoming part of a bygone era, and

laptops becoming the preferred method of computing, ICT continues to insinuate and alter itself in the ever-changing globe.

Today's society shows the ever-growing computer-centric lifestyle, which includes the rapid influx of computers in the modern classroom.

Information and Communication Technology can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development and more efficient education management, governance and administration. UNESCO takes a holistic and comprehensive approach to promoting ICT in education. Access, inclusion and quality are among the main challenges they can address. The Organization's Intersectral Platform for ICT in education focuses on these issues through the joint work of three of its sectors: Communication & Information, Education and Science.

At independence, Zambia inherited an education system that was characterized by racial segregation and different types of curricula for the various races namely Europeans, Asians, Arabs and Africans, UNESCO, (2005). The colonial schools had a different curriculum from that of the African independent and the 65 missionary schools.

According to Otach, (2008) "before 1960, free and universal primary education had not been extended to African children in any of the East African British colonies, racial discrimination in primary education was still intact" The expansion of primary education remained a crucial problem in the colonial era. The situation did not radically change with the achievement of independence in 1964. ACTIONAID-Zambia (2004) reports that, the achievement of independence heightened pressure to increase the school population and a rapid more towards universal primary education. The purpose of education was political, social, cultural, humanistic and economic, (UNICEF & World Bank, 2009). It was expected that the education would mould a whole individual who will contribute profitably to society.

In January 2014 the PF (Patriotic Front) government implemented the ICT policy in primary and secondary education programme with the aim of providing more opportunities to the disadvantaged

school age children. The programme created a positive outcome because it resulted in significant increase in enrolment in a majority of the schools.

However, serious challenges have bedeviled the implementation of the ICT policy, UNICEF & World Bank,(2009). They include congested classrooms, limited physical facilities and shortage of qualified teachers, lack of computers, lack of power which negatively impacted on the quality of teaching and learning on one hand and contributed to failure rate in ICT in schools on the other Okwach & George,(1997).

ActionAid Zambia is deeply saddened by the various challenges experienced by pupils and teachers in the on-going Grade 9 examinations particularly for practical subjects such as ICT and science subjects that require equipment. It is particularly disheartening to note that the schools that are affected the most are government schools and the worst hit are in rural areas where access to education, retention and progression are already a challenge for many children .

It is unacceptable that children spent the whole day and whole night in many schools waiting to undertake the examinations in various parts of the country. 'Like other many other districts in the country, Sesheke has experienced the horrors of the examinations' lamented ActionAid Zambia Programme Coordinator for Sesheke, David Mwanamambo.

Information obtained by Mr Mwanamambo in Sesheke indicates that school children at Maonde School have not sat for their ICT exams as the school only has one computer with no printer and no electricity. 49 children were scheduled to undertake the exam at the school. Katongo school had 30 pupils writing ICT exams. The exam started yesterday at 8hrs on the 2nd of November 2015 and ended at 02 hours on 3rd November 2015. The school has only 3 computers and the solar power being used was not sufficient. The pupils could also not print their work due to lack of a printer.

At Katopola school, also in CHIPATA, 65 pupils undertook the exam that started at 08hrs on 2nd November with a number of challenges namely power, inadequate computers and printers. The exam finally finished at 12 hours on 3rd November, this happened in many parts of rural schools in Chipata. ActionAid Zambia Programme Coordinator for Nakonde reports that the district experienced challenges

not only in conducting the ICT examinations, but the integrated science exams as many schools had to improvise equipment and purchase chemicals for the exams. Many schools in the district have no power and could not conduct the examinations. Musesengoma and Wulongo schools had no power and so children from these schools had to use the boardroom at one of the dry ports in Nakonde which is several kilometres away. According to information gathered by the ActionAid team in the district, Nakonde district received K250, 000.00 to procure ICT equipment for all primary schools with some schools receiving grants of as low as K2, 000.00. Many schools ended the exams in the early hours of 3rd November 2015.

In Nalolo District of the Western Province, pupils at Sianda Primary school finished their examinations at midnight on 2nd November 2015. The school only has 1 computer while 4 were personal computers provided by the teachers at the school. At Lubosi Primary School, only 8 pupils had sat for examinations by midnight of 2nd November 2015 due to load shedding and due to the fact that the school only has one computer and borrowed another from a teacher at the school. The remaining 26 pupils continued the exams on the 3rd of November with the school managing to borrow 2 more computers.

From these incidences, it is clear that many schools do not have equipment to undertake these subjects and therefore ActionAid questions the logic of examining children in subjects they have not been taught due to lack of equipment. ActionAid calls on government to cancel examinations in schools that experienced adverse challenges where children wrote the examinations under duress. The Ministry of Education must immediately source equipment and support these schools to re-administer the examinations. It is unfair that some children wrote these examinations late at night or in the early hours of the morning when they were exhausted and hungry.

ActionAid notes that frequently policy changes such as changes made to the curriculum are made and implemented haphazardly often resulting in policy reversals and policy inconsistency. ActionAid further calls on the government to immediately consider the implications of the revised curriculum in light of these challenges. While the intention of having a curriculum that covers practical skills is a good one, it is pointless if such policy changes are not resourced. Government needs to urgently allocate funds for procurement of equipment for practical subjects and that schools have these by the start of the school calendar to facilitate learning for students and as such avoid another disaster in 2016. ActionAid notes

that it is not practical and logical to make computer subjects compulsory and examinable without having in place the necessary infrastructure and logistics.

Government has taken full responsibility over the chaos that characterized the first ever Grade nine Information and Communication Technology examinations. Delivering a Ministerial Statement General Education (former Minister) Dr John Phiri in 2015 said that the examination will be compulsory for teaching but optional in terms of examination where materials will be inadequate. He said: “Last week Grade nine pupils in some parts of the country had to write their exams throughout the night owing to power outages and also inadequate computers”. Dr Phiri told parliament that his ministry had learnt lessons and will make practical steps in redressing the problem. He said that an in-service training program for teachers had been rolled by the ministry to ensure that there would be no repeat of the chaos of 2015.

Dr Phiri said the ministry will issue instructions to all schools prescribing the desired pupil to computer ratio with the schools that fall short exempted from conducting the examination. He also said that the examination will now be conducted over three days with different papers prescribed for the different days.

Dr Phiri said 15 instructors trained in France will conduct training for teachers with 2, 545 teachers already having benefited. The ICT examination idea was mooted in August, 2013 but took effect in the 2015 calendar amidst heavy challenges. Thousands of children sitting for their Grade 9 ICT practical exams were forced to sit for their papers past midnight on Monday due to shortages of computers. The situation was further compounded by ZESCO load shedding as some schools did not have power from as early as 12 Hours and power was only around 22:30 Hours.

This forced the school authorities to detain the pupils in the school grounds waiting for power to be restored after which pupils took turns in sharing the fewer available computers. A check at most schools in Lusaka around 23 Hours found concerned parents and guardians taking blankets and food to their children. Some schools such as Libala Basic School had asked parents and guardians to donate laptops or money to enable the school hire computers for the practical exams.

The few hired computers were still not enough and the situation was worsened after ZESCO cut off power supply to most schools forcing the school authorities to delay the exams until power was restored.

As late as 02 Hours, Tuesday morning, some children were still waiting for their turn to write their exams. Some children who had finished their papers were forced to walk back to their respective homes in the thick of the night as school authorities refused to allow them in the school grounds fearing they would leak the exams questions to their colleagues who were waiting for their turn to enter the exam room.

This paper therefore reviews the ICT policy highlighting its achievements and challenges. The paper also assesses the progress and establishes the negative Factors affecting ICT implementation in selected secondary schools in Chipata district in eastern province of Zambia.

STATEMENT OF THE PROBLEM.

It is sad to note that despite the government's commitment to eradicate ICT illiteracy through introduction of ICT to secondary schools, the education levels have continued decreasing. "This has been attributed to poor pupil teacher ratio in the nation and lack of training materials and qualified ICT personnel, congested classrooms, limited physical facilities and shortage of qualified teachers, lack of computers, lack of power which negatively impacted on the quality of teaching and learning on one hand and contributed to failure rate in ICT in schools on the other" Okwach & George,(2007). In fact in 2014 when ICT was first implemented 97% of the pupils had to spend nights writing practical exams in Chipata. It is against this back ground that this research is designed to find out the extent to which ICT have imparked on the performance of pupils and investigate and establish the negative Factors affecting ICT implementation in selected secondary schools in Eastern Province, Chipata.

1.2. THE PURPOSE OF STUDY

The purpose of study is to investigate and establish the negative Factors affecting ICT implementation in selected secondary schools in Chipata district in eastern province of Zambia.

1.3. OBJECTIVES OF THE STUDY

The objectives of this study are:

AIM: To establish the challenges that affects the implementation of ICT in selected secondary schools.

SPECIFIC OBJECTIVES

1. To assess the impact of ICT education implementation on pupils performance in Chipata district.
2. To establish factors that would lead to successful implementation of ICT policy in Chipata district in Zambia.
3. To identify challenges of ICT education implementation policy in Chipata District in Zambia.
4. To assess the impact of ICT infrastructure and computer resources on implementation of ICT selected secondary schools in Chipata District.

1.4. RESEARCH QUESTIONS

1. What is the impact ICT education implementation on the pupil's performance in Chipata district?
2. What are the factors that would lead to successful implementation of ICT in Chipata district in Zambia?
3. What are the challenges of ICT education implementation policy in Chipata district in Zambia?
4. Did ICT infrastructure and computer resources had an impact on implementation of ICT selected secondary schools in Chipata District?

1.5. Significance of study

The study was important because it would assist the government to assess the Challenges in implementation of ICT in Secondary Schools in Zambia so that the best method of implementing ICT and other courses to come can be found. In addition the study will provide valuable information to government and other interested parties like the NGOs; Civic organizations who would like to come on board to help poor children get their ICT education. also, the study was important because the findings would provide information that would be essential to a number of stakeholders such as the school administrators, teachers, the Social Sciences Teachers Association of Zambia, pupils, the Examination Council of Zambia, the Ministry of education and the government at large to initiate measures that will help implement ICT in future and come up with strategies to help educators improve the academic performance of pupils in ICT. Furthermore, the study would offer some insights to other researchers

wishing to engage in further studies and contribute to the improvement of the quality of ICT education in Zambia.

1.6. LIMITATION OF THE STUDY

The limitation of study was that it was a case study of Chipata urban district secondary schools thus may not be taken to generalize as a representation for the whole population.

1.7. Scope of Study

This research paper assessed the Challenges and identified factors that would lead to successful implementation of ICT in selected Secondary Schools in Chipata urban in Eastern province of Zambia, and gave conclusion and recommendations.

1.8. OPERATIONAL DEFINITIONS

BASIC SCHOOL- a school comprising grade one to nine classes

ICT –Information Communication Technology is the study of the use of new devices at home and at places of work like computers, Television, Video camera, Digital cameras, washing machines to make the work easier.

PRIMARY SCHOOL- a school comprising grade one to seven classes.

UPPER BASIC SCHOOL – lower secondary school comprising grade eight and nine

STANDARD OF LIVING-average resources that is measurable on one's life.

QUANTITATIVE DATA- a subjective formulated pieces of information.

PARTICIPATORY STUDY- is where everybody is involved in solving the problem

RESPONDENTS- are men are women who are interviewed or given questionnaires to answer.

POPULATION- is the number of people living an area

SAMPLE - a group drawn from total population that the researcher uses for the purpose of study, which must represent the total population.

UNSTRUCTURED INTERVIEWS- interviews conducted without following any order of questions

OBSERVATIONS – Finding out but looking at the activities taking place

INSTRUMENTS- tools used to gather data

QUESTIONNAIRES- a tool that is made up of questions used to gather data

THE QUALITATIVE DATA- Objective type of information

ACCESS: An opportunity or a right of a person to be in school

DISPARITIES: Lack of equality in the provision of school opportunities to the school age population.

DROPOUT RATE: The percentages of pupils or students who dropout from a given grade in a given school year

GROSS ENROLLMENT RATIO: Total enrolment as a percentage of the official school age population.

LITERACY: The ability to read and write with comprehension, as well as to make simple arithmetical calculations basic cognitive skills enabling one to obtain and process information in a meaningful manner.

NET ENROLMENT RATIO: Enrolment of official age group expressed as a percentage of the corresponding population.

SECONDARY EDUCATION: The provision of first level instruction to children usually in the 11-25 age groups.

SURGE: Sudden increase in value or number of pupils in a class or school in a given school year.

ENROLLMENT: The number of pupils enrolled at a given level of education regardless of age.

CHAPTER TWO

2.0 LITERATURE REVIEW

INTRODUCTION

This section summarizes the literature that is already in existence regarding factors
Influencing ICT projects in secondary schools and their relationship. It presents an overview of previous work on related topics that provide the necessary background for the purpose of this research.

2.1 Global perspective

ICT is a generic term referring to technologies which are being used for collecting, storing, editing and passing on information in various forms SER, (2007). A personal computer is the best known example of the use of ICT in education, but the term multimedia is also frequently used. Multimedia can be interpreted as a combination of data carriers, for example video, CD-ROM, floppy disc and Internet and software in which the possibility for an interactive approach is offered Smeets(2006).

Generally, the following functions of the use of ICT in education are described in literature (SER, 2008, Moonen and Kommers, 2005, Pilot, 2008).

1. ICT as object. It refers to learning about ICT. Mostly organised in a specific course. What is being learned depends on the type of education and the level of the students. Education prepares students for the use of ICT in education, future occupation and social life.
2. ICT as an ‘assisting tool’. ICT is used as a tool, for example while making assignments, collecting data and documentation, communicating and conducting research. Typically, ICT is used independently from the subject matter.
3. ICT as a medium for teaching and learning. This refers to ICT as a tool for teaching and learning itself, the medium through which teachers can teach and learners can learn. It appears in many different forms, such as drill and practice exercises, in simulations and educational networks.
4. ICT as a tool for organisation and management in schools.

In 2008, OCTO (a Dutch educational research institute) studied the extent in which ICT is actually being used for realizing the above-mentioned functions. The research was carried out on all educational levels in The Netherlands. The present work concentrates on vocational education. However, given the lack of a sufficient response, a reliable image for the entire sector cannot be given, but an impression of the status quo of the use of ICT in vocational education is possible. Janssen Reinen,(2009). "ICT is never being used as a (learning) objective by 33 of 55 teachers; 27 teachers do not use ICT as teaching material and 21 teachers do not use ICT as an aid". If the computer is being used, then this is mainly for the purpose of word processing and exercising the lessons. Thus, it seems that the computer is being used especially for supporting more traditional educational settings Janssen Reinen, (2009).

We can conclude (present work and uncited literature) that ICT has many technical possibilities, but that the real innovative use of ICT is not broadly adopted in Dutch vocational education.

For most European countries, the use of ICT in education and training has become a priority during the last decade. However, very few have achieved progress. Indeed, a small percentage of schools in some countries achieved high levels of effective use of ICT to support and change the teaching and learning process in many subject areas. Others are still in the early phase of Information and Communication Technologies adoption.

According to Bingimlas, K. (2009), Technology Integration Initiative was designed in Ireland to support schools in developing their ICT infrastructure. Schools received grants for the purchase of computer hardware, and those schools that did not already have an internet connection were assisted in getting on line. The aim of the Technology Integration Initiative was to have at least 60,000 computers in schools by the end of 2009. In the following year the National Centre for Technology in Education (NCTE) census reported that there were some 84,000 computers in Irish schools. The Teaching Skills Initiative recognized that there was little point in putting computers in schools unless teachers were trained in their use. This initiative provided for teacher training in three distinct areas, namely ICT skills and awareness, professional skills development in ICT, and pedagogical skills development. The Schools Integration Project dealt with whole-school development and investigated a range of teaching and learning topics with regard to ICT integration. Approximately ninety pilot projects were established in a number of "lead" schools, which worked in partnership with education centers, businesses, industry, third-level

institutions, and the community. Most of the individual projects implemented as part of the SIP concluded in 2001 and 2002, and the remainder were completed in 2004 (Broadley, T., 2012).

Schools IT 2000 envisaged that ICT advisors would be appointed in education centres to support the work of the National Centre for Technology in Education (NCTE) by providing leadership, training and support, including on-line support, at the regional level and by providing regular feedback on progress and issues arising. Ultimately some twenty ICT advisors (later increased to twenty-one)—one in each of 16 the full-time education centres-were appointed. The main role of these advisors may be summarised as follows: to advise and support teachers in their region in integrating ICT in their teaching and in their students' learning, to build a knowledge base on all matters relating to the use of ICT in their local schools. A report on the implementation of Schools IT 2000 published in 2001 revealed a high level of satisfaction with the initiatives implemented under IT 2000 -National Policy Advisory and Development Committee (Tubaishat, A. and Lansari, A. 2011).

According to Tubaishat, A. and Lansari, A. (2011), the report, however, identified three issues of concern as follows: the need for more training for teachers, the need for more funding (equipment and computers, maintenance, support), the need for more support (technical support, encouragement to use ICT). Based on its findings, the committee made recommendations covering a range of areas, including policy, funding, and the professional development of teachers, pre-service teacher education, infrastructure, and technical support.

In 2001 the Government launched its second policy document on ICT in education, (A Blueprint for the Future of ICT in Irish Education). This was a three-year strategic plan designed to support the continuation of the main initiatives begun under IT 2000 and to build on the progress achieved under that plan. The main objectives of the Blueprint policy were to: to expand ICT capital provision to schools, increase access to, and the use of, internet technologies, further integrate ICT in teaching and learning, enhance professional development opportunities for teachers (BECTA, 2009).

Schools in the LDCs especially in Africa and those in their development phase have not been left behind as far as ICT in education is concerned. Bordbar, F. (2010; 2011) points out that many developed

countries have implemented ICT successfully into schools for teaching and learning, and argue that, owing to the cost of implementing ICT into education, many LDCs have fallen behind with the implementation process. According to Broadley, T. (2012), most governments around the world see the development of ICT policies as indispensable to the successful integration of ICT in education. According to Kozma and Anderson (2010), 17 countries from Chile to Finland and from Singapore to the United States have all set national goals and policies that identify a significant role for information and communication technologies (ICT) in improving their education systems and reforming their curricula. Major investments have been made to increase the numbers of computers in schools and the networking of classrooms (2002 :387).While governments do all they can to initiate computer implementation in schools, it is the poorer countries who have lagged behind in the computer implementation process. A report published by UNESCO (2010) on the state of ICT projects in education in Africa states that, although ICT in education is seen as significant in many aspects in a computer-rich world, there is still a huge gap regarding implementation of computers in schools between rich and poorer countries. This is what is known as the 'digital divide (Williams, 2011). World Bank (2010) describe the 'digital divide' as a growing disparity between those individuals and communities that have and those that do not have easy access to new information technologies, (2001 :261).

The digital divide is more evident in the implementation rate of computers in schools. According to Castro Sánchez, J. J. and Alemán, E. C., 2011.), while many developed countries have had a 90 – 100% computer implementation success rate; developing countries have had less success with the implementation of computers in their schools. For example in United Kingdom, the government spending on educational ICT in 2008–09 in the UK was £2.5bn, in United States, the expenditure on K-12 schools and higher education institutions was $6 billion and $4.7 billion respectively in 2009 and in New Zealand, the government spends over $ 410 million every year on schools ICT infrastructure (Ajayi, L., 2009).

Despite all these investments on ICT infrastructure, equipments and professional development to improve education in many countries, (Barolli, E., 2012) claimed that huge educational investment have produced little evidence of ICT adoption and use in teaching and learning especially in Turkey.

Evidence suggests that education sector is investing heavily on ICT projects but the implementation of these educational ICT projects lagged behind than in the business sector (Bingimlas, K., 2009).

According to Polikanov and Abramova (2003), cited in Saekow & Samson, (2011); although Internet access in Africa is among the lowest in the world, ICT in Africa is rapidly increasing. Many African states now have Internet access, with South Africa the leader in this regard in southern Sahara. They further argue that the majority of Internet users in Africa are rich males, who speak English or any other Western language and live in the cities.

AFRICAN PERSPECTIVE

However, many African countries still do not have adequate Internet connectivity due to a lack of infrastructure (Afshari et al 2009).This inadequacy in ICT infrastructure and connectivity reflects the pessimists' idea (Bingimlas, K., 2009) that ICT will broaden the divisions that exist in the so-called 'digital divide' (Warschauer, Knobel and Stone, 2004,cited in,Afshari et al 2009) between the rich and the poor nations.ICT policies are yet to be developed by governments in Africa to ensure successful integration of ICT in all spheres of society, especially in education (Kawooya, 2004; Kadzo, 2011; Ayere, Odera & Agak, 2010).This also explains why it was very difficult to find ICT policies of African countries on the Internet.

As in many other countries in the world, the South African government maintains an optimistic view regarding ICT projects implementation in schools (UNESCO, 2009). ICT is perceived as a panacea to many educational, social and economical problems. In a speech made by President Thabo Mbeki in 2001, he said that South Africans must continue the fight for liberation against poverty, against under-development, against marginalization and information and communications technology is a critically important tool in that struggle (Imbizo for African Youth, 2001, as cited in the White Paper on e-Education (DoE, 2010:10).

At this time, the state of ICT in South African schools was worth considering, since only 26.5% of schools in South Africa were found to be having access to computers for teaching and learning in 2002, according to the White Paper on e-Education (DoE, 2010:1-2).

The South African government's response to address the digital divide was to establish the Presidential International Advisory Council on Information Society and Development in 2001 (DoE, 2004, cited in Park, et al., 2009). One of the council's key areas of focus was ICT in education, especially by addressing the digital divide (DoE, 2004). In addition, various other policy frameworks have been put in place to enable the integration of ICT into teaching and learning (Williams, 2010). These policies are dealt with in a number of documents published by the South African government, including the "Draft White Paper on e-Education (DoE, 2003), the Revised National Curriculum Statement documents for Grades R-9 for the General Education and Training band (DoE, 2001), the Draft National Curriculum Statement for Grades 10-12 (Schools): Computyping (Computer Applications Technology) (DoE, 2002a) and the Draft National Curriculum Statement for Grades 10-12 (Schools): Computer Studies/Information Technology/Computer Science) (DoE, 2002b)" (Williams, 2010).

Like many other countries in the world, Zambia has developed National ICT Policy (2006). It sets out the nation's aims, principles and strategies for the delivery of Information and Communications Technology to improve the livelihoods of Zambians (MoE, 2011b). Ministry of Education (MoE) introduced the National ICT Strategy for Education and Training (Farrell 2007).The ICT policy gives an opportunity for establishment grass root based infrastructure for knowledge sharing (Mureithi and Munyua 2009; MoE, 2011a .). The ICTs in Education Options Paper (MOEST 2005), discusses the ways in which information and communications technologies (ICTs) can be leveraged to support and improve the delivery of quality education for all Zambians. It provides a comprehensive range of potential technologies to improve teaching, learning, and management. It is intended to enable the government of Zambia (GOK) to plan appropriate ICTs in education interventions as they move forward with the comprehensive Zambia Education Sector Support Programme 2005 –KESSP (UNESCO, 2005).This includes interactive radio instructions (IRI), use of computers in schools, development of ICT skills and the access of internet (Ayere, M.A.; Odera, F.Y.and Agak, J., 2010).

According to Ayere, Odera & Agak (2010), there is rich literature on ICT initiatives in Zambia both by GOK and nongovernmental organizations (NGOs). GOK and the U.S.Agency for International Development (USAID) have a joint commitment to improve education in Zambia in collaboration with

Zambia's Ministry of Education. This is aimed at Accelerating 21st Century Education (ACE) by improving the quality of primary and secondary education through the effective use of information and communications technology (ICT). The initiative to establish a School Technology Innovation Center (STIC) in Nairobi will serve as a hub where education leaders and teachers access the latest information on technology solutions that are proven to enhance innovative teaching and learning, thus improving the skills needed by students to thrive in the 21 st century (Andiko,2009).

A report in the CIA WorldFactbook (2010) shows that Zambia has government ICT Board whose main objective is to avail quality and affordable technical support to the Digital Villages to enable their smooth operation. The board has technical support focus points of standardized method for the testing and implementation of new software, the upgrading of hardware and the overall tracking of licenses and equipment. It also develops a collaborative relationship with the person responsible for Technical support and encourage them to include capacity building in the planning of future changes. The board works closely with the education institutions to ensure quality technical services as well as the internet providers.

From research, the attempt to integrate ICT in Zambian secondary schools is faced by various challenges such as Lack of adequate number of computers in the schools, inability to acquire sufficient computers or update those which are obsolete is due to lack of finances, fast changing technology and high overhead costs, loaded curriculum which make it difficult to find time to prepare ICT teaching materials, Lack of a unified school curriculum in primary and secondary schools, resistance by teachers to use ICT in teaching and learning, the lack of government employed Teachers the schools are forced to hire thus draining the scarce resources which could have been used for upgrading the ICT facilities (Kidombo 2009, Oloo2009). This is backed by the government report on ICT capabilities in secondary schools in Zambia (Kadzo, L., 2011).

Blanskat, Blamire, kefala (2006) conducted a study carried out in national, international, and European schools With the aim to draw evidences regarding the advantages and benefits of ICT in schools achievements. It seeks to measure the impact of ICT on students' outcomes. The study also tried to establish a link between the use of ICT and students' results in exams. The findings are interesting: ICT has positive impact on students' performances in primary schools particularly in English language and

less in science. Schools with higher level of e-maturity show a rapid increase in performances in scores compared to those with lower level.

In addition, schools with sufficient ICT resources achieved better results than those that are not well-equipped. There is a significant improvement on learners' performances. Finally, teachers become more convinced that educational achievements of pupils are due to good ICT use. In fact, high percentage of teachers in Europe (86%) states that pupils are more motivated when computers and Internet are being used in class.

Many pupils consider ICT tools very helpful in that it helps them to do assignments teachers see that ICT enables students with special needs or difficulties. It also helps to reduce the social disparities between pupils, since they work in teams in order to achieve a given task. Students also assume responsibilities when they use ICT to organize their work through digital portfolios or projects. In addition, the study showed that ICT has significant impact on teachers and teaching processes.

By virtue of government Interventions and training seminars organized in this regard, ICT tools stimulate teachers. Indeed, an absolute majority of teachers in Europe (90 %) claim to use ICT to do tasks, such as preparing lessons, sequencing classroom activities, etc. Therefore, teachers plan their lessons more efficiently. ICT also help teachers to work in teams and share ideas related to schools curriculum. There is also evidence that broadband and interactive whiteboards play a central role in fostering teachers' communication and increasing collaboration between educators.

The ICT Test Bed evaluation Underwood (2006) provides an evidence that many teachers use ICT to support innovative pedagogy. It states: "New technologies that provide a good fit with existing practices, such as interactive whiteboards are first to be embedded, but others like video conferencing, digital video and virtual learning environments are now being incorporated, providing evidence of ongoing learning by the workforce. Training needs to continue to support innovative pedagogy." Both examples show that ICT is being integrated in a continuous process. Therefore, ICT can improve teaching by enhancing an already practiced knowledge and introducing new ways of teaching and learning. Transforming teaching is more difficult to achieve. Underwood (2006) "Changes that take full advantage of ICT will only happen slowly over time, and only if teachers continue to experiment with

new approaches." This evaluation came from a teacher training seminar in IT during the ITMF project. It showed that teachers have not fully changed their use of ICT in education; however, most of them changed their way of thinking about the application of ICT in education. Teachers have increased their use of ICT in lessons where students look for information on the net and use it afterwards for subject specific areas, but hardly any use of ICT for class presentations. Nonetheless, teachers do not make use of ICT to engage students more actively to produce knowledge. Similarly, the e-learning Nordic study shows an increase in the use of ICT to teach but not to innovate teaching methods: "ICT generally has a positive impact on teaching and learning situations, but compared with the ideal expectations; the impact of ICT on teaching and learning must still be considered to +be limited" Ramboll(2006).

Many teachers use ICT to support traditional learning methods, for example, information retrieval in which students are 'passive learners of knowledge instead of 'active producers able to take part in the learning process. In a document entitled teaching and learning with ICT, G. Galea (2002) explains how ICT can promote teaching and learning. According to her there are two main reasons behind increasing the use of ICT in education in UK. Firstly, ICT can change the lessons' pace: she stated that children in modern society need to develop sufficient potentials and skills that enable them to take full advantage from the new opportunities that ICT offer. Second, there are groundswells of interest of academic researchers in UK in how technological tools can enhance the quality of teaching and learning in schools, and so help learners to achieve better outcomes.

Furthermore, it has been proved that new technologies have lots of benefits on the students. Ofsted (2002) "ICT allow for a higher quality lessons through collaboration with teachers in planning and preparing resources". Students learn new skills: analytical, including improvements in reading comprehension Lewin et al, (2000). ICT also develop some writing skills: spelling, grammar, punctuation, editing and re-drafting (Lewin et al, (2000). Still new technologies encourage independent and active learning, and students' responsibility for their own learning Passey (1999) ICT proves that students who used educational technology felt more successful in school they are more motivated to learn more and have increased self- confidence and self-esteem. It is also confirmed that many students found learning in a technology-enhanced setting more stimulating and much better than in a traditional classroom environment (Pedretti and Mayer-Smith 1998).

From this research conducted by Blanskat, Blamire, kefala (2006) it is clear that schools with sufficient ICT resources achieved better results than those that are not well-equipped and that there are a lot of benefits in using ICT in education both to a teacher and to the pupils. He did not research on the challenges faced in implementation of ICT but concentrated on the advantages of ICT and its benefits in Education.

There is need for planning and communication to help ensure a successful implementation. In this column, we looked at the actual work typically performed in a complex implementation. However, your implementation may not be as complex, and you may not need to look at all of these areas. Nevertheless, there is usually a lot more involved than just throwing the final solution into the implementation environment. You need to account for the environment the solution will run in, as well as processes and training needs of the client community. If you think through implementation from a holistic approach and communicate well, there is a much greater likelihood that your project will end as a win.

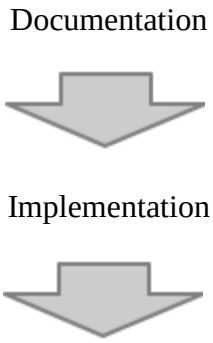
Let's look at the major steps associated with implementation. Note that many of these activities need to be completed ahead of time. You cannot start planning for implementation while you are actually implementing. According to Lee,(2004) a successful implementation of any new system go through the following stages:

1. Prepare the infrastructure**.** Many solutions are implemented into a production environment that is separate and distinct from where the solution was developed and tested. It is important that the characteristics of the production environment be accounted for. This strategy includes a review of hardware, software, communications, etc. In our example above, the potential desktop capacity problem would have been revealed if we had done an evaluation of the production (or real-world) environment. When you are ready for implementation, the production infrastructure needs to be in place.
2. Coordinate with the organizations involved in implementation**.** This may be as simple as communicating to your client community. However, few solutions today can be implemented without involving a number of organizations. For IT solutions, there are usually one or more operations and infrastructure groups that need to be communicated to ahead of time. Many of these groups might actually have a role in getting the solution successfully deployed. Part of the

implementation work is to coordinate the work of any other groups that have a role to play. In some cases, developers simply failed to plan ahead and make sure the infrastructure groups were prepared to support the implementation. As a result, the infrastructure groups were forced to drop everything to make the implementation a success.

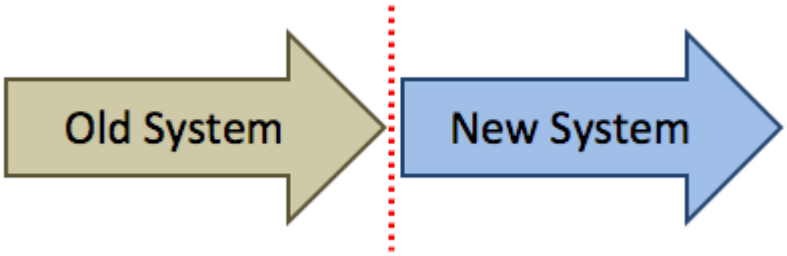
3. Implement training**.** Many solutions require users to attend training or more informal coaching sessions. This type of training could be completed in advance, but the further out the training is held, the less information will be retained when implementation rolls around. Training that takes place close to the time of implementation should be made part of the actual implementation plan.

The implementation of the new system occurs when the old system is replaced by the new one. There is a new of ways of implementing a new system...



Direct Changeover

The **old** system is **stopped completely**, and the **new** system is **started**. All of the data that used to be input into the old system now goes into the new one.



This has its advantages...

- Takes the minimal time and effort
- The new system is up and running immediately

But there are also disadvantages...

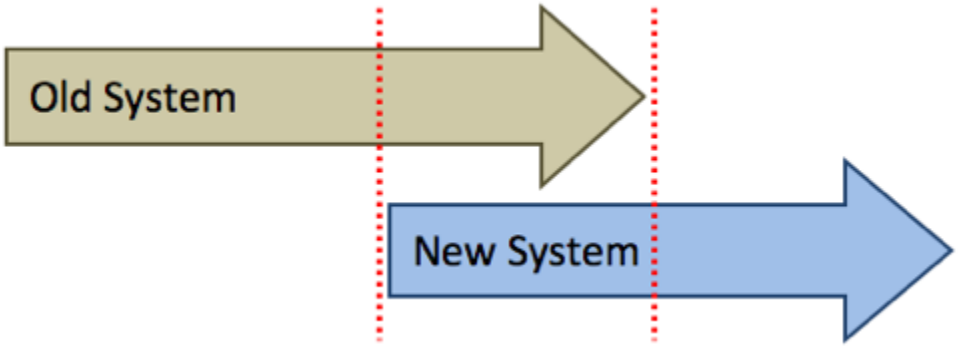
- If the new system fails, there is no back-up system, so data can be lost

Parallel Running

The new system is started, but the old system is kept running in parallel (side-by-side) for a while. All of the data that is input into the old system, is also input into the new one.

Eventually, the old system will be stopped, but only when the new system has been proven to work. The implementation of the new system occurs when the old system is replaced by the new one.

There is a new of ways of implementing a new system...



This has its advantages...

- If anything goes wrong with the new system, the old system will act as a back-up.
- The outputs from the old and new systems can be compared to check that the new system is running correctly

But there are also disadvantages...

- Entering data into two systems, and running two systems together, takes a lot of extra time and effort

This has its advantages...

- Allows users to gradually get used to the new system
- Staff training can be done in stages

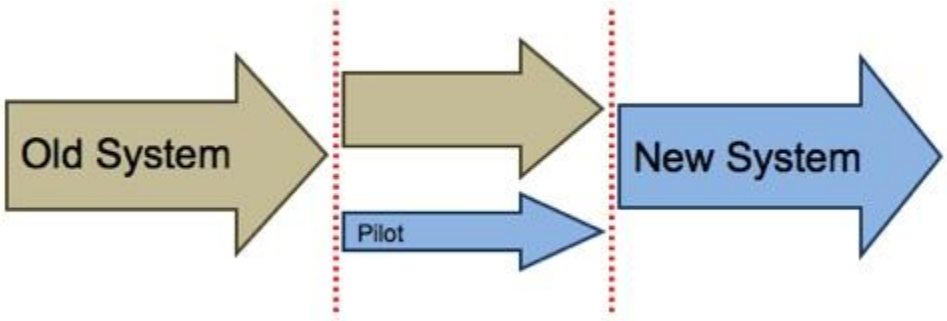
But there are also disadvantages...

- If a part of the new system fails, there is no back-up system, so data can be lost

Pilot Running

The new system is first of all piloted (trialled) in one part of the business / organisation (e.g. in just one office, or in just one department).

Once the pilot system is running successfully, the new system is introduced to the all of the business / organisation.



This has its advantages...

- All features of the new system can be fully trialled
- If something goes wrong with the new system, only a small part of the organisation is affected
- The staff who were part of the pilot scheme can help train other staff.

But there are also disadvantages...

- For the office / department doing the pilot, there is **no back-up** system if things go wrong

According to Brummelhuis, A. C. A. (2005), "Parallel adoption is a method for transferring between a previous (IT) systems to a target (IT) system in an organization. In order to reduce risk, the old and new system run simultaneously for some period of time after which, if the criteria for the new system are met, the old system is disabled. The process requires careful planning and control and a significant investment in labor hours".

This entry focuses on the generic process of parallel adoption; (real-world) examples are used for a more meaningful interpretation of the process if necessary. Moreover a process-data model is used for visualizing the process which is intended to provide a complete overview of all the steps involved in the parallel adoption, but emphasis will be laid on the unique characteristics of parallel adoption. Some common characteristics, especially defining an implementation strategy, that go for all four generic kinds of adoption are described in Adoption (software implementation).

Besides parallel adoption, three other generic kinds of adoption can be identified. The choice for a specific adoption method depends on the organizational characteristics; more insight on this topic will be provided below. The three other adoption methods are: Big Bang Adoption , Also known as Direct Conversion, slam dunk, or cold-turkey strategy, Phased adoption and Pilot adoption.

- Big Bang Adoption/Plunge Adoption: A big-bang adoption entails transferring the entire organization from the old system to the new system in an instant changeover. This is the cheapest option but if the new System fails, the organization is in big trouble. It also opens risks for the system not to be accepted by its users. However, this may be the only approach to take when the two systems cannot coexist or activating the new system is an emergency.
- Phased adoption (Also known as gradual conversion): In phased adoption implementation, the organization is gradually transferring to a new system in different phases, per module or sub-system. Some systems are incapable of being introduced in pieces as it is too reliant on the whole system. Using the phased adoption has less risks, but causes the most disruptions due to it taking the most time to transfer from the old system to the new.

- Pilot adoption: The pilot adoption method is used for large organizations that have multiple locations or largely independent departments. The new system is introduced in one of the locations or departments and extended to other locations or departments over time. (limited boundary if a new system is a failure) (Turban, 2002)

There are several instances when parallel conversion cannot be considered a viable conversion strategy. First consider if the new system contains significant schema changes. Data elements required by one system that are not being populated by the other can lead to at best data inaccuracies and at worst data corruption. Another concern is if the system relies on consumer off the shelf technology (COTS). If a COTS vendor's documentation states that more than one application can not share the same database, then parallel conversion is not an option. An example would be Oracle's Siebel products. Other COTS products may also place restrictions when patches or major upgrades require unique license keys. Once applied they may make database changes that might cause the application to falsely detect a parallel system running against the same database as an attempt at getting around licensing controls and thereby disable the system.

There seem to be little conventions regarding the process of parallel adoption. Several sources (e.g.: Turban, 2002, Eason, 2008, Rooijmans, 2003, Brown, 2009), do not use a single process-description name. The term *parallel adoption* is denoted in these sources, although consistent per source as: parallel conversion, parallel running, shadow-running, parallel cutover and parallel implementation. This appears to be the case because a generic description of the process does not need a distinct classification. There are a quite some standard implementation methods, where different adoption techniques are described but often in a practical context; real-world case scenario or a more comprehensive set of implementation techniques like Regatta: adoption method, SIM and PRINCE2. In general, parallel adoption can best be seen as a Systems Engineering method of implementation of a new system.

In principle, the parallel adoption method is different from the decision to change a system in an organization and can be seen as one possible mean to achieve that goal. However, there are quite some factors that are being taken into account in determining the best implementation strategy. Moreover, a successful implementation can depend to a big extent on the adoption method.

Lee (2004), the activities are divided in four main phases:

- **Define implementation strategy** that deals with the kind of implementation strategy should be executed.
- **Pre-implementation**, which has to do with constructing a planning of all aspects and requirements involved in the implementation.
- **Prepare organization** The organization should be prepared properly according to the previous phase.
- **Conversion** deals with the actual conversion process and closing the conversion process; proceeding with the new system.

2.2 Zambian perspective

John (2005). "ICTs have received growing attention in recent years from development practitioners, policymakers, government officials and civil society organisations in Southern Africa".

They are believed to contribute to improving development outcomes in two main ways:

ICT-based knowledge and products contribute directly to wealth creation the use of ICTs contributes indirectly to national development through its impact in social and economic sectors such as agriculture, health and education, and by empowering individuals to take advantage of new opportunities.

Walton, Richard, E. (2009) "Individuals also benefit from the availability and use of ICTs in a number of ways – for example, by substituting phone calls for travel, which saves time and money, and by using ICTs to obtain information on prices, for their own produce and for purchases".

In these various ways, ICTs can have a significant impact on a country's ability to achieve the Millennium Development Goals (MDGs). There are, however, also constraints on the potential impact of ICTs in many developing countries. These constraints include 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. These factors reduce the scope for countries and communities to realise the potential of ICTs for development (ICT4D), and may even increase exclusion and marginalisation. The difference between access to and use of ICTs in urban and rural areas, and between prosperous and poor members of society – often called the 'digital divide' – has been of particular concern.

The limited fixed phone network has proved to be a major constraint on internet access in Zambia. In 2007, the Communications Authority of Zambia (CAZ) estimated that there were 18,000 internet subscribers in the country, mostly using dial-up access.

Even in 2009 some government departments were still using dial-up rather than broadband internet connections. However, thanks to rapid growth in the number of telecentres and cybercafés, the number of internet users is estimated to have risen from around 50,000 to 500,000 between 2006 and 2007. These telecentres are managed either by private entrepreneurs or by NGOs, some with donor support. There is no official initiative to promote them, but potential telecentre operators may borrow from state empowerment funds to cover set-up costs. Telecentres have become the most important means of access for internet users in Zambia, although – as elsewhere in Africa – it has been difficult to establish successful business models or to ensure skilled maintenance of technical equipment.

The Republic of Zambia is a landlocked country in Southern Africa, which has been independent since 1964. Its population has grown from 10.8 million in 2000 to 12.6 million in 2008. Zambia ranks 164th out of 182 countries in the Human Development Index as listed in the UN Human Development Report 2009. This puts it in the category of countries with low human development.

The country's economy is towards the lower end of the sub-Saharan African spectrum, with a GNP per capita of US$1,300, although growth rates averaged more than 5 per cent in the years leading up to the 2007–2008 international financial crisis. The economy is highly dependent on agriculture and on the extraction of copper from an area of the country known as the Copperbelt.

As a 'least-developed' country, Zambia suffers from high levels of deprivation and poor infrastructure, especially in rural areas. Literacy, however, now runs at between 85 per cent and 90 per cent of the adult population. The country's current National Development Plan covers the years 2008–2012. Priorities for national development include education, agriculture (food security), wealth creation and the reduction of HIV and AIDS and malaria.

ICTs in Zambia Like other countries in sub-Saharan Africa, Zambia has experienced a tremendous upsurge in telephone ownership and use since the advent of mobile phones. The number of mobile phone subscriptions rose from less than 500,000 in 2003 to more than 3 million in 2008, around one cell phone for every two adult citizens. At least one of Zambia's mobile networks now has coverage throughout the national territory.

The fixed telephone network, however, remains extremely limited in range and use – largely confined to the main urban centres, the Copperbelt and the rail links between them. In 2008 there were just over 90,000 fixed line subscriptions. While the mobile and internet sectors are competitive – there are three national mobile operators and some 20 internet service providers (ISPs) –the fixed network has remained a monopoly of the state-owned company ZAMTEL.

AfriConnect, in partnership with the Ministry of Education, have been piloting a project aimed at bringing web-based eLearning to schools in different parts of the country. Some 20 schools have been provided with free or low-cost connectivity, plus teacher training and support. A large website of free learning materials has been built, based on the Zambian curriculum. The project is now moving to the next phase with more schools and a more detailed study of how teaching and learning can be improved and what inputs are needed. The objective is to move from the traditional chalk-and-talk pedagogy to enquiry-based learning, while at the same time bringing the option of lifelong learning to people who have already left school.

With collaboration from Intel, Cambridge University and the University of Zambia, this project will revolutionise the way students learn in Zambia. By 2009, some mobile phone users with higher specification phones were beginning to make use of mobile internet access, which may provide a major new means of online access in the future.

Sharon S. (2001) "Another major constraint on ICT development in Zambia, as elsewhere in Southern Africa, has been the lack of adequate international communications infrastructure". The problem is particularly acute for Zambia because it is a landlocked country, which has had to rely on satellite links or interconnection agreements with neighbouring countries to gain access to international telecommunications networks. This means that internet use in particular has been expensive in comparison with other parts of the world. In 2009 new fibre optic cables were laid along the coast of East and Southern Africa. These may lead to lower prices for international bandwidth. However, Zambia will only benefit fully from this if it is accompanied by improved national and regional fibre optic cable backbones, revised international interconnection agreements, and greater liberalisation of the telecoms marketplace within the country. National broadband fibre optic networks are under construction in Zambia. One is being developed by the fixed telecoms operator ZAMTEL, while separate networks are being built by the country's power utility ZESCO and the Copperbelt Energy Company (CEC). These

are separate ventures, however, and neither the government nor the telecoms regulator has required coordination between them.

Until recently Zambia's telecommunications market was regulated by CAZ, and overseen by the same ministry as the state-owned operator ZAMTEL. Although CAZ is generally felt to have performed competently, some Zambians believe that its subordinate status led to a regulatory environment that favoured ZAMTEL over other operators. At the end of 2009 CAZ changed its name to the Zambia Information and Communication Technology Authority (ZICTA) when it assumed a new, broader mandate and gained greater autonomy following the passage of a new ICT Act. Measures towards liberalising the fixed market and international gateways, and for the partial privatisation of ZAMTEL were also underway by the end of 2009.

Continued development of the learning process involves the usage of new educational approaches and accompanying technologies. Trends in modern education are associated with changes in the role of participants in the learning process. Teachers explore and apply various means to improve the interactivity and involvement of learners not only as passive listeners, but as active participants in the training process. Students are actively involved and are responsible for their own learning. The development of ICT is a prerequisite for the existence of many diverse technical resources that can be used in training. In front of teachers stands the important task to choose those means that most will reflect the specifics of the subject area and the characteristics of learners. The idea of the active implementation of e-learning was adopted in Information and Communication University in 2003. More and more teachers from different departments and faculties of the University consider E-learning as a means of achieving a new model of teaching and learning. Since then they continually explore different ICT tools that affect various aspects of teaching. We implement various ICT tools in our practical activity seeking a suitable model for the realization of E-learning, consistent with the specifics of curriculum subjects. The main goal of the current work is to summarize the results of our studies and present some specific ICT tools used in learning process. The work distinguishes some of the main advantages of ICT tools, which have become a reason for our choice. It sets out some performance after their application in our teaching practice.

Creswell, J. W. (2004). " E-learning is a learning process based on the usage of computer and communication technologies". There is constantly development of electronic tools that can be used to realize each stage of training – preparation of the learning materials, their delivery to the learners, the processes of learners' evaluation and knowledge control. Each of these tools allows the implementation of a specific model of E-learning with different form and degree of learners' activity. The presentation of multimedia information (text, graphics, audio and video materials) is one of the important advantages of E-learning. Based on modern information technologies multimedia elements can be used in creating electronic learning content. In E-learning the learning content is actual, dynamic and accessible. There are opportunities for easy and quick actualization of the learning materials and adding new ones. E-learning includes wide range of activities and assignments which develop different students' skills. Learners have access to many learning resources through remote multimedia databases. E-learning presumes enhanced communication (synchronous and asynchronous) and interaction between participants in the learning process in various forms.

Through actual feedback teachers and students receive information about the level of assimilation of the learning content, qualitatively and quantitatively assessed achievements, the effectiveness of the training. Feedback is a corrector both for teaching and for students' future work and activities. Using feedback we can correct some weaknesses of the educational process in time. This is the way to achieve greater efficiency of training. Like any form of education, E-learning has some drawbacks. Some of them emanate from the weaknesses of the technologies themselves, by which it is implemented. Others are related to the waste of time and labor consumption in developing learning materials. Teachers invest in time and money without being aware in advance with the final didactic results. They have to learn new information and educational technologies constantly. They have a tough job to choose the most appropriate means of training, taking into account the specifics of the subject area and the specificity of the learners. Development of the methodologies units for each course (subject) requires considerable expenditure of time by teachers to explore the opportunities of available software tools and to adapt them to the specifics of the subject area. It is very important to avoid shifting the focus of training – learners should learn the learning materials, and not make more efforts to learn how to use ICT tools. Some drawbacks of E-learning have overcome with the development and improvement of ICT. When teachers select the specific electronic means, taking into account the characteristics of the situation and

E- learning is combined with traditional forms of training, the results can be encouraging. In recent years, WWW is used actively as a virtual environment in the educational process. The specific features of Web-technology assume quick realization of all learning activities. Web-based education acquires new dimensions and qualities and becomes accessible from the most remote parts of the world. The main aspects of E-learning are: pedagogical, software-technological and organization- management. Implementation of E-learning is related to knowledge of software, educational and management technologies.

The usage of ICT tools in the learning process can be viewed from different perspectives. ICT tools can be:

• Subject of study in certain curriculum subjects;

• Aid in the conduct of training;

• Environment in which training takes place. We teach subjects in the field of IT, and therefore cover the three aspects of the use of ICT tools. We analyzed what stages and aspects of training are realized successfully and effectively with the implementation of various ICT tools in the educational process. It is important to determine which tools are best suited to carry out: training and preparation of students, self-study and self-evaluation by the students themselves; assessment – formative (during the training itself) and summative. One of the first steps towards the usage of information technologies in education is a visualization of the learning process. For several years the visualization of lectures in all subject taught at the university relies on multimedia tools. The visualization takes place in organizing seminars, exercises and testing of knowledge in most of the courses. Implementation of e-learning is linked to the growing need for educational software for all levels of education. Some departments of Information Communication University have specialized software for individual learning units, which is used for: visualization, performance of practical tasks, examination of the records of seminars, monitoring. Other departments use software for solving professional tasks: preparing rations; determination of population genetic parameters, breeding value evaluation, economic analysis of the company and etc. Market offers a variety of products, but for most of them customers have to pay expensive licensing fees. We are interested in free software (open source software). It gives users an access to the source code of the programs and they may use it freely. We consider the free software as a serious alternative to the popular commercial products currently used in the training on subjects in the field of Information

technologies. The usage of free software restricts the software piracy. There is an opportunity to learners to explore new products, which are free in most cases; have various features and can be customized according to user needs.

As a result of our continuing work in the area of E-learning we apply various ICT tools in our practical activities to meet the needs of different aspects of training. Due to the fact that almost all of ICT tools are from the group of free software, is possible to use them together and integrate into a one system. LMS Moodle can be regarded as a core of the system. Since the system is an open source, there are capabilities to enrich with new modules for additional activities. This is a prerequisite for expansion and diversification of activities and techniques used by teachers in the training. We can summarize that to the LMS Moodle and its basic activities, we have added some new, namely: web-conferencing tools (DimDim, WiZiQ and Open Meetings). We believe that the integration of various ICT tools to one system is effective for teachers and for learners. On the one hand the learners work in a familiar user-friendly environment; they do not need any special skills or prior training to work with software. On the other hand the benefits for teachers derive from the fact that it is not necessary to install and adjust a variety of products to carry out different educational purposes. They choose from available tools and diversify the teaching process.

E-learning is an integral part of training. It can be realized in various forms using different technologies. SER (2007). “E-learning is a limitless source for: the expansion of interactive activities used by teachers; innovating teaching and learning; stimulating students' activity and improving the communication between teachers and learners”. E-learning can be used as a complement to the traditional training. All these aspects lead to increased efficiency of training. There are many different technologies and tools for implementing e-learning. We consider them as aids to ensure the learning process, which can increase its effectiveness. Our efforts as teachers are directed to the selection of appropriate means consistent with the features of the studied subjects and the specificity of the trained students. The presented examples of application of ICT in the learning process work well in Information and Communication University. The usage of free software stimulates the interest to information technologies and motivates teachers and students to improve. The integration of various ICT tools into one system is a very effective approach that covers all phases of the learning process. Zambia has not

yet reached this stage where a teachers use video conferencing, Moodle, and other forms of e-learning to teach in a classroom situation because of many factors that this paper has come up with. So we could safely say as a nation we are very far in implementation of ICT in schools. What we say is ICT is just a tip of the whole course because here in Zambia we have just started using computers for social media and a little of online transactions which are done in banks and other organizations. The implementation of ICT in schools that is talked about is just the use of computers to store data and type. But also this has meet a lot of challenges as this paper will endeavor to elaborate. The only universities that I have seen trying to implement ICT using e-learning in Zambia are Information and Communication University and Cavendish University.

Universal access to ICT means providing affordable and accessible ICT products and services to rural areas or to all citizens across all demographic factors irrespective of geographical locations, sex, disabilities, race, tribe or religion.

Latest figures from the ZICTA(Zambia Information Communication Technology Authority) shows that the country now has 6.1 million internet users representing a penetration rate of 39%. MTN is still the leading internet mobile service provider currently within 45.5% of data market, followed by Airtel with 40.1% and ZAMTEL with 14.4%.

The figures also show that Zambians mobile phone penetration rate has reached 74.3% of the population, with 11.6 million subscribers out of 15million Zambians.

It is true that the number of people with access to ICT in Zambia has increased.

The current available statistics indicate that mobile subscribers have risen from less than 500,000 in 2003 to more than 4 million in 2015. This growth occurred after the government regulatory agency embarked on installation of ICT towers to all chiefdom's in Zambia. Zambia Information and Communications Technology Authority, ZICTA (a moribund government regulatory agency for ICT in Zambia) initiated a project dubbed 'Universal Access to ICT' to facilitate installation of communication towers in most parts of the rural parts of Zambia to deliver affordable accessible ICT services to rural communities. The regulator says this project has been a success although it was quite challenging to implement and very costly too.

Read more at: http://www.manic.co.zm/the-state-of-ict-in-rural-zambia/

PREVIOUS STUDIES

- Early research and educational programs in Information and communication Technology is a powerful influence on growth, development and the productive life of every nation. Optimal knowledge at each stage of the life cycle is therefore a fundamental human right with ICT illiterate levels being viewed as a denial of that right. Further, ICT is linked to all millennium Development goals (MDGs) and the right to education, adequate ICT information and ICT implementation are fundamental to achieving the MDGs.

COMPARARATIVE STUDIES

- According to ZICTA (2015) evidence of main years has supported that well-managed ICT education programs can at relatively low cost bring about behaviour changes that contribute to improved implementation of ICT. For instance, studies in the United States have documented that carefully designed and implemented ICT education curriculum can resist certain adverse implementation challenges, inclusively education pattern that cause ICT lapses.

ESTABLISHMENT OF THE GAP

- Despite appreciable worldwide improvements in ICT development, ICT literacy and implementation status, we all view with deepest concern the unacceptable fact that millions of people in developing countries still do not have access to ICT to meet their basic daily needs for ICT educational for their day to day activities.
- We are especially distressed by the high prevalence and increasing numbers of Illiterate levels and deficiency of ICT materials at both primary and secondary level of schools in parts of Africa, Asia and Latin America and the Caribbean.
- Moreover, more than 6 500 million people, mostly pupils, are deficient in one or more ICT literacy levels.
- Hundreds of millions of people also do not have access to ICT because of poverty and lack of ICT infrastructure and computers and ICT resources.

  ZICTA(2016) “Thus, efforts are needed to make ICT accessible for everyone, everywhere and at all time through public schools because ICT is vital to all human beings and to societies that they comprise this is done by providing computers to schools in the Ministry of education”. When ICT is strategically employed it improves the quality of life in the targeted rural areas and

reduces the gap in access to information while promoting equality between urban and rural dwellers.

CHAPTER THREE

3.0 METHODOLOGY

Research Design- in order to provide accurate account of the situation of the implementation of ICT in education and find a way of improving it, the study will use a descriptive design. The research will use both quantitative and qualitative approaches to describe the existing situation.

It will be participatory study because it aims at involving the respondents in the process of research. To collect data it will use interviews, observations, questionnaires and group discussions. To obtain information, the researcher will establish good relationships with respondents by working in non directive manner aimed at making respondents feel free to contribute to the discussion.

3.1 CHOICE OF STUDY AREA

The choice of Chipata district did not however make other district less important, but it was just appropriate because of the following factors: Easy transport, availability of communication network facilities, lack of enough funds to go to other towns and accommodation.

3.2 POPULATION OF STUDY

Eastern Province is one of Zambia's ten provinces. The province lies between the Luangwa River and the border with Malawi to the east and Mozambique to the South, from Isoka in the northeast to just north of Luangwa in the south. The provincial capital is Chipata. The province's population was 1,592,661 in the 2010 census - about 12% of Zambia's total population. The population of study is made up of teachers, members of the community, provincial education officer, district board secretary, pupils, and head teachers.

3.3 SAMPLE POPULATION

The sample will consist of fifteen (33) teachers, three(3) from Magazine, three(3) from Gondar, three(3) from Mpezeni School three (3) from Hillside girls, three(3) Chizongwe and 3 from Anoya Boys three(3) Katopola School three(3) from Nadalisika School, three (3) Chongololo Private School, three (3)

Munga School, three (3) Chipata Day Secondary School, 10 members of education administrators and seven(7) pupils . A total of fifty (50) questionnaires were distributed. The sample size was eighty 80 respondents that includes the interviewed, on discussion, questionnaire respondents.

3.4 SAMPLING FRAME

The simple random technique was used to select head teachers, teachers and pupils. The quota sampling technique was further used to select pupils in order to accord both the male and female pupils equal opportunities to participate in the study. Furthermore, the purposive sampling technique was used to select the DEBS, the DESO, and the lecturer because they are holders of valuable data that was required for the study.

3.5 INSTRUMENTS FOR COLLECTING DATA

The principal instruments for data collection was self administered questionnaires using open ended and closed questions, group interviews and group discussion.

3.6 Procedure for data collection

(a) Questionnaires

In the study, the researcher prepared twenty (50) questionnaires for respondents which were distributed as follows:

Ten (10) questionnaires for head teachers of the schools that were sampled, twenty three (23) questionnaires were completed by teachers, five(7) questionnaires were completed by pupils, three (10) questionnaires were completed by the District Education Board staff; one (1) questionnaire was completed by the DEBS and one (9) by the ESOs and SESOs.

(b) Interviews

The researcher conducted interviews with teachers and pupils in some of the sampled schools where questionnaires were distributed. The total number of respondents interviewed was ten (10); that comprised five (5) teachers and five (5) pupils all of them were randomly selected to participate in the study

3.6.1 UNSTRUCTURED INTERVIEWS

The Unstructured interviews with some 10 education officials were used in order to obtain supplementary information. The responses was collected, arranged, analyzed and filtered so that only useful responses useful to the test of hypothesis will be used.

3.6 .2 OBSERVATIONS

This was done by observing teachers conducting their lessons and sees how many pupils in each class. Teachers and learners were told in advance that an observer was to come to observe the lesson. At the end a review was done by looking at the way the lessons are conducted and how preparations are done. Any challenges observed was told to the teacher involved and suggestions on how to solve the problem was relayed to the Head teacher in-charge.

3.6.7 GROUP DISCUSSION

Group discussions were held with 10 learners to find out from them how they felt about how ICT is implemented in Chipata District. Their responses enriched the data base to be used to write a good dissertation.

3.6.8 DATA ANALYSIS

The researcher analysed data both quantitatively and qualitatively. The statistical package (STATA) was used to analyse the quantitative data that was collected for the study. Furthermore, quantitative data that was collected was systematically entered on Microsoft excel sheet, coded and later interpreted into tables and graphs. The qualitative data that was collected was analysed theoretically under their respective emerging themes and sub themes. Data was also interpreted using descriptive statistics in form of frequencies and percentages.

3.6.9 Triangulation

The researcher cross checked and validated data obtained using the different forms of data collection instruments which included data obtained using the questionnaire to that which was obtained through the interview schedules and from the focus group discussion in order to understand phenomena better (ibid, p. 167). Triangulation helped to test the reliability of the results obtained by considering issues not

only from one perspective rather by employing a wider choice of techniques to obtain the desired results. For instance, both qualitative and quantitative methods were used.

3.8 Theoretical frame work: Procter, M. (1993), "A theoretical framework is a collection of interrelated concepts, like a theory but not necessarily so well worked-out". A theoretical framework guides your research, determining what things you will measure, and what statistical relationships you will look for. Theoretical frameworks are obviously critical in deductive, theory-testing sorts of. In those kinds of studies, the theoretical framework must be very specific and well-thought out. There is a gap between the urban and the rural schools that existed when time came to implement ICT. The gap theory used in the study suggested that the rural schools would fail to implement ICT to children but the urban schools would do that without any problem. This could lead to underdevelopment and dependence syndrome in the country by the rural schools. In this research we are going to measure the challenges that affect the implementation of ICT in primary and secondary schools. We are also going to measure ICT literacy levels, impact of ICT on education standards among girls and boys. This will be purely qualitative research based on quantitative research that gives us figures of the responses.

According to the implementation theory of Lee, (2004) any project should go into phases for it to successful. Before implementation there is need to have all the resources available needed to implement it for example, human resource and equipment together with training materials like books, computers, overhead projectors should be available before the implementation stage.

3.9 Ethical consideration

To make collection of data easier as per obligation in research, consent to carry out this study was sought from pertinent authorities at the Information and Communication University Zambia, the District Education Board Secretary's Office and the Head teachers' of respective Primary Schools. All data collected during this study was used exclusively for the intention of the study, and was kept strictly as a secret. Approval was sought from respondents and no informant was forced to participate in the study. Moreover, names of the respondents and institutions were not disclosed in any way. Furthermore, the researcher fully explained to the subjects in advance and "de-briefed" them afterwards.

CHAPTER FOUR

PRESENTATION OF THE FINDINGS

4.0 Introduction

The previous chapter presented the methodology that was used in the study. This chapter presents the background characteristics of the respondents and further presents the findings of the study on 'the impact of ICT implementation on the pupils' academic performance in selected schools in Chipata District' addressing the factors affecting implementation of ICT and; the effect of ICT on pupils' academic performance and the measures to be undertaken to improve the implementation of ICT.

Respondents' background characteristics

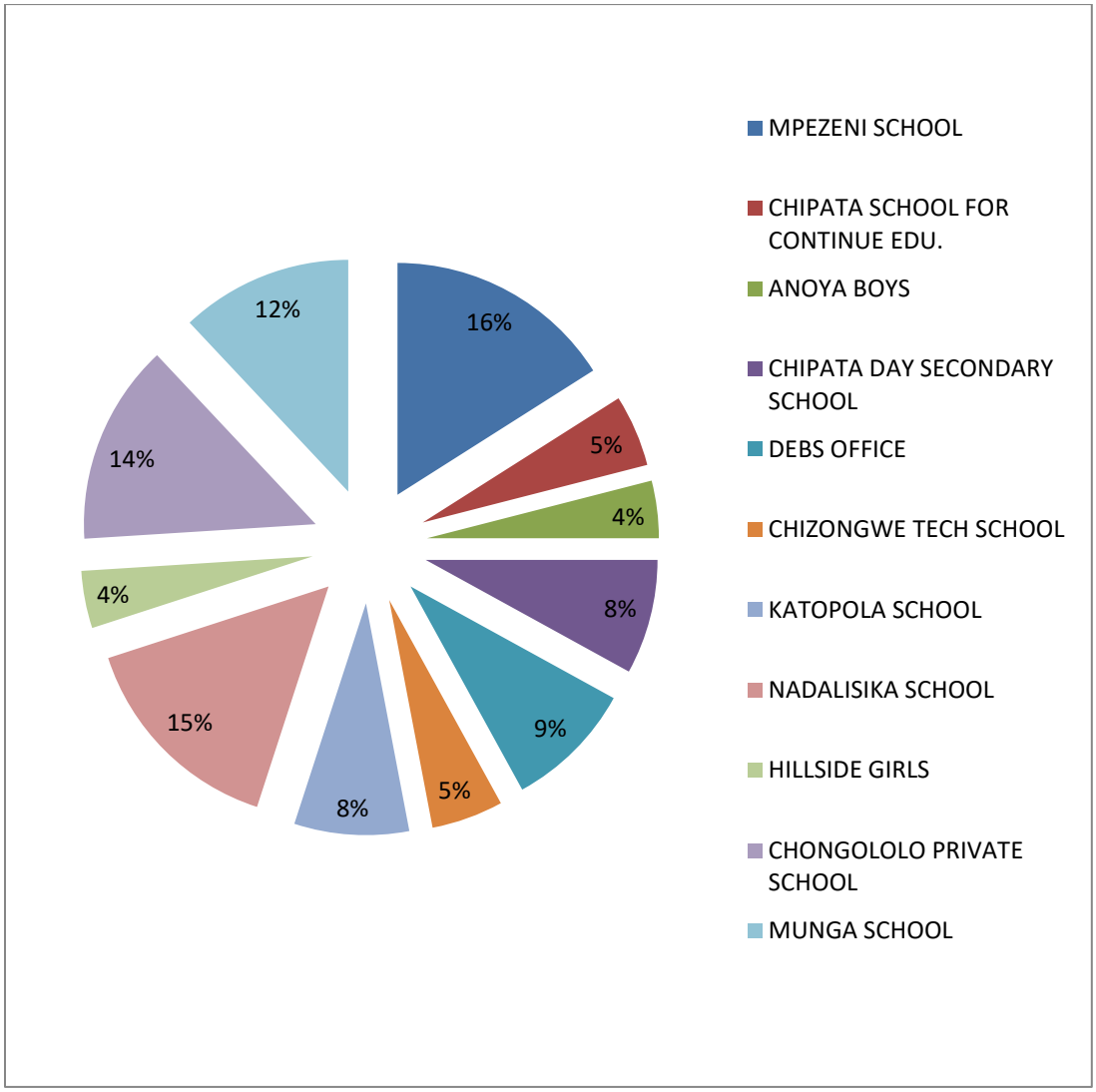
Table 4.1.1 Distribution of respondents by institution

MPEZENI SCHOOL	16%
CHIPATA SCHOOL FOR CONTINUE EDU.	5%
ANOYA BOYS	4%
CHIPATA DAY SECONDARY SCHOOL	8%
DEBS OFFICE	9%
CHIZONGWE TECH SCHOOL	5%
KATOPOLA SCHOOL	8%
NADALISIKA SCHOOL	15%
HILLSIDE GIRLS	4%
CHONGOLOLO PRIVATE SCHOOL	14%
MUNGA SCHOOL	12%
TOTAL	100%

Table 4.1.1 above shows the institutions where the respondents were drawn. It shows that sixteen percent of the respondents (16%) were from MPEZENI SCHOOL, five percent (5%) were from CHIPATA SCHOOL FOR CONTINUE EDU. and another four percent (4%) from ANOYA BOYS DAY SECONDARY SCHOOLS. The table further shows that eight percent of the respondents (8%) were from KATOPOLA SCHOOL, nine percent (9%) were from the DEBS' office, five percent (5%) from CHIZONGWE eight percent (8%) from CHIPATA DAY, while fifteen percent (15%) came from

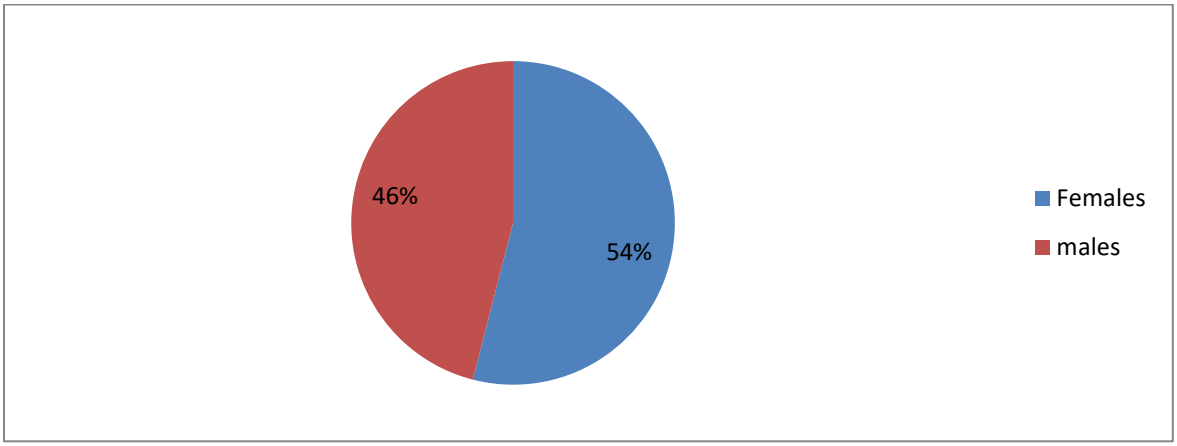
NADALISIKA SCHOOL, HILLSIDE GIRLS four percent (4%), CHONGOLOLO PRIVATE SCHOOL fourteen percent (14%) and twelve percent (12%) came from MUNGA SCHOOL.

Figure 4.1.1 is a graphical presentation of the respondents by institution.



Field work 2016

Table 4.1.2 Distribution of respondents by sex



Source: Field work 2016

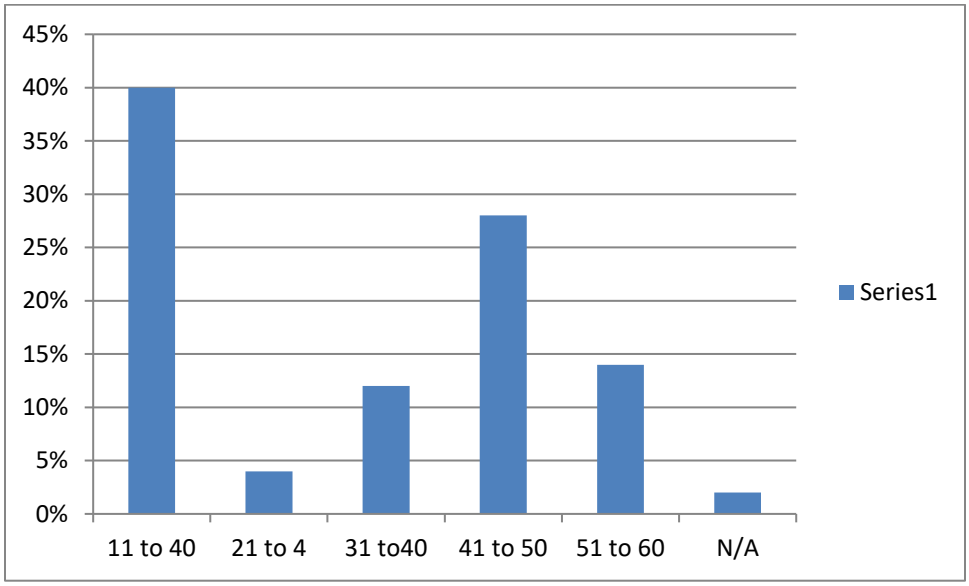
Following the table above, it is clear that out of the total number of fifty (50) respondents 27 (54%) were female while 23 (46%) were male. Therefore, there were more female participants than male although the sampling was generally random for most of the participants except for the administrators who were selected purposively as a result of the positions they held. Perhaps the reason for having more female respondents could be that there were more female teachers in Chipata district than male teachers being an urban district.

RESPONDENTS AGE DISTRIBUTION ANALYSIS

AGE RANGE	PERCENT (%)
11 TO 20	40%
21 TO 30	4%
31 TO 40	12%
41 TO 50	28%
51 TO 60	14%
N/A	2%
TOTAL	100%

Following the analysis of the respondents' ages, the study revealed the ages were between 11 and 60 years and broken down as follows; Participants who were between 11 and 20 years represented forty percent (40%) of the total sample size. Those who were between 21 and 30 years represented four percent (4%) which had probably the least participants. Respondents who were between 31 and 40 years represented twelve percent (12%), while twenty eight percent (28%) were between 41 and 50 years and another fourteen percent (14%) were between 51 and 60 years old. Furthermore, two percent (2%) of the respondents did not declare their ages hence displayed as N/A on the table. Forty percent of the respondents were in the lowest age range showing that most of the pupils were between 11 and 20 years old.

FIGURE 4.1.3: THE DISTRIBUTION OF RESPONDENTS AGE RANGES



Source: Field work, 2016

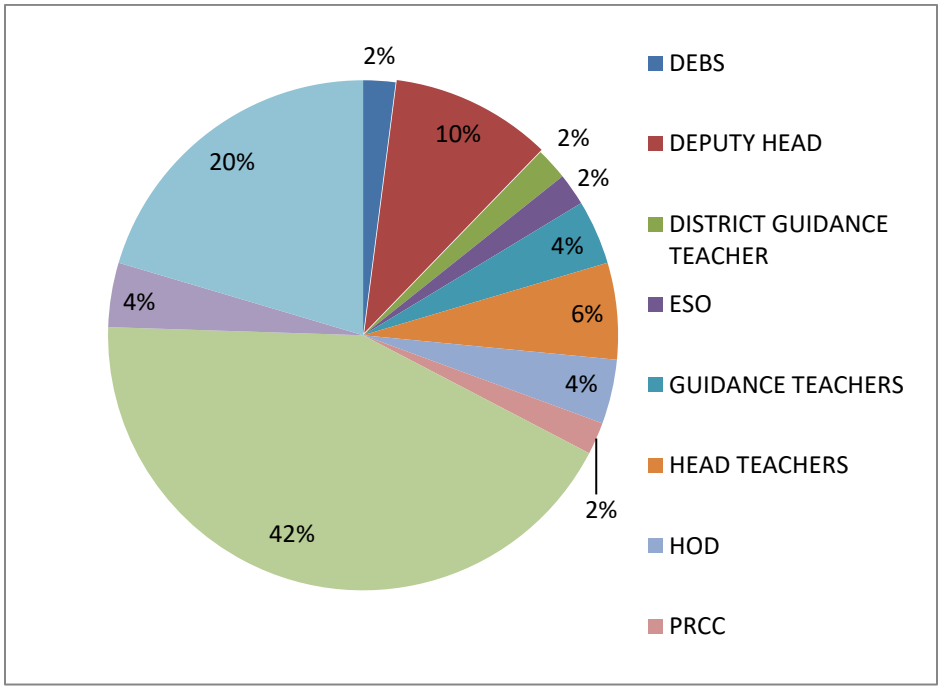
Table 4.1.4 positions held by respondents in institutions

POSITION	PERCENT (%)
DEBS	2%
DEPUTY HEAD TEACHER	10%
DISTRICT GUIDANCE TEACHER	2%
ESO	2%
GUIDANCE TEACHERS	4%
HEAD TEACHER	6%
HOD	4%
PRCC	2%
PUPIL	42%
SECTION HEAD	2%
SENIOR TEACHER	4%
SUBJECT TEACHER	20%

TOTAL	100%

Table 4.1.4 above shows the positions held by respondents. Out of the total one hundred percent, the highest percentage of respondents comprised the pupils who represented forty two percent followed by subject teachers whose total was twenty percent. Furthermore, deputy head teachers totaled ten percent, head teachers, six percent, guidance teachers, HODs and senior teachers totaled four percent each while the rest of the respondents who included the DEBS, ESO, District Guidance coordinator , PRCC and section head represented two percent each. Despite the percent of pupil respondents being high, the number of respondents holding administrative positions which included head teachers, deputy head teachers, HODs, senior teachers, the DEBS, ESO and the District Guidance coordinator was equally which meant that the respondents had wide experience in teaching, conducting and managing examinations.

FIGURE 4.1.4 DISPLAYS THE POSITIONS HELD BY RESPONDENTS



Source: Field work, 2016

Table 4.1.5 Respondents' ICT levels of implementation in Chipata District

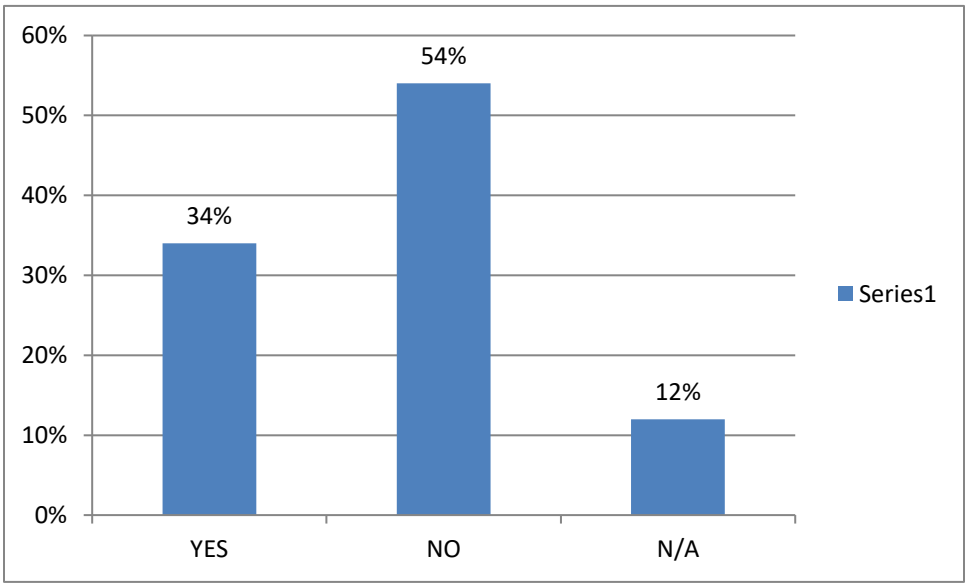
LEVEL OF ICT IMPLEMENTATION	RESPONSE PERCENT (%)
VERY HIGH	2%
HIGH	56%
LOW	24%
QUITE LOW	4%
N/A	14%
TOTAL	100%

Following the results of the study tabulated in figure 4.1.5, two percent of the respondents said that ICT implementation levels were very high, fifty six percent of the respondents said ICT implementation levels were high, twenty four percent further said they were low while four percent declared ICT implementation levels were quite low and fourteen percent of the respondents did not say anything concerning the ICT implementation levels in Chipata District. Despite fourteen percent of the respondents did not express their views whether ICT implementation levels were high or not, the table shows clearly that ICT implementation levels were still a problem in our country' implementation system because, no matter what the respondents could have said whether very high, high, low or quite low, it was evident that the problem of ICT implementation was far from being over. This was evidenced by few or no computers found in some schools. In addition some schools do not even have a teacher and electricity to say the least.

The study further analyzed what the respondents said about the impact of inadequate teaching materials in ICT. At least thirty four percent of the respondents denied the fact that inadequate teaching and learning materials had any influence on pupils' academic performance. Although twelve percent of the respondents did not give their views on the matter, the majority of the respondents comprising fifty four percent of the total number of participants said that the

inadequate teaching and learning materials did not have any influence on the pupils' academic performance.

4.1.6 Respondents declaration of the Impact of ICT on Pupils academic performance



Source: Field work, 2016

One pupil at the named school lamented and said: "my ICT results have been below 40% since 1914. I have failed 3times now"

34% of the respondents agreed that implementation of ICT has a negative effect on pupils performance will 54% refused that it affects the performance of pupils. But 12% of the respondents were not sure.

Table 4.2.2 Respondents' views on the pupils' attitude toward ICT implementation

PUPILS' ATTITUDE	PERCENT (%)
NEGATIVE	6%
POSITIVE	80%
N/A	14%
TOTAL	100%

Table 4.3.1 shows the perceived challenges of ICT on Pupils' academic performance in Chipata.

CHALLENGES
Lack of training materials
Lack of ICT teachers
Over enrolment
Low numbers of computers
Lack of ICT infrastructure
Lack of electricity
Poor funding for implementation of ICT

Source: Field work, 2016

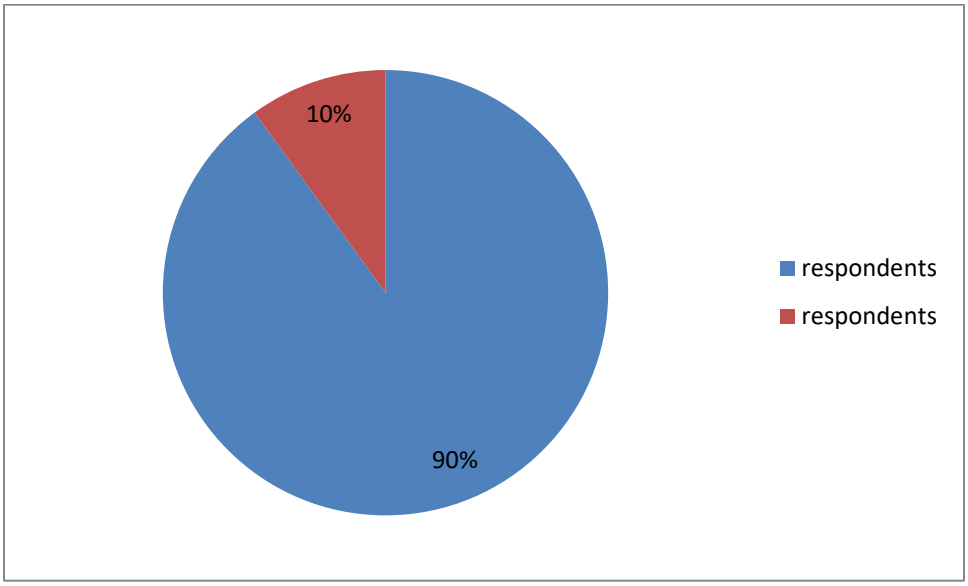
From the questionnaires issued to pupils it was discovered that 90% of schools in chipata do not have computers, ICT teachers, ICT books and computer infrastructure in general.

75% of the questionnaires given to school officers reviewed that the pupil –teacher computer ratio is 1 to 18. 25% of school officers said that the pupil –teacher computer ratio is 1 to 5.

The head teacher at Walela School reviewed that because of few computers at school they took two days to write ICT exams and this was the same scenario in many schools in Chipata urban and rural areas.

The interview with the DEBS reviewed that the ICT results were very bad and attributed this to lack of training materials, ICT teachers and computers in schools. He suggested that this year the schools should make a deliberate policy of buying at least 10 computers every month from the government grant given. He also reviewed that the government is doing everything to recruit many ICT teachers this year to improve the results this year 2016. But the challenge is that not many colleges have trained teachers in ICT courses. It is for this reason that the PEO eastern province has recruited Lecturers in ICT to help beef up the numbers of ICT teachers in eastern province.

Impact of infrastructure and computer resources on implementation of ICT in Chipata district



90% of the respondents said that lack of computers and ICT influstructures negatively affect the ICT implementation. One pupil at Katopola said: *"we have 3 computers but no laboratory in school to learn effectively. In class we are 45 and we have 3 classes".*

FACTORS TO CONSIDER IN EFFECTIVELY IMPLEMENTING ICT IN CHIPATA DISTRICT

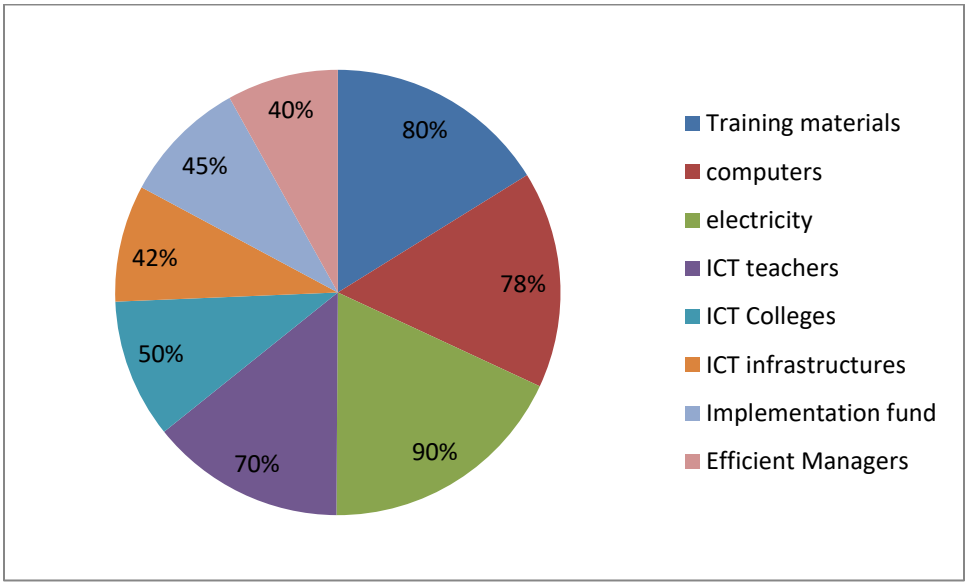
Factors	No	%
Training materials	40	80%
Computers and other accessories	39	78%
Availability of electricity	45	90%
Availability of ICT teachers	35	70%
Availability of ICT colleges	25	50%
Availability of ICT infrastructure	21	42%
Availability of ICT implementation fund	23	45%
Availability of effective and efficient managers of the ICT implementation process	20	40%

Source: field work 2016

The table above reviews the responses from teachers and pupils on the factors to consider to effectively implementing ICT in Chipata district. 50% of the respondents said that ICT colleges

are not enough, 90% said that electricity is another factor that need to be looked at to effectively implement ICT in Chipata, while 78% said that computer and other accessories should be considered before you implement ICT. 70% said that availability of teachers is another very important factor to consider before implementing ICT in Chipata. Other factors are self explanatory on the table above

Chart showing Factors that would lead to successful implementation of ICT



IMPACT OF ICT IMPLEMENTATION ON TEACHERS AND PUPILS

Access to information has been made easy	75%
Learning of other subjects has become easy	65%
Teachers role is now to facilitate not teaching as it were	80%
Teaching has become easy	76%
Training materials are readily available on the internet to download	45%
Teaching can be done through e-learning	45%
Enrolment has increased	25%

The table above shows that access to information through ICT has been made easy. This can be done through the internet where pupils easily research information on the internet. For instance when a teacher gives learners home work they can google it and easily find the answers.

Learning of other subjects has become easy 25% of the teachers say ICT has helped in increasing Enrolment in schools, 76% of the teachers interviewed say teaching has become easy, 45% of

pupils and teachers interviewed say that training materials have become readily available on the internet to download, 45% of teachers also say teaching can now be done through the internet using e-learning techniques, 80% of the teacher reviewed that the role of a teacher now is as facilitator not a teacher as it were.

Teaching can be done through e-learning. 80% of the teachers say accessibility to materials has become easy so learners not need notes but are told to download data on different websites given to them by the teacher in charge. Lastly 65% of teachers and learners reviewed that learning and teaching other subjects has also been simplified by ICT subject.

FACTORS TO CONSIDER IN EFFECTIVELY IMPLEMENTING ICT IN CHIPATA DISTRICT

Training materials	80%
Computers and other accessories	78%
Availability of electricity	90%
Availability of ICT teachers	70%
Availability of ICT colleges	50%
Availability of ICT infrastructure	42%
Availability of ICT implementation fund	45%
Availability of effective and efficient managers of the ICT implementation process	40%

Source: field work 2016

The table above reviews the responses from teachers and pupils on the factors to consider to effectively implementing ICT in Chipata district. 50% of the respondents said that ICT colleges are not enough, 90% said that electricity is another factor that need to be looked at to effectively implement ICT in Chipata, while 78% said that computer and other accessories should be considered before you implement ICT. 70% said that availability of teachers is another very important factor to consider before implementing ICT in Chipata. Other factors are self explanatory on the table above.

4.5 Summary of Findings

The study investigated the challenges faced by the government in implementing ICT in selected secondary schools in Chipata district. The findings showed that challenges were influenced by the government's attitude toward Implementation of ICT. For instance schools were not well funded, the government was in a hurry, there are few ICT trained teachers, schools do not have computers, training materials, equipment, Laboratories, pupils were not adequately prepared for coming new subject so even them are also making it difficult to implement ICT in schools. Therefore, this had a negative impact on both the school teachers and the pupils taking the exams. The study further revealed the impact of this quick move by the government to implement ICT in Zambia that many schools did not manage to write this examination as scheduled making the Minister of Education to nullify ICT examination in rural areas. These effects had a negative impact on the socio-economic development of the nation and lowered the nation' academic integrity.

Respondents thus suggested some measures could help the nation to overcome these challenges as follows: electrifying all rural schools, provide computers, training materials, trained ICT teachers, build many ICT universities, take teachers for ICT refresher courses, do a phased implementation method, carry out a research before implanting ICT in schools, provide good funding to schools to implement ICT easily.

From an analysis and review of the research data and additional data gathered through the respondents and informants, a number of issues became apparent.

The first objective of the study was to establish how infrastructural facilities influence the implementation of Information Communication Technology projects in public secondary schools in Chipata District, Zambia. Data analysis, interpretation of interview responses and questionnaire responses from the respondents of the study revealed that infrastructure plays a major role in implementing ICT projects in schools. In the study for example, a greater percentage of above 78% of the schools were lacking formal and well equipped computer laboratories. Others had turned their classrooms into make shift computer laboratories. Only 22% of the schools had more than 20 computers. With the increasing number of students in schools, a number less than 20 computers is much low than the standard agreed ICT education. Only 10% of the population indicated that in their schools there was fully power supply from electricity and

back-up generator while 5% of the schools still have no source of power. Frequent power black outs rated high as part of the challenges that were facing most schools in ICT projects implementation. Therefore, infrastructural development has to be taken into account when implementing ICT projects in schools because they are closely tied.

On the objective that sought to establish factors that would lead to successful implementation of ICT policy in Chipata district in Zambia. The respondents had the view that most administrators in secondary schools in Chipata District don't support the implementation of ICT projects fully. This was with 65% of the respondents, while 5% were not sure and 30% agreed that school administration supports ICT. 50% of the respondents said that ICT colleges are not enough, 90% said that electricity is another factor that need to be looked at to effectively implement ICT in Chipata, while 78% said that computer and other accessories should be considered before you implement ICT. 70% said that availability of teachers is another very important factor to consider before implementing ICT in Chipata.

The third objective was to assess the impact of ICT education implementation on pupils' performance in Chipata district. The study found out that 34% of the respondents agreed that implementation of ICT has a negative effect on pupils performance will 54% refused that it affected the performance of pupils. But 12% of the respondents were not sure. This was true based on the examination analysis which showed an increase in pass rate if we are to compare with 2014 results and 2015.

On the final objective that sought to identify challenges of ICT education implementation policy in Chipata District in Zambia. It was found that the major funding for ICT projects in schools came from the government. This was supported by 54% of the respondents, while 46% of the respondents went for the NGOs. Stake holders like the NGOs, Government and Donors are not fully participating in implementing ICT projects by providing computers, finances and building computer laboratories just like it is done in other places, accessibility of the computers by students and teachers in most schools was limited to once a week or twice a month and this has been a factor that has led to poor ICT implementation in schools. The other challenges were lack of training materials, lack of ICT teachers, Low number of computers, Lack of electricity.These factors have dragged ICT projects implementation in public secondary schools in the Country.

CHAPTER 5

DISCUSSION OF FINDINGS

INTRODUCTION

This chapter presents the discussion and interpretation of the findings of the study starting with the challenges that affected implementation of ICT in selected secondary schools in Chipata, impact of ICT implementation on teachers and pupil's performance, factors to consider in effectively implementing ICT in Chipata district, and measures to solve these challenges of implementing ICT in Chipata.

4.3.1 Lack of training materials

The majority of the respondents said Lack of training materials was common among schools which make it very difficult for them to help in the implementation of ICT in Chipata. For any school to implement ICT easily they need ICT training materials without which it is practically impossible to implement ICT in schools. Therefore, many respondents said that Lack of training materials had a negative effect on pupils' academic performance and was a recipe for failure in ICT subject. Some respondents further said, 'last year many pupils fail in ICT subject because of lack of books in ICT and that they did not learn it but they were examined; ' For instance, one respondent said from Katopola,

> *"The performance of some of the pupils ICT was very low because we do not have books, computers, and teachers to teach us, we also don't have a computer Laboratory".*

4.3.2 Lack of ICT teachers

Respondents further said they do not have ICT teachers at their school. They did not learn anything on ICT the whole year apart from a few tips from the head teacher who had a laptop and was taught ICT as a course during his degree studies. For pupils to do better in ICT there is need for trained teachers, books, computers and other things like computer laboratory. It was observed some of the learners were very keen to study ICT and did tuitions in town internet cafes and managed to pass ICT examinations.

Furthermore, one respondent said;

"the government was in a harry to implement ICT in schools but they don't have infrastructure and teachers and training materials."

Perhaps the assertion could also contribute to the pupils' loss of concentration or focus.

4.3.3 Poor academic performance

This was another consequence of trying to implement ICT when not read was poor academic performance which respondents talked about. For instance, some respondents said pupils who were known to be generally good in class failed ICT examinations because they lacked self confidence and were swayed by the fact that they were not taught which distracted their attention. Moreover, during the examination period, it was observed most pupils spent much of their valuable time looking for ICT past paper instead of reading and preparing for the examinations

Furthermore, poor performance during ICT examinations left the teachers not only amazed but also disappointed because pupils who normally performed well in class were the ones who obtained the lowest grades.

One teacher said:

"*If it were possible can the government use a deliberate principle to take on all Business Studies teachers back to school to do ICT studies so that the implementations can be enhanced and be achieved otherwise these will be mere rhetoric's from politicians but implementation will never be achieved and our learners will keep on failing ICT subject".*

4.3.4 Over enrolment

The study further revealed that Over enrolment is another challenge faced by the government to implement ICT subject which is a practical subject. The schools are highly over enrolled such that teaching is a very big problem. The classes are just unmanageable for ICT subject.

Thus one respondent said;

"a class needs at least 25 pupils to learn ICT if results are to be better, unlike the status quo we have 65 pupils in class to be taught ICT on 7 computers"

While another respondent said,

> *"The furniture is not available for learners and what they do is stand whilst typing this makes them get tired easily and not concentrate, in addition there is always scramble for computers."*

4.3.5 Low numbers of computers

The respondents also observed that Low numbers of computers in schools has contributed to poor implementation of ICT in Chipata District. Some schools do not have computers and books in ICT while others have less than the acceptable number of computers to teach effectively.

4.3.6 Lack of ICT infrastructure

Most of schools do not have ICT infrastructure like computer laboratory making it very difficult to implement ICT in Chipata district. The first thing to do to have a good ICT implementation is to build go infrastructure to facilitate successful ICT implementation. Therefore, every province, district and institutions had to come up with strategic plans of how they were going to solve the problem of infrastructure to help the government implement ICT successfully.

4.3.7 Lack of electricity: many schools in rural areas are mostly disadvantaged because of the remoteness of their areas where ZESCO cannot reach with electricity. This is one problem that needs to be solved first if ICT implementation is to be easily implemented. Many schools have may be 3 or 6 computers but they do not have electricity. So this makes it practically impossible for them to help implement ICT in their school. Some head teachers have used initiative by buying solar power generators which are doing very fine but this is a sacrifice as schools are not well funded in rural areas. According to ZICTA 2015 report "Zambia is relatively less electrified by global standards with only 33.1 percent of the households in the country connected to the national grid". This has important adverse ramifications on ICT access and usage by individuals and households, schools who must rely on electricity to operate any ICT device.

4.3.8 Poor funding for implementation of ICT: Some of the participants in the study proposed that the funding of ICT implementation was cardinal in the implementation of ICT. Therefore,

the government of Zambia must aim at increasing the funding to implement ICT. Some respondents said the government of Zambia knows very well that funding is very poor to this effect but why they cannot do the right thing by doing first things first is what is not known. Furthermore, respondents suggested those in planning for the implementation should be scrutinized to see if they are competent if not they be replaced by competent ones.

One respondent thus said:

"The government must first provide funding, infrastructure, equipment and trained personnel before starting this mammoth task of implementing ICT in Zambia."

It is clear that if the government would do its homework in this area this problem of implementation will be history.

MEARSURES TO SOLVE THESE CHALLENGES OF IMPLEMEENTING ICT IN CHIPATA

The respondents were aware of the measures the government has put in place to curb the challenges in the implementation process such as provide funding, infrastructure, equipment and trained personnel. However, some respondents thought much more needs to be done. For instance, the implementation should be in phases, the implementation should first be piloted in rural areas and in urban areas then implement it all over the country. The idea is good but the method of implementation has failed the government they needed to conduct a thorough research before implementing it. It failed last year it will also fail this year because no practical measures have been implemented so far to help solve the challenges faced by the government in implementing ICT in schools. One teacher who did not what to be named said:

"Last year we had 3 computers and wrote ICT exams for four days but no one past the examination in ICT, even this year the status quo is the same so the results can be predicted. This has made learners to abscond ICT lessons because even teachers teaching it are not trained".

4.4.4 BUILDING ICT UNIVERSITIES

Furthermore, respondents proposed government should build a number of universities training teachers in ICT and introduce ICT major in already built universities while taking teachers for fresher courses in ICT as a short term measure because the disaster we faced last year in ICT

national wide was a shame to teaching fraternity where an examination was conducted for 3 to 4 days in notable schools even in Lusaka capital city of Zambia.

4.4.5 Build laboratory facilities in rural and urban areas

Many schools in Chipata do not have computer labs making it difficult to teach computer effectively. Some computer Labs that are there cannot be accepted as Laboratories because they don't meet the standards. For example one computer lab we visited had no air conditioner, no computer chairs, no printer, no scanner, no overhead projector, computer were not networked, to mention just a few. Dust was all over, the computers were not covered, no UPS, food was prepared at one Conner in the room making computers get damaged every day

IMPACT OF ICT ON TEACHERS AND PUPILS PERFORMANCE

The respondents reviewed that ICT has made teachers and pupils performance to go up. They said teaching has now become easy as learners have enough information already. When learners are given syllabus they go ahead research on their own and are always ahead of the teacher. The teaching methodology currently is pupil centered not teacher centered as it were previously. Learners made study groups where they share information both electronically using whatsapp and facebook. I C T helped learners in almost all courses as they download data on any question on the internet. In addition there a lot of tutorials on YouTube on all subjects. This made learning simple and easy whereby learners can even learn from home without being in contact with teachers.

5.0 CONCLUSION

- The implementation of ICT in schools has been affected negatively due to lack of ICT teachers, computers, ICT books, and prior preparation by the government. It is clear that a research was not conducted before ICT was introduced in schools. It is also clear that the government was in a hurry during the implementation of ICT in schools in Zambia.
- The performance of ICT was negatively impacted by ICT implementation which was rushed.

- It would have been successfully implemented if parallel method of implementation was used. This is where both systems are used side by side until the new system of education is successful that is when they can drop the old system.
- In addition it is concluded that lack of infrastructure and computer resources have a negative impact on implementation of ICT in secondary schools.

5.0 RECOMMENDATIONS

- The government should employ many ICT teachers to cope with this increase in enrolments.
- The government should increase the funding in ICT to primary and secondary schools to meet their needs.
- The schools should be encouraged to buy a lot of ICT training materials for the institutions to effectively implement ICT in schools.
- The schools should furnish the computer labs with computer programs and equipment regularly to cope with the changes in technology.
- The government should upgrade the labs regularly to meet the education standards.
- The research on the number of schools, ICT teachers, training materials, computers in schools should be conducted before implementing ICT.
- ZICTA should intensify its program to rural schools with computers.
- The government should connect all rural schools to the national grid(ZESCO)

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