European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available on-line at: www.oapub.org/edu

DOI: 10.46827/ejes.v7i10.3280 Volume 7 | Issue 10 | 2020

# TEACHING AND LEARNING RESOURCES AND TEACHERS FOR THE IMPLEMENTATION OF COMPUTER STUDIES CURRICULUM IN SELECTED PUBLIC PRIMARY SCHOOLS IN NDOLA DISTRICT OF ZAMBIA

**Robert Changwe[1i],**
**Catrina Lwaba Mulenga[2]**
[1]The University of Zambia,
School of Education,
Zambia
[2]Ministry of General Education,
Zambia

**Abstract:**
The government of the Republic of Zambia in 2013 decided to revise its primary and secondary school curriculum in order for the education system to address the much needed societal challenges. Among other subjects that the 2013 education curriculum framework brought on board was Computer Studies as a compulsory subject in both primary and junior secondary schools. Researchers in this study sought to analyse the availability of teaching and learning resources in the implementation of Computer Studies curriculum in selected public primary schools in Ndola district of Zambia given that this was a new subject that had not existed in the curriculum before. Qualitative research approach was used where the researchers employed a descriptive design. 54 primary schools which were clustered into 9 zones were targeted and the study sample comprised of 9 schools one from each of the 9 zones. A total of 72 respondents made up of 9 Head teachers, 18 teachers of Computer Studies and 45 learners of Computer Studies were purposively sampled. Semi-structured interview guide, an observation checklist guide, document analysis and focus group discussion guide were used to collect data and thematic analysis was used to analyse the data. Research findings indicated that teaching and learning resources in schools were inadequate which hampered the effective implementation of the curriculum. Besides, teachers of Computer Studies were not qualified and trained to teach the subject. Hence, the researchers recommended that the government through the Ministry of General Education (MoGE) should provide funds (grants) to schools to procure more computers and their accessories and provide infrastructure such as computer laboratories. MoGE should also recruit qualified teachers of Computer Studies in all public primary schools while universities and colleges of

[i] Correspondence: email robert.changwe@unza.zm

education should incorporate Computer Studies education in their curriculum so that they could produce teachers who are competent in matters that have to do with information and communication technology (ICT). In addition, continuous professional development (CPD) should be a must for all teaching staff so as to acquaint themselves with the evolving nature of computer education.

**Keywords:** curriculum implementation, computer studies, information and communication technology, teaching and learning resources

## 1. Introduction

Advancement**s** in technology and many other societal needs have compelled both developed and developing countries to embark on seeking for solutions by reviewing and refining their educational curricula. For instance, in Zambia, the Ministry of General Education (MoGE) had identified a good number of crosscutting themes or issues that were to be considered when providing education right from early childhood, primary, secondary and up to tertiary education. Among the key issues that the 2013 education curriculum framework reflected on involved; the language of instruction, curriculum localisation, special educational needs, vocational subjects and many others. Vocational subjects included subjects such as; Agricultural Science, Art and Design, Computer Studies, Design and Technology, Home Economics, Physical Education and Music Education. This was all based on MoGE's vision to produce holistic learners who are; creative, innovative and productive, connected to the family, community, national and global developments, capable of learning and living with others, life-long learners as well as leaders and agents of change in the transformation of the society (MoE, 2013).

Despite the issue of information and communication technology (ICT) being new and almost done on an experimental basis in Zambian schools, Mingaine (2013) explained that since the 1980s, the implementation of (ICT) in schools has been compulsory in most developed countries. Based on the relevance and efficiency of ICT, Omwenga (2007) emphasised the need for education systems around the world to be conversant with ICT so that they could teach learners the worthwhile knowledge, values and skills needed for the 21st century. In fact, when learners in developing countries are competently taught the development and application of ICT, there would be a reduction in terms of knowledge, technological and economic gaps between learners in developing countries and the rest of the world.

It is impossible in this digital age for the education system as well as the economy of any country to thrive without the knowledge and skills of ICT. This is supported by Deepark and Turner who argued that Computer Studies as a subject has been recognised worldwide over the ages of civilisation as a vital tool for survival particularly in areas of science and technology (Deepark and Turner, 2006). In March 2007 as explained by Masumba and Mulenga (2019) the Zambian government launched its national ICT policy with the main objective of integrating ICT into the educational curricula as well as other

literacy programmes to provide for equitable access for all learners regardless of the academic level. The policy stated that Computer Studies was to be introduced as a subject in public schools in 1998 just as it was done in private schools (Isaacs, 2007). For the Zambian learners not to be left behind in the global world, the minister made an emphasis over the inclusion of ICT in the curriculum. In his ministerial statement to parliament on 21st February, 2014 the then minister of General Education explained that Zambia needed a new look at the curriculum. Despite the efforts of introducing Computer Studies as a single subject being successful, the subject became compulsory in 2014 for both primary school learners and for grades 8 and 9. Thus one of the notable changes that was quickly implemented in both primary and junior secondary schools was the introduction of Computer Studies as a compulsory subject. The relevance of the subject cannot be overemphasized as it incorporated a broad range of transferable skills and techniques, including logical thinking, creative design, synthesis and evaluation. Besides providing learners with the knowledge and skills to understand the underpinnings of current computer technology as well as preparing them for emerging technologies, Computer Studies further teaches generically useful skills such as communication, time management, organisation and teamwork (Republic of Zambia, 2014).

Despite the relevance of incorporating Computer Studies as a study area in the Zambian education system, it must be reverberated that a very well-developed curriculum is worthless if it cannot be effectively implemented. Borrowing from the words of Kantoma (2015:14), curriculum implementation entails "*putting into action the planned curriculum. It is the actual classroom teaching which includes the use of infrastructure, personnel, materials, methods and techniques."* Moobola and Mulenga (2020: 15) further stated that curriculum implementation involves "*how the planned study is interpreted by the teacher into schemes of work and lessons to be taught to the learners*." Thus, the availability of teaching and learning resources are cardinal for the effective implementation of any curriculum. The researchers in this study were wondering how effective the implementation of the Computer Studies curriculum was being done since learner performance in national examinations in this new subject was not impressive (Examinations Council of Zambia (ECZ), 2015). Besides, Mwale (2015) stated that while the Ministry of General Education's decision to introduce Computer Studies as a compulsory subject in schools may be a step in the right direction, its implementation may prove beyond the capabilities of those involved. This motivated the researchers to analyse the availability of teaching and learning resources in the implementation of Computer Studies curriculum in selected public primary schools in Ndola district of Zambia. The researchers settled on public primary schools in Ndola because firstly, by virtue of being public schools the government was mandated to provide appropriate teaching and learning resources. Secondly, Ndola is a provincial headquarter of Copperbelt province which was likely to be the recipient of teaching and learning materials before they are distributed to other districts within the province.

## 2. Theoretical Framework

The study was guided by the curriculum implementation theory propounded by Gross (1971). Gross explained in this theory that the implementation of any educational programme brings into consideration the question of facilities, teachers' capability, management support and compatibility with organisational arrangement and clarity of the implementer of what is to be done. This theory was relevant to guide the study because the factors that Gross propounded are relevant to enhance the effective implementation of Computer Studies curriculum in Ndola district. In his theory, Gross advocated four major elements that influence curriculum implementation, namely; clarity of the innovation to implementers, capability of the implementers, and availability of resources and provision of management support. This theory was quite appropriate for this study since a curriculum encompasses all these things as Mulenga (2018) had noted. The elements in the theory are explained as follows: clarity of innovation to the implementer requires that teachers who are the implementers should be aware of changes in the curriculum. Resources meant for the new curriculum or existing curriculum must be available and relevant to the curriculum. Capability of the implementer implies that those implementing the curriculum, in this case teachers, must be educated and trained as explained by Mulenga (2020) so as to be in a position to handle the curriculum. As far as management support is concerned, principals and management personnel should be involved and put in place by availing finances to make the new curriculum a success.

## 3. Brief Review of Related Literature

The 21st century has brought with it an enormous demand for the use and application of ICT in both developed and developing countries in all sectors of life. It is such a demand that has necessitated many third world countries to embark on reviewing their curricula so that their respective education system could respond positively to the demands of the global world. In Zambia, in order for learners not to lag behind in terms of new technological advancements, the Ministry of General Education introduced Computer Studies as a compulsory subject in primary, secondary as well as in some post-secondary institutions of learning such as colleges of education (ZANIS, 2014). While all this is fine and a necessary development for education, there has been some indications that the introduction of Computer Studies in Zambia was done hurriedly and thus policy makers did not have enough time to think through the implication of such a development in terms of the availability of teaching and learning resources for a subject that never existed in schools. To make matters worse researchers such as Mulenga and Mwanza (2019) have reported that the involvement of teachers in the curriculum development process in Zambia has been extremely bad in the sense that teachers are not involved in this significant process. As a result teachers are marginalized to the classrooms where they have to meet the challenges of implementing a curriculum whose genesis they did not

participate in as Mwanza and Mulenga (2019) have rightly put it. In this section we will briefly review related literature by reflecting on the; availability of resources and infrastructure, teachers' skills and training in ICT and Computer Studies as well as explain some remedies that can help improve the implementation of Computer Studies curriculum.

### 3.1 Availability of Resources and Infrastructure

It is worth acknowledging that developing a curriculum is one thing and ensuring that the developed curriculum realises its intended purpose is yet another thing. Despite putting in place a very good curriculum, the availability of resources and infrastructure can be a serious impediment to the implementation process if the planning of it is not well funded and well thought out. The actual implementation of ICT requires large capital investments and it is because of this aspect that Ministries of Education need to be prudent in making decisions about what models of ICT to implement. It is important to note at this point that while the Ministry of General Education in Zambia reviewed its curriculum from a content based one to a competency-based curriculum in 2013, Mulenga and Kabombwe (2019) noted that the budgetary allocation to the Ministry of General Education kept on decreasing. One then wonders how such a move by the government could improve the quality of education with the introduction of subjects such as computer studies which need a steady and continuous provision of modern teaching and learning resources. Hennessy (2010) observed that one of the greatest challenges in the implementation of ICT in schools is balancing educational goals with economic realities. Besides, Farrell and Shafika (2007) argued that high costs of acquisition and maintenance of ICT infrastructure is a challenge that has continued to hamper adoption and implementation of ICT in schools. This means that the country's economy may determine the quality of education to be provided.

Moreover, quality textbooks are key to effective implementation of a curriculum because teachers and learners in particular depend on textbooks for them to effectively implement the developed curriculum. However, it is important to note once again that the quality of textbooks that were development after the revision of the curriculum in 2013 in Zambia were of poor quality as Musilekwa and Mulenga (2019) revealed in their study. Generally this has been a common challenges among African countries as Magambo (2007) noted that there was a general outcry amongst the teaching staff on lack of basic resources like textbooks in schools which affected the implementation of the curriculum. In Africa, lack of physical educational facilities such as classrooms and computer laboratories were amongst the major challenges that affected the implementation of the ICT curriculum (Hennessy, 2010; James, 2010; Middleton, Flores and Knaupp, 1997). However, researchers in this study what to find out the extent to which this was the case in Zambian primary schools in Ndola. Thus the implementation of ICT calls for the purchase of textbooks, specialised furniture, computers, computer accessories as well as good infrastructure which can at times be costly to most developing countries given their poor economies. This assertion can be substantiated by the study

done by Kahn (2006) who revealed that there were inadequate resources such as computer laboratories in 33.3% of schools in poor countries which greatly affected the implementation of Computer Studies curriculum. Similarly, the study done in Kenya by Kinyanjui (2003) revealed that more than 40.0% of the sampled schools had less than 10 computers and only 4.5% of the schools had more than 20 computers. This meant that a lot of schools had no computers for the effective implementation the Computer studies curriculum. Based on the research findings that have been cited as well as the study done by ROK (1999) it is inevitable to consider the quality and adequacy of resources such as teaching and learning materials as well as physical infrastructure in the implementation of the Computer studies curriculum.

The other aspect that cannot be ignored in the implementation of Computer studies in schools is the availability of electricity. Even when schools have all the necessities, it is impractical to implement Computer studies when the source of electricity is questionable more especially in rural areas. In Zambia, for instance, ZANIS (2014) shared the sentiments where the Ministry of General Education spokesperson explained that the ministry was aware of the problems that learners in rural areas were facing regarding the implementation of Computer studies curriculum. The ministry through its spokesperson stated that the ministry was working hand in hand with the Rural Electrification Authority ((REA) to make sure that all the schools in rural areas were electrified. This position of the ministry meant that learners in areas where there was no electricity were expected to learn theory only for some time not until their schools were connected to power grid. This was worrisome in the sense that a subject such as computer studies cannot only be learnt theoretically more especially for learners who had not at any point in their life laid their hands on a computer. In view of the various arguments regarding the implementation of Computer studies in schools in Zambia, it is therefore correct to state that the introduction and implementation of Computer studies was a good idea although such kind of programmes required a good number of resources such as time, textbooks, electricity, computers, printers and good infrastructure such as computer laboratories.

### 3.2 Teachers' Skills and Training in Computer Studies

When a team of curriculum developers embark on curriculum development one of the pertinent questions worth asking and addressing is who is to implement or teach a particular subject that is introduced in a curriculum. This question is asked and addressed because of the importance of a teacher in the implementation of any developed curriculum at every level of the education system. In order to clearly show the importance of the teaching staff at school level, Mulenga and Luangala (2015: 39) explained that "*teachers play a very important role in the facilitation of the learner's acquisition of desirable knowledge, skills, values and attitudes.*" Moobola and Mulenga (2020) further noted that teachers have a significant role in curriculum implementation by interpreting the syllabus as well as breaking it into teaching schemes and lesson plans. Teachers too adapt the curriculum as they are mandated to decide on the appropriate teaching and learning

material to be used, the methodology to adopt and the amount of time to spend on each component of the syllabus. This means that for the teacher to effectively perform his/her role competently, teachers need to be competent enough in their area of specialisation.

Several studies that have been done for instance by Hennessy (2010), Dzidonu, (2010) and Mwaniki (2007) have all revealed that lack of appropriate ICT skills amongst the teachers of Computer Studies which was as a result inadequate teacher education was a major obstacle in the implementation of ICT in schools. The study by Teo and Lim (1998) also reported that the competencies of individual teachers handling computers in most African countries was very low in that most of them lacked both educational and technical training. The researchers recommended that there was a need to equip teachers with computer technological skills and knowledge through effective training on how to use computers in teaching. Hsin-Kai et al., (2007) reported that teachers' technological skills such as technology proficiency and computer literacy were critical for successful implementation of ICT in the classroom. This means that successful implementation of computer education can only be guaranteed through teachers who have acquired necessary knowledge and skills. Based on this assertion, Krischner and Davis (2003) explained the need for teachers to become sufficiently competent to make use of computers via ICT as a mind tool to become masters of a range of educational paradigms that use ICT as a tool for teaching.

To successfully implement ICT in schools, there is need to have comprehensive pre-service courses on ICT that equips teacher trainees with the appropriate knowledge, values, attitudes and skills to enable them understand the relevance of ICT and how it can be implemented in schools. Thus a study by Higgins and Moseley (2011) revealed that the inability of teachers to understand why they should implement ICT in teaching and how exactly to implement it was an impediment to its implementation. Despite developing ICT courses for pre-service student teachers, scholars such as Higgins and Moseley (2011), Dzidonu (2010) as well as Malcolm and Godwyl (2008) emphasised the need for developing in-service courses for subject teachers who were already in the profession. These scholars argued that there was need for continuous upgrading of teachers' knowledge and skills through continuous professional development (CPD) for effective implementation of ICT in schools. Besides, Afshari et al., (2009) noted that teachers who were actively involved in their professional development were able to implement changes in their teaching. As earlier indicated, teachers' knowledge in the implementation process is very crucial. Mooij and Smeets (2001) investigated the implementation of ICT and its importance within secondary schools in Holland. Results in that study revealed that lack of teachers' competence and confidence in their skills were among the main factors that influenced teachers' willingness to integrate technology in their teaching-learning process.

According to a survey by UNESCO (2005), about 35% of the already trained teachers in secondary schools in Europe, Asia and Africa had basic skills in ICT, which had left 65% of the teaching workforce on the three continents still in need of computer skills. UNESCO (2005) reported that teachers, professors, technical and administrative

staff needed to be given training that could enable them to integrate new information and communication technologies into their teaching programmes. In Turkey to be specific, it was discovered that the major impediment to the implementation of computer science in institutions of learning was the insufficient in-service training for teachers (Ozden, 2007 and Toprakci, 2006). All these research findings point to the fact that there is a need to have highly qualified and motivated teaching workforce who are capable of understanding the needs of the learner and the curriculum in order to effectively implement it.

In order to adequately respond to such demands, the introduction of Computer Studies curriculum in primary and secondary schools in Zambia in 2013 was consequently followed by the introduction of ICT for teachers in colleges of education as well as universities. Despite having recorded such an enormous milestone in the education sector, a study of this nature needed to be conducted to explore how Computer studies was being implemented in public primary schools of Zambia. This was important because the time period within which the whole process of introducing computer studies was done left a lot of question as to how the implementation was being done in relation to the availability of teaching and learning resources and teacher competencies in the subject. For instance, the study by Oduda (1998) indicated that despite Computer Studies being an examinable subject at Grade 9, schools had few trained teachers of Computer Studies. He further stressed that schools depended on hired personnel who were not professional in classroom delivery. Therefore, it is important to note that having ICT knowledge and being trained to be a teacher of ICT are two different things that cannot be equated. In Zambia, research has been done on the integration of ICT in teaching and learning and its benefits, but not much has been done on the implementation of Computer Studies curriculum as a separate subject and hence the reason for carrying out this study.

## 4. Research Methodology

In order for the researchers in this study to collect, analyse and interpret data, qualitative research approach was used. Hancock (2008) considered a qualitative research approach as a better approach when it comes to developing explanations of social phenomena. This means that the approach aims at helping the researcher to understand his/her own world by reflecting on social aspects of the world through interacting with the respondents' opinions, experiences and feelings in their natural environment as noted by other researchers such as Mwimba and Mulenga (2019). Therefore, a descriptive design was employed in this study. Best and Kahn and Best (2006) noted that a descriptive design is very much concerned with conditions of relationships that prevail where the researcher does not manipulate the variables but determines and reports the way things are on the ground. Out of 54 primary schools which were clustered into 9 zones, 9 schools one from each of the 9 zones were sampled. 72 respondents who were purposively selected participated in the study whose break downs were as follows; 9 Head teachers, 18

teachers of Computer Studies, two from each school and 45 learners of Computer Studies 8 from each school. The respondents were selected based on the possession of useful knowledge regarding the subject of investigation. Thematic analysis was used to analyse the data.

## 5. Findings and Discussion

When curriculum developers start the process of curriculum development one of the pertinent questions that they labour to address is based on how such a curriculum would be implemented. Thus, curriculum implementation is part and parcel of the curriculum development process. It is important to make it clear from the onset that educational goals cannot be realised if there is no effective implementation of the curriculum. Consequently, Moobola and Mulenga (2020: 19) explained that "*the realisation of the goals of an educational system is dependent upon how the implementers put a plan, decision, idea or policy into effect.*" The plans of curriculum implementers can therefore be appropriately administered when they are supported with appropriate teaching and learning resources.

Having considered the relevance of curriculum implementation of any well-developed curriculum, the researchers in this study decided to explore the availability of teaching and learning resources in the implementation of Computer Studies. The findings are presented and discussed in this sections that follow.

### 5.1 Availability of Resources and Infrastructure

When interviewed, all the 9 Head teachers and 18 teachers of Computer Studies indicated that their respective schools had implemented the Computer Studies curriculum. When asked in the same interview whether their schools had all the required resources and infrastructure for the effective implementation of the curriculum, table 5.1 shows the Head teachers' and teachers' responses.

**Table 5.1:** Frequency and percentage distribution of the availability of computer resources and infrastructure in schools

| **Resources and Infrastructure** | **Available** | | **Not Available** | |
|---|---|---|---|---|
| | *f* | % | *f* | % |
| Computers | 27 | 100.0 | 0 | 0.0 |
| Electricity | 27 | 100.0 | 0 | 0.0 |
| Backup Generator | 2 | 7.4 | 25 | 92.6 |
| Uninterrupted Power Supply (UPS) | 1 | 3.7 | 26 | 96.3 |
| Printers | 25 | 92.6 | 2 | 7.4 |
| Overhead Projectors | 1 | 3.7 | 26 | 96.3 |
| Computer Laboratory | 25 | 92.6 | 2 | 7.4 |
| Books/Materials | 8 | 29.6 | 19 | 70.4 |

The results from table 5.1 indicates that all the 9 Head teachers and 18 teachers stated that their schools had computers despite being inadequate. Further, 25 out of 27 respondents reported that printers and computer laboratories were also available in schools.

Regarding Computer Studies textbooks and reading materials, 19 (70.4%) respondents reported that textbooks were not available while 8 (29.6%) respondents reported that they had some reference materials. 26 (96.3%) respondents revealed that Uninterrupted Power Supply (UPS) and overhead projectors were unavailable in their schools. In addition, 25 (92.6%) respondents confirmed that their schools had no backup generators.

In order for the researchers to substantiate the Head teachers' and teachers' responses pertaining to the availability of teaching and learning resources, they decided to conduct a focus group discussion with the learners of Computer Studies. Through focus group discussions, all the 45 learners explained that their schools had computer laboratories although many computer laboratories were formerly used as learners' classrooms. Besides, 80% of the learners shared the same view that was held by the head teachers and teachers when they indicated in the discussion that their schools had computers although the number of computers was inadequate. Further, the majority of the learners adding up to 98% stated that textbooks, printers, projectors, backup generators and uninterrupted power supply were not available in schools. All the learners in the focus group discussion complained about the load shedding by the Zambia Electricity Supply Corporation (ZESCO) company which in most cases affected the teaching and learning of Computer Studies. Regarding the availability of computers and other school facilities, one of the learners from a focus group discussion explained that;

> *"We have few computers. If you consider the number of pupils who take computer studies as a subject, with the number of computers and computer labs you will find that there are more pupils as compared to the number of computers and many other facilities. That is a serious threat to pupils who can't learn because of the situation."*

Another learner in another focus group discussion said that;

> *"We only have 10 computers at our school, and we are many who learn computer studies. So it is very difficult to even touch a mouse or keyboard when you are doing a practical which is a big challenge on our part as learners.*

This was a similar view held by the all the Head teachers and the 18 teachers. These respondents were of the view that despite the introduction of Computer Studies being a good initiative, the Zambian government rushed into implementing this policy when schools had inadequate computers. One Head teacher for example, stated that;

> *"Computer studies cannot be done in theory alone because it is a practical subject. This policy will not be effective in the sense that computers in both rural and urban schools are not just there."*

Commenting on the same issue, a teacher from one zone stated that;

*"The policy was good and welcome but would not serve the purpose without being accompanied by adequate facilities. Computer studies should not have been compulsory at the moment not until there was improved infrastructure and facilities in schools."*

Figure 5.1 shows the bar chart indicating the inadequacies regarding the number of computers in the sampled schools.

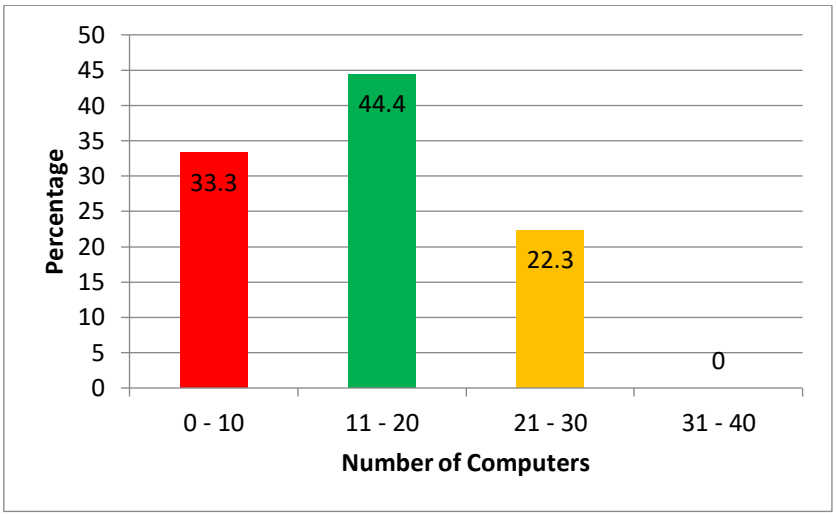


**Figure 5.1:** Percentage of the availability of computers in schools

The data in figure 5.1 shows that 33.3% of the sampled schools had between 1-10 computers, then further 44.4% of the sampled schools had between 11-20 computers while 22.3% of the very sampled schools had between 21-30 computers. The study further indicated that 91.1% of the available computers were in good condition with 8.9% being defective. This is not good enough for the schools given that most schools in Zambia have a population of more than 50 learners per class with one grade have between four and five streams for primary schools.

The research instruments used by the researchers in this study to collect data namely; semi-structured interview guide, an observation checklist guide, document analysis guide and focus group discussion guide enabled the researchers to note that the sampled schools had inadequate resources and infrastructure. Regarding textbooks, it was observed that schools that had textbooks only had one or two which only teachers could use. The researchers considered this as a very serious challenge that is likely to compromise the quality of the education provided. The researchers were of the view that before any well-developed curriculum is implemented, the government through the Ministry of General Education was expected to ensure that schools had all the required teaching and learning resources and infrastructure. This was contrary to what was prevailing in the implementation of Computer Studies in public primary schools in Ndola district of Zambia.

The lack of backup generators, UPS, printers, overhead projectors and textbooks as well as the inadequate number of computers in the sampled schools should have made

the implementation of Computer Studies difficult since it requires hands on practical experiences in order to realise the intended learning outcomes.

These findings concur with several scholars whose research findings revealed that effective implementation of ICT in most African schools was greatly hampered by lack of appropriate teaching and learning resources as well as lack of physical educational facilities such as computer laboratories (Hennessy, 2010; Magambo, 2007; Ndwiga, 2005 and Kinyanjui, 2003). Further, the Head teachers' and teachers' views that the ministry rushed when it came to the implementation of Computer Studies curriculum when resources were inadequate, concurred with the argument by IFIP-UNESCO (2006) who explained that the availability of resources in any form of education system places a restriction on the degree to which any subject can be introduced into the school curriculum. Therefore, it is vital that in order not to disadvantage learners new subjects should only be introduced and implemented in schools when the resources are inadequate. This is critical because in implementing a learner centered curriculum such as the one the Ministry of General Education in Zambia has been advocating for the need for teaching and learning resources are key as Luangala and Mulenga (2011) explained that leaners centered teaching is activity based. One then wonders how the teaching of computer studies will be possible without computers themselves.

**5.2 Government Support**

Since the Zambian government through the Ministry of General Education was in charge of managing the country's education system, the researchers wanted to know by interviewing teachers of Computer Studies on the kind of assistance that was rendered to the schools by the government to ensure effective implementation of the curriculum. It was interesting to note that the government did not do much in terms of alleviating most of the problems surrounding the effective implementation of Computer Studies curriculum. The research findings indicated that 8 participants representing 44.4% of the respondents were of the view that the government was involved in organising regular ICT training workshops and seminars for teachers, while 10 participants representing 55.6% of the respondents indicated that the government was not doing anything in that line. Further, 1 participant representing 5.6% of the respondents felt that the government had recruited teachers of Computer Studies in primary schools in Ndola district while 17 participants representing 94.4% stated that the government did not recruit trained teachers of Computer Studies. Regarding the issue of in-service training courses, 2 participants representing 11.1% of the respondents were of the view that the government had been organising in-service courses for teachers of Computer Studies while 16 respondents representing 88.9% stated that the government did not organise any in-service courses for teachers of Computer Studies. In addition, all the 18 respondents explained that the government neither donated funds to enable the schools to procure computers and computer accessories nor did they distribute computers in schools in Ndola district.

The research findings on government support is consistent with the findings of Karuru (2005) who revealed that one of the problems that was faced in the implementation of Computer Studies in Kenya was the lack of adequate support by government to procure and provide computers and their accessories to schools. The researchers in this study felt that the failure by government to effectively support the implementation of the curriculum was worrisome as this was going to affect learners' competencies both at the present time as well as in their near future. Besides, the study done in Zambia by Mulenga and Kabombwe (2019) indicated that the implementation of the competency based education was likely to suffer serious setbacks because it was introduced at the time when the National budgetary allocation to the education and skills sector had been reducing as follows; 2015 (20.2%), 2016 (17.2%), 2017 (16.5%) and 2018 (16.1%). The duo further argued that it was very expensive to implement the competency based curriculum unlike the content based curriculum because the former demanded for specialised teaching and learning resources, equipment and infrastructure especially in the vocational and science based study areas.

### 5.3 Teachers' Knowledge of the Subject Matter

One of the most important resources that cannot be ignored in the implementation of any school curriculum is a teacher. The teacher's knowledge of the subject matter is cardinal for effective implementation of the curriculum. It is for this reason that Zulu and Mulenga (2019:277) clearly explained that every teacher needs to possess pedagogical content knowledge in order to manage the important task of achieving outcome-based education. The pedagogical content knowledge (PCK) helps the teacher to guide learning in ways which are appropriate as prescribed by the curriculum in order to achieve the aspirations for education of a nation.

Like any other subject, Computer Studies requires a special knowledge gained from a reputable College of Education or the University apart from the mere common knowledge of Information Technology. The researchers in this study used document analysis as well as the interview guide in order to find out whether teachers of Computer Studies were trained and qualified to teach the subject. Table 5.2 shows the results.

**Table 5.2:** Frequency and percentage distribution of the level of Computer Studies training among teachers of computer studies

| **Level of the Computer Training** | **Teachers of Computer Studies** | |
|---|---|---|
| | *f* | % |
| No computer training | 9 | 50.0 |
| Certificate | 1 | 5.6 |
| Diploma | 2 | 11.1 |
| Degree | 0 | 0 |
| Others | 6 | 33.3 |
| **Total** | **18** | **100** |

Table 5.2 shows that out of 18 sampled teachers of Computer Studies, 9 teachers had not undergone any computer training or education programme, 1 teacher had a certificate based on some computer packages that he had done and 2 teachers had diplomas in computer related programmes. Although 6 teachers in table 5.2 had other teaching qualifications, they had not done any formal computer training and education. The researchers in this study established that out of the sampled schools, there was only one trained employed teacher who had a certificate in computer packages and the two with diplomas were just employed by the school board at school level despite not having been trained as teachers of Computer Studies. It was also discovered that teachers with no formal computer training had just gained some basic computer literacy through their own personal computers and internet cafes.

When Head teachers were asked through to state whether teachers who were teaching Computer Studies were qualified, one Head teacher said that;

> *"We have no skilled teachers in ICT because teachers have not yet been trained on how to teach the subject.*

Another Head teacher confessed that;

> *"We are just using teachers who have interest in teaching the subject and who seem to show some skills in it. Otherwise this is a very big challenge and problem for most schools in Ndola, since most of my head teacher colleagues have said so in several meetings that we have had in the district."*

Based on the research findings, it was clear that the majority of the teachers who were teaching Computer Studies were not professionally qualified to handle the subject. This made the researchers to wonder whether there was appropriate and effective teaching of Computer Studies in public primary schools in Ndola district. Changwe (2017) noted that for anyone to be declared ready for the teaching career he/she must possess both the appropriate subject matter knowledge and the pedagogical content knowledge during his/her teacher education in the subject of specialisation. It could be possible therefore to argue that what was going on in public schools in Ndola district was telling or helping instead of teaching. These research findings are in agreement with Waiharo (2007) whose study established that 87.2% of the teachers in Kenyan secondary schools did not have any computer studies training. Besides, Oduda (1998) asserted that although Computer Studies was an examinable subject at grade 9, few teachers were trained in the subject as most schools depended on the hired personnel to teach the subject and the majority were not professional in classroom delivery. Similarly, Mwaniki (2007) identified low number of qualified teachers to be one of the major impediments to the implementation of computer courses. This is worrisome because Banja and Mulenga (2019:176) actually noted that the Ministry of General Education in Zambia was aware of the fact that "*essential competencies that are required in every teacher are mastery of the material*

*that is to be taught and the skill in communicating that knowledge and skills to learners*". Researchers in this study then wondered how this can be possible if teachers have no education in the subject area that they are teaching learners. Like what other studies have revealed as challenges regarding curriculum implementation in most developing countries lack of teacher's competencies in the subject area has been cited as one of them. Stressing on the key role that curriculum implementation plays in achieving educational learning outcomes Mulenga and Lubasi (2019:63) actually explained that "*curriculum implementation is a very crucial stage of any curriculum development process. The problems that may arise during implementation can cause disparities in the intended curriculum, implemented curriculum and achieved curriculum*". What we are actually seeing regarding Computer studies in Ndola district will impede on the effective implementation of the curriculum.

**5.4 Therapies for the Effective Implementation of Computer Studies Curriculum**

In order to holistically explore the implementation of Computer Studies curriculum in public primary schools in Ndola district, the researchers went further to seek for suggestions regarding workable remedies that would enhance the effective implementation of Computer Studies curriculum. Among the key suggested remedies included; government support, intensifying in-service training for teachers as well as the school administrative support.

Regarding government support, all the respondents which included 9 Head teachers, 18 teachers of Computer Studies and 45 learners of Computer Studies were of the view that the government of the republic of Zambia needed to provide grants to schools for them to procure enough computers and computer accessories as well as setting up good infrastructure such as computer laboratories. Furthermore, all the Head teachers from the sampled schools and 15 out of 18 sampled teachers stated that for Computer Studies to be effectively taught in schools, the government needed to recruit well qualified teachers of Computer Studies as well as technical persons to be repairing the equipment in all public schools. The government through the MoGE needed to ensure that schools were provided with appropriate textbooks as well as generators or solar panels so that in case of load shedding Computer Studies lessons could not be disturbed. The suggested therapies made the researchers to question the quality of Computer Studies education that was being provided in Zambia for that particular period of time which lacked adequate support from the government with few or no qualified teachers and personnel to be constantly checking and repairing of computers. The remedies were in agreement with the study done by Karuru (2005) in Kenya who revealed that the government had not done enough on the issue of assisting schools to procure computers and called for the government's intervention in their supply by putting in place regulatory and supervisory oversight to safeguard access, equity and quality of ICT facilities.

Another area that was considered as a remedy to improve the implementation of Computer Studies curriculum in schools was the aspect of intensifying in-service training for teachers of Computer Studies. Despite teachers acquiring appropriate competences in

their field of specialisation during their teacher education, 6 out of 9 Head teachers and 15 out of 18 teachers of Computer Studies proposed that MoGE needed to take keen interest in organising regular seminars, workshops and conferences to sensitize Head teachers and teachers on how to teach Computer Studies as well as on the importance of implementing Computer Studies curriculum in their schools. The respondents further indicated the relevance of MoGE to get involved in sponsoring teachers of Computer Studies for further studies. The respondents stated that there was also need to encourage CPDs amongst all the teaching staff and all school Head teachers needed to provide financial and material support for the CPDs to be effectively conducted in schools.

The suggested views are very important for the effective implementation of the curriculum. For instance, well organised courses, seminars, workshops and conferences for teachers would create a good platform for all the teachers to learn new ideas and techniques of teaching from their fellow specialised teachers. In line with what was suggested, Bishop (1985) explained that seminars, workshops and conferences for the in-service teachers was a more conventional way of introducing teachers to new knowledge, ideas, techniques and methodologies in education. It is in fact during such sessions where teachers get the opportunity to advance their knowledge in their areas of specialisation which in turn improve the quality of curriculum implementation. The research findings are also similar to those by Malcolm and Godwyl (2008) who reported in their study that lack of professional development programmes for teachers to upgrade their skills on emerging technologies is a hindrance to ICT implementation. Besides, Afshari et al., (2009) further pointed out that teachers who are actively involved in their professional development are able to effectively implement changes in their teaching. For example, formal certification of in-service professional development that leads to diplomas or degrees in ICT could improve their skills and knowledge which would materialise in quality classroom teaching. This is also in line with Krysa (1998) who observed that professional development and training was a solution to successful ICT implementation. In addition to what was suggested as remedies for the effective implementation of Computer Studies curriculum in schools, All the respondents in this study realised that administrative support was cardinal for all the suggested views to realise the intended results. The research findings indicated that all the school administrators were adequately supporting the implementation of Computer Studies curriculum in schools. For instance, all the Head teachers explained that they were putting up some initiatives such as fundraising ventures to raise funds that would enable them to purchase the necessary accessories to make sure that appropriate resources and infrastructure were provided. They also indicated that they had continued lobbying for qualified teachers of Computer Studies to enhance quality teaching in their schools. Besides, some Head teachers explained that their school board/PTA had employed some teachers to help in teaching their learners Computer Studies. The researchers also observed that one school had a teacher who was employed and paid by the school board to teach computer studies classes only.

It was interesting to note that all the school administrators were very supportive to ensure that Computer Studies curriculum was effectively implemented. It must be argued therefore that despite having in place a very good and progressive curriculum, it may not bring out the intended purpose if it lacks the school administrators' support. The findings are similar to Laaria (2012) who argued that in many instances, school leaders support the implementation of technology in their schools through acquiring the needed infrastructure. Krysa (1998) also stated that administrative support was an enabling factor to successful implementation of Computer Studies in the school. He further indicated that the implementation of computers in the schools was one of the top priorities that was supported by the head teachers. For instance, some of the Head teachers had supported the new network lab by ensuring that money was made available for hardware and software (Krysa, 1998). Besides, Bukaliya and Mubika (2011) revealed that administrative support could also take the form of policy enactments where ICT competence is made mandatory for school teachers. This could be an effective measure to improving teachers` ICT knowledge and skills.

In the focus group discussion, at least 90% of the learners discussed and suggested that there was a rush in implementing Computer Studies as a compulsory subject when it was in fact supposed to be initially an optional subject due to inadequate facilities and resources in schools. Learners complained that the inadequate facilities and resources in schools made candidates to spend a night within the school premises during the Junior Secondary School Leaving Examinations in 2015. 95% of the learners were of the view that since it was government policy to make it compulsory, the Examination Council of Zambia needed to increase the number of days for conducting the practicals like they did for other subjects such as Home Economics during national examinations.

## 6. Conclusions and Recommendations

Despite all the sampled schools having implemented the Computer Studies curriculum in public primary schools, researchers in this study concluded that the effective implementation of Computer Studies curriculum had been a failure due to many impediments such as; inadequate funds to procure computers and their accessories, lack of trained and specialised teachers of Computer Studies as well as lack of other relevant resources and infrastructure required for the effective implementation of Computer Studies curriculum. Researchers observed that effective implementation of Computer Studies curriculum in Zambia had a long way to go and there was no need to rush when resources in schools were inadequate. Based on the research findings and the conclusion, the researchers recommended among other things that the government of the republic of Zambia should provide funds (grants) to schools in order for the schools to procure more computers, their accessories and set up infrastructure such as computer laboratories. There is no effective implementation of any curriculum that can take place when schools have no specialised and trained teachers. Thus, the Ministry of General Education (MoGE) should recruit trained teachers of Computer Studies in all public schools. This is

likely to enhance the acquisition of appropriate knowledge, values, attitudes and skills by the learners. This would in turn help the country to attain the sustainable development goal number four which borders on quality provision of education. Continuous professional development should be encouraged amongst all the teaching staff as a way of acquainting themselves with the most recent knowledge and developments in Information and Communication Technology. Besides, in order for graduating teachers to comfortably teach Computer Studies in schools, Universities and Colleges of Education should incorporate computer studies education in their curriculum.

**About the Authors**

**Robert Changwe** is a Curriculum and Teacher Education Scholar at the University of Zambia in the School of Education. He holds a Master of Education degree in Curriculum Studies and a Bachelor of Arts with Education degree from the University of Zambia. He also holds a Secondary School Teachers' diploma from the Copperbelt Secondary Teachers' College, in Zambia. Mr. Changwe has been researching, publishing and teaching on issues such as; Curriculum Development and Implementation, Educational Assessment, Teacher Education and pedagogy. He also has vast experience in the teaching of Mathematics in secondary schools.

**Catrina Lwaba Mulenga** is a teacher in the Ministry of General Education in Ndola. Mrs Mulenga holds a Master of Education degree in Educational Management and a Bachelor of Arts with Education degree. Her research interests are in Curriculum Management, Instructional Leadership and Pedagogy.

**References**

Afshari, M., Bakar, K. A., Su Luan, W., Samah, B. A. and Fooi, F. S. (2009). Factors Affecting Teachers' Use of Information and Communication Technology. *International Journal of Instruction.* 2(1), 77– 104.

Banja, K. M. and Mulenga, I. M. (2019). Teacher Education at the University of Zambia and Teacher Quality with Specific Reference to English Language. *Makerere Journal of Higher Education,* 10(2), 171 – 190. http://dx.doi.org/10.4314/majohe.v10i2.13.

Bishop, G. (1985). *Curriculum Development: A Textbook for Students*. London: Macmillan Education Limited.

Bukaliya, R. and Mubika, A. K. (2011). Factors Militating Against the Introduction of Computer Education in Secondary Schools. *Journal of Education and Instructional Studies in the World.* 2(3), 56-68.

Changwe, R. (2017). *Effectiveness of the Mathematics Teacher Education Curriculum at the University of Zambia in Preparing Secondary School Teachers of Mathematics*. Lusaka: Masters Dissertation. The University of Zambia.

Deepark, K. and Turner, J. (2006). *Education for the 21st Century: Impact of ICT and Digital Resources.* Boston, MA: International Federation for Information Processing.

Dzidonu, F. (2010). *The Role of ICTs to Achieving the MDGs in Education: An Analysis of the Case of African Countries*. Accra. Retrieved on 20th May, 2016 from http://www.ait.edu.gh.

Examination Council of Zambia (2015). *Results Analysis – Business Studies National Examinations.* Lusaka: ECZ.

Farrell, G. and Shafika, I. (2007). *Survey of ICT and education in Africa: A summary report based on 53 country surveys.* Washington, DC: World Bank.

Gross, N. (1971). *Implementing Organizational Innovation: A Sociological Analysis of Planned Education Changes.* New York: Basic Book Inc.

Hancock, B. (2008). *An Introduction to Qualitative Research.* Nottingham: Trent Focus.

Hennessy, S. (2010). *Developing the use of Information and Communication Technology to Enhance Teaching and Learning in East African Schools: Review of the Literature.* Nairobi: Aga Khan University.

Higgins, S. and Moseley, D. (2011). Teachers' Thinking about ICT and Learning: Beliefs and Outcomes. *Journal of Teacher Development.* 5(2), 191-210 http://dx.doi.org/10.1080/13664530100200138

Hsin-Kai, W., Ying-Shao, H. and Fu-Kwun, H. (2007). Factors Affecting Teachers' Adoption of Technology in Classrooms: Does School Size Matter? *International Journal of Science and Mathematics Education*. 6: 63-85.

IFIP-UNESCO. (2006). *ICT Curriculum for Secondary Schools*. Retrieved February 25, 2016, from http://..../public/spip/ecrire.

Isaac, S. (2007). *Survey of ICT and Education in Africa: Zambia Country Report*. New York: World Bank.

James, R. (2010). *Eric Schmidt, chairman of Google, condemns British education system*. Retrieved October 22nd 2015, from The Guardian Newspaper: http://www.theguardian.com/technology/2011/aug/26/eric-schmidt-chairman-google-education.

Kahn, J. V. and Best, J. W. (2006). *Research in Education (10th Ed).* New Jersey: Prentice-Hall.

Kantoma, L. (2015). *Assessment of the Implementation of the Social Studies Curriculum in Junior Secondary Schools in Kaduna State*. Zaria: M.Ed. Thesis, Ahmadu Bello University.

Karuru, I. W. (2005). *An Investigation into the Status of Information Communication and Technology Policy (ICT) in Education System.* Nairobi: Unpublished M.Ed. Thesis Kenyatta University.

Kinyanjui, L. W. (2003). *A survey on ICT Access and Use in Secondary Schools*. Nairobi: School Net Africa.

Krischner, P. and Davis, N. (2003). Pedagogic Benchmark for Information and Communication Technology in Teacher Education. *Technology, Pedagogy, and Education.* 12(1), 125 -147.

Krysa, R. (1998). *Factors Affecting the Adoption and Use of Computer Technology in Schools.* University of Saskatchewan Retrieved from:

http://www.usask.ca/education/coursework/802papers/krysa/krysa. PDF on 23rd February, 2016.

Laaria, M. (2012). Leadership Challenges in the Implementation of ICT in Public Secondary Schools, Kenya. *Journal of Education and Learning*. 2(1), 32-43. Retrieved on 10th March, 2016 from http://dx.doi.org/10.5539/jel.v2n1p32.

Luangala, J. R. and Mulenga, I. M. (2011). *Cultivation of Thinking Skills through Instructional Procedures in Zambia Basic Schools.* Saarbrucken: LAP Lambert Academic Publishing.

Masumba, K. C. and Mulenga, I. M. (2019). Teachers' pedagogical content knowledge for teaching Computer Studies in rural Zambian secondary schools of North-western Province. *Zambia Journal of Library & Information Science (ZAJLIS)*, 3(1 & 2), 90 – 106.

Magambo, J. (2007). *Use of Information and Communication Technologies (ICTs) in Teacher Education in Sub-Saharan Africa: Case studies of selected African Universities.* (Unpublished PhD thesis). Cologne: University of Cologne.

Malcom, E. and Godwyl, F. (2008). *Diffusion of Information Communication Technology in Selected Ghanaian Schools.* Unpublished Doctoral Dissertation, Ohio University.

Middleton, A. J., Flores, A., and Knaupp J. (1997). Shopping for Technology. *Educational Leadership,* 53 (3). Retrieved from: http://www.ascd.org/pubs/el/nov97/exmiddle.html On 12th June 2020.

Mingaine, L. (2013). Challenges in the Implementation of ICT in Public Secondary Schools in Kenya. *International Journal of Social Science and Education.* 4 (1). 22-41.

Ministry of Education. (2013). *The Zambia Education Curriculum Framework.* Lusaka: Curriculum Development Centre.

Moobola, L. and Mulenga, I. M. (2020). Social Studies Curriculum at the Crossroads: Implementation of the Secondary School Social Studies Curriculum in Chingola District of Zambia. *European Journal of Education Studies***.** 7(3), 13-34.

Mooij, T. and Smeets, E. (2001). Modelling and Supporting ICT Implementation in Secondary Schools. *Computers and Education,* 3(6), 265–281.

Mulenga, I. M. (2020). Teacher Education versus Teacher Training: Epistemic Practices and Appropriate Application of both Terminologies. *Journal of Lexicography and Terminology*, (4) 1, 52-73.

Mulenga, I. M. and Kabombwe, Y., M. (2019). A Competency-Based Curriculum for Primary and Secondary Schools: Learning from Theory and some Countries around the World. *International Journal of Education and Research*. 7(2), 117-130**.**

Mulenga, I. M. and Luangala, J. R. (2015). Curriculum Design in Contemporary Teacher Education: What Makes Job Analysis a Vital Preliminary Ingredient? *International Journal of Humanities Social Sciences and Education.* 2(1), 39-51.

Mulenga, I. M. and Lubasi, I. M. (2019). Teachers Present in School but Absent in Class: Utilization and 'Silent Erosion' of Learning Time in the Implementation of the Curriculum in Mongu District of Zambia. *European Journal of Education Studies*, 6 (2). 61-79. https://doi.org/10.5281/zenodo.2678061.

Mulenga, I. M. and Mwanza, C. (2019). Teacher's Voices Crying in the School Wilderness: Involvement of Secondary School Teachers in Curriculum Development in Zambia. *Journal of Curriculum and Teaching*, 8(1), 32-39. https://doi.org/10.5430/jct.v8n1p32

Musilekwa, S. and Mulenga, I. M. (2019). Development of Social Studies Learners Textbooks for Secondary Schools in Zambia. *Journal of Education and Practice*, 10(6), 99-108.

Mulenga, I. M. (2018). Conceptualization and Definition of a Curriculum. *Journal of Lexicography and Terminology*, 2 (2), 1-23.

Mwale, S. (2015). *Information and Communication Technology in Schools Uphill Battle.* Times of Zambia.

Mwaniki, C. M. (2007). *Constrains Affecting the Implementation of ICT in Primary Teachers Training Programmes.* Nairobi: Unpublished M. Ed Thesis, Kenyatta University.

Mwimba, C. and Mulenga, I. M. (2019). Challenges of Using Icibemba in the Learning of Initial Literacy in Selected Primary Schools in Serenje District of Zambia: An Analysis of Views of Teachers and Learners. *Multidisciplinary Journal of Language and Social Sciences Education*, 2 (1), 143-167.

Ndwiga, S. P. (2005). *An Appraisal of the Incorporation of Computer Courses in Kenya Diploma Teacher Colleges.* Nairobi: Unpublished M.Ed. Thesis, Kenyatta University.

Oduda, A. (1998)). *Logistic Hitch Computer Studies*. The Daily Nation 21st February, p. 16, 17.

Omwenga, E. (2007). *Pedagogical Issues and Issues of E-learning Cases: Integrating ICTs into Teaching and Learning Process.* Nairobi: Nairobi University.

Ozden, M. (2007). Problems with Science and Technology Education in Turkey. *Eurasia Journal of Mathematics.* 4 (2), 61-80. https://doi.org/10.12973/ejmste/75391.

Republic of Zambia (2014). *Computer Studies Syllabus Grade 8 and 9*. Lusaka: CDC.

ROK (1999). *National ICT Strategy for Education and Training. Nairobi:* Government Printers.

Teo, S. H. T. and Lim, K. G. V. (1998). Factors Influencing Desktop Computer usage among Novice and Experienced users. *Journal of Information Technology Management,* 10(1).

Toprakci, E. (2006). Obstacles at Integration of Schools into Information and Communication Technologies by taking into Consideration the Opinions of the Teachers and Principals of Primary and Secondary Schools in Turkey. *Journal of Instructional Science and Technology (Ejist),* 9(1), 1-16.

UNESCO. (2005). *Global Digest*: *Comparing Education Statistics across the World*. http://www.uis.unesco.erg/template pdf. Retrieved on 18th August, 2015.

Waiharo P. K. (2007). *Sustainability of ICT in Kenya Secondary Schools. A Case Study of Secondary Schools in North Eastern Province*. Nairobi: Unpublished M.Ed Thesis Kenyatta University.

ZANIS (2014). *Zambia Launches New ICT Policy*. Issue No.349, 8th April.

Zulu, J. and Mulenga, I. M. (2019). Teachers' pedagogical content knowledge, curriculum designing, and student's comprehension of secondary school ordinary level physics in Lusaka, Zambia. *UNESWA, Journal of Education*, 2 (1), 273-288.