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"Borrow–to-Adapt" or "Brain – Earn" ICT education: A critical analysis and lessons learnt from the first ever ICTs examinations in Zambian public schools

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Abstract
This article is part of the on-going PHD study titled "A Problem-Solving ICT education approach and its implications on the teaching and learning of Mathematics in selected secondary schools of Central Province, Zambia. The need for the use, implementation and integration of ICTs in the education system may vary from country to country depending on the education and curriculum policy for a particular nation. Despite such variations in policy and curriculum direction of individual nations, the measure of central tendency however lies in the fact that everyone requires information and communication technology (ICT) competence in order to survive in this information era. In agreement to the above, Adoni and Kpangban (2010) [1] confirm that the ability to access and use information is no longer a luxury, but a necessity for development. Mulauzi (2007) [12] further present that information and access to ICTs are no longer a luxury, but a human need and basic right. ICTs in this article are taken to mean technologies that provide access to information through various telecommunication medium such as radio, satellite, television, cell phone, the internet, wireless networks and other communication mediums. The importance of ICTs in the teaching and learning cannot be overemphasised as Brakel and Chisenga (2003) [4] advanced that ICTs play significant impact not only in the area of human activity but also in the education sector. This article aims to establish the rationale for the use, implementation and integration of ICTs in the Zambian Education system. Further, two broad concepts 'Borrow-to-adapt and Brain-Earn will be examined and how these concepts impacts on the implementation and integration of ICTs in the education sector should be actualised. Furthermore, lessons from the first ever grade Nine ICT examinations which were administered in the Zambian public schools will be assessed as well. Additionally interventions instituted by the Zambian government to enhance the implementation of ICTs in the education system will be objectively critiqued. Lastly, conclusions and recommendations will be drawn.

Keywords: Borrow-to-Adapt, Brain – Earn, ICT education, Examination, Public School

Introduction

As briefly noted in the abstract, Information and Communication Technology (ICT) according to Marianne and Solly (2010) [10] refers to all aspects of managing, communicating and processing information. It is argued that although computers are central to information management, information and communication technology embraces more than just the internet and computers. It includes computer hardware and software, telecommunications, cell phones, digital video, cabling, microwaves, radio waves, etc. In other words, ICT can be seen as a combination of information technology and communication technology to create or provide a massive network of electronic devices which includes computers.

Nations globally are putting ICTs at the centre of economic, social, political and educational activities. Noticeably, the use, implementation and integration of ICTs in the education sector seem to be a priority to most countries. Of course, some developed countries have already exploited the benefits of using ICTs in the education system while the Least Developed Countries (LDCs) and the developing nations have started taking up the challenge of integrating technologies in the learning and teaching processes. Although constrained by limited financial resource envelop, Zambia is one of the African countries that has embraced the integration of ICTs in its education system. What then are some of reasons for embarking on such an expensive venture? How is the implementation and adoption of ICTs in the Zambian schools being done? What approaches are being employed in the implementation and integration of ICTs in our Zambian schools? Are there lessons for example that can be learnt from the first ever Grade Nine ICT examinations which were conducted in November 2015? What are some of the interventional measures government and other stake holders have put in place to ensure smooth implementation of ICTs in all Zambia's' public schools? Are these interventional measures specific, measurable, attainable, realistic and viable? These are some of the contentious issues being addressed in this article.

Reasons for Integrating ICTs in the Zambian Education System

The findings from several studies such as those conducted by Kapesa and Katulwende (2015), [9] UNESCO (2013) [17] and Mtanga, Imasiku, Mulauzi and Wamundila (2012) [11] which investigated on the benefits of using ICTs, revealed that there was improvement in the attentiveness exhibited by learners, pupils engaged more in reading and learning, the overall performance of pupils improved and teachers' competence when dealing with technology also improved. Yusuf (2005) [19] explains that ICT has affected teaching, learning and research

with the potential to improve the quality of education. For instance, in group research projects, pupils can have an online collaborative platform where they can share information and ideas and work on the project simultaneously across space and time (Mtanga, *et al*, 2012). [11] In this regard, the use of ICTs would provide an added advantage of creating teamwork skills in the pupils which would be useful in their post-secondary schools endeavours. Further, Newhouse (2002) [14] observes that the use of ICTs have the potential to reduce on teacher dependence but instead increase learner dependence which would ensure pupils' active participation in school. "This is possible where pupils can have access to learning material independent of the teacher and can have self-paced lessons not restricted by space and time. Additionally, a pupil can have access to electronic learning resources like Encarta Encyclopaedia and other scholarly articles available electronically that have the potential to increase knowledge and add value to the pupils learning process" (Mtanga, *et al,* 2012: 3) [11].

Further, ICTs does not only benefit pupils but teachers as well. For instance, teachers can derive many benefits from the use ICTs education through integrating different ICTs into the various teaching activities. In this respect, teachers are able to easily prepare, modify and distribute course material to pupils through e-mail, whatsup and facebook to mention but a few. Additionally, non-teaching tasks such as calculating continuous assessments and assessing individual pupil's performance over time and other administrative tasks like compiling pupils' attendance registers in a particular school term or year can be easily managed by use of software applications designed to perform such tasks or activities. Furthermore, teachers can make use of software applications, audio-video among others to present their lessons in different ways and have pupils make presentations using different multi-media (Mtanga, *et al,* 2012)[11].

An interview by the Zambia Daily Mail (2015: 18) [20] with the permanent secretary Ministry of General Education (MoGE) revealed the following as regard to why government place ICTs at the centre of the education delivery system:

Like citizens of other countries, Zambians are living in a constantly evolving digital world where information and communications technology (ICT) has an impact on nearly every aspect of life. The digital era has transformed the way people communicate and access information, seek help and learn. As technology becomes more rooted in the Zambian culture, there is need to provide learners with relevant and contemporary experiences that allow them to successfully engage in technological issues and prepare them for life after school. It is for this reason that the government, through the Ministry of General Education, introduced computer studies in public schools.

It is clear from the above that governments' motive to integrate ICTs in all the public schools in Zambia are driven by the huge benefits that can be drawn from such technologies. Further, governments' rationale to the introduction of ICTs in the education system is in agreement with the outcome from several studies reviewed above. While the reasons advanced by government concerning the use, implementation and integration of ICT education in all public schools are welcome and valid, the approach of actualising such a noble project leaves much to be desired. The implementation process is rather reactive than proactive. This leaves us with no option but to discuss the 'Borrow – to –Adapt' and 'Brain – Earn' concepts as one among other cost effective implementation of ICT education approaches in Zambian schools.

Borrow –to – Adapt and Brain – Earn ICT education Concepts

Riccio (2001) [16] in Riva and Galimberti (2001: v) established that "Beyond the development of network technologies, the most striking trend in contemporary telecommunications is the tendency to convergence among the various media, a convergence that involves the computer as well. The convergence of the computer with telephone and television technologies is, in fact, producing new communication environment...from distance learning to cyber mails...that are shaping our experiences." It is true that technology is never a static sector. It is dynamic hence the need to adopt strategies and approaches that are flexible, problem-solving and above all techniques that would inspire our pupils to develop the mind that is able to create, invent and innovate ideas aimed at solving their own real life challenges but also numerous problems communities encounter. The biggest question that our leaders in the country and later on policy and curriculum formulators should ask is, are we going to borrow the already made technologies and adapt or should we chat our own technological innovations? What about the ICT education which is being given to our pupils, which approach or strategy should be adopted?

Mwewa (2011) [13] has made related arguments, as have many others that "Zambians are as equipped naturally as any peoples on the globe to develop and embrace technologies that can change the nation's trade, intelligence, industrial or socio-political landscape forever. All that is required is a political will to expose our children to technology early; to avail to them technology facilities; to involve them in education tailored towards problem-solving; and to stress competition without sacrificing cooperation." Practically, there are several challenges that must be overcome. Chief among them is lack of financial resources. Financial resources are required to update skills, purchase software and hardware necessary to brace superior technologies, etc. However, there is a cost effective way to this. It is vested in two concepts: Borrow-to-Adapt and Brain-Earn [13].

Mwewa (2011) [13] further asserts that the Borrow-to-Adapt concept requires building on what already exists. In this regard, it may be necessary to borrow and adapt approaches from other countries and regions. As a matter of fact, the concept of Borrow –to-adapt has been utilized in all areas of technological advancement. Although one may need to obtain permission and pay any fees requested from the original source, sometimes such dynamics are not necessary. It is argued that businesses as well as governments thrive on borrowed ideas which they exploit to their advantage. For example, China is rising as the global giant in technology. But Chinese ingenuity is partly acquired through borrow and adapt arrangements. Chao (2009) [5] writes that Chinese companies succeed by taking an existing technology and then tweaking it for a local audience. For example, Baidu Inc, owner of the most popular website in China, is not known for ground-breaking innovation. From the Google-esque look of Baidu.com's main page to its Wikipedia-like encyclopaedia to question- and –answer service that's similar to Yahoo Answers, the Chinese Internet search

company is revolutionizing the way borrow and adapt concept is manipulated (Baidu, 2009) [3].

In this regard, due to limited financial resource envelop, the Zambian technology ICT implementation team mandated to implement the ICT education in the education sector can take advantage of the fact that foreign ICT education system often struggle to adapt their education policies to the African and later on Zambian education aspirations. While this may not earn the nation the respect to be known as a global ICT education innovator, most Zambian schools may benefit and supplied with basic IT tools in the short term and long term. In other words, the Zambian ICT education sector can benefit by taking existing technologies or ideas and giving them a Zambian feel. Agazzi (2010) [2] agrees that technology transfer...could assist least Developed Countries suffering from the effects of technology deficiency. Mwewa (2011) [13] equally observes that the easiest way to create winning technologies may be simply to borrow and adapt them from some of the greatest technologies in existence. In the short term, this could be the answer to many challenges the Zambian education system could be facing concerning ICT education due to financial limitation that hinders the purchase of advanced and expensive technologies. For example, the survey conducted by the Zambia Daily Mail (2015: 18) [20] government through the Ministry of General Education acknowledged the following challenges:

The first ever Grade Nine computer studies practical examinations were conducted early this month amid serious challenges and inconveniences to the learners including their parents and guardians. The computer examinations, which various sections of society described as having been improperly organised, saw pupils take turns in groups to share the few available computers. Some pupils only managed to sit for the examinations after midnight, a predicament which caused panic among parents and guardians, some of whom were forced to wait all night long for their children to finish writing around 03:00 hours. Power outages also compounded the learners' predicament. The government regretted the challenges and inconveniences caused during the examinations. Government would like to apologize to the parents and learners for the inconveniences caused during the administration of computer studies practical examinations. We appeal for calm among parents and learners... such a thing would not happen again as Government are putting in place effective interventions to ensure the availability of computers and no power outages in schools especially during examinations.

So what exactly are the interventions the government is putting in place to ensure future computer studies practical examinations are properly managed? Did the government hurriedly introduce the ICT examinations? Does the country even have enough ICT teachers? These were some of the questions raised by sections of society following the problems that characterised the first ICT examinations (Zambia Daily Mail, 2015). [20]

The other concept worth highlighting is Brain –Earn. It is argued that the emigration of individuals with technical-how, skills and knowledge to other countries is normally referred to as Brain-Drain. It is also known as human capital flight. There are number of reasons why such human capital flees, which may include lack of opportunity, political instability, etc. Therefore, Brain-Drain involves the departure of educated or professional people from one country's economic or other sectors for another in search of 'greener pastures' or for better pay or living conditions. The sad reality of Brain-Drain is that it leads to the de-skilling of emigrants in their country of destination. Skills that were acquired at high cost to the government or local organisations usually end up being disregarded in the country of destination when they are vital to the development of the originating country (Mwewa, 2011).[13] That is how traditionally Brain-Drain has been viewed.

However, Brain-Earn, is a new concept which is not antithetical to Brain-Drain. Brain-Earn involve the technological plough-back of rich experiences of the immigrants from the developing countries. In this regard, Borrow-to-Adapt concept is related to Brain-Earn in that it requires that emigrated workers use the skills, information, training and knowledge they acquire in the countries of destination to develop their countries of origin. This demands that governments in developing countries create a policy-framework which favours the return of foreign-experienced workers to their countries of origin. A practical example is the contribution by the renowned professor Chirwa who has contributed greatly at the Copperbeilt University in Zambia after returning from Europe where he did a lot in the engineering industry that manufactures bodies for planes. Therefore, the Zambian Ministry of General Education can take deliberate move of recalling great ICT experts in the Diaspora to come and help implement and integrate ICT education in the education system at an affordable cost. In short, government through the Ministry of General Education should assess these approaches and adapt to those that seem viable and cost effective. Having discussed the Borrow-to-Adapt and Brain-Earn concepts, it is important to discuss some of the major lessons that government through the ministry of General Education has learnt in its first ever Grade Nine ICT practical examinations which were conducted in November 2015.

Major Lessons Learnt from the Zambia's First Ever ICT Practical Examinations in Public Schools.

In an interview by the Zambia Daily Mail (2015:18) [20], the Permanent Secretary Ministry of General Education, highlighted the following lessons that government through the Ministry of General Education has learnt:

What we have learnt from the first computer studies examinations is that effective information flow is very important. When we discovered that we could not raise enough resources to buy computers for all the schools, we decided to remove computer studies from the list of compulsory subjects so that only schools with enough computers conduct practical examinations...also regretted that schools that did not have computers still went ahead with the practical examinations using any means possible. He said computer studies examinations will only be compulsory when all schools are equipped with ICT materials. We have also learnt that the introduction of ICT examinations in schools cannot be implemented at once but gradually since we do not have enough computers to cater for the over 8,000 primary schools in the country, he said. In the 2015 national budget, the government had set aside funds to purchase computers for only 300 schools.

The lessons learnt according to government are not just realistic but also quantified and clear. It is one thing to acknowledge that there is a problem and another to constitute measures aimed at addressing such challenges. Clearly, most of the problems identified could have been avoided had government and other

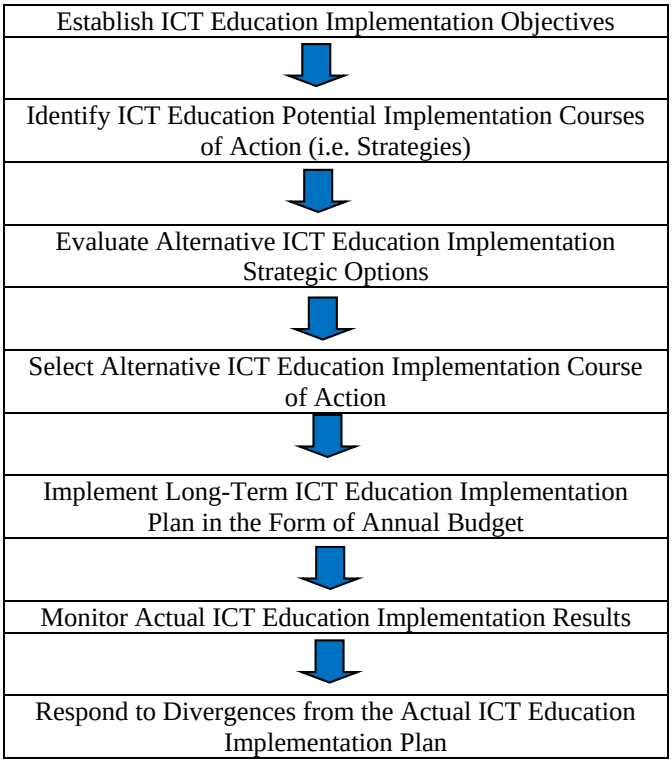
key stakeholders planned coupled with taking a proactive role. Planning for the implementation of ICTs in the education sector could have helped government through the Ministry of General Education to:

- Evaluate the current ICT education status.
- Visualise the planned desirable ICT education status at the end of the planning period.
- Prioritise the ICT education implementation objectives.
- Articulate different strategies for moving from the current ICT education status to the desired status in more realistic and rational manner.
- Evaluate alternative ICT implementation strategies and choose the preferred strategies, thus avoiding investment and financial decisions that may have adverse financial consequences for the government.
- Evaluate possible deviations from the ICT education integration desired outcome in the preferred strategies and development.
- Develop ICT education action plan and cost them.

For example, government had statistics about the total number of schools which should have been used to project the number ICT nodes to be purchased. A total of over 8,000 primary schools were projected yet the budget only allowed the purchase of computers for only 300 schools. This implies that government had the capacity of only 3.75% to purchase computers meant to be used for ICT lessons and practical examinations. By the way, the 8,000 are just primary schools. What about secondary schools? The figure would be projected much higher.

Therefore, government with other stake holders should have strictly adhered to the planning process as illustrated below.

ICT Education Implementation Planning Process



Moreover, the computer is not the only tool required in the ICT education. There is need for internet connectivity for example which is largely powered by electricity that is in most cases not available especially in rural areas. To cut the story short, the government had a full knowledge of the magnitude of the problem yet they went ahead to declare ICTs compulsory in public schools. What could have been done was to start implementing the integration of ICT education in schools in phases according to the resources available. While the motive was welcome but the timing and the implementation approach was not suitable.

In his response during an interview, the permanent secretary Ministry of General Education had this to say:

...Government could not wait to have enough computers in all the schools for it to introduce computer lessons for fear that the country would remain technologically backwards...People are condemning us, saying why introduce such a thing (ICT in schools) when you are not ready, but if we do not introduce it now, we shall be a backward nation...Technology is advancing everyday and the longer we wait, the more backwards we shall be. We have to start from somewhere... (Zambia Daily Mail, 2015: 18)[20]

While government should be recommended for taking such a bold decision of introducing ICTs in the education sector, the timing was rather miscalculated. The stance taken by government to say they had to start from somewhere is good but implementing such a costly project countrywide was rather unrealistic taking into consideration the limited resource envelop at play right now. Moreover, even implementing the project in phases is equally starting from somewhere. This is the reason government later changed and recommended integrating ICTs in phases which should have been the case at the beginning. There are several advantages of implementing a project in phases such as decrease in the project risk, easier to control and follow up a project divided into well-defined phases, to mention but a few.

Interventions Instituted by Government aimed at Enhancing ICT Education in Zambian Public Schools

This paper argues that implementation of ICT education in schools should always be proactive rather than reactive unless critical issues arise during the integration process. According to the survey conducted by Zambia Daily Mail (2015: 18), [20] government instituted the following interventional measures:

1. To address the problem of inadequate computers in schools, government signed a memorandum of understanding (MoU) with i-school.zm, which would provide tablet computers in schools. i-school.zm would provide tablets which will be used as teaching and learning aids in schools. The ultimate goal is to ensure that by 2017, 50 percent of our learners will have access to ZEDUPAD (computer tablets) provided by i-school.zm.
2. Because of limited resources, Government alone cannot manage to buy computers for all schools in the country. It will therefore continue to work closely with the private sector in the provision of ICT equipment in schools.
3. Government will also set up a team of experts to determine how many computers are needed in all schools countrywide.
4. To address the shortage of ICT teachers in schools, government with support from the United Nations Educational, Scientific and Cultural Organisation (UNESCO) has trained over 2,500 teachers in computer studies.

5. Government had sent 15 teachers to France for a computer studies course and upon their return; they started training their fellow teachers. So far, 2,545 teachers have undergone computer studies training countrywide.
6. Capacity building among teachers will continue and government has since written to all tertiary learning institutions to consider introducing distance computer courses for teachers.
7. The government will further mobilise resources to ensure that there are many schools examining pupils in computer studies.
8. Government, through the Examination Council of Zambia, has resolved that in future, computer studies examinations will be conducted over a period of three days. The examinations will be set for computer studies and all of them will be assessing similar competencies in the pupils for three days. So there will be no leakages or congestion...
9. The government is also exploring the possibility of having separate examinations for full-time and external pupils to reduce congestion when writing computer studies examinations.
10. Over power outages, government advised school management to be proactive and consider using alternative sources of energy such as solar or liaise with ZESCO not to load-shed their institutions during examinations. Government stressed the need to start exploring alternative sources of energy other than hydro electricity.
11. Government is encouraging the private sector to work closely with the government in implementing measures aimed at ensuring that future ICT examinations are smoothly conducted.
12. Government encouraged school managements to endeavour supplementing government's efforts through their own initiatives instead of waiting for it to provide their institutions with computers and related accessories.

Having tabulated some of the critical measures instituted by government hereunder is a critical analysis of these interventions. The first intervention of engaging ischool.zm to provide computer tablets with pre-loaded teaching and learning lesson plans is welcome. However, this is short term measure in that IT sector is a dynamic field that keep on evolving because of new technologies that are being discovered every day. The challenge that government is likely to encounter with this intervention is that by the time tablets reaches the intended pupil especially in rural areas, the content contained in the tablet would have been outdated. Our hope is that those tablets has a provision of updating the content contained otherwise, it may be a costly exercise to keep on replacing the tablets time and again. In the article titled "Africa still behind in ICT progression", Nkana (2015: 12) [15] laments how a desktop which was acquired meant to help teach ICTs at a named rural school in Zambia become outdated:

...a teacher heading the ICT department...spoke of the challenges he faces conducting computer lessons without power and PCs...Mr Banda...he uses his laptop to teach computer lessons to 50 pupils...To complete teaching 50 pupils with one laptop is a toll order...because it is time consuming and he also worries that results will be poor when the learners sit for exams next year..Knowing the importance of ICT in schools, Mr Banda is determined to teach the subject that demands he charges his laptop battery at the head teacher's home because he has no power at his home...But before the lesson is over, the battery goes flat, and frustrated, Mr Banda has to stop teaching...When computer studies were first introduced at the school, a desktop computer was purchased but it is not compatible with the generator hence my using a personal laptop whose battery has now become faulty.

It is clear from the above that implementation of ICTs in Zambian schools remain a big challenge especially in rural areas such that distributing computer tablets may help provided those tablets don't require being regularly charged with electricity or solar. It seems there is political will in the project of distributing ZEDPUD computer tablets with pre-loaded lessons to at least 50% of the pupils by 2017 because the Zambian Republican President made mention of the initiative during his special speech to the national assembly in September 2015. The other hope is that the project has an inclusion of Zambian experts because the person who was instrumental in this project (Mr Mark) died. In other words, the sustainability of the initiative should be assessed before being adopted in the schools. This is because most donor driven projects die a natural death once the donor stop funding such a project or the founder dies.

For the interventions (2) and (3), government can still manage to purchase ICT resources of which the computer is just one of them for all the schools. Scarcity of financial resources can among others as a result of misplaced priorities. The huge sum of money being spent on conducting by-elections could be injected in the education sector thereby speeding up the implementation of ICTs in our Zambian schools. All what is needed is for the parliamentarians to formulate laws that discourages by elections. For example, by the end of 2013, government had spent about K17 billion on by-elections alone (Electoral Commission of Zambia, (ECZ), 2015). [6] This kind of money could have made a significant contribution had it been used to integrate ICTs in our education system. The participation of the private sector is welcome but government should create an enabling environment within which the private entities can participate. Moreover, private owned schools, colleges and universities are already on top of things in as far as the use of ICT education is concerned. However, most of such private schools are found along the line of rail that is, in urban areas where they make profits leaving rural areas starved of ICTs use and integration. Government in this case, should move in and provide a service to the marginalised areas so that both urban and rural schools benefit equally.

Regarding interventions (4), (5) and (6), while it is recommended on the part of government to train ICT teachers, the quality of training may be compromised. This is because government is in a hurry to have quantitative number of teachers but this may be done at the expense of quality. For instance, it takes a minimum of four years for one to graduate with a bachelor's degree from the University of Zambia and Copperbelt University. ICTs curriculum came into force early this year (2015) and one wonders when the claimed teachers underwent the training. Short term seminars and workshops cannot be converted into training of professionalism hence the compromised quality of ICT education that can be offered to our young generation. Here, we are not despising short term seminars but those should be given as refresher courses to the already trained existing professionals in ICTs.

Government's interventional measures numbered (7-9) all hinges on government's ability to mobilise financial and technical resources. Most of the issues raised here are

dependent on availability of financial resources which has become a song by our leaders that they could have done this and that but they didn't because there is no money. While excuses are given of unavailability of finances, other programmes especially those which are political in nature are seen to be implemented. The blame in this regards should not entirely heaped on political leaders but partially on our laws. For instance, the Zambian constitution stipulates that if a Member of Parliament dies or resigns; a by-election should be held within 90 days. This would force those at the helm of leadership to defend and respect the constitution but when it comes to matters of democracy, human rights and education, the law is either silent or porous or depends on international declarations that Zambia quickly become a signatory but fails to domesticate such progressive laws. Perhaps Mwewa (2011) [13] is correct when he observed that our Zambian leaders should avail our young generation with technology facilities and involve them in education tailored towards problem-solving. But to achieve this, there are several challenges that must be overcome and chief among them is lack of financial resources. While this is the trend in Zambia, the task should not be left to government alone. All citizens should participate in mobilising resources so that our education system become effective and efficient as all of us will benefit in the long run in one way or another. The mentality that government will do everything should be stopped so that all of us participate in finding solutions to many challenges our education sector is facing later on the implementation of ICT education in our schools.

Nevertheless, government should also be honest and accountable in the way it allocates the hard earned resources to various areas of need. Our political leaders should be selfless by investing into areas which may start to bear fruits when they are long gone rather than concentrating only on activities that will make them politically popular today yet digging a grave for next generation. The education sector is one such area that may give returns after a decade yet worth of the investment. Zambia can learn lessons from China, Australia and India who developed their own ICT education curriculum that is now rewarding them after many years of sacrifice, perseverance and determination. If such an approach and attitude is embraced by our leaders and all of us, it is possible to achieve the rest of the interventions (10-12) as proposed by government. The challenges of integrating ICTs in our education system is not government's problem alone but is our problem hence the need to collaborate and embrace concerted efforts between government, citizens and the private sector.

Taking a snapshot from the above interventions, it is clear that government is committed to the fruitful implementation of ICTs in the education system. This commitment is demonstrated by government putting in place the ICT policy and other pieces of legislations aimed at enhancing the integration of ICT education in public schools. There are also other interventional measures that government in collaboration with various partners has embarked aimed at promoting the use of ICTs in schools such as Computers for Zambian Schools Trust, Schoolnet, UNESCO Distance Learning Telecentres, e-Brain Forum and One World Africa to mention but a few (Mtanga, *et al*, 2012 [11] and Shafika, 2007 [18]). The recent first ever ICT practical examinations which were held in all schools countrywide further demonstrate government commitment in actualising the use of ICTs in the learning and teaching processes. While such good pronouncements have been made, it is hoped they will not just remain on paper.

As argued by Habeenzu (2010)[8] that despite such remarkable progress at ICT for education policy level that is supported by major government pronouncements, the ICT education plans however are always not implemented not only in Zambia but in most African countries. The development of plans doesn't necessarily equate with implementation and results on the ground. In most cases implementation remains very dependent on the support of partners from the donor community and the private sector. Farrell, Shafika and Trucano (2007)[7] further add that many African countries Zambia inclusive, their ICT sector policies constitute a vision for development whereas their implementation plans need to focus on practical and sustainable initiatives that can be taken in the shorter term to move towards the vision. This can be evidenced from many irregularities recorded in the first ever ICT practical examinations which were held in all the Zambian public schools. The whole exercise unearthed serious planning, logistics and financial deficits. In a nutshell, most of the interventional measures proposed by government as stipulated above are welcome but they should not end up being shelved in book shelves. Such measures should be backed by practical and tangible actions such as serious mobilisation of financial resources, ICT technical experts and SMART implementation strategies like the Borrow-to-Adapt and Brain-Earn options.

Conclusion and Recommendations

It is clear from this discourse critical analysis that despite several challenges government faces in the implementation of ICTs in the Zambian education system, one thing that is central is that ICTs are here to stay. Indeed, the age of information and communication technology has arrived. That time to vigorously pursue, exploit and embrace ICTs in our education sector and other developmental sectors is now. Anyone who is resisting change and the integration of ICT education in our schools will be consumed by change itself. ICTs play a critical role in the delivery of quality education and later in the development agenda of the nation. Therefore, the introduction of computers in the Zambian public schools cannot be over-emphasised because pupils need to be armed with basic competency skills in computers so that they are prepared for the ever technologically advancing world. More importantly, our pupils should receive a problem-solving ICT education that would inspire them to develop critical thinking, reasoning, logic, and above all be able to invent and innovate ideas thereby solving their own problems and those society is encountering by transforming theory into practical and tangible products. The introduction of ICTs as a compulsory subject in schools is not a problem in itself but the implementation timing and strategies employed are rather reactive than proactive. Therefore, regardless of the challenges that government faces, we should do everything it takes to make sure that our education sector is effective and efficient by among others the integration of ICT education in our schools, colleges and universities. We do acknowledge that government is constrained by its limited financial resource envelop, but this can be mitigated by exploring cost effective measures such as Borrow-to-Adapt and Brain-Earn approaches among others. Zambia as a nation has enough IT experts who when properly harnessed, they can play a critical and cost effective role in the implementation of ICTs in our schools. We are not refusing the use and adoption of foreign based technologies because we leave in one global village but the locally produced technologies should be given a platform and be recognised thereby playing a complementally

role. Can we successfully integrate ICT education in our numerous schools dotted all over the country? YES we can. All we need is re-aligning our priorities, resource distribution, self-belief, self-determination and political will.

This paper therefore makes the following recommendations:

1. Government should vigorously, rationally and realistically turn brilliant pronouncements into tangible actions that will produce quantifiable results. This can be achieved by government through political leadership to be honest by prioritising financing of ICT education. For example, huge sums of money spent on political expiation can be channelled to the implementation of ICTs in schools. For instance, Zambia spent over K200 million to hold 18 by-election in 2011 and at the end of 2013, the government had spent over K17 billion on by-elections (ECZ, 2015). All these huge sum of money if injected in the education sector can make a positive difference in integrating ICTs in schools. There is need henceforth to amend the law in the constitution that would discourage by-elections so that much of the resources can be invested in viable sectors such as education.
2. Government should take stock of all ICT tools needed in schools and budget for them. The emphasis should not be only on computers as that is just one of the nods needed. Having a full cost of implementing ICTs in all the schools would enable government to know exactly the magnitude of executing such a project. Such an approach is realistic so that workable interventions could be instituted. Just making political pronouncement is good but not good enough. It is extremely important for our leaders to walk the talk in as far as integrating ICTs in schools is concerned. While some of the steps government has taken are welcome and recommended, the timing and underestimation of financial requirement remains a huge challenge. Therefore, government and other stake holders should avoid a situation where very good policies and pronouncements on the integration of ICTs in education remains a white elephant.
3. The implementation of ICT education in schools should be done by experts and not politicians. The role of political leaders is to formulate favourable policies which should be actualised by experts headed by permanent secretaries in respective ministries later on Ministry of General Education. Once experts are engaged, there should be minimal or no political interference. The separation of powers here comes into play that is each of the following should perform its functions, the executive, the judiciary and the legislature. If such project like the implementation of ICT education in schools is spearheaded by civil servants who are experts, then it would guarantee continuity even when there is change of government.
4. Government with the involvement of all citizens should take up the responsibility of financing the integration of ICTs in the education sector thereby reducing on donor dependency. Let the private sector and the donor community just supplement the efforts of government projects that have a nation character in nature.
5. Government should promote locally designed technologies by our own pupils, student, and experts which are cost effective to implement. The notion that foreign based technologies are superior to Zambian indigenous technologies should be challenged. Locally produced technologies should be funded and value addition so that they can not only be used in our Zambian schools but also compete favourable on the international market. In this regard, Brain-to-Adapt and Brain-Earn are among other options worth exploring in the implementation of ICTs in the Zambian education system.

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