Assessment Of The Availability And Utilization Of Icts For Teaching And Learning In Secondary Schools - Case Of A High School In Kwekwe, Zimbabwe.

Sibanda Mavellas, Mapenduka Wellington, Furusa Samuel

Abstract: This paper looked at the availability of common educational Information communications Technologies (ICTs) in secondary schools, using a high school in Kwekwe, Zimbabwe as a case study. Such technologies include computers, radios, televisions, networks, wireless technologies, interactive boards, internet, email, eLearning applications, video conferencing and projectors, just to mention, but a few. It further assessed whether the available ICTs are being utilized by teachers and students, looking at such usage activities as preparation for lessons, lesson delivery, issuing of assignments, research and communications. The research further identified the factors that are hindering the ICT utilization in these schools, among them lack of power supply, insufficient resources, fear of technology, lack of interest, ICT skills deficiency, higher ICT cost and poor physical infrastructure. The findings were tabulated and analyzed. Recommendations were put forward on how to improve ICT availability and utilization at the school and schools in general for the betterment of teaching and learning. Conclusions were drawn from the findings.

Index Terms: ICTs, ICT availability, ICT utilization, factors hindering ICT utilization.

1 INTRODUCTION

EDUCATION is vital for the development of a nation. An educated population leads to a productive workforce. Information communications technologies (ICTs) have become an integral part of education the world over. ICTs is an umbrella term used to describe communication devices or applications that are used for the gathering, processing and dissemination of information. ICTs are always talked of in terms of context, like in this case, ICTs in education (Rouse, 2015). Over the years the government of Zimbabwe, through the ministry of primary and secondary education has been encouraging schools to embrace and utilize ICTs in their teaching and learning activities. Schools have been investing in various and different ICTs and at different paces in order to be consistent with the government calls. Some schools that have huge financial muscle are moving with the ever changing technology and their students and teachers are not only computer literate, but keep in touch with the latest hardware, software and communication technologies. However some schools whose financial muscle is weak hardly have useful ICTs, apart from depleted and outdated desktop computers. The objectives of this research are therefore to find out:

a) Which ICTs are currently available in schools b) What is the level of utilization of these ICTs
b) What are the factors hindering the utilization of existing ICTs in schools

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2 LITERATURE REVIEW

2.1 Definitions of ICTs

A number of definitions for ICTs were brought up in this review, all centering around the hardware and applications used for gathering, processing, storage and dissemination of information. According to the United Nations Development Programme (UNDP), in a UNESCO article (2008), ICTs are defined as “information handling tools- a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. They include ‘old’ ICTs of radio, television and telephone, and the ‘new’ ICTs of computers, satellite and wireless technology and the internet. These different tools are now able to work together, and combine to form our ‘networked world’- a massive infrastructure of interconnected telephone services, standardized computing hardware, the internet, radio and television which reaches into every corner of the globe”. Rouse (2015) defines ICTs as an umbrella term that cover communication devices or applications that include computers, televisions, radios, networks, satellites, video conferencing and eLearning. She also added that ICTs are always talked about in a particular context, like ICTs in education, libraries, health, etc. According to elmoglobal (2014), ICTs in education means teaching and learning using ICTs. Educational ICT tools are divided into three categories namely: input source, output and others. Input source includes such things as Personal computers (PCs), Tablets, applications software, student response systems, visualizer or document camera. Output source refers to such devices as projector, interactive boards, monitors, display, Television. Others include digital camera, digital recorders, switchers and other technologies. ICTs can lead to improved student learning and better teaching methods. In order to harness the full potential of ICTs in education, a nation must come up with policies regarding the implementation of such solutions. Policies are as important as the technological innovation itself. Policies encompass

the master plan of what needs to be achieved within the political, economic and social context (Swarts, 2008). According to an educational site called www.open.edu, ICTs are technologies used for conveying, manipulating and storage of data through electronic means. Examples include the internet, mobile phone systems, television systems and radios. Techterms (**2**013) defines ICTs as technologies that provide access to information through telecommunications. Examples include internet, wireless networks, cellphones and other communication mediums. It is this researcher's view that, in education, both educators and students therefore need to utilize these technologies for purposes of research, lesson preparation, lesson delivery, assignment issuing and submission. These technologies tend to improve sources and quality of information obtained, efficiency and effectiveness and accuracy, which traditional methods did not have.

2.2 ICTs availability and utilization in education

According to Ngwu (2014), most ICT resources are not adequately available in schools. This therefore implies that, even though teachers are adequately trained and willing to impart the knowledge they have to students, they are blocked from doing so by this lack of technological equipment and laboratory facilities. The same research revealed a low extent utilization of ICT resources and related technologies in the schools under study. The research recommended provision of funds for procurement and maintenance of ICT resources, ensuring existence of functional computer laboratories, consistent power supplies in schools and provision of in- house training for teachers so that they keep in touch with the developments in ICT and related technologies. Egomo et al (2012), in their research paper titled " Availability and utilization of ICT tools for effective instructional delivery in tertiary institutions in Cross river state, Nigeria" revealed that the availability of ICT tools for effective instructional delivery is relatively low, except for laptops, multimedia projectors and internet facilities. They went on to argue that this affects the quality of graduates produced from these institutions. The research recommended that ICT tools should be availed in institutions of learning, teachers should make an effort to acquire these tools since they are an integral part of instruction delivery, government should come up with appropriate ICT policies and workshop training programmes for teachers should be organized among teachers at all levels of education. Adedeji (2011) suggested that governments should invest in provision of ICT resources to schools for training because the findings of his research revealed that most ICTs available in schools were being utilized for administrative purposes. A research conducted by Kiptalam and Rodrigues (2011) revealed that the use of ICT and related technologies is still at an early stage of development and implementation. They noted that while the pace was slow in other instances, in some there was a faster absorption rate to the extent of some schools developing electronic content for their teaching and learning. Such material is available in CDs and DVDs. Samuel and Bakar (2006) in their research paper titled "The utilization and integration of ICT tools in promoting English language teaching and learning: Reflections from English option teachers in Kuala Langat District, Malaysia ", revealed that there are insufficient laboratories in schools, internet in erratic, there are limited computer facilities for teachers, no central databases are used and no learning management systems are available for purposes of electronic learning. The research also revealed that there is insufficient courses and training, the teachers are not adequately trained, poor ICT integration, CD ROMS not working and never used, poor support from administration, negative attitude from teachers and lack of technical support skills from the laboratory technician. Generally the research proved that lack of infrastructure facilities is one of the many causes of poor ICT integration in schools. It is this researcher's view therefore that ICTs are neither adequately available nor being fully utilized in schools globally. In some cases resources are available, but not being fully utilized, but generally a lot needs to be done to improve the current scenario if schools are to fully benefit from the development and growth of ICTs and related technologies.

2.3 Factors hindering ICT utilization in schools

Mungai (2010), a teacher by profession, identified the following as factors that are hindering utilization of ICTs in his country: lack of qualified teachers since the few they have are overwhelmed, lack of electricity, which is a common problem in most African countries, inadequate computers, breakdown of the computers, higher prices for the procurement of ICT resources, burglary, computer phobia by both administrators and teachers, obsolete computers and increased moral degradation, that is abuse of such facilities as internet by people who watch inappropriate material, cyberbullying and other anti-social behaviors. Langat (2015) identified barriers hindering implementation of ICTs as shortage of infrastructure and resources, shortage of teachers, lack of clear digital curriculum, political factors, poor timing and poor planning, high cost of implementation, communication barriers , corruption, moral issues and high crime rates. This researchers made recommendations that would improve utilization as: all stakeholders' needs assessment analysis, establishment of proper communication channels, professional development of teachers and technicians, establishment of digital curricula and creation of partnerships in education. Mahmood et al (2014) attributed lack of ICT utilization in schools to a number of factors. Firstly they highlighted lack of exposure and expertise on the part of teachers who are computer illiterate, against modern students who are quick to self-educate and highly computer literate. The second aspect is the forcing of teachers to use technology in the classroom without giving them ample time to learn, acquire and apply the technology appropriately. Another factor identified was lack of confidence amongst teachers, which again is attributed to lack of professional training. According to Afshari et al (2009), there are manipulative and non-manipulative school and teacher factors that affect utilization of ICTs. Non-manipulative factors are those that cannot be influenced by the school, which include such factors as age, teacher experience, and computer experience of the teacher, government policy and availability of external support for the school. Manipulative factors refers to those the school can influence, which include such factors as teacher's attitudes towards ICTs, teachers ICT skills and knowledge, school commitment towards implementation of

ICTs and availability of ICT support. Kivuli (2013) identified lack of all stakeholders' awareness of the importance of technology in teaching and learning as a hinderance factor. These include teachers, parents, students and the community at large. He also mentioned lack of ICT resources in schools and encouraged local software developers to work with schools in developing software ideal for training. Lack of professional development of principals and teachers in schools was also sited. Teachers need to be encouraged to use ICTs in schools and lack of time to integrate ICTs into existing curriculum was also sited to be a contributing factor. According to Mingaine (2013), factors that affect ICT utilization in schools include the availability of electricity, cost of ICT infrastructure, School leadership and teacher skills available. It is this researcher' view that, while there are a number of factors affecting and hindering utilization of ICTs in school, all of them can be minimized or completely reversed if necessary interventions are put in place.

3 METHODOLOGY

3.1 Approach

This paper used a quantitative research approach, given that all the three research questions required numerical results/answers. Quantitative research is a more logical and data-led approach which provides a measure of what people think from statistical and numerical point of view. It can gather a large amount of data that can be easily organized and manipulated into reports for analysis. Quantitative research is predominantly used as a synonym for any data collection technique (such as questionnaires) or data analysis procedure (such as graphs or statistics) that generates or uses numerical data (Saunders et al, 2009). Quantity is an amount, it is how much of something. It assumes a meaning and refers to a measure of it. Quantitative studies are more common, especially in economics (Blumberg et al, 2008).

3.2 Participants

The target population were teachers at the high school understudy (N=51). And the sample size was (n=45). Sampling was done using simple random sampling method given that all teachers at the school are expected to use ICTs and are equally exposed to existing facilities. So every teacher is therefore expected to give their side of the availability of ICTs, their utilization and the factors hindering utilization. The sample size was obtained using the Yamane (1967) formula. According to Yamane (1967), the formula for calculating the sample size, given the population size and margin of error is:

$$n = \frac{N}{1 + Ne^2}$$

Where: n – sample size

N- Population size e- Margin of error

For this research, sampling was done at 95% level of certainty.

This means that if the sample is selected 100 times, atleast 95 of these samples would be certain to represent the characteristics of the population (Saunders et al., 2007). The margin of error therefore becomes 5% (0.05). The margin of error is a small amount that is allowed for in case of miscalculation or change of circumstances. It means that one did not get to sample everyone in the population and so expect sample results to vary from that population by a certain amount (Rumsey, 2011).

3.3 Research Instrument

The questionnaire was used as the sole research instrument in this research. A questionnaire is a research mechanism which consists of a sequence of questions and other prompts used for the purpose of collecting information from a selected sample of respondents. These are crafted in line with the research objectives (Best and Khan, 2004). Questionnaires provide a relatively cheap, quick and efficient way of obtaining large amounts of information from a large sample of people. Data can be collected relatively quickly because the researcher would not need to be present when the questionnaires are completed. They are very useful for large populations when interviews would be impractical (McLeod, 2014). This researcher carefully crafted the questionnaires to be used in this research such that it was relatively easy for the targeted respondents to answer and give strictly what was required, thereby avoiding too little or too much information. It had three components, covering the ICTs availability, Utilization and the Factors hindering Utilization of the resources at the school. Strengths of questionnaires

According to Popper (1959) the following are the strengths of questionnaires: -

- Large amounts of information can be collected from a large number of people over a short period of time in a cost effective way.
- Can be used by the researcher or by any number of people with limited effect to its validity and reliability.
- The results of the questionnaires can usually be quickly and easily quantified by either a researcher or through the use of a software package.
- Can be analyzed more 'scientifically' and objectively than other forms of research.
- When data has been quantified, it can be used to compare and contrast other research and may be used to measure change.
- Positivists believe that quantitative data can be used to create new theories and / or test existing hypotheses. They are practical.

4 FINDINGS /|DISCUSSION

The school understudy has a total of fifty-one (51) teachers. A total of fifty (50) questionnaires were distributed to the teachers. Forty-five (45) out of the fifty (50) responded. The following were the findings of the research:

4.1 ICTs availability at the school

		Adequate	Not adequate	Not Available	Decision
1.	Computer laboratories	(16/45) 36%	(29/45) 64%	(0) 0%	Not Adequate
2.	Internet facilities	(31/45) 69%	(14/45) 31%	(0) 0%	Adequate
3.	E-mail services	(19/45) 64%	(16/45) 36%	(0) 0%	Adequate
4	Satellite services	(7/45) 16%	(24/45) 53%	(14/45) 31%	Not Adequate
5.	VOIP Telephone	(12/45) 27%	(7/45) 15%	(26/45) 58%	Not Available
6.	Wireless technology	(43/45) 96%	(2/45) 4%	(0) 0%	Adequate
7.	LCD projector	(17/45) 38%	(28/45) 62%	(0) 0%	Not Adequate
8.	Interactive board	(0) 0%	(10/45) 22%	(35/45) 73%	Not Available
9.	Public address system	(14/45) 31%	(10/45) 22%	(21/45) 47%	Not Available
10.	Printer	(42/45) 93%	(3/45) 7%	(0) 0%	Adequate
11.	Scanner	(42/45) 93%	(3/45) 7%	(0) 0%	Adequate
12.	Projection screen	(10/45) 22%	(9/45) 20%	(26/45) 58%	Not Available
13.	Television	(3/45) 7%	(10/45) 22%	(32/45) 71%	Not Available
14.	LAN/ WLAN	(28/45) 62%	(14/45) 31%	(3/45) 7%	Adequate
15.	Radio	(9/45) 20%	(0) 0%	(36/45) 80%	Not Available
16.	Maintenance workshop	(7/45) 16%	(3/45) 7%	(35/45) 77%	Not Available
17.	Spare part and accessories rooms	(3/45) 7%	(7/45) 16%	(35/45) 77%	Not Available
18.	e-Learning applications	(7/45) 16%	(31/45) 68%	(7/45) 16%	Not Adequate
19.	Video conferencing	(0) 0%	(0) 0%	(45/45) 100%	Not Available

***Table 1**- ICTs available in the school*

As evidenced in table 1 above, 47% of identified ICTs are not available at the school, 21% are inadequate and 32% said are adequately available. Therefore the overall decision is “Not available”, meaning that most of ICT resources required for teaching and learning are not there at the school. This information is summarized in the chart below:

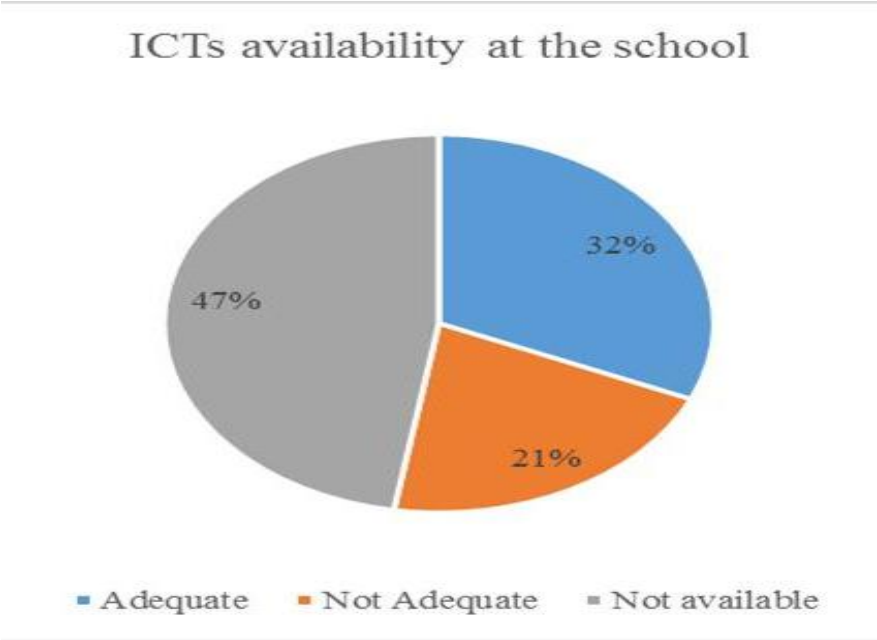

***Figure 1**- ICTs availability*

4.2 Level of ICTs utilization at the school

	Item statement	Very High Extent	High Extent	Low Extent	Very Low Extent	Decision
1	Laptop is used for lessons preparation	0%	(12/45) 27%	(32/45) 69%	(2/45) 4%	Low Extent
2	Internet is used in preparing lessons	(7/45) 16%	(21/45) 46%	(3/45) 7%	(14/45) 31%	High Extent
3	Interactive board is used for delivering lessons	0%	0%	(14/45) 31%	(32/45) 69%	Very Low Extent
4	Printers are networked for use in the department	(16/45) 35%	0%	(7/45) 16%	(22/45) 49%	Very Low Extent
5.	Projectors/ Television are used during teaching	(5/45) 11%	(14/45) 31%	(26/45) 58%	0%	Low Extent
6.	subject materials are provided online for students	0%	(7/45) 16%	(7/45) 16%	(31/45) 68%	Very Low Extent
7	Students assignments are online based	0%	0%	(9/45) 20%	(36/45) 80%	Very Low Extent
8.	Teachers and students communicate through E-mail	(3/45) 7%	0%	(3/45) 7%	(39/45) 86%	Very Low Extent
9	Public address system is used during teaching	0%	(7/45) 16%	(2/45) 4%	(36/45) 80%	Very Low Extent
10	Teachers always use their laptop during lessons	0%	(5/45) 11%	(22/45) 49%	(18/45) 40%	Low Extent

***Table 2**- level of ICTs utilization*

Table 2 above shows the extent to which the available ICT resources are being utilized. 60% of the available resources are being utilized to a Very Low Extent, 30% to a Low Extent, 10% to a High Extent and 0 said Very High Extent. Therefore the overall decision is “Very Low Extent”, meaning that ICTs available are not being fully utilized. This information is summarized in the chart below:

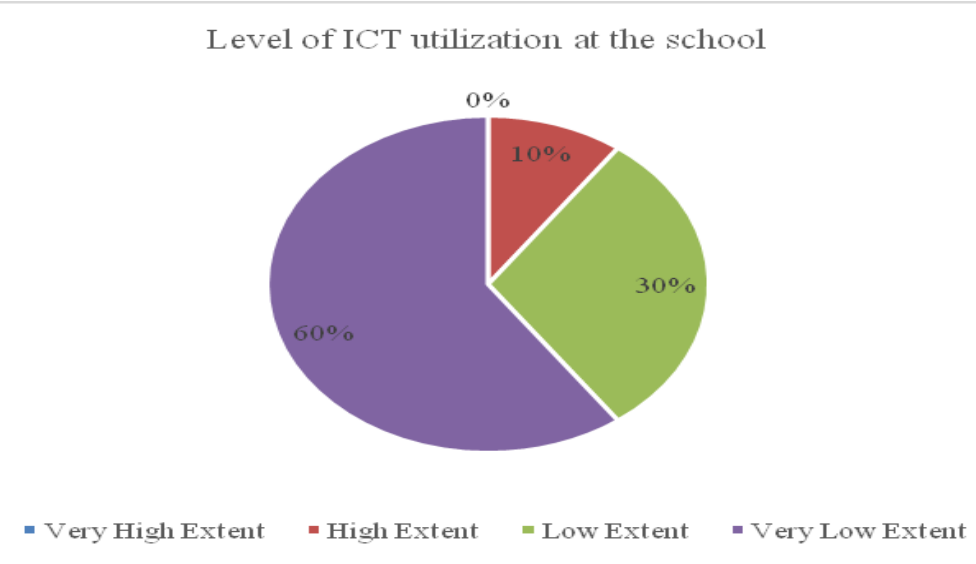

***Figure 2**- Level of ICT utilization*

4.3 Factors that hinder ICTs utilization at the school

	Item Statement	Strongly Agree	Agree	Disagree	Strongly	Decision
1.	Lack of functional computer laboratory	0%	(10/45) 22%	(25/45) 56%	(10/45) 22%	Disagree
2.	Time constraints in using ICT	0%	(18/45) 40%	(27/45) 60%	0%	Disagree
3.	Insufficient computer peripherals (scanner printer)	0%	(23/45) 51%	(22/45) 49%	0%	Agree
4.	Problem of accessibility to existing hardware (computer, projectors) etc	0%	(23/45) 51%	(22/45) 49%	0%	Agree
5.	Inadequacy of computers for teachers	0%	(27/45) 61%	(16/45) 35%	(2/45) 4%	Agree
6.	Deficiency in skills in ICT Utilization	0%	(27/45) 61%	(14/45) 31%	(3/45) 8%	Agree
7.	Lack of interest of teachers in ICT utilization	0%	0%	(39/45) 86%	(6/45) 14%	Disagree
8.	Deficiency in professional development opportunities	(10/45) 18%	(14/45) 35%	(18/45) 40 %	(3/45) 7 %	Disagree
9.	Teacher and students fail to carry laptop because of theft	(2/45) 4%	(3/45) 7%	(23/45) 51%	(17/45) 38%	Disagree
10.	Absent reward systems to encourage ICT usage	0%	(13/45) 29%	(29/45) 64%	(3/45) 7%	Disagree
11.	Deficiency in support services in material development and ICT usage	0%	(29/45) 64%	(8/45) 18 %	(8/45) 18%	Agree
12.	Insufficient financial resources for ICT integration	(10/45) 22%	(20/45) 45%	(2/45) 4%	(13/45) 29%	Agree
13	Non reliability of power supply	(10/45) 22%	0%	(25/45) 56%	(10/45) 22%	Disagree
14.	High cost of ICT resources	(8/45) 18%	(34/45) 74%	(3/45) 8%	0%	Agree
15.	Constant innovations in ICT industry	(10/45) 22%	(33/45) 74%	(2/45) 4%	0%	Agree
16	Technophobia (fear of technology) in teachers and students	0%	(2/45) 4%	(26/45) 58%	(17/45) 38%	Disagree
17	Poor physical infrastructure of learning environment	(10/45) 22%	(8/45) 18%	(27/45) 60%	0%	Disagree
18	Frequent breakdown of ICT resources	(0) 0%	(31/45) 69%	(5/45) 11%	(9/45) 20%	Agree
19	Teachers lack finance to subscribe for monthly internet usage	(2/45) 4%	(17/45) 38%	(14/45) 31%	(12/45) 27%	Agree
20	Lack of student ICT background	(10/45) 22%	(29/45) 64%	(3/45) 8%	(3/45) 6%	Agree

Table 3- *Factors hindering ICTs utilization*

Table 3 above indicates that 55% of factors hindering utilization at the school are agreed to, while 45% are Disagreed to, 0% Strongly Agree and 0% Strongly Disagree. Therefore the overall decision is “Agree”, meaning that the majority of given factors are really hindering utilization at the school. This information is summarized in the chart below:

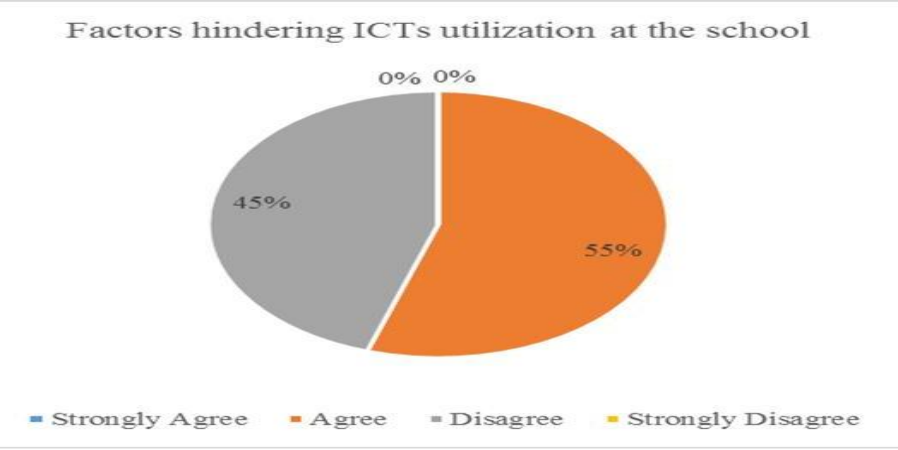

Figure 3 *– Factors hindering ICT utilization*

5 RECOMMENDATIONS

Following the findings of this research, it is recommended that:

- There be continuous training and ICT skills upgrading for teachers.
- There be consistent monitoring and evaluation of government policy on ICTs in education.
- Alternate sources of power such as solar energy and generators be put in place to alleviate the problem of electrical power cuts.
- ICTs be integrated into the current curricula.
- Government and stakeholders provide funds for procurement and maintenance of ICTs in schools.
- Technical support be provided in schools to ensure that help for those in need is always available and facilities are kept in their expected operational status.

6 CONCLUSIONS

This research focused on the availability of ICT resources in schools, the level of utilization of the available resources and the factors hindering the full utilization of the available ICTs. The research revealed that most ICTs required for training are not available at all, and those that are available are inadequate. It also revealed that the available ICTs are being utilized to a very low extent and it was generally agreed that the given factors are indeed the ones affecting or hindering utilization of the available resources in schools. While these findings may not reveal the status in all schools, most of the high schools, especially in rural areas are worse than this case. Based on these findings, it can be concluded that ICT resources are not available at the school and most secondary schools in general and where available, they are inadequate, those available are being underutilized and there are numerous factors that favoring underutilization and thus need to be addressed.

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