



Implementation Status and Challenges of ICTs In Zambian Schools

PREPARED BY:

RESEARCH:

Esther Nyemba (Researcher) with the support of Mrs. **Bernadette Deka Zulu** (Executive Director)

TECHNICAL REVIEW:

Salim Kaunda (Head of Research and Analysis)
Albert Kasoma (Senior Researcher)

EDITORIAL TEAM:

Brian Sambo Mwila (Communication Specialist) **Layout and Design**
Melody M. Simukali (Head Communications and Grants) **Editorial**

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ABBREVIATIONS

CDC	Curriculum Development Centre
CFT	Competence Standards for Teachers and Teacher Training
EMIS	Education Management Information System
GRZ	Government of the Republic of Zambia
ICT	Information and Communication and Technologies
IT	Information Technology
MIS	Management Information system
MoE	Ministry of Education
MoGE	Ministry of General Education
NREN	National Research and Education Network
OCRS	Online Candidate Registration System
ODL	Open Distance Learning
ZICTA	Zambia Information Communication and Technology Authority
SDG	Sustainable Development Goals



Source: Background vector created by freepik - www.freepik.com

INTRODUCTION

Information and Communication Technologies (ICTs) have gained influence in the global development agenda and are essential investments required by all nations to achieve the 2030 Global Agenda. **ICTs are important catalysts in the achievement of Sustainable Development Goals (SDGs) with specific focus on development goal number 4 which aims to ensure inclusive and equitable education and promotion of lifelong learning opportunities for all.** ICTs in this SDG are necessary for achieving a sustainable education system that promotes the right skills for the labour force and entrepreneurship.

According to the Second Decade of Education for Africa Plan for Action (2006–2015), “education forms the basis for developing innovation, science and technology, in order to harness resources, industrialize and participate in the global knowledge economy and enable Africa to take its rightful place in the global community. It is also the means by which Africa will entrench a culture of peace, gender equality and positive African Values” (African Union, 2006). **ICTs have been used in many countries especially developed countries to improve quality and access to education, as well as improve productivity for both teachers and pupils.**

In this regard, ICTs in schools can be used as a communication tool to improve student learning and better teaching techniques. In the technological era, ICTs in education compel many schools to get accustomed to smart technology through the use of computers, internet and multimedia as the medium of communication.

Zambia’s ICT uptake in the education sector is still facing challenges and expected benefits are taking long to be achieved. The use of ICTs in schools to enhance learning, could help overcome some of the challenges of improving the efficiency and productivity of both teaching and learning in Zambian schools, thereby narrowing the digital divide.

It is against this background that the paper aimed at assessing the status and challenges of the implementation of ICTs in Zambia’s education sector.

GENERAL ICT PROFILE

In Zambia the general ICT uptake can be looked at from the use of mobile phones, computers, televisions and radios, as well as the use of internet among others. ICTs have been integrated in various sectors of the economy. This integration is aimed at breaking through the walls of isolation and exclusion from the global economy to sustainable human development based on the efficient and effective use of ICTs. **In Zambia, the use of ICTs has been integrated into the Tax Payment System, Banking, E-governance and other sectors.**



The 2018 National Survey on Access and Usage of ICTs by households and individuals conducted by Zambia Information Communication and Technology Agency (ZICTA) indicated that households were switching technology from the traditional ICT devices that include fixed telephone line, radio and television to mobile phones and computers. The survey further showed an increase in the access to mobile network coverage and internet by most households. **Access to internet services among households also increased from 12.7 percent reported in 2015 to 17.7 percent in 2018 (ZICTA, 2018). The survey also revealed that the proportion of households across the country with a working television set increased from 33 percent to 37 percent between 2015 and 2018. On the other hand, the percentage of households country wide that own a working radio reduced from 45 percent in 2015 to 40 percent in 2018.**

In order to expedite the implementation of ICTs in all sectors, the Government established SMART Zambia Institute (SZI); as an institution mandated to coordinate the implementation of all e-governance programs in the country.

THE CURRENT ICT PROFILE IN ZAMBIAN SCHOOLS

The use of computers in the education sector dates back to 1996 when the Examination Council of Zambia (ECZ) started processing examinations using its own computers. As late as the early 2000s the use of computers as a learning tool was only common in private schools and for open and distance learning (ODL) through e-learning. The Zambian education sector has in recent years endeavoured to integrate ICTs in teaching and learning at all levels to assist and improve the quality of education delivery. A study conducted by Panos London Network in 2007, an independent institute working to ensure that ICTs are used effectively to foster development concluded that the penetration of ICTs in the education sector was low, with schools that were equipped mostly utilizing second hand and refurbished computers (Panos London, 2010). From this study, a conclusion can be drawn that the debate should no longer be whether to use ICTs in the education sector, but

how best to use it and how to ensure equitable access for teachers and learners, whether in urban or rural settings. **The Government through both Ministry of Higher Education and General Education has managed to implement ICTs in teaching and learning at all levels of education to assist and improve the quality of education delivery.** Therefore, this study aimed to assess the implementation status and challenges of ICTs in education through the availability of a curriculum, ICT infrastructure and ICT hardware.

A. Curriculum

The integration of ICTs into the curriculum of learners is of immense benefit to them. In 2002 the Ministry of General Education through the curriculum development centre (CDC) began to design a syllabus in computer studies for grades 1-9 and in 2013 Computer Studies was introduced as a subject at both primary and secondary school levels. **ICTs have also been introduced at higher learning institutions for teacher training as a requirement for the successful implementation of the curriculum.**

B. Hardware

The introduction of computer studies as a compulsory subject in schools requires the use of computers for hands-on practical usage among learners. The administration of computers in schools has increased in the recent years after the introduction of computer studies. There has been an increase in the number of computers in schools from **15,490** in 2014 to **38,418** computers in 2018. The table below shows the number of computers in schools for different provinces.

Table 1: Number of Computers by Province 2014-2018

Province	2014	2015	2016	2017	2018
Central	1281	1682	2255	2851	3833
Copperbelt	4135	5203	6647	7738	7925
Eastern	714	1221	2205	3248	3109
Luapula	541	934	1386	2103	2164
Lusaka	3713	4786	5406	6209	6958
Muchinga	478	567	817	1457	1984
North Western	753	1132	1657	2113	2451
Northern	508	746	1133	1529	2086
Southern	2537	2851	3942	5932	6119
Western	830	904	1127	1692	1789
Total	15,490	20,026	26,575	34,872	38418

Source: (Ministry of General Education (MoGE), 2018)

C. Infrastructure

The successful implementation of ICT in Zambia’s educational system requires reliable and adequate infrastructure. **Infrastructure in the ICT sector is that which supports the installation and maintenance of ICT hardware, software and connectivity. This infrastructure includes internet, electricity and computer laboratories.**

Electricity

Electricity is an important component for the successful implementation of ICTs in the education sector, as it offers support to internet and ICT access. According to the study conducted by ZICTA and other Government institutions in 2018, Zambia is relatively less electrified by global standards with only 32.9% of households in the country connected to the national grid (Zambia Information and Communication Authority, 2018). This situation is similar to the education sector, a few schools are connected to the national power grid, with most schools using alternative sources.

According to the 2018 Educational Statistical Bulletin, only 4356 schools country wide have power from different sources and 5054 schools have no power making it a huge number of schools having no power thereby affecting the implementation of ICTs.

Below are tables depicting the status of electricity connectivity in schools across the country.

Table 2: .Numbers of Schools by Power Source 2018

Province	Generator	Main Power Grid	No Power	Solar	Standalone Hydropower
Central	36	350	557	51	1
Copperbelt	43	697	296	34	2
Eastern	33	190	623	186	3
Luapula	26	219	367	103	3
Lusaka	79	579	197	59	6
Muchinga	9	119	449	71	7
North Western	26	179	548	63	10
Northern	15	168	654	71	4
Southern	52	361	679	176	7
Western	12	163	675	140	3
Total	331	3025	5045	954	46

Source:[Educational Statistical Bulletin,2018]

Table 2 depicts low levels of electricity connectivity in schools across the country, and this has adverse ramifications on ICT access and usage both in schools and households that rely on electricity to operate any ICT device. The use of alternative energy sources to power electrical appliances by households is equally minimal with only 17 percent of the total number of households in the country using solar energy to power electrical equipment while only 1 percent utilizes generators (Ministry of National Development Planning, 2016). Interventions to increase access to electricity could be effective in increasing ICT access and usage.

Internet

Access to internet services among households increased from 12.7 percent reported in 2015 to 17.7 percent in 2018. The survey established that mobile broadband services accessed through a mobile phone were the most prominent source of internet services by households.



Internet connectivity and access are important factors in ICT education as it supports most ICT software. Successful communication and (financial) transactions are dependent on internet connectivity. The ICT sector in relation to internet has grown from an internet penetration of 12.7 percent in 2015 to 17.7 percent in 2018, though it still remains below the Sub Saharan region average that has grown from 3.1 percent to 19.2 percent in the same period (**Zambia Information and Communication Authority, 2018**).

Table 3 Number of Schools with Internet Facilities by Education Level 2018

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Table 3: Number of Schools with Internet Facilities by Education Level 2018

Province	Temporary	Incomplete	Permanent	(2018) Total	2017
Central	Internet Service	98	34	132	99
Copperbelt	Internet Service	112	63	175	202
Eastern	Internet Service	43	15	58	26
Luapula	Internet Service	40	20	60	38
Lusaka	Internet Service	113	49	162	148
Muchinga	Internet Service	28	12	40	36
North Western	Internet Service	75	38	113	55
Northern	Internet Service	100	30	130	34
Southern	Internet Service	105	47	152	131
Western	Internet Service	64	18	82	33
Total		778	326	1104	802

Source: [Educational Statistical Bulletin, 2018]

Computer Laboratories

The necessity of computer labs that are available for use by students in rural and urban areas is recognized by the Ministry of Education in the ICT Strategic Plan (2011). However, the fact that Zambia's education system is under-resourced poses serious challenges to domestic financing of computer purchases at a large national-scale.

Table 4 Number of Computer Laboratories in all Schools by Province 2018

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Table 4: Number of Computer Laboratories in all Schools by Province 2018

Province	Temporary	Incomplete	Permanent	(2018) Total	2017
Central	19	25	146	190	136
Copperbelt	10	11	367	388	384
Eastern	8	8	136	152	102
Luapula	8	3	63	74	78
Lusaka	18	14	312	344	277
Muchinga	7	10	56	73	51
North Western	6	7	61	74	80
Northern	17	5	57	79	60
Southern	18	19	1310	1347	252
Western	2	12	76	90	83
Total	113	114	2,584	2,811	1,503

Source: (Ministry of General Education, 2018)

D. ICTs for Administrative support

Since the mid-1990s, the Ministry of Education (MoE) has been using ICT tools in their administration of various tasks. ICTs for the management of the education sector in the recent years have been used for examination registration through the online candidate registration system (OCRS). **The Education Management Information System (EMIS) is used to transfer information from provincial education offices to the headquarters to provide data on national education system. Access to of examination results until 2019 was done through mobile phone short code services and in 2019 an online platform for accessing results was introduced.**

BENEFITS DERIVED FROM THE USE OF ICTS IN SCHOOLS

If ICTs are implemented successfully in schools, there are a number of benefits that can be derived for both learners and the school as outlined below.

1. Administrative advantages of ICTs if accurately implemented include:

- Through the use of ICT tools such as computers and projectors, communication within the school is made more efficiently by using emails and power point presentations among school management and in class respectively.

- Record keeping for administrative purposes is made easy and orderly. Manual records which have been used for many years, in most cases get lost and damaged due to poor record keeping.
- Routine tasks such as accessing pupil's school records, are performed faster and saves time from physically looking through piles of files.

2. **Benefits that learners are likely to derive from the use of ICTs in the learning process are:**

- The implementation of ICTs in schools if supported with good infrastructure such as internet would enable students have access to immense amounts of information from online sources which can be used in their research.
- ICTs in education enables learners to become creators of knowledge in their own right and understanding. For example, through the research projects, ICTs can be used to develop a culture of personal information management and independent learning by learners. Furthermore, ICTs can foster and strengthen communication and research skills, which are highly valued in today's global workforce.
- ICTs in education makes learning interactive and enjoyable for learners through the use of computer images for teaching and other interactive applications and software.

CHALLENGES FACED IN THE IMPLEMENTATION OF ICTS IN SCHOOLS

Despite the implementation of ICTs in schools across the country, there are a number of challenges that have made it difficult for the Ministry of Education to fully implement the various tools of ICTs in schools and the delivery of computer studies as a subject source. Some of these challenges are discussed below;

1. **Limited infrastructure required to support the use of ICTs in schools:** According to the Ministry of General Education, various schools lack fully functional computer labs especially in rural areas to house and support both hardware and software. The lack of complete infrastructure in many schools has posed a security challenge to the distribution of computers in various schools and the installation of computers requires a fully functional computer laboratories.
2. **Lack of necessary ICT skills among teachers and the specific training needed to be able to use ICTs appropriately in the class room:** Despite the introduction of computer studies in the curriculum, there were no ICT teachers until 2016 when the first ICT teachers were employed. As at 2015, there were 482 ICT teachers against 96,228 learners, resulting in a pupil teacher ratio of 199:6 which is very high for successful quality education delivery.

BEST PRACTICES

There are a number of African countries that can be used as best practices who have successfully implemented ICTs in their education sector through the formulation and implementation of ICT policies in the education sector.



South Africa

ICT in the education sector had been on the policy agenda for the South African Government since 1996 and the realization of ICTs as a catalyst for economic growth and social development prompted provincial governments to respond by initiating ICT projects in education. **At national level, the Government through the Department of Education (DoE) responded by developing an e-Education policy in 2004 and a guideline for teacher training and professional development in ICT training, as well as the development of a curriculum source.**

The aim of the e-Education policy is to achieve the nation's education goals by providing modern technologies for schools in order to enhance the quality of learning and teaching (Department of Education , 2004). The policy for teacher training and professional development in ICT training is aimed at developing knowledge, skills, values and attitudes required by teachers to implement the ICT national curriculum effectively (Department of Education , 2007).

In order to effectively implement the e-Education policy at national level, the DoE developed a national framework for ICT competences for teachers, school managers and administrators. At institutional level, school managers and administrators promote the use of ICTs which has led to the realization of the transformative benefits of ICTs in schools and education. These policies have made significant strides in developing and supporting ICT administrative systems in schools (Czerniewicz, 2005). The implementation of these policies has further led to the introduction of ICTs in the South African education system both for administrative purposes and as a learning and teaching tool. According to the Ministry of Science and Technology, the policies have helped bring impressive partnerships with the various stakeholders leading to the implementation of a number of projects with focus on teacher training and curriculum development (Mdlongwa T. , 2012).

The path taken by the Department of Education in South Africa is a viable option for Zambia to fully reduce the digital divide in the education sector and the nation as a whole through better successful implementation of ICT policy in the education sector and capacity building among teachers and school administrators.



Uganda

The ICT policies in Uganda have its genesis from 1998 when a number of international organizations approached the Uganda National Council for Science and Technology to develop ICT policies for various sectors. In 2003, the Ugandan Government through the Ministry of Works, Housing and Communications **developed and implemented the National Information and Communication Technology Policy which provided guidance for development of ICT policies in different sectors source.**

The National ICT Policy strategic objective number 2, is **aimed at improving literacy and human resource capacity building through the integration of ICT in mainstream educational curricula, as well as other literacy programmes (Uganda Ministry of Education and Sports Development, 2005).**

In order to realise the implementation of ICTs in the education sector, the Ugandan government through the Ministry of Education and Sports Development in 2005, formulated and implemented the ICT policy in education. The policy was aimed at guiding investment in ICTs in the education sector from primary to tertiary level and the implementation of ICT programs in schools. The implementation of the two policies has resulted in significant investments in ICTs in Uganda including the education sector; notably the significant investment in the Education Management Information System (EMIS) for the maintenance of timely and sustainable quality education statistics. The other important benefits of the implementation of the policies have been the increased supply of ICT equipment in schools by both local and international NGOs and quality delivery of education through ICTs by qualified ICT trained teachers.

In summary, investments in ICTs in the Ugandan education sector have been guided by defined policies at both national and sectorial level.

PMRC RECOMMENDATIONS

▪ **Establish an enabling policy environment**

The Ministry of General Education should ensure that all investments in ICT for education are directed by a single integrated strategy so as to foster efforts towards a coordinated goal. This can be achieved through the development and implementation of an ICT investment strategy and a stand-alone ICT policy in education as the case in Uganda.

▪ **Widen access to ICT infrastructure and connectivity**

Both the Ministry of General Education and of Higher Education with their implementing partners should ensure the implementation of programmes that will enable teachers, learners and administration to gain access to computers.

▪ **Harness ICT to improve management and administration of the sector**

There is value in harnessing ICT to improve educational management and administration, evidence shows that there is lack of a policy to promote data driven decision making at educational institution level. The use of Education Management Information System (EMIS) is only present at district and provincial level and the Ministry's headquarters leading to gaps in information sharing from the schools.

▪ **Build human capacity**

The ICTs in education is affected by lack of well qualified teachers since the introduction of computer studies in the curriculum with a few teachers trained in ICTs. In order to improve the quality of education through ICTs both Ministry of General Education and Higher Education should adopt a sustainable professional development framework to guide teacher training in the use of ICTs. Some of the notable existing training frameworks include the UNESCO ICT Competence Standards for Teachers and Teacher Training (CFT).

▪ **Ensure funding for the successful implementation of ICTs in schools**

The Ministry should ensure that schools acquire adequate ICT resources and technology. This will enable quality education and greater improvement in the management of the sector. The integration of ICTs in education requires national budget support as well as nationally driven Public Private Partnerships which are mostly driven by one collective agenda.

CONCLUSION

In conclusion, the use of ICTs in the education sector may not be the solution for all the challenges that are currently faced in the education sector, many challenges still remain in ensuring universal access to education. However, research conducted both in Zambia and in other countries has shown that the use of ICTs can influence and improve the productivity and efficiency of both teaching and learning.

The continued implementation of ICT education in both rural and urban areas in Zambia presents a great opportunity for the nation to have greater access to information and communication platforms that can foster new and stronger skills for the young generation and this will enable Zambia to make use of, contribute to and create international information platforms. However, in order for Zambian schools to derive the benefits that come with the use of ICTs in schools, serious financial commitment and implementation frameworks are required especially for girls and other vulnerable groups to guarantee them successful ICT skills acquisition and quality education in order for them to be easily competitive in the global labour market.

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Correspondence on this Research Report can be sent to:
info@pmrczambia.net

Policy Monitoring and Research Centre (PMRC)
Ministry of National Development Complex, Corner of John Mbita and Nationalist Roads, Ridgeway,
Private Bag KL 10
Tel: +260 211 269 717 | +260 979 015 660

www.pmrczambia.com

