

# The use of ICT in teaching of Geography in selected schools of Petauke district in eastern province of Zambia

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**Abstract:** This article explored the use of ICT in teaching of Geography to pupils in selected schools of Petauke district in eastern province Zambia. Objective of this article was; to establish the types of ICT materials available for teaching Geography in secondary schools in Petauke District, Zambia, to explore the extent to which ICT devices/platforms were being integrated in the teaching and learning of geography in selected schools of Petauke district; and to suggest the best means of integrating ICT's in teaching and learning of geography in selected schools of Petauke district.

A qualitative approach with a descriptive study design was used to collect data through in-depth interviews and observations. A total of twenty-eight (28) respondents were involved in the study and the information collected was thematically analysed with the guidance of Braun and Clarke's (2006) six phase framework. The study revealed that computers, laptops, projectors, printers, smartphones and tablets were among the widely used ICT devices in the teaching and learning of Geography in the selected schools of Petauke district. However, these devices were very few and could not cover the needs of every learner or teacher due to the resource to user ratio, which proved highly unsustainable. The findings showed that integration of ICTs was hindered by the unavailability and shortage of resources. The findings further pointed out that teachers and learners lacked in skill to use most ICT resources beyond these resources' basic functions. According to the findings, the conclusion drawn was that to enhance effective integration of ICTs in the teaching and learning of Geography, teachers and learners need to be provided with adequate ICTs resources in their teaching and learning of Geography. It is also important for school management to provide adequate funding to enable its Teachers to attend workshops where they can gain skills and knowledge for integrating ICTs in the teaching and learning of Geography.

**Key words:** Education, Information Communication Technology, integration, geography

## I. INTRODUCTION

Since the inception of technological advancements in the world at large, people have sought to incorporate technology in their day-to-day lives and this has been successful so far. So successful to the extent that nearly every household has technological appliance.

In as far as education is concerned, the use of Information and Communication Technology (ICTs) in African schools is slowly taking ground and they are being used by both teachers and learners. This is because ICTs have the ability to

efficiently manipulate and transmit information in ways that enhance the teaching and learning experience (Chirwa and Mubita, 2021). These ICTs include hardware such as computers, various accessories, projectors, printers and photocopiers, radios and televisions, communication devices such as mobile telephones, video and audio recorders and various software among other things (Marker, 2007).

The integration of ICTs in education happens at two distinct levels thus the content integration and the pedagogical integration. According to Roblyer and Doering (2001) and Chirwa and Mubita (2021), the introduction of ICTs in schools for occasional use by teachers and learners is called physical integration, while the pedagogical integration of ICTs in schools refers to routine use of ICTs in the teaching and learning processes.

While ICTs have penetrated schools in the western countries in great numbers, most African countries have lagged far behind. For several years now, the African education system has been coping with a multitude of problems, such as funding and countries have had to make some hard choices, which generally do not attach much importance to Computer usage. These schools were still struggling with basics of computer processing. With time however, teachers soon got interested in Computer-programmed Teaching (CPT), an innovation developed in North America and Europe. This allowed the teachers in some African countries to offer instruction in certain subjects with the help of technology (Yong et al, 2016).

With further development, Computer-Assisted Teaching (CAT) came into existence next. This type of instruction was delivered partially or totally through the use of computers. This was done through various tutorials, or educational software, specifically designed to help learners acquire knowledge and develop skills in a given subject area. It could be used at all levels of education from primary to post-secondary courses and thus, proved particularly popular in the schools it was introduced in developed African schools (Clark and Mayer, 2003). By the early 1980s, Computer Assisted Learning (CAL) was then introduced and in the mid-1990s, ICTs were being used in a variety of disciplines. CAL covered a range of computer-based software packages and applications aimed at providing interactive instruction usually in a specific subject area.

The Zambian government has acknowledged the need for ICTs and via the attainment of Sustainable Development Goals (SDGs number 4) that demand for quality education, there has been an introduction of ICTs in schools as tools to enhance the teaching and learning experience (Ministry of Transport and Communication, 2006). The sustainable development goal number four, which is the educational goal, focuses on ensuring inclusive, equitable and quality education and promoting lifelong opportunities for all. To attain this goal, ICTs play a vital role in the education sector (Yadav, 2013; Chirwa and Mubita, 2021).

ICTs in Zambia have been integrated in nearly every sector of the nation's development sphere thus social and economic. This has brought about the need for a workforce that is ICT literate so as to achieve vision 2030 of making Zambia a prosperous middle-income nation by the year 2030 via social and economic development. The policy recognized the need for integrating ICTs in education and thus, the government formulated the National Information and Communication Technology Policy whose aim was to integrate ICTs in the education system and develop the nation's Research and Development (RandD) capacity to support, facilitate and contribute to the development of key sectors of the economy including the development of appropriate local ICT products and services (Ministry of Transport and Communication, 2006).

## II. PROBLEM STATEMENT

ICTs in Zambia have been integrated in nearly every sector of the nation's development sphere thus social and economic. This has brought about the need for a workforce that is ICT literate so as to achieve vision 2030 of making Zambia a prosperous middle-income nation by the year 2030 via social and economic development. The policy recognized the need for integrating ICTs in education and thus, the government formulated the National Information and Communication Technology Policy whose aim was to integrate ICTs in the education system and develop the nation's Research and Development (RandD) capacity to support, facilitate and contribute to the development of key sectors of the economy including the development of appropriate local ICT products and services (Ministry of Transport and Communication, 2006).

Even though the use of ICT-based teaching and learning methods have been proven to be one of the most powerful educational strategies and the policy promoting their use in Zambia has been put in place since 2007 (National Council for Science and Technology, 2010), there is uncertainty concerning how ICT's were used in the teaching and learning of Geography as a subject to ensure that the concepts learnt are relevant to current and ongoing technological developments. These uncertainties ought to be addressed if Geography, as a subject, is to be considered relevant and in line with educational goals, hence this study in Petauke district of eastern Zambia.

I. *AIM:* to assess use of ICT in teaching of Geography in selected schools of Petauke district in eastern province Zambia

## II. OBJECTIVES

This study was guided by the following objectives:

- (a) To establish the types of ICT materials available for teaching Geography in secondary schools in Petauke District, Zambia.
- (b) To explore the extent to which ICT devices/platforms were being integrated in the teaching and learning of geography in selected schools of Petauke district.
- (c) To suggest the best means of integrating ICT's in teaching and learning of geography in selected schools of Petauke district.

## III. THEORETICAL, CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

### 3.1 Theoretical Framework

The constructivist approach to teaching geography formed the theoretical framework of this research. This approach places the student engagement with the material being learnt in the center of the learning process. As such, the efficacy of the teacher's pedagogy is measured or evaluated according to the extent to which learners are engaged in the learning process and are therefore able to understand the subject matter (Richard, 2015). In the case of Geography, learners need to be actively involved in the learning process as opposed to the traditional lecture method where learners are just passive expecting the teacher to spoon feed them with knowledge.

Constructivism is grounded in Lev Vygotsky's (1987) theory of social constructivism in which he argues that the role of the teacher is to help the learner acquire knowledge and skills which it would be difficult for the learner to acquire without the help of teacher. Constructivism requires a teacher who acts as a facilitator whose main function is to help students become active participants in their learning and make meaningful connections between prior knowledge, new knowledge, and the process involved in learning (Rice and Wilson, 1999). In Geography it is assumed that digital technology support constructivist learning through student engagement and collaboration. Part of the learning process requires "objectification" of knowledge. Objectifying knowledge involves making abstract concepts concrete so that it is easier for the learner to understand what is being taught. For example, digital illustrations used in the Geography classroom appear closer to reality and the teacher uses this to help learners learn better.

### 3.2 Conceptual framework

This study adopted the Technological Pedagogical and Content Knowledge (TPACK) model as explained by Shulman (2004). The TPACK is a pedagogical framework to understand the different but related kinds of knowledge needed by the teacher for the effective and efficient

pedagogical practice in a technological enhanced learning environment. It argues that the introduction and effective use of ICT in the geography classroom, requires teacher's understanding and negotiating the relationships between these three major components, namely, pedagogy, technology, and content. In order to integrate ICT in the geography classroom effectively, there has to be technological knowledge, content knowledge and pedagogical knowledge. According to Mishra and Koehler (2006) the TPACK model is the foundation of good teaching with technology and requires an understanding of the representation of concepts using technologies, pedagogical techniques that utilize technologies in constructive way to teach content, knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems students face.

### 3.3 Literature Review

In the 21st century, the use of technology, especially the use of Information and Communication Technologies (ICTs) has greatly enhanced the excitement of geographical learning. This includes the use of computers, software, communication networks, digital data storage and audiovisual systems. According to Schleicher (2019), Information and Communication Technology (ICT) refers to the use of communication networks, computers, software, digital data storage and audiovisual systems in our world. Schleicher (2019) confirms that the use of ICTs provides overwhelming benefits to learners if used appropriately in the classroom.

ICT has important positive impact in higher quality lessons through greater collaboration between teachers in planning and preparing resources as noted by Ofsted (2002). More so, the use of ICT changes the characteristics of problems and learning tasks, and hence play an important task as mediator of cognitive development, enhancing the acquisition of generic cognitive competencies as essential for life in our knowledge society (Zenelaj, 2013). Learners exposed to ICTs for learning purposes become immersed in the process of learning and as more and more students use computers as information sources and cognitive tools (Reeves and Jonassen, 1996), the influence of the technology on supporting how pupils learn will continue to increase in schools.

ICTs also help in conducting research related to Geography teaching and learning as noted by Lako and Mubita (2021). This is because ICTs facilities like computers make it easy to store and process data in the research process. ICT tools have been proven to be very helpful to researchers and teachers in finding needed information quickly and easily, expedition in the research process, improvement in job performance and have also helped in information access, management and communication (Lako and Mubita, 2021).

From the foregoing, the study may highlight and the benefits in the use of ICTs in Petauke in eastern province of Zambia. Therefore, suggestions may be brought forth on how best to teach Geography in rural schools like those in Petauke.

## IV. METHODOLOGY

### 4.1 Research Approach

The study was conducted over a period of eight months within which participants were selected, data was collected and analyzed for presentation as well as documentation.

This study used a qualitative research approach. Ary et. al. (2010) concurs suggesting that qualitative research focuses on understanding social phenomena from the perspective of the human participants in natural settings. Qualitative research enables human thinking and reasoning for doing something to be matched and understood. Various human qualities that may be difficult to quantify can be studied better using the qualitative research method. That is why it is important for this study to find out ways in preparedness of Geography educators and learners to integrate technology in Geography, a qualitative research design was appropriate for this study.

### 4.2 Research Design

Research design is defined as a plan used to study a problem or question. In the same line, Orodho and Kombo (2002) define a research design as the scheme, outline or plan that is used to generate answers to research problems. Meanwhile, Msabila and Nalaila (2013:27) point out that a research design is a plan on how a study will be conducted or a detailed outline on how an investigation will take place. This research utilized a descriptive research design. Being a qualitative study, this research sought to identify characteristics, trends and categories as observed in the field, therefore, a descriptive design proved most appropriate for the study so as to attain the set objectives of the study (Creswell, 2015).

### 4.3 Target Population

Target population refers to the total number of items or units in any field of inquiry or the total number of items about which information is desired (Sidhu, 2009). In this study, the target population was all basic and secondary school teachers and learners in the selected schools of Petauke district of eastern province. Petauke district has in total 157 schools from which the sample was selected (MOE, 2007). This population was selected on the basis that this was where the phenomena under study had been observed by the researcher.

### 4.4 Sample Size

According to Sidhu (2009), a sample is a small proportion of the population selected for observation and analysis. For the purpose of this study, four schools in Petauke district of eastern province were selected. Two primary schools coded, A1 and A2, as well as two secondary schools coded as B1 School and B2. These schools were selected on basis that they were government schools which were connected to the national electricity grid and had been examination centers for over 10 years. This selection criterion ensured that the selected school were regarded as government-gazetted established schools. By selecting gazetted schools, the study ensured that findings were representative of most government

schools. These criteria ensured that the set objectives were obtained due to the fact that the schools, being examination centers, needed to have computer laboratories which kept ICT devices.

Primary schools were included on the basis that they had grade 8s and 9s who took Social studies in which Geography is a sub-subject. Two (2) teachers from each school participated giving a total of eight (8) teachers. In addition to this, five (5) learners from each school participated giving a total of 20 learners. The total number of participants therefore came to twenty-eight 28.

Table one summarizes the selected sample size of this study which included four selected schools, two secondary schools, B1 and B2, and two primary schools, A1 and A2.

Table 1: Sample Size

School	Teachers	Learners	Total
B1	2	5	7
A1	2	5	7
A2	2	5	7
B2	2	5	7
<b>Total</b>	<b>8</b>	<b>20</b>	<b>28</b>

Source: field data, (2020)

#### 4.5 Sampling Technique

With reference to Kombo and Tromp (2006), sampling technique is that part of the research plan that indicates how objects are to be selected for the study. Sampling technique or procedure is the process of selecting units from the target population of the researcher's interest. A non-probability sampling method was used, specifically homogeneous purposive sampling. Scholars like Singleton et al (1988) note that purposive sampling is a type of sampling which is based entirely on the judgment of the researcher. In this technique, a sample is composed of elements which contain the most characteristic, representative of typical attributes of the population.

White (2003) observes that purposive sampling is based on the researchers' knowledge of the population and a judgment is made about which subjects should be selected to provide the best information to address the purpose of the research. Msabila and Nalaila (2013) add that purposive sampling involves nothing but purposely handpicking individuals from the population based on the authority or the researcher's knowledge and judgment. With regards to the study, homogeneous purposive sampling was used to select teachers and learners who taught and learnt Geography, respectively. Homogeneous purposive sampling is a purposive sampling technique that aims to achieve a homogeneous sample; that is, a sample whose units share the same or very similar characteristics or traits (Kombo and Tromb, 2006). Therefore, two teachers of Geography per school participated and five learners who took Geography as a subject per selected school were selected as participants in the study.

#### 4.6 Research Instruments

On the basis of being a qualitative descriptive study design study, this research mostly used inductive data collection methods which were unstructured interview guide and an observation guide.

##### (a) Unstructured Interview Guide

This research employed inductive techniques, which were based on a less directed and prescriptive interview techniques. Thus, the interviews were unstructured and conversational and were organized around themes rather than direct questioning. These interview schedules acted as a guide as some questions may have not been asked while others may have been included to elucidate issues. The interview schedule grew as issues emerged in other interviews. The researcher used unstructured interview schedule to collect qualitative data from both teachers and learners in the selected schools. Subjective responses in the unstructured interview provided more information through certain gestures and expressions regarding the integration of ICTs in geography in the selected schools of Petauke district.

##### (b) Observation Guide

An observation guide was used to collect data aimed at satisfying the set research questions and objectives. Thus, this research used the non-participatory approach on the unstructured observation. According to Kombo and Tromp (2006) this observation technique enables the researcher to take up the role of an onlooker and focuses on describing the studied phenomena. The researcher used an observation guide to acquire further information on the available ICT devices and their usage amongst the learners and teachers of Geography in selected schools of Petauke district.

#### 4.7 Data Collection Procedures

Before commencement of the data collection, a pilot study was conducted whose purpose was to test the unstructured interview guide and the observation guide in one school which were not part of the sample but were equipped with ICT facilities which were used for teaching and learning. This was done so as to find out ambiguous or poorly worded items on the instruments which were to be amended afterwards. The pilot study generally served as an assurance of the reliability of the instruments and their outcome.

Individual based interviews were conducted to collect data. In order to determine validity of the interview findings, the data collected was verified via participant validation. According to Bergold and Thomas (2012) this technique involves testing initial results with participants to see if they still ring true. To attain this, this research had all interviews recorded on an audio recording device then later transcribed and presented to participants for validation before analysis was done.

Classroom and infrastructure observations was one of the two methods that was used to collect data on the integration of ICTs in teaching and learning of Geography in the selected

schools of Petauke. Cohen et al (2007) suggest that the distinctive feature of observation is that it offers an investigator the opportunity to gather live data from naturally occurring social situations. In this study, non-participatory approach towards observation was used thus the researcher did not get involved or influence the observed so as to ensure accuracy of information. The researcher therefore, whilst being as unnoticeable as possible, observed teachers and learners as they utilized ICTs in the teaching and learning process during classes which were 40 minute sessions. ICT facilities were also observed so as to take note of the available ICT resources.

Using classroom and infrastructure observations as well as interviews showed a correlation of what was said and what was seen on the actual ground thus providing some form of triangulation to validate the collated data.

#### 4.8 Data Analysis

The data collected in this study was analyzed by use of thematic analysis. Interviews were recorded and common themes were categorized and put together under each research question so as to enable qualitative content analysis (Bergold and Thomas, 2012). This thematic analysis was guided by Braun and Clarke's (2006) six phase framework. Table two summarizes the analysis procedures.

Table 2: Six Phase framework for thematic analysis

Phase	Activity
<b>Familiarization</b>	Transcribed data, read and reread, and noted down initial codes.
<b>Coding</b>	Coded interesting features of the data in a systematic fashion across the data-set and collected data relevant to each other.
<b>Generating themes</b>	Assembled codes into potential themes and gathered all data relevant to each potential theme.
<b>Reviewing themes</b>	Themes were checked if they worked in relation to the coded extracts and the entire data-set so as to generate a thematic 'map'.
<b>Defining and naming themes</b>	Ongoing analysis refined the specifics of each theme and generation of clear names for each theme was established.
<b>Writing up</b>	Appropriate extracts were selected, discussion of the analysis was done in relation to research question and literature and later on a report was produce.

Source (Braun and Clarke, 2006)

#### 4.9 Trust worthiness of the study

To ensure credibility of the findings of this study, a pilot study was undertaken so as to ensure that the instruments used address the sought objectives. Furthermore, the instruments used provided a form of triangulation as information obtained through observations was confirmed by the information attained through interviews. Interview findings were validated through participant validation.

## V. PRESENTATION OF FINDINGS

### 5.1 Description of Study Participants

The study had 28 participants and all gave both written and verbal consent to participate in the study. The study took place in Petauke district in four schools coded, B1, A1, A2, and B2. Table 3 summarizes the description of participants that took part in the study.

Table 3:Description of study participants

School	Teachers	Learners	Total
B1	2	5	7
A1	2	5	7
A2	2	5	7
B2	2	5	7
<b>Total</b>	<b>8</b>	<b>20</b>	<b>28</b>

Source: field data, (2020)

The study included only teachers of Geography as well as learners of Geography as summarized in table 4.

Table 4: Social Demographic Characteristics of participants

Category		Learners	Teachers
<b>Gender</b>	Male	11	5
	Female	9	3
<b>Academic Qualifications</b>	Degree (BAEd)	-	3
	Diploma	-	5
<b>Years of Service</b>	0-5	N/A	4
	6 -10	N/A	2
	>10	N/A	2

Source: field data, (2020)

Among the participants of the study were eleven male learners and nine female learners along with five male teachers and three female teachers. Three of the teachers were degree holders and five were diploma holders. Two of the teachers who participated in the study had taught for over ten years and two others had been teaching for not more than ten years. The remaining four teachers had all been teaching for not more than five years.

### 5.2 Available ICT devices and facilities

Through observations and interviews, it was established that all schools visited had ICT facilities and devices useful for the teaching and learning process. The most common devices found in all the visited schools were; Computers (laptop and desktops), televisions (with DSTV subscription), radios, printers and internet facilities. It was observed that most computers available were outdated and were running on old operating systems.

However, one primary school did not have a projector, as it was damaged and has not been repaired since. This was

because, according to one of the teacher participants, there were very few activities that required the use of projectors in primary schools. This was because only grade 8's and 9's needed such services. One participant explained this scenario as follows:

*We need to have more laptops and projectors as a school because there are instances where I would wish to use a projector and another teacher wishes to do the same. Because of this, most of my fellow teachers avoid using the projector even when it's free or fear of having an altercation with fellow workers over the projector (Participant, T02).*

In all schools visited, it was observed that TV's were restricted to the staffrooms only and laptops to departments, thus only personally owned laptops were used by the participant teachers in lesson delivery. Tablets/iPads and smart phones used were also personally owned by the Teachers. Furthermore, in all four schools visited, learners were not allowed to come with their iPads/tablets and smart phones. According to one of the participants this restriction is done so as to avoid learners losing concentration during lessons via usage of social media and the internet. One participant explained this as follows:

*Learners are not supposed to come with their phones or tablets unless special permission is given. This is because they tend to be distracted in class as they either will want to show off the device to their friend or they will be busy on WhatsApp and Facebook thereby missing out on the lesson (Participant, T01).*

### 5.3 Benefits and challenges of ICTs in teaching and learning of Geography

The Teachers were asked to point out what they regarded as any other advantage associated with the integration of ICTs in the teaching and learning of Geography. Some of their responses were that the use of ICTs had the capacity of developing some practical skills in pupils that are needed in order for one to succeed in life. They attributed this to the fact that the use of ICTs in the teaching and learning process provides a hands-on experience for learners thereby intensifying the ability to grasp geographical concepts being passed on.

Teachers also explained that the integration of ICTs in the teaching process ensured that learners were made aware of the digital world as it relates to Geography therefor making the subject more relevant to the learner. According to one of the teachers:

*Learners are exposed to the use of gadgets and software that enhance their research capabilities and skills. This will help them once they get into tertiary education as well as in industry too. Therefore, ICTs play a vital role especial role in Geography especially considering that it is a subject that bridges earth (natural science) and man (social science) (Participant, T06).*

Despite these pronounced benefits the use of ICTs presented, both teachers and learners also expressed the downside that come with the use of ICTs. One of the challenges mentioned by teachers was that concentration on the subject during lessons is compromised due to the learner's curiosity to explore the ICT device further. As a result, the learner lagged behind and this eventually resulted in poor performance. One of the teachers explained as follows:

*I once gave my tablet to one of the learners to read out some work to their classmates and the minute I left them unsupervised, him and his friends halted the lesson so that they could explore other functions that the device had. Totally out of the lessons content, they began taking pictures (Participant, T06).*

This showed that the device proved to be more of a distraction than a teaching aid as learners were more interested in using the device for pleasure rather than learning geographical concepts.

Another downside that the use of ICT devices and platforms brings to the classroom is that most learners are not from families that can afford to get them any ICT devices. Hence such learners tend to lag behind as they often have to rely on their friends' devices or spend most of their time copying notes and drawing diagrams instead of studying. This discourages some teachers from integrating ICT in their lessons as they felt that some of the learners would feel left out. One of the teachers explained as follows:

*In most cases I prefer using the traditional way of teaching, thus the use of chalk board, because no child should feel left out in class. If they do feel left out then I would have failed as a teacher, therefore to ensure that no one is left behind, I introduce at a very slow pace such that each learner is on the same page (Participant, T04).*

Moral degradation is yet another threat brought about with the use of ICTs if misused. Some learners indulged themselves in the consumption of illicit content found on the internet. This could be pornographic content or crime related, and in the long run they will as a result indulge in sexual relations and other morally degrading vices. One of the teachers explained to say:

*I avoid leaving my learners unsupervised when dealing with geographic research that requires them to Google up some work, by doing so I try to restrict them from visiting sites that have harmful and illicit content (Participant, T04).*

According to the findings of this study, teachers were demotivated to integrate ICTs in the teaching of Geography due to the challenges that are brought about with the use of ICTs. Despite the benefits that using ICT brought about, the challenges appear to be more pronounced due to the inadequate ICT devices and facilities available in the visited schools.

#### 5.4 Integration of ICTs in teaching and learning of Geography

The study established that there are various ICT devices and platforms being utilized in the teaching of Geography. Amongst these laptops, printers, tablets/iPads, projector and smartphones proved to be the most widely used ICT devices that are integrated in the teaching and learning of geography. However, it was observed and noted that there is little known knowledge on how to incorporate most geographical applications and software available on laptops in their teaching and learning process. Most teachers and learners during interaction with these devices only limited their usage to note taking, as one would do with a hardcopy book. Therefore, learners did not attain the skill of manipulating information on these devices to attain the intended skill. One participant explained this as follows:

*Our teacher likes to come with his tablet and he uses it when teaching because that's where he saves his notes. Sometimes he shows us diagrams on the tablet whenever the projector is not available. I don't know how to use the tablet so most times when he asks for someone to write point-form notes on the board very few of us offer to participate. But I know how to open a document on my phone and on a computer (Participant, L13).*

During a lesson observation at B1 School, whilst conducting a lesson on Earth Movements via PowerPoint, the teacher only relied on bulleting notes and pictures to convey the concept of earth movements. The focus on pictures and bulleting notes was at the cost of not using videos and models found in some software installed on the laptop such as Encarta Encyclopaedia. Such software has animations illustrating earth movements. When asked about this during interviews, teacher explained not being aware of such a provision being available on the laptop. One participant explained this as follows:

*I don't know any software that has Geographic videos that is why I rely mostly on the bulleting. The alternative would be using YouTube but then again that would require data bundles of which the school does not provide (Participant, T03).*

During another lesson observation conducted in at B1 School, when a grade 12 learner was asked to operate the laptop, they showed to have little know how on the basic functions on how to operate a laptop and display a PowerPoint presentation on a projected screen. However, opening the same PowerPoint document on their mobile devices was a walk over as they were more convenient with their mobile device. Teachers in the visited schools occasionally shared printed out copies of PowerPoint documents with learners whenever ink was available in the school printers. This, however, was not common as most cases the printers were reserved only for administration to use for running documents and thus teachers had little to no access to printers. Teachers in most cases were forced to use their own money to have their work printed out and this proved costly due to the overwhelming number of

learners in classes. As a result, learners incurred the cost of printing these documents as teachers would only share softcopy documents.

In an interview with the learners, it was noted that their lack of knowledge on how to operate the computer was due to the fact that they are hardly given work that needs the use of the laptop. The learner explained as follows:

*Even when our teacher wants to send us softcopy notes, we access them through our phones because we can't afford to buy laptops and some of my friends who don't have smartphones print and photocopy the same notes from the market because we are not allowed access to use the school printer. There are also very few computers in the computer lab and they are never connected to the Internet when we go there (Participant, L06).*

When asked about availability of computers in school to learners, one of the teachers explained to echo what the learner had explained of not having enough devices in the lab. The teacher explained that the school has a very high enrolment rate that surpasses the available resources. The computer lab at B1 consisted of 24 desktops and one printer whilst the Geography classes handled by the teacher comprised of not less than 70 learners per class. Therefore, it was difficult to conduct lessons from the computer lab where learners could have hands on access to computers. As a result, the teacher was limited to the use of just his laptop and the projector during classes. One participant explained this as follows:

*Our computer lab has 24 computers and my class is a class of 70 learners, so it is not possible to conduct a lesson from the lab as a result I really mostly on the projector if I want to show them a video or diagrams (Participant, T03).*

This lack of adequate computers proved to have been a common problem for all the other schools visited under the study. All the teachers also shared the view that there was a tendency of over enrolment that resulted in ICT devices not being enough for the learners to use during lessons.

It was also established that internet services were hardly available as school management told the teachers that they have no money to always have an active internet subscription in school. As a result, some teachers utilised their personal data bundles whenever they wished to access the internet on school laptops or computers. This discourages most teachers in using ICTs because the cost of buying data bundles was high.

## VI. DISCUSSION OF FINDINGS

### 6.1 Description of Study Participants/ Social-Demographic Characteristics

The study had 28 participants and all gave both written and verbal consent to participate in the study. The sample size was equally distributed amongst all four schools as illustrated in table three (page 10). This sample comprised of two teachers

per school and five learners per school. The sample size was evenly distributed to ensure an equitable representation of findings from all four schools. The study further sought to fairly distribute respondents according to gender so as to tell if usage of ICTs is somehow gender dependent. However, this was not possible as shown in table four (page 10), there were more male respondents amongst both teachers and learners. This did not affect the study as there appeared to have been no indication assuming that the use of ICT was dependent on gender. The results of the study did not collaborate with a study by Hernandez (2017) who demonstrated that females had more positive attitudes towards ICT usage than males.

With regards to academic qualifications of teachers, there was no evident data showing a difference in skill or knowledge on content matter on Geography or integrating of ICTs with Geography. Both degree and diploma holders proved to have been at par with regards to competence and this was established during the interviews and classroom observations conducted in all four schools.

The number of years served by teachers in service proved to have had a slight impact on their willingness to utilize ICT resources. Mostly it was the teachers who had served less than five years who were more willing to use ICT resources. This is because this group of teachers were fresh out of collage or universities and were more exposed to the use of ICT resources as compared to the elderly teachers.

#### *6.2 ICT Facilities available in the selected schools*

According to findings, the schools were found to be mainly using computers and projectors and hardly using TV or video clips, and smart phones as ICT facilities in the learning and teaching of geography. It was further discovered that among the ICTs used in the schools, they were poorly stocked with regards to quantity and modernity of the devices. The findings further disclosed that primary schools where least stocked in ICT resources as compared to secondary schools.

These findings as similar to study by Ahmadi et al (2011) and Chirwa and Mubita (2021) which indicated that where the infrastructure exists, secondary schools are more likely to be equipped than primary schools. This is understandable given that in many countries, policies to support ICT integration favor investment in higher levels of education.

These findings fall in line with the given literature by UNESCO (2014) suggesting that the integration of ICT in classrooms in most African countries does not meet the needs of the 21<sup>st</sup> century labor market. However, this does not necessarily mean the teaching and learning going on in the selected schools of Petauke district is null and void, it simply means there is a long way to go and from the looks of things these schools are not so far behind (Chirwa and Mubita, 2021).

Furthermore, the findings established that there was a tendency by teachers of not utilizing ICTs due to the overwhelming number of learners in class that made it

difficult for the teachers to make illustrations on ICT devices such as computers. This resulted in most teachers avoiding using ICT devices with the view that the devices would not be available, even when the devices are actually available. A good example could be the use of a projector, in three of the visited schools, only one projector was found per school. This very projector was utilized by all departments of the schools including administrations during meetings. Therefore, access to the device was difficult and hence the demotivation teachers had in the use of it. As a result, the benefits of using ICTs, in this case the projector, as earlier explained were not realized. Therefore, some teachers resulted in spending most of their time trying to dispense information the traditional way by writing and drawing on the chalk board. This is in line with what some researchers like Chirwa and Mubita (2021) and Mewcha and Ayele (2015) who stated that some of the major impediments to ICT use in schools have been attributed to inadequate ICT infrastructure and poor access to ICTs.

With regards to the above, as seen in the literature review according to Van de Schee (2003), it is important that audio-visual learning aids are part and parcel of the geography lesson and that it is the duty of the teacher to use his/her pedagogical skills to provide these learning aids. Therefore, omitting the use of video clips as evident in the findings results in failure to fully fulfill the benefits that the use of ICTs present.

Furthermore, the population of learners in the schools by far outnumbered the available types of ICTs used in these schools. The implication of this finding is that learners are not exposed to a variety of ICTs hence not fully benefiting from them. In addition to this, the simplicity of the type of ICTs found in the selected schools proved to have been too basic for learners to fully realize their learning capabilities. The desktops available were all old models with old software hence they were slow and as a result, learners only accessed them for basic functions such as displaying information from a thumb drive. Similar to the explanation of Alkahtani (2017), society is advancing at an alarming rate digitally and having any access to ICT devices is a plus to the learners. However, these devices if outdated, as seen in some of the schools visited, will not yield the desired outcome of the geography lessons. GPS devices are always being updated, similarly weather applications and other geographic related applications are being updated nearly on a monthly basis, thus to have a computer that is dated 10 years back is not practical and falls short of what one would describe as quality education due to lack of relevance.

Despite these shortcomings, Chirwa and Mubita (2021) noted that most teachers found a way of being innovative enough to curb the impact of having outdated ICT resources. The use of personally owned devices was one of these means of addressing this issue of outdated ICT resources. Even where some teachers could not manage to provide modern ICT resources, additional information was given to the learners on current developments regarding the particular geographic phenomena under study. Doing enabled learners to outsource



resources thereby sharpening further on their research skills. This is in line with a study by Selwyn (2011), it explained on how ICT enhances learning by enabling learners to learn on their own with teachers only playing the role of instructors.

Furthermore, these findings are similar to what Kiptalam et.al (2010) found in their study, it was observed that access to ICT facilities is a major challenge facing most African countries, with a ratio of one computer to 150 students against the ratio of 1:15 students in the developed countries.

### *6.3 ICT devices and platforms being integrated in the teaching and learning of geography*

The findings of the study established that projectors, laptops, desktops and tablets were the most widely used devices in the visited schools. However, it was established that both the teachers and the learners in the visited schools had limited skills with regards to the usage of these devices. This was observed during class observation and further confirmed during interviews where teachers admitted to not knowing other geographically beneficial applications and software available on laptops, computers, tablets and smart phones. Sarangi's (2003) study revealed that teacher's competency levels have a direct impact on learner's performance, hence if teachers are not well vested in the use of these ICT devices, set geographical objectives are very unlikely to be attained. Given a scenario where ICT resources are available, with the status quo at the time this study was conducted, learners would still find it hard to grasp concepts because their "instructors" lack the needed skills to operate and let alone integrate ICTs in the geography lessons. The findings of this study therefore confirmed and agrees with Sarangi's (2003) findings.

In most of the visited schools, it was established that the teacher was in most cases the only one interacting with the technology and then conveying concepts. As a result, learners are left blank with regards to how to use the ICT devices. Chirwa and Mubita (2021) confirmed that attaining the best results with the use of ICTs in Geography lessons might require that learners have direct interaction with the ICT resources being used, furthermore, the learning process ought to be led by learners to ensure learner centeredness. This was evident in one of the schools visited where the teacher only gave instructions when learners diverted from the intended objectives.

The findings are line with Sarangi (2003) and Alkahtani (2017) whose study revealed that educators had a limited idea about how the available ICT equipment could be used in teaching-learning situation. Their findings were attributed to the poor training opportunities for teachers to develop the necessary ICT skills.

Furthermore, some teachers shunned the use of ICTs due inadequacy of the resources in schools, this resulted in some of the learners not being presented with the chance to integrate ICTs in their learning hence missing out on the benefits that come with usage ICTs. These findings are similar to what Mishra and Koehler's (2006) study which suggested

that good pedagogical techniques used when teaching using technology, thus ICTs, should often involve constructivism. In this, learners interact with the technology and with the help of the teacher, bridge geographic concepts with the ICTs being used.

### *6.4 Suggested means of imparting skills in teachers and learners to make them more proficient in integrating ICTs in teaching and learning of geography.*

The findings of this study on one hand found that there was a link between the challenges faced in integrating ICTs in Geography and financial funding of the Geography department. It was revealed that there was need for conducting workshops and CPDs where teachers would share and learn skills needed for the integration of ICTs in teaching and learning of Geography. However, teachers complained that their department was poorly funded and thus most of them hardly go for workshops. This is in line with Husain's (2010) and Chirwa and Mubita (2021) findings which revealed that teachers thought that using ICT skills in developing and presenting information was essential technical competency that teachers need to acquire. However, ICTs as excellent pedagogical tools does not come without any demands from the teachers. There is need for teachers to put up an extra effort and creativity in achieving this objective. It is imperative then, that teachers need to be well vested in ICTs if they are to integrate them in the teaching and learning of Geography.

Learners on the other hand placed the responsibility of them knowing how to integrate ICTs in Geography on their teachers. They explained to say once the teacher made them familiar with a specific ICT device or platform to be used prior to the lesson, the learners would find it much easier to focus on the lesson and not get too carried away with curiosity over the ICTs being used. Therefore, teachers and learners must both have some pre-exposure to ICT resources to heighten their preparedness and willingness to integrate ICT in Geography lessons (Zhang, 2013) and also to make their research processes easy (Lako and Mubita, 2021).

These findings are similar to the study conducted by Light (2009) and Chirwa and Mubita (2021) where it was noted that that the shift in using ICT and pedagogy must not involve the teachers only, but must involve the whole education system alongside sustainable investment in infrastructure, human resource, circular frameworks and assessment. Other researchers have suggested that teachers should receive training on the effective strategies and tools that can allow technology integration into classrooms and improve curricula with technology-boosted materials (Almekhlafi and Almeqdadi, 2010).

These findings further support UNESCO (2005) suggestions for having an effective integration of ICTs in the Teaching process. According to UNESCO (2005), there must be an effective learning environment that exceeds beyond the classroom to home-based study as well as effective training in practical integration of technology into the classroom

activities and not only basic computer functions. Other requirements include a supporting structure for ICT, quality content and materials, enabling policies and strategies (including legal and ethical guidelines for the use of ICT), practice informed by evaluation and research, vision and leadership student-centered approaches to learning, and relevant assessment tools.

## VII. CONCLUSION AND RECOMMENDATIONS

### 7.1 Conclusion

This study aimed to establish the available ICT resources which were being integrated in the teaching and learning of geography by teachers and learners in Petauke district so as to ensure relevance of the Geography subject to the current and ongoing technological developments that are shaping the country's social and economic growth. The basis of this was to find strategies that would enhance effective integration of ICTs in the teaching and learning of Geography in the selected schools of Petauke district by exploring how ICTs are being integrated in Geography lessons so as to realize the benefits of ICTs.

From the findings, there proved to be very minimal integration of ICTs in the teaching and learning of Geography. It was established that no reliable pedagogy had been developed yet by teachers to meet the demands of ICT integration in a constructivist approach and teachers were still stuck in the pedagogy of yester years. The study showed that perceptions about the value of ICTs for teaching did not fall in line with the realities of trying to integrate ICTs in the classroom. This was evident with learners just as much as with the teachers.

There were a number of barriers noted leading to the failure of effective integration of ICTs in Geography, some of these included limited ICT knowledge from the learners and the teachers, and the availability of ICT resources. Despite being aware of the benefits that come with using ICTs in class, teachers in the observed schools neglected using ICTs even when they came with them to class.

In relation to Shuman's (2004) TPACK model, it was evident that the teachers in the study lacked the basic requirements needed for ICT integration. Teachers had a limited pedagogical, content and technical knowledge. Them having laptops and smartphones does not necessarily translate to them using these devices effectively in the classroom. Some teachers are still struggling with the basic functions of using a laptop and worse off on integrating ICTs as part of their pedagogy in Geography lessons.

Therefore, a paradigm shift is needed for both the teachers and learners to appreciate ICTs as learning tools and this is a process that calls for patience from all stakeholders to achieve full ICT integration.

Learners proved to be in need of adequate exposer and training regarding the use of ICTs in Geography. By doing so, learners will not lag behind as evidently seen during

classroom observations where learners were more curious on learning the functions of a computer or tablet and not geographical content.

### 7.2 Recommendations

The study revealed that the application of ICTs can help prepare learners to be self-reliant after school. It is therefore, recommended there is need to set up Continuous Professional Development (CPD's) programs as well as workshops for Geography teachers to educate and train them on pedagogical skills that will equip them with strategies to effectively integrate ICTs in lessons.

Additionally, schools through Parent-Teacher Association (PTA) meetings, should sensitize guardians of the learners on the benefits and demerits of ICTs so that learning should be an on-going process that does not just start and end in the classroom.

## REFERENCES

- [1] Ary, D, Jacobs, L, Sorensen, C and Razavieh, A. (2010). *Introduction to educational research*: Wadsworth: Cengage learning.
- [2] Bell, J. (2005). *Doing your research project: A guide for first time researchers in social science*. Education and HEALTH, New York.
- [3] Bergold J. and Thomas S. (2012). *Participatory research methods: A methodological approach in motion*. Cambridge, Polity Press, UK.
- [4] Braun V. and Clarke V. (2006). *Using Thematic Analysis in psychology Qualitative research in Psychology*. American Psychological Association, Washington DC.
- [5] Catling, S. (2015). *Research and Debate in Primary Geography*. Routledge, London.
- [6] Chirwa, C and Mubita, K. (2021). *Preparedness of Teachers and Learners in the integration of Information Communication Technologies in the teaching and learning of geography in selected schools of Petauke District of Eastern Province in Zambia*. International Journal of Research and Innovation in Social Science (IJRISS) Volume V, Issue III pages 456-463
- [7] Cohen, L., Manion, L., and Morrison, K. (2007). *Research Methods in Education (6th Ed)*. Routledge Falmer, London.
- [8] Creswell, J.W. (2015). *A concise introduction to mixed methods research*. Sage Publications. London.
- [9] Hernandez. M, R. (2017). *Impact of ICT on Education: Challenges and Perspectives*. Universidad San Ignacio de Loyola, Lima, Perú, 5 (1), 325-347
- [10] Kombo, D.K. and Tromp, D.L.A. (2006). *Proposal and Thesis Writing: An Introduction*. Paulines publications Africa, Nairobi, Kenya.
- [11] Lako, P and Mubita, K. (2021). *Geography Teachers' Perspectives on Research Engagement in Selected Secondary Schools in Serenje District of Central Province of Zambia*. International Journal of Research and Innovation in Social Science (IJRISS) |Volume V, Issue VIII, August 2021|ISSN 2454-6186
- [12] Ministry of Transport and Communication (2006). *National Information and Communication Technology Policy*. Lusaka: NICTP.
- [13] Mishra, P. and Koehler, M. J. (2006). *Technological Pedagogical Content Knowledge: A Few Frameworks for Teacher Development*. Teachers College Record.
- [14] Msabila T. and Nalaila, G. (2013). *Research Proposal and Dissertation Writing*. Nyambari, Nyangwine publishers. Nairobi.
- [15] Office for Standards in Education (Ofsted), (2002). *The curriculum in successful primary schools*. Ofsted Publications Centre, London.

- [16] Orodho, J and Kombo, D.K (2002). *Proposal and Thesis Writing. Introduction*. Pauline Publication. Nairobi.
- [17] Reinfried S., Schleicher Y. and Haubrich H. (2007). *Geographical Education for Sustainable Development*. Firefly Books, Willowdale, Ontario, Canada.
- [18] Sarangi, D. (2003). *Integrating ICT in Teacher Education- Experience from a DIET*, Orissa. ICT in Education, 61-66
- [19] Schleicher A., (2019). *Envisioning the future of education and jobs*. OECD Publishing, Paris.
- [20] Shulman, L. (2004). *Those who understand: Knowledge Growth in Teaching. The Wisdom of Practice*. Jossey-Bass.
- [21] Sidhu, K.S. (2009). *Methodology of Research in Education*. Sterling Publisher, New Delhi.
- [22] White P.R. (2003). *The Language of Evaluation, Appraisal in English*. Macmillan, Palgrave.
- [23] Schleicher, Andreas. OECD Education Directorate. *The case for 21st-century learning*. Retrieved 10 October 2021 from: <http://www.oecd.org/general/thecasefor21st-centurylearning.htm>
- [24] Yadav, M. (2013). *Effectiveness of Multimedia Package (SLM) on Achievement in Geography International Research Mirror*. Issue Vol. 1, April 2013.
- [25] Yong, S. T, Gates, P. and Harrison, I. (2016). *Digital Native Students – Where is the Evidence?* TOJNE, Vol. 6, Issue 1
- [26] Zenelaj, E. (2013). *The use of ICT in geographical teaching and learning at secondary and high school in Albania*. Albania