PERCEIVED CHALLENGES OF ICT AS AN EXAMINABLE CURRICULUM SUBJECT IN RURAL SECONDARY SCHOOLS: VOICES OF TEACHERS AND LEARNERS IN SOUTHERN ZAMBIA

Kalisto Kalimaposo[i],
Siana Moono,
Harrison Daka,
Sanny Mulubale,
Chivunda Kaumba,
Fumbani Mphande
University of Zambia,
School of Education,
Lusaka, Zambia

Abstract:

The study interrogated teachers' and pupils' perceptions of Information Communication Technology (ICT) as an examinable curriculum subject in secondary schools of Mazabuka district in Southern Zambia. In 2013 Ministry of Education (MoE) reviewed the National School Curriculum introducing ICT as an examinable subject at the junior secondary school level. This development was, however, received with mixed feelings among different stakeholders across the nation. The study employed Davis' (1989) Technology Acceptance Model (TAM) as a theoretical framework to establish the teachers' and pupils' perceptions of ICT as an examinable curriculum subject. A descriptive research design was used to collect qualitative data from a sample size of 36 participants which included school administrators, ICT teachers, and pupils. Purposive and quota sampling was applied to select the participants. Data were collected using unstructured questionnaires, interviews, and focus group discussions. The data were analysed thematically by categorization of major and sub-themes that emerged from the study. The study showed that both teachers and pupils had positive perceptions towards ICT as an examinable curriculum subject. The majority of the participants strongly felt that the current times demanded for ICT knowledge in order for learners to fit well in the world of technology. The study also identified challenges faced in the teaching and learning of ICT such as; a lack of trained teachers, inadequate computer hardware and software, and irregular power supply. Various measures were employed in mitigating the challenges such as community engagement, voluntary teaching, class splitting, use of alternative sources of power, and explorations of online resources. The study recommended that the Ministry of Education should revert to its earlier policy position

---

[i] Correspondence: email kalisto.kalimaposo@unza.zm, kkalimaposo@yahoo.com

where all schools were to offer ICT as a compulsory examinable subject at the junior secondary school level. The government also should consider the reduction of taxes and tariffs on end-user consumer ICT products such as desktops computers, iPads, projectors, and others.

Keywords: Information Communication Technology (ICT), examinable curriculum subject, pupils, teachers, learning and teaching materials, software and hardware, secondary school

1. Introduction

1.1 Background to the study

It has been observed that the advent of Information and Communication Technologies (ICTs) has made teaching and learning easier beyond the traditional face-to-face interaction between the teacher and the learner. This kind of learning basically involves the transfer of skills and knowledge through electronic devices aimed at improving the teaching-learning process (Sarfraz, Daka, Zubair, and Sarfraz, 2022). In homes, schools, and industries, computers are steadily replacing human presence. As a result, many countries, Zambia inclusive, have embraced the use and integration of ICT in education (Phiri, 2016). It is argued that ICT has the potential to improve all aspects of social, economic, and cultural life (Annan, 2003). Realising the importance of ICT, the Zambian Government in 2007 formulated and adopted the National ICT policy with an emphasis on the integration of ICT in education (UNESCO, 2013). In 2013 the Ministry of Education (MoE) reviewed the National School Curriculum to launch ICT as an examinable curriculum subject at junior level in all secondary schools.

In teaching and learning of ICT, the availability of facilities plays a vital role since ICT is a practical subject that should not be learned in the abstract. Various researchers have identified the computer to be the most common ICT facility available in learning centers. Mulima (2014) argues that secondary schools in Zambia have a variety of ICT facilities both hard and software though they are insufficient. Similarly, Ang'ondi (2013) in Kenya notes that computers, laptops, LCD projectors, and printers are the most common ICT tools available in schools. However, the facilities are not enough to carter for both teachers and pupils. The study reports that teachers take their own personal computers to schools to curb the problems. These findings are similar to Mulima (2014) and Lufungulo (2015) who postulate that computers and laptops are among the most common ICT facilities in schools but the challenge is that they are inadequate.

Becta (2004), further observes that lack of confidence is a major intrinsic barrier to the uptake of ICT by teachers in the classroom. The lack of confidence emanates from the fear of failure and limitations in teachers' ICT knowledge making them feel anxious about using ICT. Becta (2004) concludes that many teachers who do not consider themselves to be well-skilled in using ICT feel anxious about using it in front of a class of children who may know more than themselves. Another challenge related to teacher confidence is the

lack of teacher competence. In developing countries, research reports that a lack of technological competence is another barrier to the acceptance and adoption of ICT (Pelgrum, 2001).

Another worldwide survey conducted by Pelgrum (2001), of nationally representative samples of schools from 26 countries, found that teachers' lack of knowledge and skill is a serious obstacle to using ICT in primary and secondary schools. The lack of knowledge and skill results in another barrier of resistance to change. Teachers resist change to new technology especially when they do not feel the need to change their professional practice. Sometimes rejecting the need for change is a lack of sufficient knowledge in accepting the change and unclear opportunities of the new technologies (Beta, 2004; Gomes, 2005). Lack of time is also a common problem in ICT education. A number of researchers point out limitations and difficulty in scheduling enough computer time for classes as a hurdle. Sicilia (2005) posits that the most common challenge faced by all teachers is a lack of time to plan technology lessons, explore internet sites, or look at various aspects of educational software. Lack of access and effective training in ICT pedagogical skills is another problem. Teachers need not just knowledge on how to use ICT tools but skills on how to teach ICT.

A study in Zambia on primary school teachers' attitudes towards ICT integration in social studies in Lusaka and Katete districts by Lufungulo (2015) found that scarcity of ICT equipment and lack of internet in primary schools is a major problem. The other challenge observed is the lack of electricity in schools, especially in rural areas. Hennessy et al. (2010) in Lufungulo (2015) argue that lack of electricity was a major problem that hampered the integration of ICT in most developing countries. On the other hand, Grimus (2000) posits that teaching ICT in schools prepares learners to face future developments with proper understanding. Research has shown that ICT is beneficial at the individual level and national level. In learning institutions for instance, ICT helps to improve the quality of the education system in general. Through ICT applications e-learning, blended learning, and open and distance learning are achieved. ICT provides a motivating learning environment where learners are given an opportunity to engage with instruction. Through ICT learners are prepared for future tasks in which the job market demands a computer-literate workforce. Technology in education further, prepares learners for a workplace where ICTs, particularly computers, and internet technologies are more pronounced in this global market.

ICT also stands out as a tool necessary for economic and social development. It plays a crosscutting role in developmental issues and once properly applied can led to broader achievement of national development goals. ICT is a potent force in driving economic, social, political, and educational reforms. Countries, particularly developing ones, cannot afford to stay passive in ICT if they are to compete and strive in the knowledge economy.

2. Statement of problem

In 2013 Ministry of General Education (MoGE) reviewed the National school curriculum introducing ICT as an examinable compulsory curriculum subject at the junior secondary school level in Zambia. This development was however received with mixed feelings among different stakeholders across the nation. Little research exists from the Zambian context on the perceptions of teachers and pupils towards ICT as an examinable curriculum subject in Zambia. Studies that have been conducted on the use of ICTs in education have tended to concentrate on the availability and effectiveness of the utilisation of ICT facilities in teaching and learning (Okeh and Opone, 2007; Ofojebe, 2006; Lopez, 2003 and Yusuf, 2000). This study endeavoured to fill this knowledge gap by investigating the perceived challenges of ICT as an examinable curriculum subject in rural secondary schools of Southern Zambia.

2.1 Purpose of the study
The purpose of this study was to explore the perceived challenges of ICT as an examinable curriculum subject in selected secondary schools of Mazabuka District of Southern Province.

2.2 Objectives of the study
  1) To establish challenges and prospects of ICT as an examinable curriculum subject in secondary schools as perceived by teachers and pupils.
  2) To explore measures employed by secondary schools in mitigating challenges of ICT as an examinable curriculum subject in secondary schools.

3. Method

The study employed qualitative design to investigate teachers' and pupils' perception of ICT as an examinable curriculum subject in Mazabuka district of Southern province. The phenomenological approach was used to collect qualitative data as it focuses on the real-life experiences of participants (Kalimaposo, 2010). The study was conducted in three selected schools of Mazabuka district in Southern province of Zambia about 125km from Lusaka city. The three schools were picked from urban, peri-urban, and rural areas. In total, the sample size comprised 36 respondents.

The study comprised 6 school administrators, 3 ICT teachers, and 27 pupils. The study being qualitative in nature used non-probability sampling techniques to come up with the sample size. Quota sampling was applied to select three (3) schools out of eleven (11) in Mazabuka district, one (1) from urban, one (1) peri-urban, and one (1) from rural. Purposive sampling was employed to select six (6) school administrators and three (3) ICT teachers. Lastly, 27 ICT pupils were selected from three (3) schools purposively.

Data was analysed qualitatively. The scripted information from questionnaires, interviews, and focus group discussions was read through and through so as to be

familiar with the data. Main ideas that repeated themselves throughout the data were labelled with a single word or phrase. After all the information was coded, patterns or themes that emerged were put into major and sub-themes. The themes were then renamed and put according to the research questions and those which were unnecessary were discarded. Lastly, conclusions were drawn based on the findings according to each objective of the study

4. Findings

Research question 1: What are the challenges and prospects of teaching and learning ICT as an examinable curriculum subject in secondary schools?

4.1.1 Lack of ICT specialised trained teachers
The study established that in all the sampled secondary schools in Mazabuka district there were no specialised trained ICT teachers. ICT was taught by teachers who had an interest in computers and had basic knowledge of computers. One newly deployed male ICT volunteer teacher during the interview said;

> *"Am not a trained ICT teacher but I teach ICT out of interest. I am instead a business studies teacher trained from Evelyn Hone College, while at college we did a component of ICT and that's how I developed an interest in ICT."* (Volunteer ICT Teacher: October, 2022)

The researcher during interviews with administrators noted that teachers had inadequate computer skills thus compromising their supervision of ICT lessons.

4.1.2 Inadequate computer hardware and software
The availability of facilities for teaching and learning ICT in secondary schools was a big challenge. The only and common tool available to pupils and teachers was the desktop computer. However, the schools still did not have enough computers for the learners to do their practical lessons in a smooth manner. A female teacher lamented that:

> *"We have only 20 computers against a class of 43 learners, worse still not all the 20 computers you see are functional. During lessons, we are only able to use 12 of these. As a result, the class is split into two but still, the PCs are usually overcrowded. How I wish we had even a projector..."* (ICT Teacher; October, 2022)

4.1.3 Irregular power supply
Power interruption due to load shedding was another problem that was identified. As a result, the practical lessons had to be discontinued in the event of a power outage. In most cases, teachers failed to find time to make up for the interrupted lessons. The power

outages during ICT lessons were frustrating in secondary schools. One male participant during the interviews explained that;

"ICT lessons have a practical component that cannot be taught without electricity. As a teacher, I have had challenges to teach practicals because sometimes power would go amidst the lesson…" (ICT Teacher; September, 2022)

The problem of power supply outages was common in all three selected schools in Mazabuka District.

4.1.4 Shortage of ICT Textbooks

The lack of ICT textbooks was another challenge in secondary schools in Mazabuka district. The researcher did not see any copy of an ICT textbook either for grade 8 or grade 9 in all three selected schools. A female participant from an urban school noted that:

"We have very few ICT textbooks for teaching at junior secondary school level. In fact, from the time I came to this school, I have not seen any grade 9 ICT textbook though we have a few copies for grade 8." (ICT Teacher: 2022)

Another participant, a pupil from a peri-urban school complained that;

"…we are not given ICT textbooks for us to study on our own. The only thing the teacher does is to write notes on the chalkboard…. In the library, there are no ICT textbooks." (Female ICT pupil: October, 2022)

The researcher went on to find out what school administrators were doing with regard to the shortage of ICT textbooks. The response was that they were still in the process of acquiring the ICT learning and teaching materials.

4.1.5 Lack of computer laboratories

Out of the three sampled schools, only one had a complete computer laboratory although it was poorly furnished. The other two schools had improvised some rooms as computer laboratories stocked with a few pieces of old desktop computers. Participants lamented that the lack of proper computer rooms was a serious challenge in ICT learning in secondary schools. One participant had this to say:

"One major challenge we have as a school is the lack of computer lab. However, we have improvised a room into a computer lab. We are just waiting to put enough furniture so that ICT practicals can be done without much difficulty." (Deputy Head: October, 2022)

4.1.6 Prospect of ICT as an examinable curriculum subject
4.1.6.1 Viability of ICT as a subject

All the participants were of the feeling that ICT was a viable examinable subject in secondary schools. The subject was said to be easy and interesting to both teachers and pupils. Both teachers and pupils said ICT was a passing subject and would love to continue with it. One participant from a Focus Group Discussion said:

"ICT is a good subject. I like it because I always get good marks in ICT. I think even in the exam it will be one of my best six." (Female grade 9 ICT pupils: October, 2022)

Both teachers and pupils considered ICT as a passing subject thereby viewing it as viable. One male teacher for example argued that;

"In the previous national examinations my pupils did extremely well in ICT. No one failed and that gives me pride as a teacher" (ICT Teacher; September, 2022)

4.1.6.2 ICT a vehicle for socio-economic development

About half of the participants were optimistic that ICT as a subject was much needed for the socio-economic development of the country. It was argued that ICT should be embraced seriously for Zambia to attain national development in this era information age. One female participant during the interview submitted that;

"All developed countries are technologically advanced and ICT plays a major role in development. It is through the use of ICT that Zambia will develop into a modern society." (ICT Teacher: September, 2022.)

4.1.7 Government political will

The administrators and teachers noted that the Government through its agencies and, line departments had put sufficient means of integrating ICT into Zambian education system such as the ICT policy and other national development plans that embrace ICT. It was felt that there was enough government support for ICT education in Zambia thus giving the teaching and learning of ICT as an examinable curriculum subject in secondary schools a bright future. One participant during the interview argued that:

"The Government's interest is to attain the Vision 2030 and this includes making Zambia a technological nation. With this policy in place, I see a bright future for ICT teaching. I foresee secondary schools receiving all the necessary requirements from the government for them to produce computer-literate citizens. The interest of any government in the world is economic development and there cannot be economic development without ICT. The schools in rural areas can easily be supplied with gen sets and solar panels to use for ICT teaching. The Government can't fail to do that; it's just a matter of priority and I believe this is the case." (Deputy Head Teacher: October, 2022.)

4.1.8 Improving ICT teacher qualification in the country

All administrators and teachers observed that ICT had a bright future because the government and private sector had come on board to train specialised ICT teachers in colleges and universities across the country. It is argued that teachers were now getting Diplomas and Degrees in ICT teaching thus the critical shortage of ICT teachers would be a thing of the past in no time. One male participant observed that;

> *"The current challenges faced such as shortage of teachers handling ICT is but a temporal situation as more and more teachers are being trained in the ICT field now. Some of them have actually been since deployed in schools across the country."* (HOD: October, 2022)

All in all, in spite of numerous limitations that were unearthed in teaching and learning of ICT as an examinable curriculum subject in secondary schools, more than half of the participants were optimistic that ICT was a promising examinable curriculum subject in secondary schools in Mazabuka district of Southern Zambia.

Research question 2: What measures have been employed by secondary schools to mitigate the challenges in teaching and learning of ICT as an examinable curriculum subject?

4.2 Measures employed to mitigate challenges in teaching and learning of ICT

In an effort to explore measures employed by secondary schools in mitigating challenges faced in teaching and learning of ICT as an examinable curriculum subject in Mazabuka, six (6) secondary school administrators and three (3) ICT teachers were subjected to a number of questions on each challenge identified during the interviews and discussions.

4.2.1 Community engagement

A question was asked on how the secondary schools acquired the hardware and software materials for teaching and learning of ICT. Two of the three schools explained that they engaged the local communities such as PTA and any other interested stakeholders. The other school indicated that apart from working with the local community, the managing agency helped them acquire good second-hand computers from Camara International Organisation, the alumni associations were also very instrumental in cushioning the problem of the shortage of computers and lack of computer laboratories in secondary schools in Mazabuka district. One administrator explained that;

> *"The computers we have are good second hand bought from Camara. We were helped by our managing agency to buy them at a very reasonable price."* (Deputy Teacher: September, 2022)

In all three schools, community participation greatly helped in alleviating the challenges of overcrowding in computer laboratories, especially through the donations of desktop computers that were critical in ICT learning.

4.2.2 Class split

With regard to the shortage of computers in secondary schools. The researcher wanted to find out how practical lessons were conducted. In two of the three schools, ICT practical lessons were a big challenge. One class had to be split into two or sometimes up to four sessions of practicals. During the interview, an ICT teacher explained that:

> *"ICT is a practical subject and each pupil needs to sit on a computer during practical but computers are not enough. So as a teacher, I am forced to divide the class into two or three groups but still the PCs are usually overcrowded."* (Male ICT teacher: October, 2022)

Class splitting gave chance to each learner to practice on the computers.

4.2.3 Volunteer teaching

The researcher asked how the schools managed to teach ICT since there were no specialized trained ICT teachers in secondary schools in Mazabuka. One school administrator explained that;

> *"The lack of trained ICT teachers is indeed a big challenge at our school even in the whole district. However, as a school, we have teachers who have volunteered to teach ICT and so far, they are doing fine."* (School Head Teacher; October, 2022)

The finding was that through the use of volunteer ICT teachers in Mazabuka district, schools have managed to downscale the problem of lack of trained ICT teachers.

4.2.4 Use of alternative sources of energy

A question was posed on how the schools mitigated the problem of inconsistent electricity supply due to frequent power outages that were being experienced throughout the country. One of the three sampled schools explained that they had acquired a thermal generator that generated power when there was no power. The other two schools said they were in the process of acquiring the generators to mitigate the challenges of inadequate electricity supply that greatly affected ICT lessons. At the time of the study, ICT teachers explained that practical lessons were usually abandoned in the event that there was no power and only theory was taught.

4.2.5 Online service aid

The researcher went on to look into the issue of the shortage of ICT teaching and learning materials such as textbooks and wanted to know what was done in this regard. The administrators and ICT teachers all in affirmative responded that ICT books for teachers

and pupils were not readily available in schools. The participant from a peri-urban school complained that:

> *"We have very few ICT textbooks for teaching at junior secondary school level. I use the internet to get the notes and present them to my class on a projector. The only problem is that sometimes the internet is slow..."* (Urban female ICT Teacher, September, 2022)

With regard to the critical shortage of grade 8 and grade 9 ICT textbooks in schools, the participants explained that the problem was minimised by the exploration of online sources. The internet was said to be one excellent source of teaching and learning materials for ICT in secondary schools although it was expensive.

5. Discussion of findings

5.1 Challenges and prospects of ICT as an examinable curriculum subject in secondary schools as perceived by teachers and pupils

5.1.2 Lack of ICT teachers

Zambia has a shortage of not only ICT teachers but also in other subjects like Science and Mathematics. The shortage of teachers in the country remains a serious challenge despite public and private colleges and universities graduating teachers each year.

In 2016 the MoE employed in excess of 4000 teachers across the nation so as to improve the teacher pupil parity. Out of the teachers that were deployed very few had specialised training in ICT. As a result of the ICT teacher crisis, secondary schools have no option but to use non-ICT specialised teachers to handle ICT classes. The competence levels of these teachers are, however, questionable due to a lack of special training in ICT teaching methods. The situation is made more complicated by the lack of ICT knowledge by secondary school administrators to effectively and efficiently supervise non-ICT trained teachers.

5.1.3 Computer hardware and software constraints

Acquiring good and adequate computer hardware and software is a serious challenge in the teaching and learning of ICT in secondary schools. The shortage of hardware and software facilities especially the desktop computer makes teaching and learning of the practical part of ICT almost impossible. At one school only 20 desktop computers were available against a class of 43 learners. Worse still not all the 20 CPs were functional but instead, only 12 pieces could be used per session. As a result, the functional PCs were usually crowded as learners fought for the mouse and keyboards during the lessons. Furthermore, there were no projectors, scanners, printers, or copiers available to ICT learners in secondary schools except at one school where the facilities were restricted from use by pupils.

The observation is similar to Ang'ondi (2013) study that established that schools in Kenya had insufficient computers to cater to both teachers and learners. The quality of

computers in secondary schools was also a problem. Most of the PCs pupils were using were outdated and better off as e-waste. Mulima (2014) equally observes that schools in Zambia have outdated computers.

The problem of outdated hardware and software in secondary schools is overwhelming due to heavy dependence on cheap or donated obsolete computers from the western countries. As a result, secondary schools have become the dumping ground for such electronic gadgets. Daka, Mugala, Mulenga-Hagane, and Kalimaposo (2022), in their study on academic flaws, during COVID-19 also observed that the lack of laptops makes students not access information sent by teachers.

Apart from a lack of hardware and software secondary schools had a challenge of ICT textbooks for both teachers and ICT pupils in the district. Grade 8 and grade 9 ICT textbooks were not readily available in schools. The teachers had only enough copies for themselves and not for pupils. The school administration in all three schools indicated that they were in the process of purchasing the textbooks though this was disputed as mere rhetoric by some participants.

5.1.4 Irregular power outages

Power supply was another challenge in ICT teaching and learning in secondary schools. Teachers and pupils were frustrated by frequent power outages during ICT practical lessons. Hennessy et al. (2010) in Lufungulo (2015) affirm that lack of electricity was a major problem that hampered the integration of ICT in most developing countries especially for schools that depended entirely on hydro-electric power.

The observation from the study was that when the power went amidst a practical lesson, the teachers had to look for alternative sources of energy such as the use of thermal generators to continue the lessons. However, not all schools had thermal generators sometimes even those who had them were found that they have no fuel in most cases. At times when they had fuel, they were mainly used for powering the administration block or the head's office and not the computer rooms. Thus, the common practice was to abandon the practical lesson for theory or break up the class and wait for a make-up lesson on a different day when the teacher would be free and power available. Unfortunately, in many instances, make-up ICT practical classes interrupted by power supply were overlooked by teachers or were reluctantly taken on.

5.1.5 Lack of computer laboratories

Out of the three sampled schools in Mazabuka only one school had a well-established computer laboratory. The other two schools had just improvised rooms as computer laboratories. The improvised rooms had inadequate furniture and were poorly ventilated. The electricity wiring system was not ideal for computers and the computers were connected to non-power surge adaptors. This compromised the safety of the users of the computers.

The improvised computer rooms were not even connected to the internet which is very much needed in ICT learning and teaching. Pupils also could not access the

computers on their own to practice while at school as the computer rooms were under lock and key.

5.2 Prospects of ICT as an examinable curriculum subject
5.2.1 The viability of ICT as a subject

ICT as an examinable curriculum subject had a bright future in secondary schools because the teachers and pupils liked the subject very much. The subject was said to be easy, interesting, and very useful at school and after school life. The finding fits well with Davis' Technological Acceptance Model (TAM) which postulates that when a new technology is perceived to be easy and useful the user develops a positive attitude towards the technology. In this case, the ease of ICT as an examinable subject is in the participants' view of it as a passing subject. Apart from that ICT was said to impart life skills to pupils that would enable them to earn a living even without formal training. Furthermore, participants argued that ICT learning in secondary schools was welcome because it set the foundation for tertiary education where ICTs were in great use at colleges and universities. The viability of ICT as an examinable subject was further supported by the excellent performance of all sampled schools as they scored between 80%-100% in the previous two past national examinations in 2015 and 2016 despite the examination administration challenges that were encountered. The participants further expressed a positive attitude towards ICT because it is a practical subject where pupils interact with computers and different electronic gadgets.

5.2.2 ICT an ingredient for socio-economic development

Many scholars have positioned ICT as an ingredient in the socio-economic development of a nation. Kwaku and Kwame-Gyimah (2010) and MOCT (2006) agree that ICT is the bedrock and enabler of social-economic development through the promotion of information and knowledge-based modern society as the basis for wealth creation and subsequent poverty reduction. The role of ICT in national development makes the teaching of ICT as an examinable curriculum subject in secondary schools imperative. The importance of ICT in the socio-economic development of a nation is clearly visible in its inclusion in Zambian government development policy documents starting with the Fifth National Development Plan, 2006-2010 (FNDP), Sixth National Development Plan, 2011-2015 (SNDP), Seventh National Development Plan, 2016-2020 (SNDP) and Vision 2030. All the policy documents have but one common agenda and that is to see Zambia turn into an information society where an information-based economy will thrive with sound e-commerce and e-government.

However, it should be noted that learning ICT only in itself is not enough to attract socio-economic development to a nation because development goes beyond ICT literacy. This is incongruent with the Zambian ICT policy document that states;

> *"Government is fully aware that ICTs alone cannot have an appreciable impact on Zambia's development prospects unless the use of ICTs in the society and economy is done*

within the context of poverty reduction and other programmes addressing a number of critical success factors at central and local government." (MOCT, 2006)

Furthermore, participants observed that the world was becoming more and more integrated into a global village through the expansion of ICT. Globalisation has made ICT to take center stage in world economic activities. Connectivity between and within nations has increased by removal of the obstruction of time and spatial separation resulting in the integration of markets. ICT was said to be a potential tool that could narrow the digital divide within the context of globalisation thus giving people an opportunity to take part in the global economic development. Through ICT a country is offered an opportunity to join the global village via e-commerce and trade enabling the people to take part in the global economy thereby progressing socially and economically. The critical role of ICT in development and globalisation makes the teaching of ICT as a subject unavoidable

5.2.3 Government political will

The study established that the government is keen on turning Zambia into a knowledge and information-based society. One measure taken by governments is the integration of ICT into Zambian education system. The government has taken sufficient policy steps to promote ICT activities in the nation. In 2007 the National ICT policy was put in place to guide the ICT activities in Zambia. This was followed by the reviewing of the national school curriculum in 2013 launching ICT as an examinable curriculum subject at the junior level in all schools. Having reviewed the curriculum MoGE implemented the first-ever ICT examination at grade 9 countrywide in 2014.

The Sixth and Seventh National Development plans and Vision 2030 have also prioritised the enhancement of ICT usage in the quest to transform Zambia into a middle-income country. Apart from the above government through ZICTA is donating computers in schools especially some rural ones so as to cushion the challenges of ICT teaching and learning. All these activities in one way or another directly or indirectly are in support of ICT learning as an examinable curriculum subject in secondary schools in Zambia.

5.2.4 Improving ICT teacher qualification

The other prospect of ICT as an examinable curriculum subject in secondary schools is in the current improvement in ICT teacher qualifications and deployment. Through government efforts, private and public colleges and universities have started training specialised ICT teachers that will be deployed countrywide to mitigate the ICT teacher crisis. Some serving teachers have also embarked on advancing their ICT skills via fast-track training and distance programmes. In no time the shortage of ICT teachers will be a thing of the past. From the aforesaid, it is evident that teaching and learning of ICT as an examinable curriculum subject in secondary schools has overwhelming support and good prospects.

The prospects of ICT as an examinable subject in secondary schools is in the viability of ICT as a subject, ICT's role in socio-economic development, government politics, and the improvement of ICT teacher qualification.

5.3 Measures employed in mitigation of challenges in ICT teaching and learning in secondary schools

The study established that secondary schools in the district faced various limitations in teaching and learning ICT as an examinable curriculum subject at the junior secondary school level. The commonest challenges were a lack of qualified teachers, inadequate teaching and learning materials (hardware and software), and frequent power outages. The schools in response to the aforesaid challenges employed various means to address the situation. Below are the initiatives employed:

5.3.1 Community partnership

The study found that schools in the district worked with the different stakeholders within the local communities and international organisations such as Camara in alleviating the challenges faced in teaching and learning ICT as an examinable curriculum subject. In two of the three schools sampled the computers they were using in teaching and learning of ICT were a donation from the community through PTAs and alumni associations. Participants observed that without the community gesture of aiding the schools to acquire the computers the challenge of scarcity of computers in these schools would have been unbearable. MOCT (2006) the government policy document on ICT supports the initiative to work with various stakeholders through Public Private Partnership (PPP). However, it was noted that community participation was quite low, especially in rural secondary schools. This concurs with Muyabi, Kalimaposo, Mubita, Mulubale, Haambokoma, Milupi and Mundende (2022) and Mwanamwambwa, Kalimaposo, Mubita, Sikayomya, Muyangana and Haambokoma (2021). The other limitation was that the donations of computers were mostly in urban grant-aided schools through the help of their managing agencies. In some cases, the numbers donated were too few to make a significant impact on the teaching and learning of ICT. Worse still the quality of the donated computers was no better than white elephants in some cases. This observation is in affirmative with Mulima (2014) who noted that most of the computers in schools were near e-waste materials.

5.3.2 Class split

The critical shortage of computers in secondary schools as earlier discussed was still a major problem in the district. The ICT teachers were doing everything possible to minimise the challenges. One initiative being employed was the splitting of classes into smaller segments during ICT practical lessons. The measure greatly helped to reduce overcrowding of the pupils on computers during practical lessons. Through class splitting initiative each pupil was given a chance to practice on the computer. However, it should be noted that the initiative gave extra work on the part of an ICT teacher.

Sometimes one class had to be split into three or four sessions taken by one teacher at different intervals. This meant working for more hours than what was timetabled for an individual teacher. As a result, the class-splitting initiative was not a favourable option among the teachers. In some cases, ICT teachers shunned or did fewer practical lessons with the pupils as they did not approve class splitting initiative.

5.3.3 Volunteer teaching

The study further found that ICT was rolled out as an examinable curriculum subject at a time when most of the secondary schools in Mazabuka District were not yet prepared for the subject, especially in the area of subject teachers. In fact, Zambia as a nation has a shortage of teachers with ICT skills in schools (MOCT, 2006). As a result, the teachers who had an interest and knowledge in computers within the secondary schools and outside the schools were asked to help in the teaching of ICT at the junior secondary school level. The move was a good initiative and received overwhelming support from the teachers. However; the competence levels of the volunteer teachers were questionable as they had no special training as ICT teachers. Most of them were actually novice teachers in the teaching profession who had just done a component of ICT at the college level (Kalimaposo, 2023). The researcher observed that ICT teachers in secondary schools volunteered to teach ICT out of excitement rather than competence. Teaching is a profession and those who are called upon to join the career must have the command of knowledge or expertise in their subject area. Thus, the competence levels of the ICT volunteer teachers were questionable in secondary schools. The situation was worsened by the school administrators' lack of sufficient ICT skills for them to monitor and supervise the ICT teaching activities in an effective and efficient manner.

5.3.4 Use of alternative source of power

The erratic supply of electricity in schools was another major challenge that was identified in the teaching of ICT as an examinable curriculum subject in secondary schools in Mazabuka district. Hennessy et al (2010) and Lufungulo (2010) confirmed this when they observed that inadequate power supply in developing countries greatly hampered the integration of ICT in education especially for countries like Zambia that largely depended on hydropower. To mitigate this challenge secondary schools in Mazabuka have improvised alternative sources of energy. The majority of them have bought thermal electricity generator sets to supply electricity in times of power outages so as to enhance the teaching and learning of ICT. The researcher, however, observed that though the schools had thermal electricity generators they were rarely used to supply power for ICT teaching and learning in the majority of the schools. The generators were usually without fuel and when they had they were mostly connected to supply power to the administration block and not the computer room.

5.3.5 Explorations of online resources

In order to mitigate the scarcity of teaching and learning materials for ICT in secondary schools in Mazabuka district, teachers resorted to the use of internet sources to get ICT notes for learners. The commonest teaching resources found in these schools were the ICT syllabus and the 2013 curriculum framework which teachers had to use in interacting with the internet. The surfing of the internet and the use of other online sources greatly helped to alleviate the challenges emanating from the inadequacy of the ICT teaching and learning materials. The researcher, however, noted that as much as the internet was a useful resource most of the secondary schools had limited access to the internet, especially schools in peri-urban and rural areas. Most urban schools had internet connected to their schools but its use was dependent on the discretion of the school administrators. Teachers could not use the facility freely at their disposal but with restrictions. Apart from that the internet was extremely slow and usually unavailable at most times. This was a result of non-payment of the service by the schools or lack of signal from the service providers. Hennessy et al. (2010) indicate that integration of ICTs in education in developing countries is easier said than done due to limited technology infrastructure, particularly internet access, bandwidth, hardware, and software provision. Isaacs's (2007) study affirms this by observing that the penetration and availability of ICTs in Zambian education institutions remain low. MOCT (2006) adds on to say among the challenges the Zambian education system, especially public schools' faces is the high opportunity cost of deploying the ICTs.

Measures employed in the mitigation of challenges in ICT teaching in secondary schools include community engagement, class split, volunteer teaching, use of alternative sources of power, and exploration of online sources.

6. Conclusion and Recommendations

The study established empirical evidence on the challenges and prospects of ICT as an examinable curriculum subject in secondary schools. The common challenges were; a lack of trained ICT teachers, inadequate computer hardware and software, irregular power supply, and a lack of proper computer laboratories. The prospects identified included the viability of ICT as a subject, the critical ICT role in social economic development, promising government political will, and improving teacher qualification

To wrap it up the study outlined the measures employed by secondary schools in mitigating the challenges in the teaching and learning of ICT as an examinable curriculum subject in Mazabuka. The measures include community engagement, class splitting initiative, use of voluntary teachers, use of alternative sources of power, and explorations of online resources. The following recommendations were made;

1) The government should consider a reduction of tax and tariffs on end-user consumer ICT products such as desktop computers, iPads, projectors, etc.
2) Government should promote Public Private Partnership (PPP) in ICT education to support the development of ICT infrastructure in secondary schools.

3) The Ministry of Education should create a stand-alone ICT department in secondary schools so as to effectively and efficiently teach ICT.

Conflict of interest statement

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

About the Authors

Dr. Kalisto Kalimaposo is currently senior lecturer in the University of Zambia, School of Education, Department of Educational Psychology, Sociology and Special Education. He holds a PhD in Sociology of Education, Master's degree in Sociology of Education and a Bachelor's degree in Sociology & Library, Information Studies from the University of Zambia. He has published quite extensively in local & international journals. His research interests include equity studies in education, curriculum innovation, teacher education, transformative learning, comparative & development education, sociology of disability, indigenous knowledge systems, & entrepreneurial education.

Siana Moono is currently a secondary school teacher in Mazabuka, Zambia. After finishing his Master's degree in Sociology of Education from the University of Zambia, he has continued conducting research in schools and teacher education. His research interests include ICTs in education, teacher education, indigenous knowledge systems, comparative and development education.

Dr. Harrison Daka is a dedicated academician and lecturer in Foundational Educational courses and Coordinator for Postgraduate programmes. He has a PhD in Health Profession Education a Masters in Educational Administration and Management and a Non – degree Masters in HIV and AIDS delivery programme done from University of Sydney. He has over 16 years teaching at the University of Zambia in different Schools, Institutes and Departments. He has lectured in over 15 educational courses in different programmes and universities. He has developed a number of new courses. He has a broad record of research both self and commissioned. He has authored many articles in local and international Journals various educational materials and reviewed many articles. He has presented numerous papers at both local and international conferences, seminars and forums. Has facilitated at many workshops, coupled with, supervising and examining at both Masters and PhD levels respectively.

Dr. Sanny Mulubale is a University of Zambia lecturer and researcher who obtained a doctorate as a Commonwealth scholar from University of East London (UEL) – UK. He is also serving as the MIET Africa Health Coordinator in Zambia, which involves working with schools and health facilities on a SADC programme called FutureLife-Now!. He ran the UEL Global Challenge Research Fund project in Zambia in 2018-2019. He also had two postdoctoral internships to coordinate and work with the UK HIV Psychosocial Network, for which he was nominated for a nOSCAR (the Wellbeing person of the year award from the Naz Project). As a researcher his keen interest is around identity, citizenship, global politics, HIV and the govermentalisation of health. His fascination is

with the nexus between theory, empirical evidence and implementation science in both research and policy frameworks.

Dr. Chivunda Kaumba is currently a lecturer at the University of Zambia in the Department of Language and Social Science Education. Chivunda holds a PhD in Education and specialises in pedagogy, theory and practices of teaching of Civic Education. Chivunda coordinates the programme for Master of Science in Peace, Leadership and Conflict Resolution at the University of Zambia. He is passionate about governance systems and corruption with focus on modelling methods upon which the young generation can be prepared for future responsibilities free from corruption and other forms of injustice. Chivunda practices transformative pedagogies that aim at enhancing and improving the role of education in creating citizens' broader knowledge and dispositions necessary to achieving a society driven by the common good through integrity, transparency and accountability in affairs that govern them.

Fumbani Mphande is a senior research fellow pursuing his PhD in the University of Zambia, School of education. He currently serves as a part-time lecturer in industrial sociology at the Graduate School of Business, he also coordinates the undergraduate research projects. Fumbani has a passion for lecturing, community works and environmental issues. His research interests include e-learning, substance abuse in schools, gender issues in education, comparative and development education. Fumbani has published quite extensively in local & international journals.

References

Ang'ondi, E. K. (2013). *Teachers' attitudes and perceptions on the use of ICT in teaching and learning as observed by ICT champions.* Proc. 10th IFIP World Conference on Computers in Education, Torun.

Annan K. (2003). *Message from United Nations Secretary-General Kofi Annan.* Retrieved from http://www.int/wsis/annan.html on 2003, 23-12-2015.

British Educational Communication Agency (BECTA) (2004). *A review of the research literature on barriers to the uptake of ICT by teachers.* Coventry: BECTA

Central Statistics Office (2012). *Zambia 2010 Census of Population and Housing: Vol.11 National Descriptive Tables.* www.zamstats.gov.zm

Daka, H., Mugala, A., Mulenga-Hagane, L. M. and Kalimaposo, K. (2022). Academic flaws in the face of the COVID-19 Pandemic: A case of University of Zambia students. *International Journal of Research and Scientific Innovation,* 9 (7), 27 – 34.

Grimus, M. (2000). *ICT and Multimedia in the Primary School. The 6th Conference on Educational Uses of Information and Communication Technologies.* Beijing, 21-25 August.

Hennessy et al. (2011). An investigation of appropriate new technologies to support interactive teaching in Zambian schools. *Itupale Online journal of African studies.* 2 (1): 39-54.

Isaacs. S (2007). *Survey of ICT and Education in Africa: Zambia Country Report.* www.infodev.com accessed 12/01/17.

Jhurree, V. (2005). Technology Integration in Education in Developing Countries: Guidelines to Policy Makers. *International Education Journal, 6(4),467-485).*

Kiptalam, G. K., & Rodriguez, A. J. (2010). *Accessibility and utilization of ICTs among secondary school teachers in Kenya.* In The International Conference on Computing and ICT Research (6) (pp. 246-263).

Lufungulo, E., S. (2015). *Primary school teachers' attitude towards ICT integration in social studies: A case of Lusaka and Katete districts.* Unpublished Masters Dissertation, UNZA, Lusaka.

Kalimaposo, K. (2010). The impact of curriculum innovations on pre-service primary teacher education in Zambia. *PhD Thesis, University of Zambia*.

Kalimaposo, K., Mulubale, S., Daka, H., Kaumba, C. (2023). Education in austerity: Exploring parental participation in supporting community schools in two villages of Eastern Zambia. *International Journal of Social Science and Education Research Studies.* Volume 3, Issue 7, July 2023. Pp: 1236-1243. ISSN (online): 2770-2790. DOI: https://doi.org/10.55677/ijssers/V0317Y2023-11.

Kwaku, F. & Kwame, G. (2010). The perceptions of students, teachers, and educational officers in Ghana on the role of computers and teachers in promoting the first five principles of instruction. *The Turkish Online Journal of Educational Technology, Vol 9, issue 3.*

Lopez V. (2003). *An exploration of the use of information technology in the college classroom: quarterly.* B(1) retrieved January 10th 2008, from: http://www.collegequartery.ca/2003-voi06-num01-fall/lopes.htm

Ministry of Communications and Transport. (2006). *National information and communication technology policy*, Lusaka: GRZ.

Mulima O. (2014). *The perceptions of Teachers and Learners on the role of ICTs in teaching religious education in Zambia: A case of selected Secondary Schools in Kabwe District.*Lusaka, Masters Dissertation, Unza unpublished.

Muyabi, P., Kalimaposo, K., Mubita, K., Mulubale, S., Haambokoma, N., Milupi, I. and Mundende, K. (2022). Parental involvement in reducing learner absenteeism in selected primary schools of Kazungula District in the Southern Province of Zambia. *International Journal of Research and Innovation in Social Science* (IJRISS). Volume VI, Issue IV, April 2022. ISSN: 2454-6186.Pp: 207-214.

Mwanamwambwa, V., Kalimaposo, K., Mubita, K., Sikayomya, P., Muyangana, A., and Haambokoma, N., (2021). Homework policy implementation in selected primary schools of Kalabo District in Western Province of Zambia: Prospects and challenges. International Journal of Research and Innovation in Social Science (IJRISS). Volume V, Issue X. ISSN: 2454-6186. Pp: 101-108.

Ofojebe, W. (2006). *The Place of Teachers Education in Manpower Development in Nigeria.* Onitsha: West and Solomon Publishing Co. Ltd.

Okeh, O. D. & Opone, M. C. (2007). Information and Communication Technology (ICT): A variable tool for national Education Growth. *Journal of Academics*. 2(3) 234-246.

Pelgrum W., J. (2001). Obstacles to the integration of ICT in education: Results from worldwide educational assessment. *Computers and Education, 37,163-178*

Phiri W. (2016). Pupils' and teachers' perception toward the use of Information and Communication Technology (ICT) in the teaching and learning of Mathematics in selected secondary schools of Central Province, *Zambia International Journal of Multidisciplinary Research and Development Online* ISSN: 2349-4182 Print ISSN: 2349-5979 www.allsubjectjournal.com Volume 3; Issue 1; January 2016; Page No. 77-87

Sarfraz, F., Daka, H., Zubair, A., and Sarfraz, F. (2022). The Viability of Blended Model in Undergraduate Medical Education in COVID-19 Pandemic. *Pakistan Journal of Medical and Health Sciences*, 16 (1), 561-565.

UNESCO, (2013). *United Nations Educational Scientific and Cultural Organization* (UNESCO) ICT in Education in Africa, Paris.

Voogt J., Knezek G. (2008). *International Handbook of Information Technology in Primary and Secondary Education.* Part one, Springer Science + Business Media, LLC: New York.