ZAMBIA NATIONAL EDUCATION COALITION

STATUS OF EDUCATION TECHNOLOGY AND DIGITAL LITERACY AMONG TEACHERS LEARNERS AND PARENTS IN ZAMBIA

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Contents

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The study was conducted by the lead researcher Dr Daniel Araia assisted in data collection and conducting individual interviews by Madam Minevah Kabongola and Mr Nkandu, ZANEC provincial focal point persons for North Western Province and Muchinga province respectively, as well as and Ms. Njavwa Gondwe who accompanied me to Kafue and Chiawa districts for data collection.

The author hopes that the study will contribute to the development of a sustainable Zambian education system that ensures that all learners acquire an education which improves their performance and prepares them to safely confront the digital dominated 21st century world.

Acronyms

AMEP	Alternative Modes of Education Provision
GSMA	Global System for Mobile Communication
IBRD	International bank of Reconstruction and development
ICT	Information Communication Technology
IPA	Innovation for Poverty Action
LAYS	Learning-Adjusted Years of Schooling
MOE	Ministry of Education
MoGE	Ministry of General education
MoH	Ministry of Health
MoHE	Ministry of Higher education
RECOVR	Research for Effective COVID-19 Responses
SDLR	Systematic desk and literature review
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International children's fund
YALE	Youth and Adult Literacy Education
ZAMTEL	Zambia Telecommunications Company Limited
ZANEC	Zambia National Education Coalition
ZICTA	Zambia Information and Communication Technology Authority

Executive Summary

This report features the status of education technology and digital literacy among primary and secondary school teachers, parents, and learners in Zambia. It assessed the various Alternative Modes of Education Provision (AMEP) being used by education providers amidst COVID-19 and their effectiveness in reaching all categories of learners, urban, rural, girls, boys, different grades, and children with disabilities, between March 2020 and March 2021.

It assessed policy context and enabling environment for education delivery through technology with a special focus on Lusaka Province (Chiawa and Kafue districts), Muchinga (Mpika and Chinsali districts), and North-Western Province (Kasempa and Mufumbwe districts) selected as study areas.

The study followed a logical structure, assessment of the status of education technology and literacy level among teachers, parents, and learners followed by an exploration of good AMEP practices in the Zambian context, and, concluded by outlining feasible mitigation strategies believed to guarantee that all learners have access to learning without being left behind**.**

1. INTRODUCTION

The COVID-19 pandemic, as well as the resulting lockdowns and school closures, has compounded obstacles and stress, notably in terms of educational performance worldwide (Favara et al., 2021). The poorest, most marginalized, and vulnerable children and adolescents are likely to have been disproportionately affected by school closures and educational disruptions, as well as restrictions and other negative social and health effects of COVID-19.

The effect and impact of COVID-19 on learning continuity have been devastating and catastrophic. For the vast majority of the world's learners, official learning came to a halt or was badly disrupted as a result of the global school closures. UNESCO estimated that one billion children, youth, and adults (two-thirds of the global student population) were still experiencing major disruptions in their learning and schooling more than half a year after the crisis began, ranging from complete school closures to reduced or part-time academic schedules (UNESCO,2020).

On 17th March 2020 Zambia's Minister of Health announced the closure of all educational institutions effective 20th March 2020. The closing of public institutions had a catastrophic effect on the Zambian education sector, an estimated 4.4 million children and adolescent learners were affected. On June 1, 2020, a total of 1.14 million learners who were in examination classes that are graded 7,9, and twelve resumed class. Classes for all the remaining learners reopened on September 11th 2020. Due to the second wave of COVID-19, the opening schools for the 2021school year was delayed by two weeks. On average the learners from none- examination classes had lost about six months of learning time.

The Ministry of General Education (MoGE) driven by this extraordinary and catastrophic incident effect on the nation's education system, in April 2020 developed an education sector-specific COVID-19 Response and Recovery Plan steered by the National Multisectoral COVID-19 response plan. The MoGE COVID-19 Response and Recovery Plan steered by the strategy emphasizes the continuity of learning as its top priority and offered many options and approaches for delivering education.

This study outlines the research undertaken to assess the education technology and digital literacy landscape among teachers' learners and parents in Zambia in light of the COVID-19 pandemic's catastrophic impact on the nation's education system and to ensure learning continuity and propose mitigation strategies to alleviate any future problems. The disruption of education due to the pandemic has exasperated an existing learning crisis in the country as well as inequities to access to education.

Zambia is a sub-Saharan African nation previously classified as a lower middle-income country, but recently due to the deterioration of Gross National Income per capita estimates recorded in 2021, the World bank has re- classified Zambia to a low-income status for the fiscal year 2023 (Ministry of Finance and National Planning, July 9/2022). Low-income countries are those with an average gross national income (GNIs) of less than US$1, 005 per person annually. According to official World Bank data as of 2020, Zambia's Gross Domestic Product (GDP) was worth 19.32 billion US dollars representing 0.02 percent of the world economy, its GDP per capital stood at 1270.86. In 2021 WB estimated Zambia's GNI per capita was at $ 1040 (World Bank,2021).

The latest 2021 census figures and projections from the Zambia Statistics Agency estimate the total population in Zambia at 18.4 million people. (Zambia Statistic Agency,2022).

Zambian Education system

Zambia's education system is divided into four stages: early childhood education, primary education, secondary school, and postsecondary education (higher education). Under the two-tier system, vocational education and training are also accessible at the secondary level, beginning in Grade 8. Technical and vocational training, as well as university education, are all part of tertiary education. For all Zambians Between the ages of 7 and 13 primary education attendance is compulsory. The Ministry of Education (MoE) oversees all activities pertinent to education in the country.

Technology and learning during the pandemic of COVID-19

According to UNESCO data, the technologies used to sustain learning continuity during the pandemic were mostly determined by a country's development position. For example, radio was used by two-thirds of low-income countries for primary education, compared to less than half of upper-middle-income countries. Meanwhile, three-quarters of countries with lower-middle incomes watched television. On the other hand, high-income countries used online learning platforms more frequently to assist with remote teaching and learning (Tawil,2020). Nevertheless by and large, in 2020, digital education became a global element of education in a way it has never been before.

Even though national governments have responded by providing additional support for digital learning and increasing the use of broadcast media, undoubtedly most countries faced challenges related to technology and access to digital resources. Internet connectivity, electricity, devices such as computers or tablets, radios, TVs, and ICT skills are key differentiators.

According to Teymori and Fardin (2020), many academics and institutions face unique concerns and challenges when it comes to online learning, including unfamiliarity with new technologies and strategies for dealing with unforeseen challenges. Significant discrepancies in access to and involvement in high-quality technology, as well as severe educational inequality, appear to exist. During the pandemic, the Government of Zambia introduced several response measures to atone for the lost learning opportunities, the most widely used AMEP was the provision of homework to learners at the time of school closing. According to the RECOVR survey, a large majority of primary school learners (75 percent) engaged in remote learning through their schoolbooks rather than through television or radio. Half of those polled said they had access to textbooks, exercises, and writing tools (IPA, 2020).
To expedite remote learning during the school closure, the MoGE facilitated the broadcast of educational lessons on national television and radio channels, as well as on the internet such as Online "E-learning" and "Smart Revision “platforms. The Smart Revision platform offered past exam papers with sample answers, while the E-learning platform offered educational materials like e-books and links to specialized services. An educational television channel was introduced in June 2020 to offer classes for all grade levels. Additionally, self-study materials were created by the Ministry of General Education and sent to all Zambian schools. While urban learners

benefited from the program, rural learners were disadvantaged due to a lack of access to television, radio coverage, electricity, and the internet.
The following table illustrates the pre-pandemic 2018/2019 availability of facilities at the household level.

Table 1.

Percentage of Population in Rural and Urban Areas with Access to Mass Communication Networks: 2018

Facility	Urban%	Rural%
Television	66.3	14.8
Radio	60.3	37.4
Internet	14.3	2.1

Source: ZICTA, National ICT Survey, 2018.

COVID-19 impact on the Zambian education system

In 2020, as a result of long-term school closures, the majority of Zambian learners (an estimated 75%) missed half of Term 1 and all of Term 2. According to Nkwain and Simwanza (2020), making use of simulation models based on Learning Adjusted Years of Schooling (LAYS), estimated that in the first three months of the epidemic, Zambia lost approximately 4.20 percent of its LAYS and 10% in total when schools reopened.
As a result of the increased demand for alternative modes of education, the MoGE created more learning materials, such as photocopied worksheets, instructional television and radio programs, and e-learning tools., Similarly, the MoHE to facilitate distant learning, granted internet connectivity to five TEVET institutes and distributed gadgets to HE learners.
Even though different studies report the engagement of different ministries in emergency activities to alleviate school closure problems related to the COVID-19 pandemic, data concerning communication and contact between learners and schools is conflicting. A RECOVR (IPA,2020) survey reported that since the schools were closed, less than 25% of households with a child in primary or secondary school have been contacted by anyone from their children's school; while a MoGE survey reported that through text messages and calls, almost nine out of ten school administrators kept communication with parents/guardians of learners (MoGE, 2020a).
The findings of the study are categorized and examined based on the three themes:

1. Education technology and digital literacy
2. Internet infrastructure and devises
3. Digital skills

The analysis performed on each emerged theme includes triangulation of data from different sources but excludes material that is not directly pertinent to this particular study.

2. Research outline

ZANEC is a network of Civil Society Organisations (CSOs) supporting the government in the delivery of education. ZANEC currently has 75 Member Organisations (MOs) comprising Community-Based Organisations (CBOs), Faith Based Organisations (FBOs), Non-Governmental Organisations (NGOs), and Teacher Trade Unions. Given the
government's decision to reopen schools, to mitigate the effects of school closure that both teachers and learners are still struggling to keep up with the newly introduced digital learning-based technologies, ZANEC with the support from the GIZ Back-Up Support Program, is

assessing the status of education technology and digital literacy among teachers, learners, and parents in Zambia. The study focuses on three provinces representing urban, peri-urban, and rural schools namely Lusaka, Muchinga, and North-Western province targeting two districts per province. Each district targets three schools, comprising private, public, and community schools totalling eighteen schools.

2.1. Scope of work.

The general scope of work is to assess the Status of Education Technology and digital literacy among teachers, parents, and learners in Zambia with a special focus on:

- identification of various AMEPs being used by education providers amidst COVID-19 and their effectiveness in reaching all categories of learners i.e., urban, rural, girls, boys, different grades, children with disabilities, etc.
- Document good practices used by education providers in the provision of AMEP in Zambia with a focus on Lusaka Province (Chiawa and Kafue districts), Muchinga (Mpika and Chinsali districts), and North-Western Province (Kasempa and Mufumbwe districts) as study areas.
- Analyse the budget allocations, disbursements, and utilization towards COVID-19 mitigation measures that aim to promote AMEP using ICTs and digital means.
- Identify plausible mitigation measures to ensure learners are all accessing learning without leaving anyone behind.

2.3. Methodology

This section will outline methodologies applied to collect and analyse data suitable to generate the deliverables of this study. To allow flexibility to lodge the various areas of research, and for convenience of data collection in the settings of the designated study areas, namely Lusaka Province (Chiawa and Kafue districts), Muchinga (Mpika and Chinsali districts), and North-Western Province (Kasempa and Mufumbwe districts), a mixed methodology approach which included the following methods was used:

Secondary Research

Desk review of primary research studies, addressing questions that are of recognized importance to a phenomenon under the study is essential. They are also important for the avoidance of research waste, by ensuring that new primary research is conducted with full knowledge of what has already been done to produce a new integrated result or conclusion. Desk reviews pertinent to the phenomenon under study are believed to provide a deeper insight were collected from the following sources:

- Information made available from various United nations agencies such as UNESCO, UNCDF, UNICEF, and the World Bank.
- Studies focusing on Zambia's digital literacy knowledge gaps and the digital divide.
- Analysis of qualitative data on digital literacy from government publications, national statistics, and civil society organizations.
- Knowledge about certain demographics and regions via database analysis
- Current news and journalistic publications

- Reports on the subject include digital literacy and digital competitiveness such as the "Digital Economies Score (IDES) 2020," by UNCDF. The Economist's "Inclusive Internet Index 2021" was commissioned by Facebook. ZICTA 2018 national Survey and ZICTA, 2022 annual report. The MoGE and MoHE Education and Skills Sector Plan 2017-2021. International telecommunication Union (ITU) 2021 report.

Interviews and focus group discussions

To enrich available secondary data and further enhance the literature review, eighteen sessions of in-depth interviews with teachers, fifty-four interviews with learners, and three focus group discussions with parents from the selected study areas (provinces) were conducted. The process was helpful to obtain diverse profiles and deep insights from urban, rural, and semi-urban schools; various socio-economic backgrounds, gender, and age.

Interview with experts

Data collected through desk review, Teachers' and learners' interviews as well as focus group discussions with parents, was validated and triangulated by conducting an in-depth interview with nine experts from various ministries and organizations. Experts' discernments, views, and expertise played a vital role in consolidating findings and building up strategies to mitigate existing challenges and problems. As stated in the consent form to respect experts' anonymity, no personal data has been revealed and only their expertise and affiliated organization are provided. Interviews were audio recorded and transcribed verbatim to assist data familiarity.

Subsequently, transcriptions were processed through a four-stage analytic method suitable for thematic analysis (Bryman, 2016), reading and rereading the transcripts, detecting key themes, coding and data analysis. Responses were categorized, and quotes from each interview were utilized to support the themes.

Furthermore, the following inquiry mapping was used to guide the selected research methodology in data collection methods, interpretation of results, identification of various challenges, as well as probable opportunities in areas of education technology and digital literacy.

Table 2.

Inquiry map.

Inquiry Map

Education technology & digital platforms	What Is the extent of education technology development?	is digital educational content available to teachers/learners?	is educational digital content easily accessible?	Can teachers/learners afford to access educational digital content?	Are educational online digital platforms employed efficiently?
Internet Infrastructure & devices	Is a reliable and efficient internet communication available	is internet connectivity reasonably affordable?	Is existing internet connectivity suitable to deliver and receive	Are devices available to teach/learn for the needed time span?	What is the extent of internet coverage?

			educational material?				
Digital Skills	What is the extent of basic skills of teachers/learners to access digital content?	Are learners /teachers capable to participate in online classes?	Is there adequate capacity to communicate between teachers/learners /parents over digital technology	Are teachers capable of creating and sharing digital content	Can teachers /learners search for relevant information for teaching/learning over the internet?	What is the level of awareness of the risks posed on the internet and the ability of protection	Are teachers/learners adequately skilled to use digital technology to critically solve problems?
AMEP	Which AMEPs are available as an alternative to face-to-face teaching and learning.	Do teachers and learners have access to AMEPs if any?	How reliable and efficient are they?	Are they easily available and affordable?	Is there any AMEP that stands above all worthy of further development/enhancement?		

2.4. Limitations of the study

- Key information gaps by experts.
- Limited prior research studies relevant to the study topic.
- Limited understanding of digital literacy and education technology by some respondents.
- Time constraint.
- Although the study delivers comprehensive insights, it does not rely on new primary data.
- Learners from Muchinga Community Schools had challenges expressing themselves in English.

2.5. Results and Analysis

The results and analysis of this study are presented by theme:

- Education technology and digital platforms
- Internet infrastructure and devises,
- Digital skills

The findings are categorized and discussed based on the patterns that emerged, and quotations from the transcripts are used to highlight these themes. These quotations are presented verbatim.
The analysis performed in this chapter includes triangulation of data from different sources but excludes material that is not directly pertinent to this particular study. Furthermore, whenever appropriate, study findings are analyzed against the available literature. Some illustrative quotations generated from interviews are presented and, comments on possible reasons for these results are provided.

2.6. Clause

Interview with learners in Muchinga province was done in the Bemba language and subsequently translated into English. To accurately represent what was stated, certain portions of some interviews have been edited.
Views and comments provided by experts do not represent in any form views and ideas of the organizations to which they are related, rather it is their perspectives.

Theme 1: Education technology and digital Platform

3. Theme 1:

Education technology and digital platform

Today, all facets of modern life have been impacted by information and communication technologies (ICTs). Digital literacy now encompasses a wide range of basic skills, including the use and production of digital media, information processing, and retrieval, participation in social networks for knowledge creation and sharing, as well as a variety of professional computing skills. The COVID-19 pandemic has highlighted the importance of digital literacy in Zambia. Before the pandemic, no significant initiative was taken to improve digital literacy and education technology. E-learning (Electronic learning) is a field that combines teaching theory and computer network technologies to let learners accomplish their coursework through a computer network (Internet or Intranet) (O'Neil, 2001).
Transitioning from a face-to-face learning system to an e-learning platform is not an easy task, it involves organizational, cultural, and educational changes.

Government Initiatives before the pandemic

In 1990 “the world conference on education for all” in which Zambia participated, recommended that all available channels of information, education, and social action be used to convey essential knowledge and inform and educate people on social issues. Education media comprises printed materials- books, journals magazines, and newspapers- and none printed material- much of which is produced or transmitted electronically including through radio and television programs and audio and video programs. Computer and communication technology has enlarged the scope of instructional media, through computer-aided instructions and computer technology. In the 1990s it was assessed that Zambia’s resources do not allow the extensive use of digital and computer technology in the education system, instead, much more attention and investment were directed to the Educational Broadcasting system which comprises radio and television broadcasting as well as audio-visual aids services. Programs and materials were directed to enriching and supplementing the educational experience of those enrolled in the formal system as well as those engaged in distance education programs and none-formal open learning offered through secondary schools.

Radio broadcasting

From the time of its establishment in 1965 until the 1980s, the Zambian radio education broadcasting service used to transmit an average of seventy-five programs per week. An estimated 60% of primary school and 20% of secondary school learners made use of the radio program. In 1975 the Ministry of Education distributed five thousand radio sets to 1500 schools across Zambia. Hence the widespread provision of radios by the ministry contributed to the development of the broadcasting service with the increasing audience. Nevertheless, despite the seemingly great potential of the radio education broadcasting system, the 1980s witnessed a decline in audience and deterioration in the quality and quantity of service provision.
Some of the prominent technologies/ICTs-based education programs implemented over the years are described below.

Learning at Taonga Market

In the early 2000s, to assist children who were unable to attend a regular government primary school, the Zambian Ministry of Education turned to community-based radio schools. These children were unable to attend school for a variety of reasons, including living in rural areas where schools were out of reach, having to assist their families with farming or caring for livestock, being orphaned and responsible for younger siblings, or being unable to afford uniforms and textbooks. Moreover, the lack of qualified trained teachers in rural areas exasperated the problem. In response to these challenges, the Ministry introduced a pioneering interactive radio instruction program (IRI) called "Learning at Taonga Market**."**

The program was based on the national primary curriculum, and it was aired across the country by the national broadcaster of Zambia (ZNBC). Lifeline Energy was involved from the start, enabling hundreds of thousands of learners to listen to the lessons through solar and wind-up radios. Over the years an estimated 800,000 children had participated in *Taonga Market*. Nevertheless, in recent years, as the result of limited resources and a decline in budget allocation to distance and open learning programs by the Ministry of Education, Taonga *Market* has been taken off air nationally. It is estimated that 60,000 children lost their best chance at an education overnight. Subsequently, lessons are now broadcast on community radio stations (Pearson, 2016).

However, the lessons broadcasted by community radios are intermittent and depend on sponsorship from projects by cooperating partners.

The voice of the farmer

In 1969 the Zambia National Farmers Union (ZNFU) launched "The Voice of the farmers," which is a radio program that educates farmers on various agricultural practices and markets. The program still runs on the Zambia National Broadcasting Cooperation's (ZNBC) Radio2.

Tv broadcasting

Educational broadcasting TV service along with audio-visual service commenced in 1967. The system like the radio was active up to the 1980s and used to broadcast between thirty-two and forty-eight weekly TV lessons, with an estimated 1400 viewers across Zambia. In 1975, the Ministry of Education distributed 350 television sets to 180 schools across Zambia. After the 1980s up to the advent of the pandemic, the system deteriorated in quality, service, and audience (EBS). During the pandemic, the Ministry of General Education in partnership with the Zambia National Broadcasting Corporation (ZNBC) established a television (TV) channel dedicated to broadcasting both primary and secondary school lessons in all subjects. These lessons have continued to be broadcasted even after the re-opening of schools.

Private sector participation

iSchool is a start-up business in Zambia that provides e-learning platforms for primary schools as well as private learners at home using tablets. The e-learning products are designed for the Zambian context, cover the entire curriculum from Grades 1 to 7, and are available in English and eight local languages. With its method of instruction, iSchool hopes to foster critical thinking in

children and assist Zambian instructors in eschewing the "chalk and talk" method in favor of one that is more interactive. The inclusive business seeks to link with rural Zambia's public and community schools. iSchool launched the product on the Zambian market in September 2013. This follows an investment of $5.2m to date, three years of hard work since inception, successful not-for-profit pilots in seventeen schools reaching 3,458 children, solid monitoring and evaluation (M&E) numbers demonstrating its impact on children's learning abilities, and several iterations of the product offering.

3.1. COVID -19 pandemic; the value of digital learning in Zambia's educational system and its implementation.

The Ministry of General Education (MoGE) driven by this extraordinary and catastrophic incident effect on the nation's education system, in April 2020 developed its sector response plan steered by the national response plan. The MoGE COVID-19 response and recovery strategy emphasize the continuity of learning as its top priority and offered many options and approaches for delivering education. Nevertheless, due to the lack of appropriate infrastructure, planning, and implementation, very few learners in urban areas have been able to benefit from the program, while the majority of the learner population remained cut off.

> *"Much of the funding that has gone towards mitigating the Impact of COVID-19, has come from foreign sources such as the Global Partnership for Education. We have not mobilized enough domestic resources really to invest in technology, ICTs in digital literacy to ensure that we mitigate the impact of COVID-19 well and good, we developed very good policies that are very inclusive because those were conditions from the global partnership for Education for us to receive the grant from them."*

ZANEC expert

The advantages of teaching computer science in schools and at the national level include, among many others, improved communication, more job opportunities on the global market, a faster pace of economic and social development, and a greater degree of social inclusion for isolated populations, especially rural ones (Kabanda, 2012). Nevertheless, incorporating ICT studies into a school system is not a simple undertaking as it necessitates a large investment in infrastructure, teacher preparation, the provision of instructional materials, and the electrification of schools that are not yet wired into the national power grid (Patrinos, Barrera-Osorio, and Guaqueta,2009).

> *"we are still facing challenges because the First and foremost challenge that we're talking about itself is the infrastructure .....you realize that our rural areas have challenges with*

the gadgets. So, it's very difficult for us to improve on our digital literacy if we don't have gadgets or people do not have gadgets…"

MoT&S expert

One of the major goals of the Zambian National policy on Education is to produce a learner capable of appreciating the relationship between scientific thought, action, and technology on one hand, and sustenance of the quality of life on the other hand (MOE, 1996).
Following the revision of the school curriculum in 2014 the Government of Zambia developed its ICT project that aims to ensure children learn ICTs from primary to tertiary level.

"In 2014, as part of the revised curriculum, the Government made ICT mandatory and examinable. It was just a pronouncement without any material support in terms of computers or laptops, in terms of platform and it was a disaster. So, through our department, we had to jump in, and we tried to mitigate the crisis."

ZICTA expert

"To all schools learning computer is compulsory from grade 5 up to grade 9, and this decision in itself you know it speaks volumes and it was launched in 2014. When it came to writing exams? we had a huge problem."

ZANEC expert

Nevertheless, to this date, the program has many challenges such as access to electricity, a lack of computers to facilitate ICT classes, and a shortage of ICT instructors. Even though learners are tough ICT theory in all schools country-wide, those with access to computers only can do the practical part (Phiri and Phiri,2017).

"As parents, we experienced that learners were affected, usually they are used to having contact with their teachers. Now to study learning using the Internet was not easy because they had not had that knowledge before. So, it was just like something that was imparted on them at a shortest period of time, which wasn't easy, it wasn't easy to say the truth to a parent or even a child to adapt to the different ways of learning at home."

LFG-1

I tried my best to help my children but so many families, very poor couldn't help their children and there was no help or assistance from the school or the GOV. parents are not knowledgeable.

MFG-3

In terms of AMEP availability and readiness to cope with the catastrophic challenges experienced during the pandemic, the Ministry of Education had immense challenges that hindered its implementation It is interesting to refer to the MoGE & MoHE Education and Skills Sector Plan 2017-2021 which highlighted the different challenges AMEP is facing ranging from inadequate infrastructure, lack of professionals, lack of funding and budget, lack of transmission equipment, inefficient management system, etc.

3.2. Open -Access digital education network.

The Ministry of education through the platforms of the Education Broadcasting Services, The Zambian national Broadcasting Corporation, and ZAMTEL, has attempted to build a network for open-access digital education. However, quality of content, geographic coverage, poor infrastructure, and socio-economic challenges have impeded its success.
the Ministry of General Education (MOGE), and the Examinations Council of Zambia, in cooperation with The Zambia Telecommunications Company (ZAMTEL), created an interactive e-learning portal and smart revision platform (ECZ). A virtual library, linkages to specialist services, and other teaching and learning resources were made available on the national e-learning portal to both teachers and learners. On the other hand, the smart revision portal offered ECZ past examination papers, sample answers, and study advice for Grades 7, 9, and 12. In addition, a television channel dedicated to broadcasting primary and secondary school classes in all disciplines had been developed by the Ministry of General Education in collaboration with the Zambia National Broadcasting Corporation (ZNBC). However, a larger percentage of school-age children lacked access to these sites.

"The Ministry of Education owns our Kitwe television studio Including the buildings and the equipment belongs to the Ministry of Education, but the Ministry of education has no interest. We are trying to get them to go into a memorandum of understanding so that we can use television from those studios, the infrastructure is there but I think we have been caught with COVID-19 challenges, but we need to draw some lessons so that we can try to leverage on existing infrastructure ".

ZANEC expert

In view of the above, it is therefore, useful to examine the 2018 ZICTA survey on access and usage of ICTs which was primarily aimed at measuring the progress attained by the country in enhancing the uptake of various ICT products and services by households and individuals. The 2018 survey

found that the proportion of households owning a working television at the national level stood at 37%, out of which63% are found in urban areas while only 15.5 % are in rural areas. When Television ownership is reflected at the province level, Lusaka commands 38%, while Muchinga and NW represent 4% and 3% respectively (ZICTA,2018)
When asked about the efficacy and effectiveness of the educational broadcasting efforts undertaken by the MoGE and other stakeholders, several experts expressed their views and personal experience as follows:

"Let me talk about the television now, the educational channel, which is TV 4 where they gave us space could not be reached without a decoder. It was available on the Top Star channel 9. Now, how many homes have Top Star decoder in the rural areas? They can't. So, it was only for those who have Multichoice or top star decoders. That was a limiting factor."

DODE expert

In terms of radio ownership, a survey conducted in 2018 showed that national level stood at 40% representing 46.8% for urban dwellers and 34.3% for rural. Details at the provincial level are represented as follows: Lusaka at 24%, Muchinga and NW at 5.2%, and 3.5% respectively (ZICTA,2018).
Radio broadcasting on its part had` its challenges and limiting factors that impeded access to the larger population of teachers, learners, and parents:

"Our educational radio, outreach is just here in Lusaka because they have a community radio station license. It's only NBC that is permissible to broadcast as of now until they change the law and other issues or ride on other satellites. It is very complicated to ensure that you reach every corner because even with ZNBC in some remote areas you can't pick the Signal, so you need a lot of investment in the support system for technology to reach out to the small schools, but if you look at our schools, they are everywhere primary rural schools. So how do you reach out where there is no connectivity? It also became a challenge."

DODE expert

"In terms of Radio Zambia has what we call the Education Broadcasting Services, which is a Ministry of Education facility. This facility if it is capitalized, we can broadcast radio programs countrywide. But the problem is it was initially registered as a result community radio station and the previous government could not grant it the permits to be able to air

programs countrywide, and that in itself limits. But what we are fighting now is to ensure that Zambia becomes one of the countries at least which will have a radio that can go countrywide and it's cheap."

ZANEC expert

To alleviate challenges faced by learners, the MoE as a last resort to support learners in remote rural schools introduced the distribution of hard copy self-teaching study kits:

".....most of these rural provinces did not get the support needed so, we gave them old study kits, which are hard copies. These were sent to five rural provinces in six subjects for distribution to the schools so that learners can pick these materials which are self-teaching materials to bridge the gap."

DODE expert

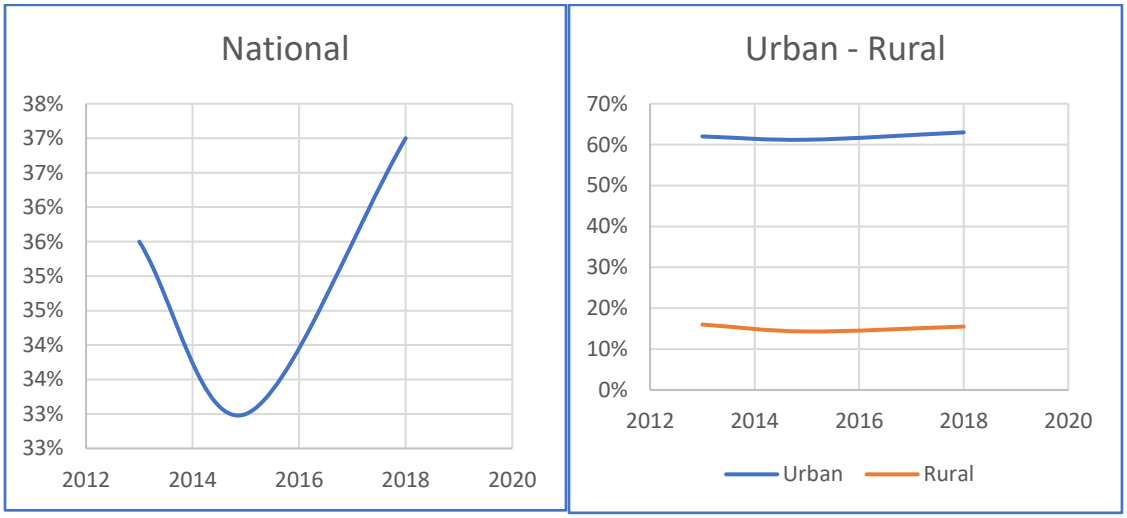

Fig.1. Distribution of ownership of working Television by set by region:2013-2018. (Adapted from *ZICTA 2018 National ICT survey).*

3.3. COVID-19 and social networking

The most popular options for digital learning are social networking such as WhatsApp, Google Classroom trailed by conferencing apps such as Zoom, and Facebook.

In the absence of equitably accessible Governmental public Educational digital platforms in Zambia during the pandemic of COVID-19, social media platforms played a vital role. WhatsApp was the most widely used platform to share educational material between learners and teachers. Out of the eighteen teacher respondents, 39% stated that they used WhatsApp to share educational material between learners and parents, 22% had physical contact with a limited number of learners

responsible to share the material with other learners and 39% had no contact with learners or parents. Nevertheless, 90% of teachers used WhatsApp to communicate with their peers.

"During the pandemic, we actually wanted to come up with some form of eLearning, but then because of some challenges, we weren't able to come up with the work. So, what we were using was,.. we were just using WhatsApp yeah, so we just send the work on WhatsApp and the parents should just be able to copy the work.".

LKT-1

"As teachers, we do communicate between us through a WhatsApp school group."

LKT-3

"I felt bad because the learners were behind. For the learners that are in urban areas, they used to learn through television through online lessons, but we as been at a rural School, our learners were left out because they couldn't they ....we don't have the facility to teach online lessons, so we were left out because of that. So, we had to when .....the government pronounced the schools open we had to like to rush the syllabus in order to cover."

LCT-2

"The school was able to send homework to the children through their parents as work was printed in hard copies, it was not easy to do it."

NWKT-3

"The assignment was given to one learner per group who was to distribute to the friends. For receiving there was a group leader who collects from the group members. The process was a bit difficult."

NWKT-2

"No activities were given to learners during the closure"

NWMT-1

"Communication with learners was difficult because parents had no access."

NWMT-2

Out of 54 learner respondents, only 33% had used WhatsApp to receive their assignments from teachers. 5.5% received their assignment by going physically to school and 22.2% collected their assignment before the school closure and submitted it once schools were reopened. 39% of the learners had no form of contact with teachers or school.

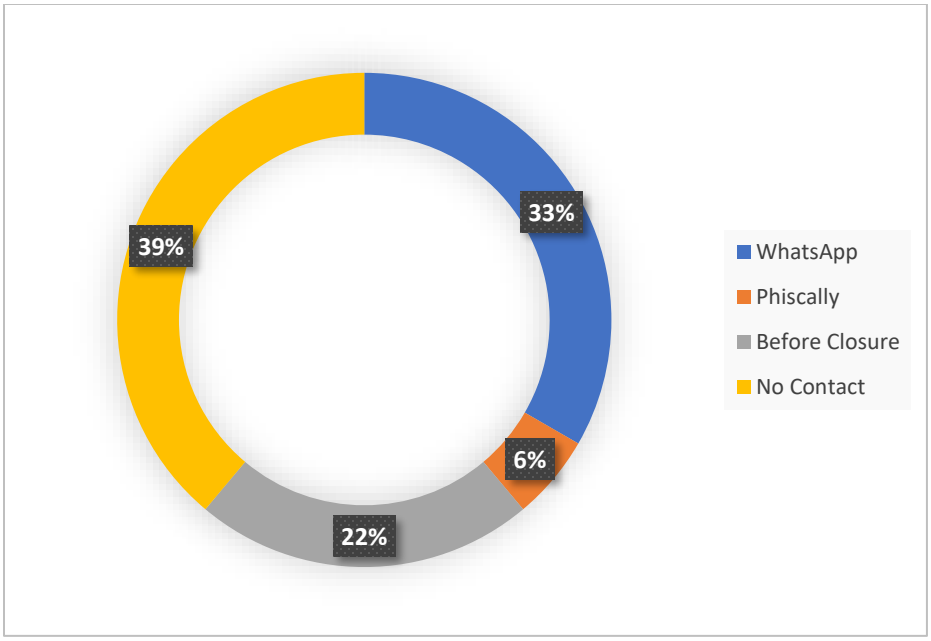

Fig.2. learners' means of communication with school/teachers during Covid-19 school closure

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"Yes I had access to zoom and WhatsApp and I had no problems communicating with my teachers and doing assignments. I used also to communicate with my fellow learners.

LKSP-2

"Teachers used to post assignments on WhatsApp, the challenge was that our friends that had access used to pass the assignment to us who had no access, then once we do the work, they capture it on camera and send back to teachers."

LCSP-2

"We used to communicate on WhatsApp with teachers, but it is very difficult, because not all pupils have mobile phones, laptops, or internet, so it is a challenge.

LCSS-1

"During the pandemic for pupils that have no mobile phones or internet, it was very difficult. You see that when the teacher posts the lesson on WhatsApp. Those that have no access miss the lesson, it was very difficult."

LKSP-2

Theme 2: Internet Infrastructure and devices

4. Theme 2: Internet infrastructure and devices

A vital pillar of the digital economy is the digital infrastructure which it is made of, that is:

a. connectivity (such as fast internet and internet exchange points),
b. the Internet of Things (such as mobile devices, computers, sensors, voice-activated devices, and geospatial instruments),
c. data repositories (such as data centres and clouds) make up the majority of digital infrastructure (The World Bank,2020).

The Eighth National Development Plan (8NDP,2022) for Zambia acknowledges the use of ICTs as a key enabler for digital transformation and innovation of Strategic development areas (8NDP,2022).

However, existing digital inequalities, such as those noted by Madianou (2020), resulted in certain countries performing better than others during the Covid19 pandemic. It is therefore, necessary to have access to this technology to participate in a digital education system.
Even though internet penetration is growing steadily in Zambia, the majority of Zambians have no access to the internet, especially people in rural areas. According to the Zambia Information and Communications Technology Authority (ZICTA)'s 2018 national survey on access and usage of ICT at the individual and national level, the percentage of households with internet access increased from 12.7% in 2015 to 17.7% in 2018. Mobile broadband services used by mobile phone users were the most popular source of internet services for homes. Less than 2.7% of the homes used fixed internet services to access the internet.

In terms of access to computers, there is a very significant disparity between households in rural areas and those in urban areas. In urban areas, 14.7 percent of households had access to a computer, compared to only 2.7 percent of households in rural areas.

There is also a considerable discrepancy in household ownership of mobile cellular telephones across provinces. Specifically, 88.1 percent of urban households own a mobile cellular phone, compared to 61.6 percent of rural households.

In terms of access to electricity, only 32.9 percent of Zambian households have access to power through a utility provider. Only 6% of rural households fall into this category.
Other aspects investigated broadly related to the quality of experience for various ICTs. Several challenges relating to the quality of experience in the course of using ICTs were observed such as, challenges with internet speeds, voice clarity on mobile voice services, intermittent network outages, and dropped calls which are all necessary elements that determine the viability of internet infrastructure.

The UNCDF Inclusive Digital Economies Score (IDES) on infrastructure has four components namely: infrastructure, ID infrastructure, connectivity, ICT usage, and ownership and digital payment, Zambia scored 47% on infrastructure while it scored 32% on ICT usage and ownership (UNFCD,2020). As of June 2020, ZICTA recorded 17.9 million registered SIM cards. This,

however, does not consider multiple phone ownership by individuals, SIM card activity, and overall usage (ZICTA,2021).

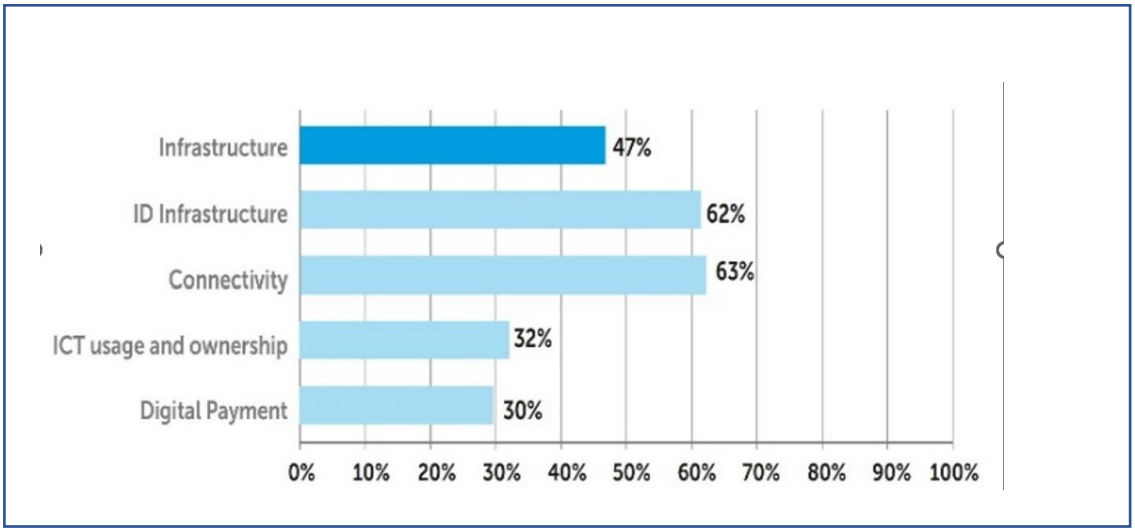

Fig. 3. Zambia IDES infrastructure breakdown. (UNCDF Inclusive Digital Economies Score Zambia,2020).

The Global System for Mobile Communication (GSMA) data on Zambia puts mobile broadband connection at 40 per cent.

Table 2.
2018 access and usage of ICT service across Zambia.

N.	Device/service description	Urban access in%	Rural access in %	National Access
1	Computer	14.7	2.7	
2	TV	63	15.5	
3	Radio	46.8	34.3	
4	Mobile Phone	88.1	61.6	
5	Internet access	31.2	6.6	17.7
6.	Power through utility provider	32.9	6	

Note. *Adapted from: ZICTA 2018 National Survey on Access and Usage of Information and Communication Technologies by Households and Individuals Access*

On the other hand, The Economist's 'Inclusive Internet Index 2021 commissioned by Facebook, which surveyed one hundred countries ranks Zambia 84th globally. Despite improved nationwide internet access, there are still significant differences between provinces. Measured across four

indices; availability, affordability, relevance, and readiness, the country improved across Affordability and Relevance, while recording a decline under Availability and Readiness.

Improvement in subcategories such as Internet quality and digital infrastructure contributed to Zambia's improved overall standing. Zambia ranked 84th overall, 88th in availability (the quality and breadth of available infrastructure required for access and levels of Internet usage); 79th in affordability (the cost of access relative to income and the level of competition in the Internet marketplace); 73rd in relevance (the existence and extent of local language content and relevant content); and 60th in readiness (the capacity to access the Internet, including skills, cultural acceptance, and supporting policy). Zambia's poor performance across all metrics highlights the extent of Zambia's unequal internet usage, underdeveloped internet infrastructure, and limited digital literacy.

Table 3.
The Economist's 'Inclusive Internet Index 2021.

Country Zambia	Global Rank	Availability	Affordability	Relevance	Readiness
2020	88	86	82	87	67
2021	84	88	79	73	60

'The Inclusive Internet Index 2021'(The Economist (2021)

A government policy that was introduced in 2012 as a result of the publishing of the Vision 2030 aimed to provide learners with a strong general education foundation in science and technology as well as a curriculum that incorporates modern teaching approaches. The adoption of ICT in primary schools as part of the updated curriculum is a step in the right direction, nevertheless, its implementation in many schools is limited (Kaumba et al, 2021).

4.1. Current internet connectivity progress across Zambia

Although Zambia has adequate Information and Communication Technology (ICT) policies and laws in place that address internet usage and access, including the Zambia National ICT Policy and the ICT Act of 2009, the Electronic Communication and Transaction Act of 2009, progress in promoting internet connectivity across the country is slow.

A significant portion of the population still lacks sufficient internet connectivity to engage in online learning. The geographic and socio-economic landscape of Zambia makes it challenging to put in place adequate internet infrastructure. Despite government efforts to address this through different initiatives, problems such as access to shared infrastructure, high tax burden and depreciation of the local currency has affected the performance of the various sub-sectors of the ICT sector (ZICTA,2021).

The legal framework on rural connectivity in Zambia was governed by the Telecommunications Act of 1994 which mandates the Authority to ensure the extension of telecommunications services

nationwide. Further the National ICT policy of 2006 provides direction regarding rural connectivity, the provision and access to telecommunication/ICT services (ZICTA,2015).

It is important to note here that the goal of the ICT policy is to integrate ICT in most of the institutions of the sectors of the Zambian economy and develop the nation's research or development capacities to support, facilitate and contribute to the development of all key sectors of the economy including Education.

> *"From the traffic that we see mostly the urban population uses our Internet service more than rural areas the peri-urban are coming up because of the cost of the smartphones, now the cost of smartphones is reducing, so we are noticing that There's a growth also in the peri-urban. But in the rural areas not that much, and sometimes because the number of populations they are small. So, putting up 4G or 3G towers is very expensive, can't be supported by the cost-benefit or return on investment".*

ZAMTEL expert

> *"I think that the main issue here is the coverage for 4G and 3G technologies in terms of providing Internet services to the entire country. Only parts of the country have got access to Internet. This is number one. Then secondly. Most people are not able to afford Smart devices like smartphones, laptops, desktops, and home Internet devices. So, I think those are the two main factors why most people are unable to access eLearning platforms."*

" ZAMTEL expert"

Internet Service Providers (ISP) continue to draw attention to the difficulties posed by the current macroeconomic environment. They highlight that the local currency's depreciation, rising inflation, and high borrowing rates had increased the cost of procuring essential inputs for their operations and constrained their chances of profitability (ZICTA,2020).

"I tried my best to help my children But so many families, very poor couldn't help their children and there was no help or assistance from the school or the GOV."

MFG-3.

Furthermore, a possible abuse of dominance on the part of tower firms was noted. It was observed that tower firms charge exorbitant rates for fiber termination at their locations, which is very expensive and directly affects the affordability for users.

Moreover, the speed and reliable quality of the internet in Zambia is not uniform across all provinces and therefore, insufficient to support digital learning. The largest proportion of internet sites in 2021 continued to be 2G sites accounting for 39.7 per cent followed by 3G sites at 31.9 per

cent. Only 28.4 per cent of the telecommunication sites were 4G/LTE sites. However, the proportion of 4G/LTE sites continued to increase over time, from 2,758 sites reported at the end of 2020 to 3,258 sites reported at the end of 2021 representing an improvement of 18.1 per cent (ZICTA, 2022).

Table 4

2G/3G/4G number of tower comparison by year

Towers	**2016**	**2017**	**2018**	**2019**	**Change 2016-2019**
N. of 2G sites	2697	2990	3412	5081	88
N. of 2G/3G sites	2354	2141	2727	2906	23
N. of 4G sites	192	254	254	202	5
N. of 2G/3G/4G sites	254	803	1212	2316	812
Total 4G	**446**	**1057**	**1466**	**2518**	**465**

Source: ZICTA (2018)

"OK, so like I said, ZAMTEL right now supports 2G which is mainly voice and of course, if you look at it in terms of data it is SMS and USSD, then it also supports 3G technologies Which cover Internet voice as well as SMS, then the 4G, which is high capacity in terms of Internet service provision on the mobile devices as well as on the home devices like routers. only parts of Zambia are covered by 4G".

ZAMTEL Expert

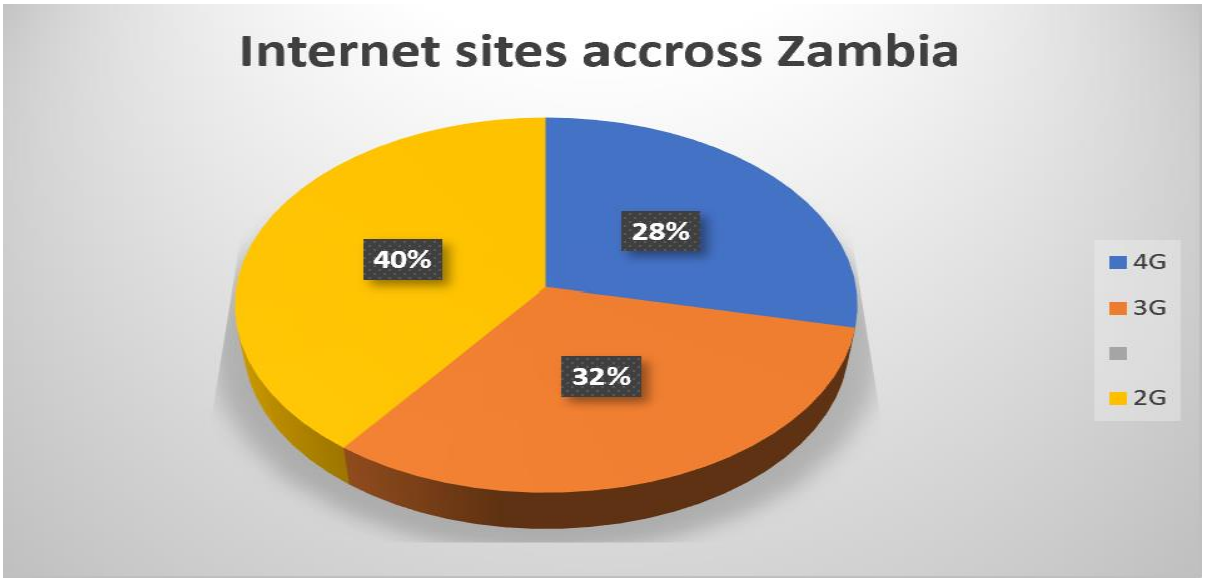

Fig.4. Internet sites across Zambia. (ZICTA,218).

In a bid to complete the Phase II of the SMART Zambia communication tower project which was set to increase geographical network coverage to 92 per cent, the Zambian Government continued to roll out communication towers. Smart Zambia is a division in the Office of the President that is charged with the responsibility of the management and promotion of electronic government services and processes. As at the end of 2021, a total of 823 communication towers out of expected 1009 towers had been constructed and on-air. The initiative was set to improve access to ICT. However, limited coordination amongst government ministries has made it difficult to efficiently map school connectivity.

4.2. Prospects of home learning in rural areas

For the majority of learners, especially those in rural and disadvantaged areas, learning from home is less feasible due to limited access to affordable quality internet and a lack of proper available digital gadgets.
For the majority of rural Learners and their families, digital learning is out of reach due to the expensive cost of the internet and the lack of consistent 4G coverage.

> "*…there are learners who are privileged and parents who are privileged who have got smartphones. Teachers had classes, they were using Zoom, others were using WhatsApp, Facebook to send messages to their learners, so it's only the poorest of the poor the last person in the queue could not get any of these various flexible ways to reach out to the child."*
>
> *DODE expert*

Estimates placed the cost of Zambia's typical consumption bundle at 5% of its Gross National Income (GNI). It was noticed that the average data bundle price was much higher than the UN Broadband Commission's aim of 2 per cent of GNI (ZICTA 2022).

> *"For me, it was very difficult to help the child how to study through the Internet because of lack of bundles Yeah because we were so much affected in so many things. Above all Yes, we are familiar with Internet it became part of our lives but it's expensive It's not every time that you have bundles you give chance to your children to use to attend Zoom classes and so forth. That was the major challenge that we had experienced during the COVID pandemic."*
>
> *LFG-1*
>
> *For me it was difficult to attend lessons, the teachers posts the work, but I don't have phones*
>
> *LKSC-1*

These patterns of unequal access aggravate disparities in education and future chances, particularly for those living in rural parts of the nation.

Even though the recent Covid-19 pandemic has led to a deeper analysis of developing nations' digital landscape, the adoption of technologies faces significant obstacles. The issue of the digital divide has been alluring in today's society, particularly the numerous difficulties that societies encounter in using all the advantages that information and communication technology can offer. Most rural communities lack basic ICT services and risk being left out of the information society. The challenges associated with the isolation of rural populations and underserved areas from ICT resources exacerbate socioeconomic problems including poverty (Aruleba & Jere,2022).

The cost of the internet, lack of devices for internet access, and also the poor quality of internet services in Zambia are major challenges in implementing eLearning (Konayuma, 2015; Mwiinga, 2018). It is important to note that research focused on the digital divide specifically targeting primary and secondary education needs to be undertaken. Interviews and discussions conducted with teachers, learners, parents and experts, and the literature available gave an insight that needs further detailed research.

> *"Well, the digital divide is huge between the urban and the rural, between the poor and the rich, and it is for that reason that we need multi-platforms for. You know digital literacy because we cannot reach everyone using Internet. We cannot reach everyone using television. We cannot reach everyone. You know using radio the unfortunate thing is that although radio is very popular, it is only. In the rural. Areas most households in the urban areas here."*
>
> *ZANEC Expert*

" I think we still have a huge task in terms of coverage, in terms of digital divide, especially in the usage of Internet. Zambia might just cover only 20% of its population. That is my take. Majority of the country doesn't have access to the Internet services, access to devices like smartphones, laptops, desktops just any digital device because most citizens might not be able to afford it."

ZAMTEL Expert

The effects of COVID-19 in Zambia were particularly severe on the most vulnerable, such as those with disabilities and immigrant children, who already face additional risks. This is because their access to education was completely compromised due to the prolonged school closure (World Vision Policy brief,2020).

The Education for All campaign, Vision 2030, the Millennium Development Goals, and the Sustainable Development Goals underline Zambia's inclusion policies which aim to increase access, participation, and achievement for all learners including children with disabilities.

COVID-19 has forced governments to rapidly roll out or scale-up remote learning programs and the ideal pre-conditions for such a rapid roll-out was+ not put in place across most countries. The efforts that were made to find alternative means for children to continue learning during the COVID-19 pandemic through digital access to learning materials, radio and television, and distribution of printed material, though commendable, the content was not adapted to enhance accessibility by children with disabilities. Children with disabilities felt more acutely the negative effects of learning disruption. Hence, these children with disabilities must continue to work twice has hard as able-bodied learners for them to progress with their learning both at home and in school and acquire the foundational skills of numeracy and literacy and progress upwards in their education journey.

It can therefore, be noted that even though Zambia had relied on existing technologies to reduce learning loss during the COVID-19 pandemic, the digital divide between students in terms of equipment access, electricity, internet access, instructor skill, inadequate infrastructure, and platforms has further widened the achievement gap, particularly for students with disabilities who face extra challenges of access to digital course materials.

Theme 3: Digital Skills

5. Theme 3: Digital Skills

The knowledge and abilities required for an individual to be able to use ICTs to accomplish goals in his or her personal and professional life, are collectively known as Digital skills. Digital skills are therefore, a mix of behaviors, expertise, knowledge, work habits, character traits, dispositions, and critical understanding of ICTs. Thus, they encompass not just technical skills but also cognitive skills and non-cognitive soft skills like communication and interpersonal skills (Commission on Science and Technology for Development, 2018).

The 7NDP aimed to have information and communications technologies (ICT) mainstreamed in schools. Therefore, the new competency-based national curriculum had made ICT a compulsory subject at the Junior secondary school level (Grades 8 to 9). However, the majority of schools lack proper access to digital devices and internet connectivity, and teachers have limited digital literacy and ICT competencies. Additional severe concerns that need immediate action are the general quality of education as less than one-third of learners pass their Grade 12 exam (IBRD,2020).

A study conducted by Pamulo et al.(2019) conducted in Western Province Mwandi, revealed that due to insufficient infrastructure in schools such as teachers' limited knowledge of computers and lack of interest, inadequate ICT facilities, and equipment; lack of time to teach computer studies, a large learner teacher ratio, lack of trained teachers, lack of technical support to maintain and upgrade computer equipment and limited financial resources has immensely contributed to the current level of inadequate digital skills.

5.1. Levels of digital skills

Even though learners have tremendous potential for digital learning, they don't possess digital skills to prepare them to confront the digital world.

Zambia needs to ensure that learners passing through the education system are equipped with fundamental numeracy and literacy abilities, otherwise, it will not fully reap the benefits of digital transformation or achieve its 8NDP (2022-2026) of enhancing strategies and programs in digital capacity and digital skills. Nevertheless, there is still room to improve the use of digital tools for education policy development, monitoring, and evaluation, teacher training, and access to modern education materials (IBRD,2020).

> *".. most learners are very good, and they quickly pick the skills of digital literacy. Teachers, It's a mixed feeling, those who were trained many years ago are still behind with digital literacy but these ones who are now the new teachers of the 21st century, they have the skills and if trained they can easily teach".*
>
> *DODE expert*

When teacher respondents were asked about their online teaching experience and if they have attended any formal ICT course, all eighteen respondents from the three study areas confirmed that they had no experience in online teaching. Concerning attendance of formal ICT courses, 33%

attended formal ICT training (17% from Lusaka province, 11% for Muchinga, and 5% from NW provinces). All teacher respondents own a smartphone while only 11% own both a smartphone as well as a laptop. In contrast, out of 13 parents' focus group participants, 69.2% had formal ICT training.

In the 2011 ICT Strategic Plan, the Ministry of Education recognized the need and importance to install computer labs across schools that were accessible to learners in both rural and urban areas. Nevertheless, the underfunded Zambian educational system poses considerable challenges to equip the school with appropriate computer labs. (Nyemba,2020).

On the question of school computer lab availability, out of the eighteen schools sampled only one-third of the schools had computer labs (MOE expert,2022).

5.2.Challenges of digital learning adaptation

Many learners find it difficult to adapt to this new style of digital learning, further challenges lay on the fact of the inability of parents to assist them.
Over the past few years, Zambia has made great progress toward digital transformation. While there are still major gaps in digital skills and digital entrepreneurship, progress is notably visible in digital infrastructure, financial services, and platforms.

for Zambia to utilize digital technologies as a transformation tool more effectively, teachers, students, parents, individuals, businesses, and the government must all possess the necessary digital skills. Zambia has not advanced as much in this area.

> *"So, when it comes to our citizens, I would say we haven't done much in ensuring that our citizens come on board in terms of digital literacy because we haven't introduced deliberate programs in order for the masses to come on board. So, we are trying to bridge that gap to ensure that a lot of teachers are also trained in ICT utilization so that we can impart ICT knowledge or digital literacy to our to our learners."*
>
> *MOE expert*

5.3. Teachers transition towards the digital world

Government initiatives aimed at supporting teachers transition towards the digital world are inadequate and lack a framework and proper planning.
The Digital Transformation Centers (DTCs) Initiatives were introduced by the International Telecommunication Union (ITU) and Cisco during the ITU World Telecom conference in Budapest, Hungary, in September 2019. The projects aim to establish international networks of Digital Transformation Centers (DTC), the main goal of which is to provide citizens of the countries chosen for the program with basic and intermediate levels of digital literacy. One of the four (4) African nations chosen for the Digital Transformation Centers (DTC) Initiatives is Zambia (ZICTA,2020).

The International Telecommunication Union (ITU) World Telecom and its Partners will support the execution of the Digital Transformation Centers (DTCs) Initiative, Phase 1 Programme, which began in January 2020, for an initial duration of eighteen (18) months. The program includes a significant amount of training for trainers sessions to enhance the capacity of citizens, teachers, public servants, and other groups. Nevertheless, expert respondents in the field when asked about the issue reported the following:

> *" So, the Smart Zambia institute in collaboration with the Ministry of Education and the ICT College In Ndola we were supposed to train about 10,000 teachers for about 10 years. We surveyed schools and got a list of those who would require training. However, the catchment was those teachers who applied and those who qualified for that particular year were supposed to be recruiting one thousand teachers, but we haven't managed, the only number that I can remember that has graduated this far is last year was seven hundred out of the targeted 10,000. There have been a number of issues of course."*

MOE expert

> *"If you look at government schools, majority don't even have computers. Even access to Internet, so it makes it very difficult. Even in the COVID pandemic era even if those platforms were there, I'm not sure how the learners and teachers would have been able to implement. …if we were able to make people aware of the advantages of using these digital platforms it would be different. So, in terms of teachers, parents, and learners, I think we still need to…..the government needs to put in place, I think certain policies or deliberate policies to make sure that parents, school going children and teachers especially be educated in terms of usage of these devices".*

ZAMTEL expert

Individuals' advanced ICT skills were noticeably lacking, with the majority displaying only basic abilities. Gender disparities in ICT access and use among households and people must be addressed. According to ZICTA's 2018 ICT national Survey, access to the internet in Zambia is quite low at 14.3 per cent. The per centage of women's access is even lower at 12 per cent compared to 17 per cent for men. Women use mobile devices less frequently than men do, and fewer of them own smartphones and mobile devices. Adequate and significant empirical studies need to be conducted to determine the cause of women's less access to digital infrastructure.

6.0.Key findings

This is a qualitative exploratory study aimed at assessing the current education technology and digital literacy status among teachers, learners, and parents in Zambia in light of the COVID-19 pandemic. A qualitative exploratory approach is appropriate for investigating new phenomena, as it investigates a problem that is not yet clearly defined (Saunders et al., 2007).

To effectively evaluate the digital literacy landscape multiple variables that influence the educational environment such as the learning system, teacher-student parent interaction, level and awareness of digital literacy, digital devices used, existing digital infrastructure, inventory of digital skills, government policies and legislations, and so many other variables determine the shape of an educational digital system need to be considered.

6.1.Education technology and digital Platform

What Is the extent of education technology development?

The COVID -19 pandemic has highlighted the importance of digital learning in Zambia's educational system, but its implementation has been impeded by a lack of a framework, suitable infrastructure, resources, the necessary digital skills, and awareness. Learners across Zambia have struggled to adapt to the compounded obstacles and challenges as a result of lockdown and school closure. They were disproportionally affected in terms of access to technology, digital device availability and connectivity, geographic isolation, socio-economic problems, and inadequate digital literacy.

In such a challenging situation, the absence of equitably accessible Governmental public educational digital platforms, social media platforms played a vital role. WhatsApp was the most widely used platform to share educational material between learners and teachers. Out of the eighteen teacher respondents, 39% stated that they used WhatsApp to share educational material between learners and parents, 22% had physical contact with a limited number of learners responsible to share the material with other learners and 39% had no contact with learners or parents. Nevertheless, 90% of teachers used WhatsApp to communicate between them.

Can teachers/learners afford to access educational digital content?

During the COVID -19 pandemic and beyond another major element identified as a barrier, by teachers, learners, and parents to engage in educational digital platforms is the affordability of the internet connection. To assess the country's service providers' ability to compete, benchmarking was done on the cost of data bundles and average usage bundles made up of voice and data minutes. The assessment considered a data bundle with at least a 2GB monthly bundle and a data and voice bundle with at least 150 minutes, 70 SMS, and 1.5 GB valid for a month. When compared to fourteen other nations, Zambia came in sixth (sixth) in terms of the cost of a monthly data bundle, demonstrating the competitiveness of the nation in terms of affordability. Nevertheless, in Zambia, the cost of the typical consumption bundle was calculated to be 5% of the nation's Gross National

Income (GNI) It was noticed that the average data bundle cost was much higher than the UN Broadband Commission's aim of 2 per cent of GNI (ZICTA,2021).

Country Name	Price 2GB Data Monthly Validity (USD)	Rank	Price of Data and Voice consumption Bundle as % of GNI	Rank
Zambia	**3.060506**	**6**	**5.072835**	**9**
Angola	3.798887	7	2.130217	2
Botswana	13.99472	15	2.593335	4
DR Congo	0.285785	1	2.16719	3
Eswatini	9.803922	13	4.542579	8
Kenya	2.585445	3	3.536944	5
Lesotho	8.402187	11	21.31054	15
Madagascar	4.849162	10	8.051278	12
Mozambique	4.394485	9	18.88168	14
Namibia	13.12958	14	3.71815	7
Nigeria	2.630298	4	1.843667	1
Rwanda	2.367684	2	5.804454	11
South Africa	9.751309	12	3.537518	6
Tanzania	4.003418	8	5.719271	10
Uganda	2.922581	5	14.81587	13

Fig 5. Regional Benchmarking of Data and Voice Bundles price in respect to GNI (Source: ZICTA Annual Report 2021).

Most teachers, parents, and learners in all three study areas reported that affordability to access digital content was challenging. The major barrier to accessing radio digital content is the fact that the current EBS radio station license is a community license authorized to broadcast only in Lusaka and its surroundings.

"Let me talk about the TV , the educational channel, which is TV 4 where they gave us space could not be reached without a decoder. It was available on the top star channel 9. Now how many homes have got Top Star decoder in the rural areas? They can't. So, it was only for those who have multichoice or top star decoders. That was a limiting factor."

DoDE expert

" our friends that had access used to pass to us who had no access the assignment, then they capture our work and send our work back to teachers."

LCSP-2

"For me It was very difficult to help the child because of lack of bundles. Yeah, because we were so much affected in so many things. Yes, we are familiar with Internet but it's expensive It's not every time that you have bundles you give chance to your children to use to attend Zoom classes and so forth. That was the major challenge that we had experienced during the COVID pandemic".

LFG-2

6.2.Internet infrastructure and devises

Is reliable and efficient internet communication available in Zambia?

Digital infrastructure is a key tenet of the digital economy. The majority of digital infrastructure is made up of connectivity, the internet of things, and data repositories (The World Bank,2020).

Even though the Zambian Government through its 7NDG 2017-2021 Implementation Plan aimed to have information and communications technologies (ICT) mainstreamed in schools, and the revised competency-based national curriculum has made ICT a compulsory subject, broadly speaking in terms of adopting ICT as mainstream into the education system the plan has missed its target. The majority of schools lack proper access to gadgets, and internet connectivity, and teachers are not adequately trained when it comes to using ICT for teaching and learning. Additionally, there are severe concerns about the general education system's quality; for instance, less than one-third of learners pass their grade 12 exam (IBRD,2020)

Gap	Indicators	Value	Source	Potential policy target	
Infrastructure	2G population coverage (%)	93	2018	98	
	3G population coverage (%)	53	2018	95	
	4G population coverage (%)	43	2018	70	
	Per cent of districts with fiber(%)	80%	ZESCO	100	

Fig 6. Policy indicators against policy targets. IBRD(2020).

Is existing internet connectivity suitable to deliver and receive educational material?

The speed and reliable quality of the internet in Zambia is not uniform across all provinces. It is insufficient to support digital learning. The largest proportion of internet sites in 2021 continued to be 2G sites accounting for 39.7 per cent followed by 3G sites at 31.9 per cent. Only 28.4 per cent of the telecommunication sites were 4G/LTE sites. Adequate internet technology and connectivity capable of handling educational digital platforms and content are 3G and 4G. 2G technology is capable of handling only voice, SMS and USSD.

> *" ... ZAMTEL right now supports 2G which is mainly voice and of course, if you look at it in terms of data it is SMS and USSD. Then it also supports 3G technologies Which covers Internet voice as well as SMS, then the 4G, which is high capacity in terms of Internet service provision on the mobile devices as well as on the home devices like routers. only parts of Zambia are covered by 4G".*
>
> *ZAMTEL expert*

Availability of computer lab, Internet connection, and ICT teachers.

The use of computer-based communication that is included into the regular educational process in the classroom is referred to as information, communication, and technology (ICT) integration in education. Teachers are viewed as the essential players in implementing ICT in their regular classroom settings and training pupils for the contemporary digital environment. This is a result of ICT's ability to provide an active and dynamic teaching-learning environment (Arnseth & Hatlevik 2012). However, some of the essential elements required to successfully undertake such activity are the computer lab equipped with necessary gadgets and technology.

The study found that out of eighteen schools sampled one-third have computer labs. Forty per cent of schools in Lusaka and 60% of schools in NW provinces have internet connectivity while in Muchinga no sampled school has an internet connection. 66.6% of schools in Lusaka, 83% in Muchinga, and 50% in NW provinces schools have ICT teachers. However, these teachers are not professional ICT teachers, their main mandate is to instruct other subjects.

Interestingly in the data reported we can observe that schools sampled in Muchinga province have no internet connection, nevertheless, the province retains the highest number of ICT teachers.

At Lusaka province district if Chiawa LCT-2 reported that " *ICT teachers are teachers that have basic computer skills, but their main role is to teach other subjects but have interest in the ICT subject and are willing to help"*. Hence, the lack of specialized ICT teachers, proper digital labs with appropriate equipment, and Internet connectivity forces schools to teach only theory.

Table 5.

Schools with Computer lab- Internet connection and ICT teacher

Province	Computer Lab	Internet connection	ICT Teacher
Lusaka	2	2	4
Muchinga	2	-	5
NW	2	3	3
Total	**6**	**5**	**12**

> *We have a single teacher that teaches ICT and also business studies for the whole school. Sometimes due to short time, he schedules classes even on Saturday and Sunday, but many learners miss class because they go to church"*
>
> *LKSC-1-2-3 1*

6.3.Digital Skills

What is the extent of basic skills of teachers/students to access digital content?

According to the ZICTA 2018 national ICT survey, in Zambia, only 6.8% of people claimed to be computer literate. The majority of people had fundamental computer skills and mostly used computers for undertaking basic tasks. Few people possess advanced ICT skills, the majority had the most basic ICT abilities. When it comes to gender distribution male respondent has more skills than female.

When teacher respondents were asked about formal ICT courses studied, out of the eighteen teachers sampled only 33.3% had formal basic ICT training. At the provincial level out of the six teachers sample per province, Lusaka reported 50%, Muchinga 33.3%, and NW 16.6 %. When Teacher respondents were asked about their online teaching capabilities none of the sampled respondents reported that had online teaching experience.

Learners respondents due to the immense barriers faced at school, geographic location, digital divide, and financial constraints, reported that all have only basic digital skills. The current digital

skills inventory of Teachers, learners, and parents is inadequate to participate in a digital learning platform.

These findings are consistent with the overall ZICTA 2018 national ICT survey that only 6.8% of people claimed to be computer literate. The majority of people had basic computer skills and mostly used computers for undertaking simple tasks. Few people possess advanced ICT skills, the majority had the most basic ICT abilities. When it comes to gender distribution male respondent has more skills than female.

6.4 AMEP

The Ministry of education Directorate of Open and Distance Education (DODE) has the mandate to Increase access to, and participation in education and training, and to provide lifelong learning opportunities for school children, youths, and adults. The target group of the program is The target group learners are:

- The dropouts from school
- The push-outs from school (Children pushed out from the school system during the transition from one level to another due to lack of space availability, socio-economic reasons, etc.).
- The never been to school

As a result of the various socio-economic factors leading to school dropouts, the Zambian education system is pyramidal, showing more learners in lower grades and fewer at the senior secondary level. Some of the reasons that led to children's school dropout are:

- Early marriages
- Teen school support (a wide variety of educational services, educational resources, and emotional support provided to learners at school).
- Pregnancies
- Lack of sponsorship
- Long distance to schools from home
- Inadequate learning space
- Death of sponsors(Parents/Guardians)
- Sickness/illness

Zambia has about 857,576 out-of-school children(Unicef,2018). The figure 857,576 is a challenge to all of us We are responsible enough to ensure the number is reduced. If not the challenges will continue in our communities. Some of the negative effects of school dropout high rate of crime, lower earnings Increased dependence syndrome, and high social costs on the government. To mitigate the negative effects of school dropouts DODE has developed education programs known as Alternative Modes of Education Delivery (AMEP). The Program is composed by:

- Distance learning
- Secondary education and skill training
- Educational Broadcasting Service (EBS) is available on radio and television.

Role of AMEP during the CVID-19 pandemic.

Even though the Ministry of General Education (MOGE), and the Examinations Council of Zambia, in cooperation with The Zambia Telecommunications Company (ZAMTEL), deployed several AMEP alternatives such as the interactive e-learning portal, the smart revision platform a virtual library, a television channel dedicated to broadcasting primary and secondary school classes in all disciplines and a radio station to both teachers and learners a larger per centage of school-age youngsters lacked access to these sites. Some of the barriers to accessing these AMEPS include geographical location, affordability, and coverage. When learners, parents, and teachers were asked about the role of the AMEPs during the pandemic, except for an insignificant number of respondents all others reported that no significant AMEP program was available for them

7. Recommendations

In light of the research findings the following recommendations are proposed:

- Encourage the development and teaching of inclusive, sustainable, and differentiated digital skills. Instead of using a "one-size-fits-all" strategy, teachers must use diversified teaching strategies based on the requirements of their students. This is crucial for Learners with special needs and underserved low-income and off-grid provinces. Develop assessment tools to continuously track the progress of digital literacy and assist in terms of training and material.
- In collaboration with partners, an all-inclusive digital learning content aligned to the national curriculum needs to be developed. Content should be accessible to children with disabilities, for instance by incorporating sign language, audio, and bigger fonts.
- Develop policies for learners with disabilities (and broader inclusion) and offer financial incentives to help underprivileged communities. This might incentivize the private sector to provide services for teachers, learners with special needs, low-income people, and off-grid areas.
- Mobile phones being the most widely used devices by teachers, parents, and learners to access the internet, learning platforms, and interfaces need to be optimized for mobile phone use.
- The development of blended learning technologies that maximize the advantages of both face-to-face and technologically based learning methods can improve overall learning outcomes. Clear guidelines that assist the progressive adoption of digital learning, especially in areas where learners have little access are required.
- Engage teachers and learners in digital learning content development as important aspects aligned to their needs may be missed.
- A proper evaluation of the level of digital literacy skills of teachers, learners, and parents is needed before policies and mitigation strategies are drafted. Digital evaluation is a complex process as it involves complex variables and needs a digital skills assessment framework. The framework should include:
  1. Identification and review of core skills/ competencies levels.
  2. self-assessment of teachers/learners

3. Analyse skills gap report analysis.
4. Identification of inconsistencies and subsequently develop learning and development actions
5. Constant Monitoring and evaluation.

- To increase equitable internet access, improve existing infrastructure in collaboration with the private sector.
- Customize digital and distance learning activities to the requirements of specific provinces. Locations with poor internet connectivity should be compensated with alternate methods such as offline content, TV broadcast, or Radio.
- Upgrade the existing EBS community radio license to national status and upgrade existing infrastructure and equipment by engaging partners and the private sector to expand coverage and outreach. In Zambia Radio is the most feasible mode of distance learning dissemination.
- Develop content suitable for TV broadcasting to be included in the national broadcasting system. Relying on decoders provided by the private sector is a barrier and exclusion mechanism for the needy and disadvantaged.
- Coordination and participation of different ministries and organizations are required for the effective delivery and implementation of ICT programs.
- Capacity building of teachers on ICT and use of ICT, distance learning, and online teaching for pedagogy through pre-service and in-service training and continuous professional development opportunities.
- Develop training sessions with a focus on improving the fundamental digital abilities of younger pupils, particularly those who are vulnerable and marginalized, such as girls and students from remote regions.
- Awareness through training sessions to both teachers and learners about the risks and responsibilities of using the internet and digital content to decrease vulnerabilities and exposure risks.

8. Annexes

Annex I
TEACHERS' QUESTIONNAIRE

Province_____ ***District_____***

School name_____ ***Participant Code_____*** ***Date_____***

Demographics				
Gender	*Male*	*Female*		
Age				
Marital status	*Single*	*Married*	*Widowed*	
The highest Education level attained	*Years of experience as a teacher*			
Title				

Introduction

We appreciate you taking the time to speak with us now. We will ask you some questions about your home-schooling experiences when your school closed due to the COVID-19 global health emergency. I'd like to say something before we get started.

- *We're curious about your experiences so that we can improve our ability to assist students in learning at home during school closures.*
- *There are no correct or incorrect responses to questions.*
- *We will not share your name, or any other personally identifying information, with other teachers, school staff, parents, or anyone else.*

Do you have any questions before we start?

Question about digital skills

	Knowledge			**Usage**				
	Very low level	Low level	High level	Very high level	Very low level	Low level	High level	

Information and Digital literacy

1. Are you familiar with Internet browsing tools and undertake basic tasks such as retrieving browsing history?
2. Can you easily access different Search engines such as Google, Wikipedia ..etc. on different devices such as PC, tablets, smartphones, etc., and locate relevant information?
3. Are you familiar with digital tools to select, organize and classify information from the internet?
4. Have you attended formal computers/ ICT training? (If yes) can you explain the level?
5. Do you own any digital devices such as Pcs, laptops, or smartphones?
6. Does your school use any learning system platform such as google classroom?
7. Do you employ e-learning in your school activities?
8. Does your school have an ICT teacher?
9. Does the school have a computer lab? If yes is this lab well equipped and well utilized in using technology to influence education?
10. Is computers/ICT training included as a subject in the curriculum? If yes, How would you evaluate it?

Communication & collaboration

11. What is your online communication capability with members of the education sector using forums, instant messaging, chats, etc.?
12. How would you explain parents' involvement and awareness in their child's digital literacy participation? do they support them? Do they consult with teachers?
13. Does the school provide any formal online teaching training/orientation?

14. Do you have any experience in online teaching? If yes, Which electronic materials and tools do you use in your teaching?

15. Can you explain to me what was your teaching experience during the pandemic? Is there any good practice you consider having been taken by the school at the time?

16. Does your school have internet access? If yes, how often do you use it?

17. How did you send and receive activities/tasks for learners to do at home? Was this process easy, difficult, or inconvenient?

Creation of digital content

18. Are you equipped with Tools to create educational videos, infographics, presentations, and interactive graphics?
19. Can you develop timelines and learner assessment systems?
20. Are you aware of the advantages and risks involved in creating and managing digital content?

Security

21. What is your knowledge about the protection of digital devices, files, and passwords?
22. Are you familiar with the Legal and ethical aspects of ICT use, safety, and privacy?
23. Do you consider yourself someone that uses digital content responsibly and ethically?
24.

Problem resolution

25. Do you have basic maintenance skills for computers, tablets, etc. to avoid problems?
26. Are you capable of assisting a diverse set of students in a classroom from an inclusive perspective using digital tools?
27. Are you familiar with digital peripheral equipment connectivity and compatibility?
28. Do you have any additional comments that you would like to add?
29.

Conclusion

We appreciate you taking the time to share your thoughts with us. Your feedback and suggestions will serve to improve at-home learning for you and other teaches

LEARNERS' QUESTIONNAIRE

Province_____ ***District_____***

School name_____ Participant Code_____ ***Date_____***

Demographics			
Gender	Male	Female	
Age			
School Grade			

Introduction

We appreciate your taking the time to speak with us now. I will ask you some questions about your home-schooling experiences when the school closed due to the COVID-19 global health emergency. I'd like to say something before we get started.

- *We're curious about your experiences so that we can improve our ability to assist students in learning at home during school closures.*
- *There are no correct or incorrect responses to these questions.*
- *We will not share your name, or any other personally identifying information, with your teachers, school staff, or anyone else.*

Do you have any questions before we start?

Question about digital skills

Knowledge				**Usage**		
Very low level	Low level	High level	Very high level	Very low level	Low level	High level

Information and Digital literacy

1. Are you familiar with Internet browsing tools and undertaking basic tasks such as retrieving browsing content?
2. Can you easily access different Search engines such as Google, Wikipedia, etc. on different devices such as pc, tablets smartphones, etc., and locate relevant information?
3. Do you own any digital devices? If yes can you explain the type?
4. Are you familiar with digital tools to select, organize and classify information from the internet?
5. Do you have an ICT teacher at school?
6. Does the school provide computer/ICT classes or training? If yes do you think it is adequate for your digital learning?
7. Do you have internet access at school?
8. Do you have a computer lab at school? If yes is the lab well equipped and well utilized by students?

Communication & collaboration

9. Do you use online communication with your teachers, fellow students, and parents using instant internet messaging, chats, etc.? If yes, Which electronic materials and tools does your teacher use in your lessons?
10. Did you feel connected to people from your school when school was closed due to the Covid 19 pandemic? (Examples of possible prompts include: classmates? Teachers? (If yes) How were you communicating with those individuals?
11. Tell me about your learning experience during the pandemic. Is there any good practice you consider being undertaken by the school at the time?
12. Is there anything your school or teachers did to help you stay connected more effectively?
13. What activities and assignments did your school provide you with during the closure?
14. Were you doing the assigned activities? If not, Why?
15. How did you receive and send assignments,/tasks you were to do at home? Was this process easy, difficult, or inconvenient?
16. What do you think about the different types of AMEP aired during the school closure by the Ministry of Education such as on TV4, and radio broadcasts? Were they useful? If not, why? (Probe: encourage him to express himself what he thinks about the programs).
17. Tell me about your parents' support in your digital learning process.

Security

18. What is your knowledge about the Protection of digital devices, files, and passwords
19. Are you familiar with the Legal and ethical aspects of ICT use, safety, and privacy?

Problem resolution

20. Do you have basic maintenance skills for computers, tablets, etc. to avoid problems?
21. Are you capable of assisting your fellow students with disabilities and others in the classroom to solve digital problems?
22. Are you familiar with digital peripheral equipment connectivity and compatibility?

23. Do you have any further comments to add or any suggestions you believe could improve your digital literacy?

Conclusion

We appreciate you taking the time to share your thoughts with us. Your feedback and suggestions will be utilized to improve at-home learning for you and other students.

Experts' questionnaire

Province_____District_____Town_____
Organization_____ Participant Code_____ Date_____

Demographics				
Gender	*Male*	*Female*		
Age				
Marital status	*Single*	*Married*	*Widowed*	
The highest Education level attained				
Organization				
Title				

Introduction

We appreciate you taking the time to speak with us now. I'd like to say something before we get started.

- *We'll ask you a few questions about, your experience with home-schooling when the school closed due to the COVID-19 global health emergency.*
- *We're curious about your experiences with education technology awareness and the digital literacy level of teachers, parents, and learners so that we can improve our ability to assist students in learning at home during school closures.*
- *There are no correct or incorrect responses to these questions.*
- *We will not share your name, or any other personally identifying information, with teachers, school staff, or anyone else.*

Do you have any questions before we get started?

Questions

1. Concerning primary and secondary learners as well as parents in the context of Zambia, is digital literacy in education important for them in their everyday life?

(If yes)

   i. Can you please comment on which Digital Literacy(DL) competencies are required in education?
   ii. What specific ICTs are required in education?
   iii. What ICTs do people generally use in their everyday life, inside and outside of work and schools?

2. Looking ahead to the next 3 to 5 years, do you think there will be increased demands on the DL competencies of youths and adults in Zambia?

   (If yes),

   i. What advances do you foresee?
   ii. Can you please elaborate on what these digital competence demands will be?

3. DL frameworks can be used for different purposes, such as to guide training provisions, and staff selection in employment situations, or to engage in entrepreneurial innovations. Are you aware of any digital literacy frameworks used in Zambia that you are professionally active in or familiar with?

   (If yes),

   i. how many frameworks are operating in Zambia with which you are most familiar?
   ii. What are the sources of these frameworks? Do you know how these were developed?
   iii. Which demographic group and economic area(s) do(es) the framework(s) target and what are is (their) purpose(s)?
   iv. How /are these frameworks being used in everyday practice?
   v. Do you think that the DL competencies of the majority of the youth and adult populations in Zambia are adequate concerning the Southern region of Africa?

4. How do you perceive the digital divide if any in Zambia?

   i. What is your suggestion to incorporate ICT use for disadvantaged and special needs learners into teacher professional development activities? Can you give some examples of these activities that work best?
   ii. Are there successful examples of how ICTs have been introduced and maintained in schools?
   iii. Are you familiar with any education policies currently in place that address ICT-related issues?

5. Do you think that Zambia possesses suitable education technology to support teaching and the effective day-to-day management of education institutions?

   (If yes)

i. Can you elaborate on the current education technology infrastructure in terms of hardware, software, digital resources, and services?
(If no),
ii. What do you suggest it would be done?

6. What was your personal experience concerning children learning during the pandemic of covid-19?
7. Is there anything else you'd like us to know, or are there any questions you thought we'd ask but didn't?

Conclusion
We appreciate you taking the time to share your thoughts with us. Your feedback and suggestions will be utilized to improve at-home learning for our learners and teachers.

FOCUS GROUP DISCUSSION QUESTIONNAIRE

Province _____ ***District_____***

School name_____ Participant Code_____ ***Date_____***

Demographics				
Gender	*Male*	*Female*		
Age				
Marital status	*Single*	*Married*	*Widowed*	
The highest Education level attained				
Profession				
Title				

Introduction

- *We appreciate your taking the time to speak with us now. We'll ask you some questions about your home-schooling experiences when schools closed due to the COVID-19 global health emergency. I'd like to say something before we get started.*
- *We're curious about your experiences, education technology awareness, and digital literacy level so that we can improve our ability to assist students in learning at home during school closures.*
- *There are no correct or incorrect responses to these questions.*
- *We will not share your name, or any other personally identifying information, with teachers, school staff, or anyone else.*

Do you have any questions before we begin?

Question about digital skills

	Knowledge				**Usage**			
	Very low level	Low level	High level	Very high level	Very low level	Low level	High level	

Questions

1. Do you know how to use computers and office programs (word, ppt, internet, etc.)?

2. Have you ever attended any formal computers/ICT training?

3. Are you familiar with any distance learning platform?

4. What were your and your children's learning experiences when schools were closed because of the pandemic?

5. As a parent, did you play the role of Teacher at the time? If yes explain how.

6. What were the psychological effects of home-schooling on the well-being of the family?

7. How did teachers send and receive activities/tasks the children were to do at home? Was this process easy, difficult, or inconvenient?

8. Did your children face any difficulties completing the activities assigned to them by their schoolteachers? If so, what were their difficulties?

9. Is there anything else you'd like us to know, or are there any questions you thought we'd ask but didn't?

10. Do you think digital literacy is important to your child's future development?

Conclusion

We appreciate you taking the time to share your thoughts with us. Your feedback and suggestions will be utilized to improve at-home learning for you and other students.

Appendix II

Informed Consent Form

TITLE OF STUDY

“ Status of Education Technology and Digital Literacy among Teachers, Parents, and Learners in Zambia.”

PRINCIPAL **RESEARCHER**
Dr. Daniel Araia

Address: Off 12th Street F/609 Chudleigh Lusaka - Zambia

Phone: + 260 971698143

Email: danirai1959@outlook.com

Purpose of the study

The Zambia National Education Coalition (ZANEC) is conducting the above-mentioned study. The purpose of this study is to assess the status of education technology and digital literacy levels among teachers, parents, and learners in Zambia.
You are kindly requested that you participate in a research project. You must be aware of the purpose and specifics of the research before deciding to take part. Kindly read the information below carefully and ask the researcher if there is anything that is not clear or if you need more information.

Study procedure

During the interview, you will be asked several questions about the study while being audio recorded. The audio recording is for the sole purpose of data collection to assess education technology and digital skills status among teachers, Parents, and Learners in Zambia. In no way, the data collected will be used to examine or evaluate the participant for other purposes.

Discomforts/risks:

There are no foreseeable discomforts or risks as a result of your participation in this study.

Benefits

Your participation will have a great impact to assess the current status of Zambian teachers, parents, and learners' education technology and digital skills, identifying plausible mitigation measures, and recommending strategies to improve the current education system and be better prepared and equipped for future challenges.

Time duration of participation:

Participation in the study will not exceed 45 minutes.

Confidentiality

Your responses to this interview will be anonymous. The researcher will make every effort to preserve your confidentiality including the following:

- Providing participants with code names or numbers that will appear on all research notes and documents
- Storing safely the researcher's notes, interview transcripts, and any other information that could be used to identify participants. Once the research is complete, collected data will be destroyed.

Contact information

1. In case you have any questions about this study at any point in time,
2. if participating in this research has caused you to experience any negative consequences,
3. If you have concerns about the rights you have as a research participant,
4. if problems arise that you do not feel you can discuss with the Principal researcher,

kindly contact ZANEC (Zambia National Education Coalition) focal person Ms. Thandiwe Banda Cell-phone n. 0979480541/0966346349 Lusaka-Zambia.

VOLUNTARY PARTICIPATION

Your participation in this study is voluntary. You voluntarily decide to take part in it. If you choose to participate, you are required to sign this consent form. Once you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. In the case you decide to withdraw from the research project before data collection completion, your data will be either returned to you or destroyed.

CONSENT

I have read and understood the provided information and have had the opportunity to ask questions I am aware that my participation is entirely voluntary where I can terminate at any moment, for any reason, and without incurring any fees. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Enumerator's signature _____Date_____

Parental / Guardian Permission Form for Research Involving a Minor

Title of Project: 'Status on Education Technology and digital literacy Levels Among Teachers, Parents and Learners in Zambia.'

PRINCIPAL **RESEARCHER**
Dr. Daniel Araia
Address: Off 12th Street F/609 Chudleigh Lusaka - Zambia
Phone: + 260 971698143
Email: danirai1959@outlook.com

To have your child take part in this study, your consent is required. Please read the following information carefully before you decide whether or not to give your permission.

Purpose of the research

The purpose of this study is to help us assess the current status of Zambian teachers, parents, and learners' education technology and digital literacy skills.

Study procedure

During the interview, your child will be asked several questions related to the study title while being audio recorded. The audio recording is for the sole purpose of assessing the learner's current education technology awareness and digital skills status, and in no way will it be used to examine or evaluate the learner for other purposes.

Discomforts/risks:

There are no foreseeable discomforts or risks as a result of participating in this study to either you or your child.

benefits

Even though there are no direct benefits to your child, the results of this study, however, will increase the knowledge of the current status of education technology and digital literacy skills of teachers, parents, and learners to recommend strategies for improvement.

Time duration of participation:

Participation in the study will not exceed 45 minutes.

Statement of confidentiality:

All records will be kept confidential and will be available only to professional researchers and staff. When the results of this study are published, the data will be presented in group form and individual children will not be identified.

Voluntary participation:

Your child's participation is voluntary. If you feel your child has in any way been coerced into participation, please inform the **ZANEC (Zambia National Education Coalition) focal person Ms. Thandiwe Banda Cell-phone n. 0979480541/0966346349 Lusaka-Zambia.**
We also ask that you read this document to your child (if age-appropriate) and inform your child that participation is voluntary. At the time of the study, your child will once again be reminded of this by the researcher.

Termination of participation:

If at any point during the study you or your child wishes to terminate the session, we will do so. Questions regarding the research should be directed to:

Dr. Daniel Araia
Address: **Off 12th Street F/609 Chudleigh Lusaka - Zambia**
Phone: **+ 260 971698143**
Email: **danirai1959@outlook.com**

This research has been commissioned by :

Zambia National Education Coalition (ZANEC).
Baptist Fellowship Building,
Plot 3061/2 Corner Makishi Road and Great East Road,
P.O. Box 30774.
Focal person:
Ms. Thandiwe Banda Cellphone #s: 0979480541/0966346349

BY SIGNING THE FORM BELOW, YOU ARE ALLOWING YOUR CHILD TO PARTICIPATE IN THE STUDY WITHOUT YOUR PRESENCE.
If you do not sign and return this form, the researchers will understand that you do not wish to allow your child to participate.

Parent Signature Box
I, the parent, or guardian of……_, a minor who is _____ years of age, permit his/her participation in the above-named research.

by ----------

_____ _____

Signature of Parent or Guardian…… Date……..

_____
Please print your name here……

Learner Signature Box
I……_, agree to participate in the research named above and understand that my participation is voluntary.

_____ ……..
Signature of Student *Date*

_____
……
Please print your name here.

Signature of Enumerator _____ Date_____

Please print your name here _____

Annex III

Sample coding and participants' demographics

This is a qualitative exploratory study. Participants who best represent or understand a phenomenon in question makes up an optimal qualitative study sample. Data is collected from people who have experienced the phenomena (Creswell,2007). The major goal of this sampling approach, according to Morse et al. (2002), is to "ensure efficient and effective saturation of categories, with high-quality data and minimal dross" (p.12).

The population of this study includes Teachers, parents, and learners of three selected provinces designated as study areas as well as experts from different national organizations. Each study area will be represented by two districts and each district will be represented by a public school, a community school as well as a private school (three schools in total). The three schools will represent a public school, a community school, and a private school. The teachers' sample size will consist of a total of eighteen participants (three teachers per district i.e., primary and two secondary teachers). Learners will be represented by a total sample of fifty-four participants (nine per district/18 per region), three each from the public, a community, and a private school. The distribution of learners' gender will be dictated by gender ratio. A total of three focus groups, one group per region will represent parents' participants. Each focus group will consist of a total of five participants. The key informants' sample size will consist of five experts at the national level represented by both the public and private sectors. Code names are used to preserve the anonymity and privacy of all participants, as indicated in the consent form. To keep the code-naming pattern simple, the three study areas will be coded as follows :

1. To represent students participating in the one-on-one semi-structured interview, the letters “SN” will follow the assigned region acronym. While the letter “S” stands for student, subsequent letters t “P, C, and PR” stand for Public, Community, and Private schools. the letter “N” stands for a participant number between one and nine, e.g. The code LKSP-1 represents student number 1, of a public school, interviewed in the Lusaka province district of Kafue.
2. To represent teachers participating in the one-on-one semi-structured interview, the letters “TN” will follow the assigned region acronym. While the letter “T” stands for teacher, the letter “N” stands for a participant number between one and nine. e.g., The code NWKT-7 represents teacher number 7 interviewed in the North-Western province district of Kasama.
3. Letters “FG” will be added to an assigned province to represent a focus group discussion e.g., the code MFG represents a Focus group discussion in Muchinga province.
4. Experts sample will be drawn from the MOE directorate of planning and information, the Directorate of open and distance education (DDE), ZANEC, Zita, and the Ministry of science & technology. Each sample will be represented by the letter “ EI” followed by the letter “N” to represent the participant number. E.g., The code EI-6 represents expert number 6.

Sample inclusion criteria

Teachers inclusion criteria

Maths, English, natural and social science teachers, who work in Lusaka Province (Chiawa and Kafue districts), Muchinga (Mpika and Chinsali districts), and North-Western Province (Kasempa and Mufumbwe districts); minimum of three years of professional experience in the school system, teachers who work in public schools; teachers who work in rural and urban primary and secondary schools

Learners inclusion criteria

Primary and secondary rural and urban public-school students; who study in Lusaka Province (Chiawa and Kafue districts), Muchinga (Mpika and Chinsali districts), and North-Western Province (Kasempa and Mufumbwe districts); male and female.

Parents' focus group discussion inclusion criteria

Parents of learners in the selected districts' public schools; at least high school completed; no gender preference and no age limit.

Experts inclusion criteria

Experts with relevant expertise in education technology, digital literacy, and the Zambian education system; at least with a first degree; more than 5 years of professional experience, no gender preference, and age limit.

Sample distribution

Table1.

Coding pattern.

Region	District	Acronym	Students acronym	Teachers acronym	Focus Group
Lusaka	Chiawa	LC	LCS	LCT	
	Kafue	LK	LKS	LKT	LFG
Muchinga	Mpika	MK	MKS	MKT	
	Chinsali	MC	MCS	MCT	MFG
North-Western	Kasama	NWK	NWKS	NWKT	
	Mufumbwe	NWM	NWMS	NWMT	NWFG

Table 2 represents LCS gender, approximate age distribution, school grade, public, community, and private schools.

Table 2.

Lusaka region districts of Chiawa public, community, and private schools students participants representation

Public school					Community School					Private school				
N.	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**
1	LCSU-1				1	LCSS-1				1	LCSR			
2	LCSU-2				2	LCS-2				2	LCSR			
3	LCSU-3				3	LCS-3				3	LCSR			

Note. LCSU= Lusaka Chiawa public school student. LKSS= Lusaka Kafue community school student. LCSR= Lusaka Kafue private school student.

Table 3 represents LKS gender, approximate age distribution, school grade, Public, Community, and Private school.

Table 3.

Lusaka region districts of Kafue public, community, and private schools participants representation

Public school					Community School					Private school				
N.	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**
1	LKSP-1				1	LKSC-1				1	LKSPR-1			
2	LKSP-2				2	LKSC-2				2	LKSPR-2			
3	LKSP-3				3	LKSC-3				3	LKSPR-3			

Note. LKSP= Lusaka Chiawa Kafue public school Student. LKSC= Lusaka Kafue community school student. LKSPR= Lusaka Kafue private school student.

Table 4 presents LCT and LKT gender, school section, and responsibility.

Table 4.

Lusaka region districts of Chiawa and Kafue participant teachers' representation

N.	**Part. code**	**Gender**	**Age**	**Teaching Subject**	**Yrs. Expr.**	**N**	**Part. code**	**Gender**	**Age**	**Teaching Subject**	**Yrs. Expr**
1	LCT-1					1	LKT-1				
2	LCT-2					2	LKT-2				
3	LCT-3					3	LCT-3				

Note. LCT= Lusaka Chiawa Teacher. LKS= Lusaka Kafue Teacher.

Table 5 represents LFG gender, approximate age distribution, education, and employment status. Out of five participant parents, three are male and two are female.

Table 5.
Lusaka province focus group representation

N.	Part. Code	Gender	Age	Education	Profession
1	LFG-1				
2	LFG-2				
3	LFG-3				
4	LFG-4				
5	LFG-5				

Table 6 represents MMS gender, approximate age distribution, school grade, Public, Community, and private school.

Table 6.
Muchinga region districts of Mpika Public, community, and private schools participants representation

Public school					**Community School**					**Private school**				
N.	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**
1	MMSP-1				1	MMSC-1				1	MMSPR-1			
2	MMSP-2				2	MMSC-2				2	MMSPR-2			
3	MMSP-3				3	MMSC-3				3	MMSPR-3			

Note. MMSP= Muchinga Mpika public school Student. MMSC= Muchinga Mpika Community School Student. MMSPR= Muchinga Mpika private school Student.

Table 7 represents MCS gender, approximate age distribution, school grade, and Public, Community, and Private schools.

Table 7.
Muchinga region districts of Chinsali public, community, and private schools participants representation.

Public school					**Community School**					**Private school**				
N.	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**
1	MCSP-1				1	MCSC-1				1	MCSPR-1			
2	MCSP-2				2	MCSC-2				2	MCSPR-2			
3	MCSP-3				3	MCSC-3				3	MCSPR-3			

Note. MMSP= Muchinga Chinsali public school Student. MMSC= Muchinga Chinsali Community School Student. MMSPR= Muchinga Chinsali private school Student.

Table 8 presents MMT and MCT gender, school section, and responsibility. Out of six participants, two are female the remaining four are male.

Table 8.
Muchinga region districts of Mpika and Chinsali participant teachers' representation

N.	Part. code	Gender	Age	Teaching Subject	Yrs. Expr.	N	Part code	Gender	Age	Teaching Subject	Yrs. Expr
1	MMT-1					1	MCT-1				
2	MMT-2					2	MCT-2				
3	MMT-3					3	MCT-3				

Note. MMT= Muchinga Mpika Teacher. LKS= Muchinga Chinsali Teacher.

Table 9 represents LFG gender, approximate age distribution, education, and employment status. Out of five participant parents, three are male and two are female.

Table 9.
Muchinga province focus group representation

N.	Participant code	Gender	Age	Education	Profession
1	MFG-1				
2	MFG-2				
3	MFG-3				
4	MFG-4				
5	MFG-5				

Table 10 represents NWKS gender, approximate age distribution, school grade, and Public, Community, and private schools.

.Table 10
North-Western region districts of Kasempa participant students' representation

Public school					Community School					Private school				
N.	Participant code	Gender	Age	Grade	N.	Participant code	Gender	Age	Grade	N.	Participant code	Gender	Age	Grade
1	NWKSP-1				1	NWKSC-1				1	NWKSPR-1			
2	NWKSP-2				2	NWKSC-2				2	NWKSPR-2			
3	NWKSP-3				3	NWKSC-3				3	NWKSPR-3			

Note. NWKSP= NW Kasempa Public school Student. NWKSC= NW Kasempa Community School Student. NWKSPR= Muchinga Chinsali private school Student.

Table11 represents NWMS gender, approximate age distribution, school grade, and Public, Community, and private schools.

Table 11.
North-Western region districts of Mufumbwe participant students' representation

Public school					Community School					Private school				
N.	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**	**N.**	**Participant code**	**Gender**	**Age**	**Grade**
1	NWMSP-1				1	NWMSC-1				1	NWMSPR-1			
2	NWMSP-2				2	NWMSC-2				2	NWMSPR-2			
3	NWMSP-3				3	NWMSC-3				3	NWMSPR-3			

Note. NWMSP= NW Mufumbwe public school Student. NWMSC= NW Mufumbwe Community School Student. NWMSPR= NW Mufumbwe private school Student.

Table 12 presents LCT and LKT gender, school section, and responsibility. Out of six participants, six are female the remaining six are male.

Table 12.
North-Western region districts of Kasama and Mufumbwe participant Teachers' representation

N.	**Part. code**	**Gender**	**Age**	**Teaching Subject**	**Yrs. Exp**	**N**	**Part. code**	**Gender**	**Age**	**Teaching Subject**	**Yrs. Exp**
1	NWKT-1					1	NWMT-1				
2	NWKT-2					2	NWMT-2				
3	NWKT-3					3	NWMT-				

Note. NWKT = North-Western Kasama Teacher. NWMT = North-Western Mufumbwe Teacher

Table 13 represents NWFG gender, approximate age distribution, education, and employment status. Out of five participant parents, three are male and two are female.

Table 13.
Northwest province focus group representation

N.	**Part. code**	**Gender**	**Age**	**Education**	**Profession**
1	NWFG-1				
2	NWFG-2				
3	NWFG-3				
4	NWFG-4				
5	NWFG-5				

Table 14 represents Experts' distribution by regional level, organization, gender, profession, and responsibility.

Table 14.
Experts' distribution.

N	Expert code	Level	Gender	Age	Organization	Profession	Responsibility
1	E-1	National			MOE		
2	E-2	National			DODE		
3	E-3	National			Min, of Technology & Science		
4	E-4	National			ZANEC		
5	E-5	National			Zita		

Note. E= Expert

List of Experts Participants

Zambia National Education Coalition (ZANEC)

Ministry of Education (MOE)

Zambia Information and Communication Technology Authority (ZICTA). Two participants

Ministry of Technology and Science (M o T & S)

Zambia Telecommunications Company Limited (ZAMTEL)

DODE (three participants)

Total of nine participants.

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ABOUT US

The Zambia National Education Coalition (ZANEC) is a Coalition of non-state actors working in the Education and Skills Sector. It is a recognized institution advocating for improved access to quality education by all citizens. The organisation is involved in research, advocacy and member capacity enhancement on different aspects of Education and Skills Sector in Zambia.

VISION

"A sustainable and inclusive education system that responds to national aspirations and fosters an environment for self-fulfillment"

MISSION

"ZANEC is a coalition of education organisations promoting quality and inclusive education for all, through influencing of policy, building consensus, holding duty bearers accountable and strengthening the capacities of stakeholders in the education sector"

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