

CHAPTER FIVE

Introduction of computer education in the curriculum of Zambian primary and secondary schools: benefits and challenges

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Abstract

The important role of ICTs in improving learning and teaching in the education sector has been widely recognised. Governments worldwide are prioritising the training of their citizens in ICTs. Consequently, the Government of the Republic of Zambia through the Ministry of General Education introduced the Computer Studies in schools, starting from Grade Eight and ending at Twelve. However, there has been limited understanding on the benefits of introducing this subject to both teachers and learners and challenges faced to teach the subject in Zambian schools. The purpose of this study was to establish the benefits and challenges in the teaching and learning of Computer Studies in Mwandi District, Western Province of Zambia. The study employed a qualitative approach where 16 schools participated in the study. Thirty-two purposively selected respondents, two from each school, participated in the study. Face-to-face interviews and non-participant observations were methods used to collect data. Data was analysed thematically. The findings revealed that there is insufficient ICT infrastructure in schools. Teachers with a bit of knowledge of computers or interest in ICTs are used to teach Computer Studies. The main benefits of having computer knowledge included improved information environment, work performance, communication and employment prospects; innovation and creativity; lifelong learning and greater self-sufficiency. Inadequate ICT facilities/equipment, lack of time to adequately teach computer studies, large teacher/pupil ratio, unreliable or inadequate power supply, lack of trained teachers in ICTs, lack of technical support to maintain and upgrade computing equipment, limited financial resources and lack of Internet connectivity were the main challenges faced towards effective teaching of the subject in schools. The study recommends for trained expertise, increased funding, and acquisition of ICTs equipment and materials in order to teach ICTs effectively.

Key words: ICTs, Computer Studies, Education Curriculum, Zambia, Training, Teachers, Learners

Introduction

Information and Communication Technologies (ICTs) and computers in particular have permeated all spheres of human endeavours. The ability to use computers and technology efficiently in today's globalised world cannot be over-emphasised. The demand for computer literacy is increasing worldwide because employers realise that computers and other ICT facilities do enhance efficiency. More than 95 per cent of jobs worldwide have a digital component and for one to make a meaningful contribution at any level of development and to realise one's full potential, there is need to be ICT literate (Mwambazi, 2016). Almost all organisations have become ever more dependent on computers to run their firms efficiently and cost-effectively. LaPlant (n.d.) affirms this by stating that computers are just as common as pen and paper for writing and for many applications - especially communicating - computers are preferred over pen and paper because of their ability to duplicate and retain information as well as ease of editing. In order to

compete in the global competitive economic environment, a highly skilled and educated workforce with aptitude and skill in the application of Information and Communication Technology (ICT) is essential (Mndzebele, 2013).

Computer literacy is the ability to use computers and related technology efficiently, with a range of skills covering levels from elementary use to programming and advanced problem solving. It also involves some understanding of computer programming and how computers work. In other words, computer literacy is the human competency to use one's own knowledge, skills and abilities from the close sphere of the hardware and software computer equipment, as well as from the wider sphere of ICT, for the collection, storage, processing, verification, evaluation, selection, distribution and presentation of information in a required form and quality to achieve their relevancy to a specified destination (Kvasnica & Hrmo, 2010).

Within the education context, it has become increasingly crucial for teachers and learners to acquire computer skills. Students are required to possess basic computer skills that equip them with the knowledge to operate a computer, such as sending emails, conducting Internet research, creating word-processed documents and creating presentations. These basic computer skills help students excel in college and eventually carry over with them into the workforce. Exercising and advancing computer literacy skills can also lead to greater opportunities (Richards, 2017). Mengo (2017) posits that the use of Information Communication and Technology (ICT) in schools has potential to give learners a head start to their future. By learning how to use the Internet to do effective research, learners are a step ahead in the heavily competitive global economy. For this reason, being conversant with ICTs in the 21st century is seen as a basic skill needed not just for personal development, but also for the benefit of the nation and global economy.

Further, Norton (2011) advanced that whether you plan a career in automotive mechanics, nursing, journalism or archeology, having computer skills will make you more marketable to prospective employers. He further explained that a computer can allow an individual to perform many diverse tasks. For instance, one can design a building, publish a newsletter, track an investment, budget and manage payrolls with a computer. Computers have re-shaped our lives at home, work or school. The vast majority of businesses now use computerised equipment in some way, and most firms are networked both internally and externally. According to Norton (2011), workers who once had little use for technology now interact with computers almost every minute of the workday.

Norton's observation is supported by ComputerCourseGuide.com (2017). ComputerCourseGuide.com posits that today, almost all office jobs require the use of a computer in some function or another. Being able to create digital spreadsheets, create documents using a word processor, operate basic filing software, and present information using presentation software are becoming requirements in office environments. Even if they are not officially required, employees are expected to know how to use them, and applicants who are already familiar with these programs are more likely to get the job than people without that experience. Knowing how to use the Internet to send messages, and use search engines to find information of use to a business is usually required as well (ComputerCourseGuide.com, 2017).

Emphasising the significance of computer skills, Gray (2017) also argued that poor skills inhibit people from gaining access to well and more paid employment. Lack of essential skills in individuals hinder the introduction of productivity-enhancing technologies and improved methods of operation. This in turn make it difficult for people to enhance their living standards. There is need to produce a labor force with digital skills.

Innovation is often characterised by research and development. Computers and Internet provide individuals with an environment that nurtures research and development, which results in new goods, new processes and new knowledge, and hence is a major source of innovation. Individuals can also tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new knowledge. It is very easy to start a job today (while at home) with a computer. Many varieties of gadgets are designed to suit human needs. E-learning, I-pads, E-mail, software, texting and messaging, Global Positioning Systems (GPS), e-commerce, digital cameras, cell phones, smart phones, social media, YouTube, iPod and iTunes, Wi-Fi, google search, and so on are some of the innovations resulting from computer technology. People with basic computer knowledge can store and catalog photographs and music, watch movies, play games, create art, interact with friends, manage their personal finances, and perform many other essential and inessential tasks using their home computer.

It is against this background that governments the world over have prioritised training of their citizens in ICTs. Similarly, the government of the Republic of Zambia through the Ministry of General Education in 2012 introduced a Computer Studies Syllabus in schools, starting from Grade Eight ending at Grade Twelve, and schools began to implement this subject in 2013. The introduction of computer studies in Zambian schools seems a step in the right direction because learners can acquire skills that will respond to the country's needs to reduce poverty. The syllabus is aimed at enabling students to acquire transferable skills and techniques, including logical thinking, creative design, synthesis, and evaluation. Additionally, students are expected to acquire generically useful skills in such areas as communication, time management, organisation, and teamwork. The subject is further aimed at providing students with the knowledge and skills to understand the underpinnings of current computer technology and prepare them for emerging technologies. Learners are to be introduced to exciting opportunities afforded by this dynamic field and this will prepare them for a range of rewarding careers. The decision to introduce computer studies was in line with the national ICT Policy whose vision is 'a Zambia transformed into an information and knowledge-based society and economy supported by consistent development of, and pervasive access to ICTs by all citizens by 2030' (National Information and Communication Technology Policy, 2006: 19).

The introduction of computer studies in schools can help Zambia attain quality education that is inclusive, in line with Sustainable Development Goal (SDG) number four. SDG number four talks about ensuring inclusive and quality education for all and promoting lifelong learning. Befekadu (2006) postulates that ICTs will improve the quality of information sharing between various stakeholders and at the same time minimise the poor learning conditions prevalent in some locations. Additionally, they would serve as tool to bridge the achievement gap between urban and rural public schools by enhancing the communication system between the two regions, and by enabling a better distribution of educational resources.

At the initial stage, the ministry commenced offering Computer Studies as a compulsory and examinable subject in schools countrywide. The first examinations for Grade Nine pupils in Computer Studies were held in 2015 and all schools had to administer these examinations in this subject. However, there has been concern from several stakeholders since the Computer Studies syllabus was introduced in Zambian schools. One of the concerns has been the lack of facilities

such as computers and electricity, especially in rural schools. Apart from a lack of computers and electricity, many teachers in rural schools were said to be so incompetent that they would need lessons before teaching their classes. Thus, in 2016, the government made the Computer Studies syllabus optional and directed that only those schools with adequate facilities should administer examinations in this subject. However, the government encouraged all schools in 2017 to prepare for the examination in this subject. Currently, there is little understanding on the benefits of introducing the Computer Studies syllabus in schools for teachers and learners. Additionally, the challenges being faced to teach the Computer Studies syllabus have not been fully understood to inform policy and decision making particularly in rural areas. It was therefore, imperative to undertake this study in Mwanzi District of Western Province. Mwanzi, being one of the rural districts in Zambia, is one of the areas where there was very little understanding on the challenges that were being encountered to teach and learn Computer Studies in schools. Additionally, it was assumed that an understanding of perceived benefits of introducing computer education to teachers and learners in rural schools like Mwanzi would greatly benefit government policy and decision making. More important, it was convenient in terms of resources to conduct the study in in this district.

Background of Mwanzi District

Mwanzi is a district that was created in 2012 out of Sesheke district. The word ‘Mwanzi’ means ‘place for fish’ (Catholic Medical Mission Board, n.d.). Mwanzi district is located in the southern part of Western Province. It has a population of approximately 25,000. Mwanzi shares boundaries with three districts namely Sesheke on the west, the newly created Mulobezi district in the north east and Kazungula district in the east (Tembo, 2014). It also shares international boundaries with Namibia in the south. The surface area of the district is 8,000 km². Mwanzi District is an economically disadvantaged area, caught between old traditions and the contemporary world. Most people live in mud huts that are scattered, often remotely, across vast rural areas. While the nearby Zambezi River is a water source for those close to the village, Mwanzi is extremely dry (Catholic Medical Mission Board, n.d.). Currently, the administrative center (headquarters) of the district is at veterinary offices of the Ministry of Agriculture and livestock located behind Mwanzi Mission Hospital on the banks of the Zambezi River.

All the government and other quasi organisations are administered from this center. The proposed district headquarters is based at Lutaba on Simungoma-Mulobezi road, about 60 kilometers from Mwanzi Royal Village (Tembo, 2014). Mwanzi district has a mission hospital, a village for the aged as well as a kindergarten near the mission hospital which has 200 children all run by the United Church of Zambia (UCZ). In addition to the mission hospital, Mwanzi has three clinics. The UCZ is also running a vocational training center where youths are trained in various skills. The district has 47 schools; 3 secondary, 35 primary and 5 community and 4 private pre-schools. However, there are 17 public pre-schools attached to primary schools (Pumulo, 2017).

Statement of the problem

Since the introduction of the Computer Studies syllabus in 2012, which schools started to implement in 2013, there has been a lot of concern. Some people felt it was rushed on account of attendant challenges (Mwambazi, 2016; Kandimba, 2015; Lusaka Times, 2015) while others felt it was timely. A number of studies have been undertaken in Zambia on ICTs in Zambian schools (Walubita & Mulauzi, 2016; Lufungulo, 2015; Phiri & Silumbe, 2015; Mulima, 2014; Mtanga, *et al.*, 2012; Kangwa, 2012; Chisunka-Mwila *et al.*, 2011; Mwale, Chilala & Kumar, 2011).

However, none of these have investigated the benefits of introducing this Computer Studies syllabus to both teachers and learners and challenges faced to teach the subject in Zambian schools. It is important to have a clear understanding of the benefits of investing in the Computer Studies syllabus and the infrastructure that is required for teaching and learning Computer Studies in schools. Hence the study was aimed at bridging this knowledge gap.

Objectives

The objectives of the study were:

- i) To explore the benefits of introducing Computer Studies syllabus in selected schools to teachers and learners
- ii) To investigate the challenges being faced to offer Computer Studies syllabus in the selected schools
- iii) To find out the availability of ICT facilities and equipment required to teach Computer Studies in the selected schools
- iv) To establish the availability of qualified Computer Studies teachers in the selected schools

Methodology

The study employed a qualitative approach where 16 schools participated in the study. The schools that participated in the study included three secondary schools; thirteen primary schools. Thirty-two selected respondents, two from each school (i.e. one pupil and one computer studies teacher), participated in the study. Purposive sampling was used to select only those schools that had registered as centres for Computer Studies examinations in Grades 8 and 9 in the district in 2016. Purposive sampling was also used to select key informants who included only those who teach Computer Studies. Meanwhile, random sampling was used to select pupils using class lists. Grade Twelve pupils were selected from the three secondary schools while Grade Nine pupils who participated in the study were selected from primary schools. Face-to-face interviews and non-participant observations methods were used to collect data. Data was analysed thematically.

Findings and discussion

Composition of study participants

The study yielded 100% response rate comprising 16 pupils and 16 Computer Studies teachers bringing the total number of respondents to 32. Pupil distribution by gender comprised 11 males and 5 females. The key informants comprised 14 males and two females. This indicates that there were more males than females that participated in the study. This gender imbalance is not surprising as there were more male pupils than females in these schools. Many other factors for such imbalances have been advanced by many scholars. These factors include early pregnancies among girl children. In as far as teachers are concerned, studies have revealed that males are more inclined to teach technical or science-based subjects. Mwambazi (2015) affirms that the numbers of females in ICT related jobs worldwide is very low because of the low numbers of girls opting to study in ICT related courses.

Additionally, all the pupils that participated in the study were below 20 years old. This is a common trend in Zambia as most children start Grade One at the age of six years. Meanwhile, 5 teachers that participated in the study were aged between 26-35 years, 7 were between 36-40 years

and 4 were above 40 years. Thus, a majority of teachers that participated in the study were aged between 36-40 years. The results are depicted in table 1.

Table 1: Participants' Background Characteristics

<i>Characteristics</i>	<i>Pupils</i>	<i>Teachers</i>
Age (Years)		
Below 20	16	0
21-25	0	0
26-35	0	5
36-40	0	7
above 40	0	4
Sex		
Male	11	14
Female	5	2

Available ICT facilities in the schools

The interest in this study was to find out the availability of basic ICT facilities/equipment required to teach Computer Studies. The ICT facilities/equipment under study included computers, Internet, printers, projectors, scanners, external information storage devices and computer laboratories. The study results revealed that all participating schools had computers with various application software ranging from word processing, to spreadsheet and presentation software. Only one school had Internet access (i.e. Mwandi Secondary School). Out of the 16 schools that participated in the study, only five had at least one printer and none of the 16 schools had projectors, scanners or computer laboratories. Seven schools reported having external storage devices.

It can be concluded from these results that schools did not have adequate ICT facilities/equipment to cater for all the pupils as seen from the large enrolments levels (*Table 3*). For instance, the recommended pupil/computer ratio in schools is 6:1. But as shown in *Tables 2 and 3*, the enrolment levels do not match with the available computers. This becomes a major challenge as pupils have to share a computer and space for lessons. One of the participants explained how he struggled to teach the large class as follows:

I have divided the computer class into seven streams, each with six pupils because the computers and space are not enough to cater for all pupils at one session... This means more hours of teaching...some learn in the morning and others in the afternoon for them to have a hand on the computer...we also need a purpose-built computer laboratory.

The above findings are in line with the observations made by a number of scholars (Mwaaba, 2015; Mutoshi, 2015; Kandimba, 2015) that while the introduction of Computer Studies is welcome and being taught in most schools, the teaching of this subject still remains a daunting assignment in the rural schools. This is because most rural schools countrywide have little or no infrastructure and equipment to use for the subject. Most schools do not have computers (Kandimba, 2015). This shortage of ICT equipment has also been observed by the Ministry of General Education (2015), who argued that although pupils would be willing to learn computer studies, their morale was reduced owing to lack of ICT facilities or equipment, lack of trained ICT

teachers, non-availability of electricity especially in rural secondary schools, lack of Internet facilities and other digital resources to mention but a few. Thus, lack of basic ICT infrastructure can act as a barrier to effective teaching of Computer Studies in schools.

Mutoshi (2015) noted with concern that pupils in rural areas would be forced to learn theory while those in urban areas would have an opportunity to learn both theory and practical thereby creating a divide. This has recently been affirmed by Mengo (2017) who claims that in pupils in places where computers and electricity is lacking may only learn theory, while waiting for their areas to be connected to the national power grid and be provided with computers. This could be a big disadvantage to the pupils in rural schools. It is important to note that effective teaching and learning in computer studies does not only require computers alone. Other needed resources such as printers, multimedia projectors, scanners, information storage devices, and so on are not available in most schools (Mndebele, 2013). Mndzebele adds that using up-to-date hardware and software resources is also a key feature in the diffusion of technology but a rare experience in most schools. Further, Mndzebele argues that the changing paradigms of education delivery demand extensive use of ICT and libraries are no longer the only source of information. The Internet is now an information highway and needs to be complemented with traditional libraries. It is therefore, expected that schools use the Internet. However, the Internet is only available in the urban schools. There is no Internet in most of the rural schools.

Table 2: Number of Schools with ICT facilities/equipment

Available ICT Facility/equipment	No. of Schools
Computer	16
Internet	1
Printer	5
Projector	0
Scanner	0
External storage devices e.g. memory sticks, CDs	7
Computer laboratory	0

Availability of qualified computer studies teachers

The results of the study revealed that none of the teachers teaching the Computer Studies syllabus had a qualification in that area (*table 3*). Instead, in most primary schools, the teachers teaching Computer Studies are certificate and diploma holders for primary schools and secondary schools respectively, some with a bit of knowledge of computers and interest in handling the subject, whereas in secondary schools, teachers with diplomas specialised to teach other subjects were teaching Computer Studies. For instance, at Mwandu Secondary School, the commerce teacher was teaching Computer Studies while at Ilute Yeta Secondary School, the teacher of Business Studies was teaching Computer Studies in all classes. At Lipumpu Secondary School, the Geography teacher was taking Computer Studies classes. One of the participants explained how he found himself teaching Computer Studies at the school:

I was just told to assist in teaching Computer Studies. I was not trained or capacity built in this field... it was out of interest and obedience to my superiors that I accepted...

Table 3: Availability of computers and Computer Studies Teacher Qualifications

S/N	Name of school	Enrolment	Number of computers	Power source	Teacher qualification
1.	Chisu Primary	30	02	Solar	Primary school certificate
2.	Lusinia Primary	51	02	Solar	Primary school certificate
3.	Kalundu Primary	22	09	Solar	Primary school certificate
4.	Mushukula Primary	31	02	Solar	Primary school certificate
5.	Mwandi Primary	92	12	Hydro	Primary school certificate
6.	Lwazamba Primary	25	01	Solar	Primary school certificate
7.	Mutuwapafa Primary	30	02	Solar	Primary school certificate
8.	Lipumpu Secondary	70	09	Hydro	Primary School Diploma
9.	Lutaba Primary	63	02	Hydro	Primary
10.	Lwanja Primary	42	02	Solar	Primary school certificate
11.	Simungoma Primary	62	04	Hydro	Primary school certificate
12.	Magumwi Primary	90	02	Solar	Primary school certificate
13.	Sankolonga Primary	30	01	Solar	Primary school certificate
14.	Mabumbu Primary	84	06	Solar	Primary school certificate
15.	Ilute Yeta Secondary	98	20	Hydro	Diploma in Business Studies
16.	Mwandi Secondary	84	20	Hydro	Diploma in Business Studies

The findings above correspond with those of Mutoshi (2015) who observed that the teaching of Computer Studies in primary schools is a source of worry for rural pupils who do not have qualified teachers to teach this subject. Similar findings have been revealed by Mndzebele (2013) in Swaziland where some schools could not administer examinations owing to lack of qualified ICT teachers. Mndzebele's findings were that the teachers were hired to teach the subjects in their areas of expertise and were expected to teach ICT as well. Mndzebele argues that if there is lack of appropriate staff training and quality training for teachers, the pupils' results will be very poor. Teacher's lack of knowledge and skills is one of the main hindrances in the effective teaching of Computer Studies in schools.

The benefits of introducing computer studies to teachers and learners

The study revealed a number of benefits that might accrue to both teachers and learners as a result of introducing Computer Studies in schools. One of the benefits that came out strongly was broadening the information environment for both teachers and learners. One of the participants

explained his experiences with information search: "...Currently, teachers remain our main sources of knowledge and information ...computer skills can empower us to access a web of knowledge and information on the Internet." Mengo (2017) affirms the above findings by stating that scholars who are acquainted with ICT skills tend to find learning materials and undertake research at the click of the button. Thus, computer and Internet skills are highly valued in today's academic and professional environments and are integral to all areas of study and work. Providing access to the Internet in schools can help many pupils achieve academic excellence, thus equipping them to provide solutions to issues that their communities might encounter in the future. According to Richards (2017), the days of textbook and teacher only research and handwritten submissions are over.

With the advent of web-enhanced courses, student must possess basic computer skills in order to execute commands in basic computer applications. Computers offer a vast array of information, making it an indispensable resource for completing academic assignments. In fact, many institutions of learning provide online databases, such as Dspace to help students conduct research at a faster rate regardless of time and space. These online databases allow students to access journals and other academic publications for free. Students can also employ their research skills using search engines to retrieve robust information as they prepare to write their assignments. They can also find a vast array of authoritative resources at their fingertips when using the Internet, including reputable news outlets, nonprofit organisations and associations. Computer literacy is a crucial component for success at a higher education institution since the student interacts with the school, the faculty, and the community by using the computer. Students can hardly complete their coursework or search for online solutions without this competency (LaPlant, n.d.). Thus, possessing basic computer skills is a critical part of academic success.

Additionally, the study results revealed that knowing how to use a computer and how it operates can enhance the work performance of individuals. One of the participants described how computer knowledge can assist in improving work performance:

Computer knowledge allows you to get work done in an efficient, more organised and timely manner, particularly if you do work that entails use of a computer every day...Computer productivity tools such as spreadsheet, word-processing or presentation are very helpful in organising thoughts...

It was further revealed by the study that computer knowledge can enhance communication. In this regard, one of the participants stated how computer knowledge can open up communication opportunities as follows:

... communication here in rural areas is problematic...knowledge of how to access the internet on a computer can open up different possibilities for us to communicate effectively and efficiently with friends, relatives, fellow teachers, the Ministry and other organisations regardless of time and location. We now have a variety of electronic communication tools such as instant messaging programs, social media websites or email ... some electronic devices allow you to communicate or send documents to large groups of persons. It is possible with computer knowledge to communicate multimedia like sound or video presentations.

The findings of this study also revealed that computer studies can improve employment prospects for individuals. Respondents argued that employers want people who can use creativity, reasoning and past experiences to identify and solve problems effectively. For instance, one participant explained his observation on employment advertisement:

When you check employment advertisements these days, most of them require computer skills. Employers prefer employing an individual with computer skills than one who doesn't have.

Another respondent added as follows:

If even you have attained a higher academic qualification, you still need computer skills nowadays...you can hardly find a workplace without a computer...doing work manually is time consuming...you can perform a number of different tasks with a computer at a short period of time...

It has been revealed further in this study that computer studies can enable teachers to use computers as teaching aids. Many teachers are not using computers today because they do not know how to use them. A teacher skilled in computer technology can effectively use a computer as a teaching tool. Students can be shown videos, images and text that are interesting and relevant to what is being taught thereby making teaching interactive and stimulating to students. ICT skills, according to the study results, are also a central foundation of knowledge for lifelong learning among teachers and learners. The findings revealed that computer skills can be applied not only to the present learning but also future learning, be it formal or informal. For instance, one of the participants explained how computer knowledge can be of use for lifelong learning:

Once we are equipped with ICT skills, we can use them for our future learning as well, whether formal or informal. For instance, we can use these skills at college or university...can use ICT skills for self-education like the way people are using Internet on their own to get to know lots of things...

Norton (2011) also believes that basic computing principles have not changed over the past few years, and they will be valid well into the future. Norton thus, argues that by mastering fundamental concepts and terminology, learners and teachers can develop a strong base that will support their learning for years to come. The study further revealed that computer knowledge can be applied in different aspects of life regardless of the location of the user. On how computer knowledge can be applied in different aspects of life, one of the participants stated:

Today, computer skills are important more than ever before. They can be used in every aspect of our lives...they are part of many day-to-day activities at home or at work.

Norton (2011) affirms these findings from the study and argues that computer technology results in skills that span different aspects of life. According to Norton, many people find their computer skills valuable regardless of the setting – at home, work, school or play and thus, believes that knowledge of computers is useful in many places other than at workplaces.

Moreover, findings from the field revealed that computer knowledge can lead learners and teachers to greater self-sufficiency. Concerning greater self-sufficiency, one of the participants explained as follows:

The basic skills I can acquire in Computer Studies can enable me excel with little support for help...it is one of the ways to enrich my life and prosper in future learning and world of work.

Literature also show that computer skills are a key to self-sufficiency (Posner, 2014) and have the potential to meet our needs in research, communication, or time management (Norton, 2011) to mention but a few.

Challenges being faced with offering ICTs in the selected schools

The results of the study revealed a number of challenges that schools faced to teach Computer Studies effectively. Just like previous studies done by Phiri & Silumbe (2015) and Lufungulo (2015), this study revealed that teachers and pupils encountered similar challenges of which the

biggest was lack of ICT facilities and infrastructure that made the teaching and learning of Computer Studies in most schools difficult. The other challenges include unreliable power supply, large pupil-teacher ratio, inadequate time allocated for computer classes, lack of maintenance and upgrade of computing equipment, lack of trained teachers in ICTs, limited financial resources and lack of teaching and learning materials.

The challenge of inadequate ICT facilities/equipment being experienced in schools covered by the study has already been sufficiently discussed above. Another challenge experienced in schools is lack of time to teach the subject, computer studies adequately. One of the teachers described the challenges he was facing to teach the subject effectively as follows: This is what one of the respondent teachers had to say:

I am the only one with good computer skills. Since I have to teach other subjects as well, I have a heavy workload...I end up teaching even after school hours...I hardly have time to properly design the lessons...

Mndzebele's (2013) study also revealed similar results, where the teachers were found to teach more than one subject and then they had to teach ICT. This implied that they were overloaded with work. According to Mndzebele, these teachers do not have time to design, develop and incorporate technology into teaching and learning. The teacher needs time to collaborate with other teachers as well as learn how to use hardware and software. Additionally, teacher lesson planning is vital in Computer Studies. This can only happen when a teacher has ample time to prepare. Where little planning has occurred, research shows that even student work is often unfocused and can result in lower attainment.

In relation to the above challenge, the study results revealed that there is a large teacher/pupil ratio in most schools. This is a big threat to providing quality education in Computer Studies. The successful implementation of Computer Studies, especially management of examinations, demands a lower teacher/pupil ratio. Thus, the maintenance of large teacher/pupil ratios in schools in the quest of providing universal education for all remains a matter of concern (MoE, 2008). The ultimate result is failure for teachers to guarantee individualistic learning especially in areas where learners meet difficulties to comprehend content.

Unreliable or inadequate power supply proved to be a challenge in most schools investigated. Most schools that entirely depended on hydro- electric power had a challenge of frequent power cuts. Though many had solar systems, it could not cater for a reasonable number of computers. Explaining on the challenges of unreliable power supply, one of the participants had this to say:

...You find that at the hour we are scheduled to have computer lessons on the time-table that is when load shedding takes place. As a result we end up just learning theory most of the time despite it being a practical one...

Another participant added:

...the solar is inadequate...it needs a battery to boost up power, but again, you need to charge it all the time...

Statistics show that access to electricity in rural areas is unprecedentedly low at less than 3% while in urban areas is pegged at 25% (USAID, 2017). Both figures are not good enough to spark an ambitious policy that requires not only a modern computer laboratory at any given school but also adequate and reliable power generation.

Furthermore, similar to Mndzebele's (2013) findings, this study revealed that schools had challenges to maintain and upgrade computing equipment. This is a challenge because once a

computer develops a small technical fault, there is no one to attend to that. One of the participants described the challenge of maintaining computing equipment at their school as follows:

...We had 4 computers working...two recently stopped working...We do not know what could be the problem...just could not boot...once we find transport, we can take them to Lusaka for repair...

Another challenge facing schools is the lack of trained teachers in ICTs. Most schools as shown in table 1 above are using non ICT trained teachers to teach computer studies. This is what was revealed from one of the participants:

...I developed the skill to teach the subject trial-and-error as well as asking for assistance from more knowledgeable colleagues, though at times such assistance rarely come, it doesn't dampen my enthusiasm and willingness to learn...I had to kick-start my own learning...To make things worse, we have no teachers' guide or pupils' text books.

Therefore, it can be concluded that since a number of teachers who are teaching Computer Studies are not sufficiently computer literate, it is very unlikely that pupils were effectively trained in this subject. Extensive teacher training and on-going exposure to ICTs and relevant professional development are essential if the subject is to be taught effectively in schools.

Lack of sufficient funding from the government is yet another challenge with which schools were faced. According to the Ministry of Communications and Transport (2006), the Zambian government faces a challenge in the high opportunity cost of deploying ICTs in the education system. It is difficult to justify spending scarce and limited resources on ICTs when many institutions are lacking basic amenities and educational supplies. "...we cannot afford to buy ICT equipment from our meagre funding...one computer costs about K4,000...K120, 000 is required for us to procure good 30 computers to cater for the 30 pupils...funding is not sufficient for us to acquire this number of computers." Elaborating more on financial difficulties schools were facing, one of the participants added:

...funding in these primary schools is not monthly but quarterly and sometimes it's beyond quarterly and the same funding goes with the population at every school...the amount is not fixed...roughly between K400 to K2, 000 is given to each school mostly twice in a year...these days it's schools which are funding DEBs and PEOs offices where even fixed amounts are given...

It is important to note that running costs and maintenance of computers and other equipment means a constant supply of funds. Effective teaching of ICTs depends on availability of hardware, software and adequate financial resources. However, in most schools, it is very hard to effectively implement the Computer Studies syllabus because it involves substantial investments in the teaching aids and setting up the infrastructure, maintenance and support of ICT facilities.

The study further revealed that schools lacked Internet facilities. Pupils learning Computer Studies are supposed to have access to the Internet. This is because the changing paradigms of education delivery demand extensive use of ICT. Moreover, traditional libraries are no longer the only source of information. In the 21st century, traditional libraries need to be complemented and enhanced by ICT. It is therefore expected that schools use Internet. However, the Internet is only available in a few urban schools. Similar to Mndzebele's (2013) study findings, it was reported in this study that schools could hardly afford the high fees charged by Internet service providers owing to lack of funds. Hence, even though schools were offering computer studies to their pupils, they were still not learning practically how to search for information on the Internet because of lack of Internet connectivity. Research skills make it easier to retrieve information without having to spend hours using books which may be out of date. The Ministry of Education, Science, Vocational Training and Early Education (2014) recognise the fact that the Internet is a very

powerful medium of communication and information nowadays. After learning Computer Studies, learners should be able to find useful information using the Internet to complete their academic assignments and improve the quality of their education in general. Internet skills would also enable teachers to create instructional material online and access model teaching plans online (Befekadu, 2006).

Conclusion

A number of benefits of introducing Computer Studies to teachers and learners were revealed in this study. These include broadened information environment, enhanced work performance, improved communication and improved employment prospects, performance of many diverse tasks, innovation and creativity, teaching aid, foundation of knowledge for lifelong and greater self-sufficiency. In terms of challenges, the findings revealed that there was insufficient ICT infrastructure such as computers, flash disks, projectors, scanners, etc. in schools that participated in the study in Mwandi district. Additionally, teachers with a bit of knowledge of computers or interest in ICTs were used to teach ICTs. Lack of time to teach computer studies adequately, large teacher/pupil ratio, unreliable or inadequate power supply, lack of technical support to maintain and upgrade computing equipment, limited financial resources and lack of Internet connectivity were other challenges faced to teach the subject effectively in schools. According to Mwambazi (2015), the opportunity of a new curriculum should not hamper benefits that pupils would get from the Computer Studies. Introduction of the Computer Studies has created a good platform for pupils including girls to take up computer related studies as they enroll in tertiary institutions.

Recommendations

- (i) The government should provide regular training programs or opportunities on ICT skills for teachers teaching the subject. For instance, the University of Zambia has a one year Fast Track Diploma in ICTs and also a Bachelor of ICTs with Education (B.ICTs. ED) which is a four year degree programme. Teachers of computer Studies can be given an opportunity to undertake such programmes.
- (ii) There is need for government to invest more in digital facilities like computers, printers, projectors and scanners rather than physical libraries to cater for the teaching and learning needs of teachers and learners.
- (iii) The government should continue to partner with the private sector for resource mobilisation to equip schools with needed ICT facilities and equipment for effective teaching and learning of Computer Studies.
- (iv) The government should step up efforts to ensure that all the schools in rural areas are electrified to facilitate ICT education.
- (v) There is need for government to ensure that the budgetary allocation to education is increased to make it possible to increase infrastructure and train more teachers for quality education to be a reality.
- (vi) The government can consider providing flash-drives with pre-loaded educational materials to rural schools which lack the necessary resources to teach Computer Studies but have computers.

- (vii) Schools connected to hydro-power could consider installing solar panels as a solution to power cuts.
- (viii) Schools should consider partnering with some Internet providers to offer affordable Internet services
- (ix) Government and other stakeholders should help schools with more mobile devices e.g. smart phones and tablets which can be used more flexibly to teach Computer Studies.
- (x) Incentives must be developed to promote effective teacher participation in teaching Computer Studies such as sponsorship to train in ICTs, pay increase or overtime pay and formal and informal recognition at the school and community levels and among peers.
- (xi) Government should create hub schools with reliable power and Internet that can download updated resources onto portable hard drives which can be used in more rural schools in the cluster by creating a local intranet.

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