

Research Article

Assessing the One Laptop per Child for Education Development a Case Study of Huye District-Rwanda

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Article History

Received: 10.08.2020

Accepted: 25.08.2020

Published: 30.08.2020

Journal homepage:<https://www.easpublisher.com/easjebm>**Quick Response Code**

Abstract: In all facets of life information communication technology (ICT) has become commonplace entities. Over the past 20 years, the use of ICT has fundamentally changed the practices and practices of almost all forms of business and governance endeavours. The schooling is a very socially oriented activity, and traditionally, quality education has been associated with strong teachers with high levels of personal contact with the learners. The use of ICT in education lends itself to more learning environments focused on students. But with the world moving rapidly into digital media and information, ICT's role in education is becoming increasingly important and that importance will continue to grow and develop in the 21st century. This research aimed at examining or evaluating the level at which the use of ICT in public primary schools in teaching and learners skills and knowledge, and finally the perception of stakeholders and the management of schools on the appropriateness of this technology in public primary schools in Huye District, Rwanda.

Keywords: Assessment, One laptop per child, and Education development.

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INTRODUCTION

Globally, ICT has benefited most people and in all areas of human development including education. ICT is perceived as the driving force behind development of a society and indeed. According to Daniels (200), has alluded that there exist imbalances when it comes to using ICT in teaching and learning. ICT is of benefit; however Cullen (2003) has a feeling that its penetration is more embraced by developed countries as opposed to developing countries. Developing countries set aside resources to address the ICT challenges and that is why the penetration is high. Crook (1994) has alluded that in a developed country like Britain, the ICT levels are high such as the Computer Based Instruction (CBI) is on uptake ladder that has seen most children in the schools accessing to ICT/ computer while learning institution equipped with latest technology. Developing countries such as South Africa, Nigeria and even Rwanda, uptake of ICT is low and this is coupled with low skilled teachers, low ICT penetration, poor internet connectivity, insufficient funds, unreliable electricity supply among others, Lundell and Howell (2002). Achuonye (2011), Oliver, 2013 have also voiced challenges in their country Nigeria where myriad of ICT penetration have occurred and this include lapses in electricity, limited resources among many other challenges. Rwanda's Vision 2020, session paper in

education 2005 projects that over 66% of the youths can only be empowered through education and hence education is the biggest drive of economic development. Rwanda Constitution of 2015 shows that there is need for education reforms that will see integration of ICT into education. This has led to much radical improvement like introduction of ICT in schools and teachers capacity building.

According to World Bank, 2004 report, globally, education system need to embed ICT in their teaching so that there is high uptake of ICT, this can only be realized when bodies that advocates for better education system put pressure on this in this era of the 21st Century. While according to (UNESCO, 2002), (Laferreire, Breuleux and Bracewell, 1999), they have argued that ICT is an excellent tool for educational development and that it improves quality in education. Developing countries in Africa, shows that ICT is met with myriad of challenges that need to be fixed such as resources needed, skills need, and infrastructure improvement among others.

(NEPAD, 2003) and (Grabe, 2007) put accent on that tools are able to play a crucial role in helping learners increase abilities and knowledge in the instruction and acquisition of knowledge process. In Rwanda, the session that was held at Nyamata which intended to train head teachers and teachers on use of

ICT (2011) where that conference highlighted that ICT skills are crucial in increasing the development of the economy of a country (Ministry of Education of Rwanda, 2011). As an outcome, the government acknowledged that an ICT well-educated labour force is the basis on which Rwanda can obtain the prominence of both economy and knowledge. As a result, the Rwanda the government has offered schooling an opportunity to equip the country with ICT abilities in mandate to build a vivacious and viable development in the economy. The National ICT plan was launched in 2013 in answering the concern elevated in that conference gathered at Nyamata, 2011 according to the Ministry of Education of Rwanda, (2012). It was also intended to guarantee the country accomplishment of the Millennium Development Goals (MDGs). The procedure outlined by the Ministry of Education shows that there are many of barriers regarding ease of access and use of Information Communication Technology in Rwanda, plus great level of poverty, incomplete rural area electrification and electricity disturbance (Ministry of Education, 2012). Most primary schools possess several computer devices. Conversely, this may necessitate the purchase of huge number laptops for these schools to operate as expected. This is because a small number of schools own the relevant tools that facilitate ICT use for students and teachers, (Farell, 2007).

Problem Statement

Information Communication Technology (ICT) is an important tool in education which can help in increasing the opportunities of learning as well as enhancing education quality by using teaching methods that are enhanced. It was due to this discovery that the current Rwanda government went ahead and promised to provide all children right from their primary level of education with a laptop from January 2010. The project requires a large number of laptops and therefore a need for a lot of preparations and thought before it was rolled out.

Although it may seem hard to believe on the implementation of this project, especially when looking at the huge investment that needs to be made on the project, the growing significance of this issue across many countries, a lot of basic questions and answers will continue to be sought concerning the application of such technology in primary education in Africa. The answers to the questions may not be easily available especially in the case of Rwanda since the project is the first of its kind to be launched within the East African region. Some of the obvious questions may include; what is the exact number of schools that are connected to the internet? How is quality the internet connection? What is the number of managers and teachers who have already received training towards using the ICT tools? What is the exact number of schools that are connected to reliable and adequate power? What is the number of computers that are

currently used for administration and learning purposes in the schools? The answers to these questions imply that innovation, productivity and public service modernization are becoming key interests. It is worth to understand issues of management which schools might be missing due to lack of ICT integration such as efficiencies in keeping of records, tabling, resource preparation, report writing, curriculum supervision and planning. It is because of this context that this research sought to investigate the degree to which ICT incorporation can help in giving instructions and passing knowledge in the primary schools as well as to establish the level of training and foundational skills among managers of various schools on the usage of ICT. Huye District was selected for this research because of its advantage in accessing infrastructure which appears to be differing from other Rwanda public schools. Electricity is available to all schools which a key impediment if unavailable if ICT use and integration are to be achieved.

Objectives of the Study

The investigation concentrated on the below stated objectives:

- i. To find out enhancement in teaching and learning through availability of ICT tools
- ii. To find out enhancement of teaching and learning by skilful teachers in ICT.
- iii. To find out enhancement of teaching and learning by head teachers' and teachers' attitude.
- iv. To find out enhancement of teaching and learning by pupil' attitudes towards approach to ICT.
- v. To find out enhancement of teaching and learning through perceptions of teachers and principals on the use of ICT in schools in Huye District

LITERATURE REVIEW

The ICT integration Concept

ICT has evolved over a period of time. As Pelgrum and Law (2003) observed in the early 1980's in which they write that the term computer by then was replaced by Information Communication Technology (ICT) that drifted away from Computer Technology to a more advance of computer capability. In 1992, upon introduction of ICT, emails were then available to the general public for communicating. ICT has been understood to refer to basic three components where by Information stood for communication while Communication refers to human interaction with the device and technology the science in it. Blurton (2000) has defined ICT similar to an established of modern apparatuses and assets rummage-sale to interconnect, produce, broadcast, collection and monitoring or managing the information. They comprise technological apparatuses, the connection of internet,

broadcasting of information (Wireless and Boob tube), and (Portable) telephone.

ICT incorporation

Earle (2002) points out ICT integration as logic of inclusiveness or fullness by which everything fundamentals components of a scheme are perfectly shared collectively to form complete purpose. ICT integration is seen when there is a unified way to help and spread out prospectus intentions and to involve learners in a significant education; it is merely of a process than a product. Active ICT incorporation in school needs emphasizing on instruction plan that possess the promising to involve learners.

Impact on Performance

ICT integration has a positive effect to students who have embraced ICT and use it as a learning tool. Below is how ICT improves the performance of the student.

Boost Performance

Students who embrace ICT perform better than those who lack skills in ICT. Computers have enabled students conduct research on areas they are studying and more so they have interacted via computer such as sharing notes, e-learning etc

Lerner's Interactive

Underwood(1998) allude that operative practice of ICT in education, the didactic practices that is rummage-sale by schools has transform their current teaching based learner, while according to World Bank 2004, ICT has to be interactive in nature in which experimentation and critical thinking should be emphasized.

ICT Motivates Students

ICT has been associated by motivating students. This has been made possible by way students are able to solve task through use of computer and hence make them want to learn more. ICT embedded in schools have motivated students in ensuring that they perform better and equally motivated.

Independence in Learning

ICT in schools have increased the independence of learners by ensuring that students in dependably research and learn on their own. They no

longer wait for the teacher to feed them with knowledge since they can easily find knowledge on the internet and try to apply them.

Easy Administration Task

Mugenda (2006) has alluded to the notion that ICT enhances efficient and effectiveness in education administration. This is seen by most tasks being undertaken through computer based program like payroll, payment, advertisement etc.

Activeness

ICT has provided room for active learning and assessment by the students. Students interact well with the system and hence typically become active.

Skilful Teachers and Students

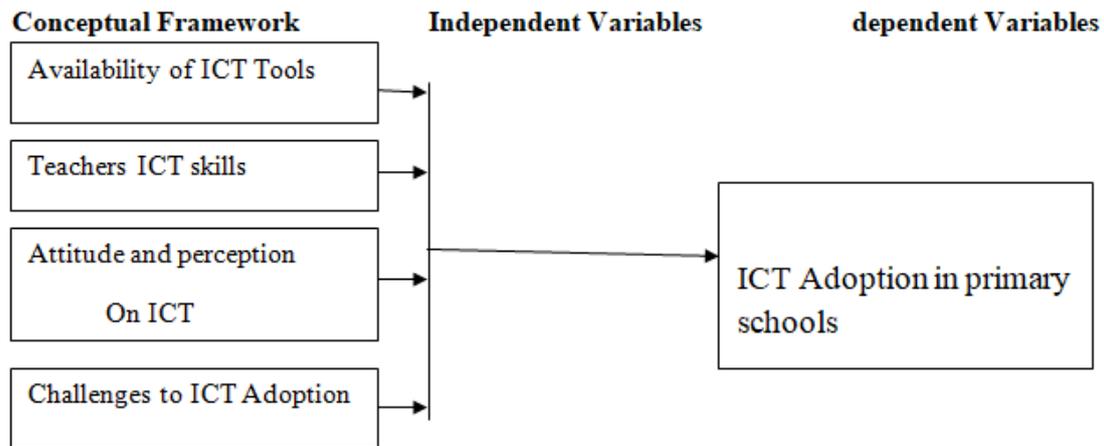
Teachers and students that have embraced ICT in their learning and teaching have shown high level of performance. Skilful teachers in ICT have demonstrated that they can pass the same skills to students and ensure them that they perform excellently. Students too those have ICT skills have proved that they can be competitive from the rest. ICT has therefore made the teachers and students excel in every task of their life.

Summary

ICT integration in school has been an expensive affair since the cost of infrastructure in very high. Schools need to upgrade their ICT infrastructure in order to produce students that are coping with the 21st Century. This is also coupled with teachers being trained on ICT so that they can easily teach. Most schools lack ICT infrastructure due to limited resources.

Theoretical Framework

Mishra (2002), Villalba and Romiszowsski (2001) carried out research on ICT in schools to establish how ICT has been used in school. Some of the areas were behaviourism, psychology, constructivism and lastly, cognitive. Another scholar by the name, Hung, 2001 came and pointed out that constructivist learning theory was the best of all. Constructivist theories including Case Based Learning (CBL) and Problem Based Learning (PBL) have come of ages since they have been widely been used and adopted.



Learning environment is the interaction of more than one person especially a teacher and a student and happens in a more defined physical setting. Solomon (1994) calls this interaction as a system of interconnected factors which mutually influence learning. The above framework shows that teachers interact with students via defined curriculum content. Therefore a teacher can use a computer as a tool of interaction with their students. ICT has been embedded to ensure administrative issues are factored and enable smooth teaching.

RESEARCH METHODOLOGY

The study opted for descriptive design whereby respondent were to share their experience with ICT and knowledge about them. According to Vyhmeister (2001) written responses are vital such that it is vital get hand first information. The target population of this study was 356 respondents. The population comprised of 24 teachers, 8 head teachers and 324 students in 12 schools in Huye district which have one-laptop per child program. This population was the target since they are the primary custodian for this research information such as ICT integration in schools. Using the Statistical Package for Social Sciences, the data from completed questionnaires were cleaned, coded, and entered into the computer for analysis. Approaches for qualitative and quantitative analyzes were adopted using Descriptive statistics to describe the ICT’s impact in schools with respect to the variables studied. Both quantitative and qualitative

research methods were used in analysing the data. The responses to each question were coded which were then categorized into recognizable themes according to the specific objectives and research questions. Descriptive statistics such as means percentages, and frequencies were used to analyse the demographic information. Coded data was analyzed using the Statistical Package of Social Science (SPSS). The following formula was used to analyse data concerning respondents’ ages, gender, professional experience and academic qualification.

RESULTS AND DISCUSSION OF RESEARCH FINDINGS

The Rate of Return of the Questionnaire

The rate of return of the questionnaire is the fraction of the overall sample size successfully that took part in the projected research processes. The research yielded 100 % return rate for all responded, i.e. all the eight principles, 320 students and the 24 teachers. The respondents’ demographic information is dealt herewith in this section, and this included the principals, teachers and students from the primary schools.

Head Teachers Demographic Information

The researcher requested the head teachers to write down their gender. The head teachers’ gender is as shown in table 4.1.

Table 4. 1: Gender dispersal of Head Teachers

| Gender | Frequency | Percentage |
|--------------|-----------|------------|
| Female | 3 | 37.5 |
| Male | 5 | 62.5 |
| Total | 8 | 100 |

The above data shows that more male head teachers participated as opposed to the female. Further

analysis indicated that male head teachers headed boys school while female girls school.

Head Teachers Age Bracket

Once again, head teachers were requested to indicate their age whose dispersal was presented in table 4.2;

Table 4. 2: Head Teacher Age Bracket

| Age Bracket | Frequency | Percentage (100%) |
|---------------|-----------|-------------------|
| 36 – 40 years | 4 | 50.00 |
| 41-45 years | 3 | 37.5 |
| 46 – 50 years | 1 | 12.5 |
| Total | 8 | 100 |

The data above indicates that most of head teachers were aged between 36 and 40 years, followed by head teachers in their 41-45 years with only one being in the 46-50 years age bracket. Consequently one can conclude that most of the schools were headed by head teachers in the in 36-45 years age bracket.

Education Background of the Head Teachers

Head Teachers education background was paramount and they were requested to indicate as shown in the Table 4.3.

Table 4. 3: Educational Background of the Head Teachers

| Professional Qualification | Frequency | Percentage |
|----------------------------|-----------|------------|
| B.ED | 7 | 87.5 |
| B.A/BSc with PGDE | 1 | 12.5 |
| Total | 8 | 100 |

The above information shows most of the head teachers held a bachelors’ degree in Education whereas only one head teacher had a higher qualification with a B.A. /Bsc and PGDE degree. Popular of the head teachers had Bachelor of Education degree. The results showed that the Schools in the district were headed by head teachers with relevant skills and could therefore adjust to the variations exhibited by ICT integration in schools.

Teachers Demographic Information

This section defines the gender, age, specialization, teachers’ knowledge using ICT for the period they had remained in the current school. The gender of the teachers was defined as shown in Table 4.4;

Table 4. 4: Teacher’s Gender

| Gender | Frequency | Percentages |
|--------------|-----------|-------------|
| Male | 16 | 66.6 |
| Female | 8 | 33.3 |
| Total | 24 | 100 |

The results in table 4.4 have indicated that most teachers from the schools who participated in the research were male with a small number of female

teachers. Henceforth, it can be construed that gender balance was considered in the study constitution

advocates for two-thirds disparity in every group of people.

Teachers’ age

As requested, the teachers indicated their ages and it was presented as shown in the figure 4.1.

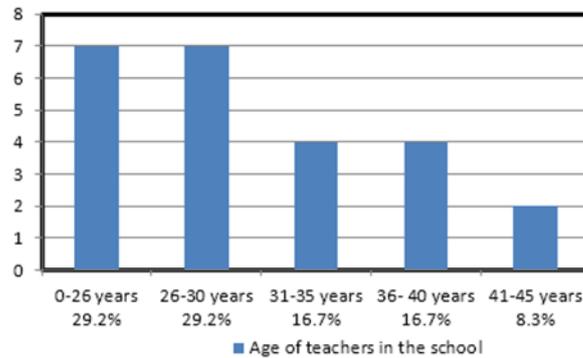


Figure 4. 1: Teachers Age

The findings in the above figure indicate that 29.2% of teachers were aged below 26 years and 26-30 years age bracket. A further 16.7% were aged between 31-35 years and 36- 40 years. 8.3% of teachers were in the 41-45 years age range. However, most teachers were aged 30 and below years. The study Outcomes also show that the teachers’ age was distributed. This can be attributed to the reality behind

ICT use and this is confirmed by Lakkala and Lehitinen (2001) who vividly alluded that the young generation are proactive when it comes to ICT as opposed to the old generation.

Education Qualification of Teachers

Table 4.5 presents the qualifications of those who responded.

Table 4. 5: Education Qualification of Teachers

| Professional Qualification | Frequency | Percentage |
|----------------------------|-----------|------------|
| MA | 1 | 4.2 |
| BA/BSc with PGDE | 1 | 4.2 |
| Bed | 3 | 12.5 |
| A level/Diploma | 15 | 62.5 |
| Any other | 3 | 12.5 |
| | 1 | 4.2 |
| Total | 24 | 100 |

The above data has shown that most teachers had Bachelor of Education holders. A small fraction had BA/BSc with PGDE. Some had A-level and Diploma qualifications. Others held a Master’s degree in Education, Master Degree in Art and other qualifications. Majority of the teachers held a Bachelors’ degree of education. This suggests that majority of the teachers had qualified and had teaching basic skills. Therefore, the study suggests that teachers

granted access to ICT practices and tools that support their values about “good learning” can adopt ICT use in teaching and learning easily (Marx, Bluemenfield, Krajcik & Soloway, 1998).

Student Demographic Information

The researcher requested the students to indicate their demographic information and this is shown in figure 4.2.

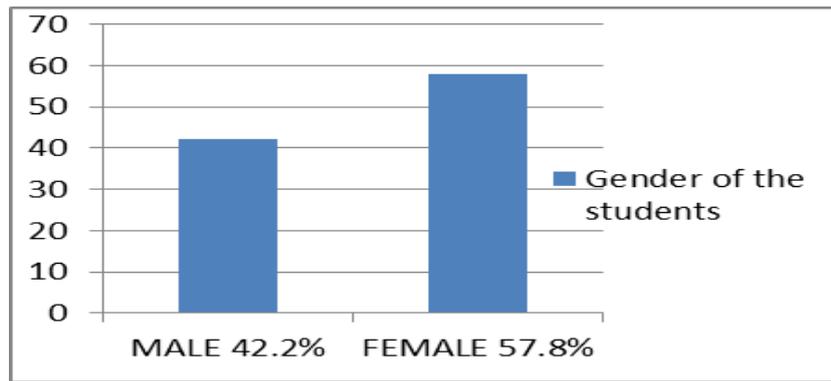


Figure 4. 2: Student Gender

From the above result, it is clear that females participated more than their male counter parts at 57.8% and 42.2% respectively.

Student Age

Students were also prompted to indicate their age and this is presented in Table. 4.6;

Table 4. 6: Student Table

| Age | Frequency | Percentage |
|--------------------|------------|---------------|
| 12- 15 years | 27 | 8.4 |
| 16 -19 years | 287 | 89.6 |
| 20 years and above | 06 | 1.6 |
| Total | 320 | 100.00 |

The study findings in the above table show that the highest number of students was at their prime age, 16 – 19 years and a small number very young at 12 - 15 years. Small percentage of girls were 20 years and above. The outcomes show that most students were young and therefore were open to ICT use in school to sharpen their skills and enhance their learning. This suggests that ICT assets in schools are significant and should be used for providing access and growing of skills (E-learning Nordic, 2006).

ICT within their secondary schools. From the responses, all the principles (100%) indicated that there were ICT departments in the schools. Conversely, the observations revealed that despite of having ICT departments in their schools, the departments did not have the relevant infrastructure.

Accessing the Internet

The school heads’ responses on whether students and teachers were in a position to access the internet is presented in table. 4.7;

Availability of ICT Tools

ICT Departments Establishment

The school heads were also required to specify whether they had established departments for

Table 4. 7: Internet Accessibility by Students and Teachers

| Category | Yes | | No | |
|--------------|------------|-------------|-----------|-------------|
| | N | % | N | % |
| Teachers | 18 | 6% | 6 | 24% |
| Students | 301 | 94% | 19 | 76% |
| Total | 319 | 100% | 25 | 100% |

From table 4.7 above, the highest number of principals indicated both students and teachers could access the internet with a few indicating that teachers were unable to access it. The observation schedules however revealed that teachers in these schools relied on external technical support although they were open to using ICT in both learning and teaching activities. It

was also established that it was necessary to establish internal technical support if full and active integration of ICT was to be achieved. It is also touted that this interest among students and teachers could lead to better outcomes including in delivering better education services to the students. 50% of the principals indicated that students were in a position to

access the internet with the other 50% indicating that students could not access the internet. These finding suggests that the experience of students needs to be improved to ensure that full ICT integration was to be adopted in learning and teaching.

Use of ICT in Teaching and Learning

The school heads were required to reveal whether teachers can use ICT in teaching at their schools. School heads (50 %) said teachers should use the technology in learning as well as teaching. (37.5 %) of school directors proposed that teachers could use PowerPoint presentations, while 12.5 % (1 principal) reported that no teacher should use ICT in learning and teaching activities in their schools. This

finding indicates most of the teachers (50%) can comfortable use ICT in their teaching activities. This implies that teachers are increasing advocating for ICT integration into education, which can encourage development of the country (Okebukola, 2000). From these findings, findings is clear that teachers in the secondary schools had taken steps to gain computer skills and literacy, ICT is less adopted in school for both learning and teaching activities.

Availability of ICT Personnel in the Schools

The study also required principals to answer if the different important ICT personnel in their ICT departments were available or not. The responses were summarized in table. 4.8;

Table 4. 8: ICT Personnel Availability in School

| ICT Personnel | Frequency | Percentage (%) |
|---------------------|-----------|----------------|
| ICT Coordinator | 6 | 75 |
| Computer Specialist | 3 | 37.5 |
| Total | 9 | 100 |

The study findings in table 4.12 shows that most principals in the schools had employed ICT coordinator with few were having experts in using computers. It is indicative that many schools do not have specialists in the ICT departments capable of providing technical support. This suggests that there is a need for policies that are comprehensive enough towards enhancing ICT integration in schools. This will help both teachers and students to respond effectively to the changing opportunities in the world.

It is therefore important to note that efficiently using ICT has the possibility of fostering new environment for learning with learning outcomes that are improved.

ICT Availability

The principals were also required to reveal their perception on they had the relevant ICT technologies. Their response were summarized and analyzed as shown in table 4.9.

Table 4. 9: ICT Availability in Schools

| Internet Facilities | Radio |
|----------------------------------|--------------------------------|
| Available and Adequate (25%) | Available and Adequate (37.5%) |
| Available and inadequate (62.5%) | Available and inadequate (25%) |
| Not available 12.5% | Not available 37.5% |

| Computer | Telephone |
|----------------------------------|----------------------------------|
| Adequate and Available (62.5%) | Adequate and Available |
| Available and inadequate (37.5%) | Adequate and Available |
| unavailable | unavailable |
| Tape Recorder | Overhead Projector |
| Adequate and Available | Adequate and Available (25%) |
| Adequate and Available (25%) | Adequate and Available (62.5%) |
| unavailable 12.5% | unavailable 75% |
| Film Projector | Cassette Recorder |
| Adequate and Available (12.5%) | Available and Adequate |
| Inadequate and Available (87.5%) | Inadequate and Available (37.5%) |
| | unavailable 62.5% |
| Printer | T.V. Set |
| Adequate and Available (37.5%) | Adequate and Available (25%) |
| Inadequate and Available (62.5%) | Inadequate and Available (62.5%) |
| unavailable 12.5% | unavailable |

Table 4.9 show that the highest number of schools owned facilities to provide internet network. However, although they these facilities were available they were not adequate. Consequently, some schools have both adequate and available internet facilities with others lacking the internet facilities. Also, among the schools selected, majority had available but insufficient film projectors. Only a few schools were identified to have available and sufficient film projectors. In the case of cassette recorders most schools indicated that they did not have them with few schools possessing the cassette recorders of which were still not adequate. In the case of printers most skills confirmed they were although they were inadequate. Those who had both available and

sufficient printers were a few. T.V in majority of schools was available bust still inadequate. Some few schools confirmed that they had T.Vs in adequate numbers with another few schools reporting they did not have T.Vs at all.

ICT Skills and ICT Implementation in Schools Respondents and ICT Usage, Knowledge and Skills

This section documents the respondents' knowledge, information and skills in ICT usage in both learning and teaching. Head Teachers rated their own experience as coordinators of ICT by quoting the number of years in their present day schools. These results were as follows:

Table 4. 10: Head Teachers experience in using ICT

| Experience in Years | Frequency | Percentage (%) |
|----------------------------|------------------|-----------------------|
| 6 – 10 | 2 | 25.0 |
| 11-20 | 5 | 62.5 |
| Over 20 | 1 | 12.5 |
| Total | 8 | 100.0 |

The data in table 4.10 above indicates that majority of head teachers had 11-20 years' experience while a small number had 6 to 10 years of experience with the rest having more than 20 years' experience. Additionally, the findings suggest that majority of school heads highest probability of using ICT in their

school can be from 11 years and above. The time that a head teacher had in their current school can be measured significant using their engagement in both planning and implementing ICT integration in their respective schools.

The respondents also were to rate their involvement as teachers their profession. The results

are presented in figure 4.3.

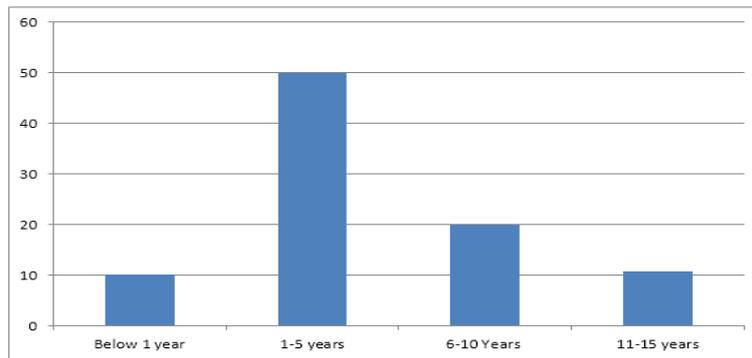


Figure 4. 3: Experience as Teachers

The above results postulate that most teachers posted a teaching involvement of ranging between 1 and 5 years. A small number of them carried exposure of between 6 and 10 years. A number of teachers possessed experience of not more than 1 year. This shows that teachers possess adequate skills to thus ICT integration in the respective schools is guaranteed.

ICT Knowledge Skills among Student

Students in the study were requested to specify their ICT usage knowledge and their responses are as shown in the figure 4.4.

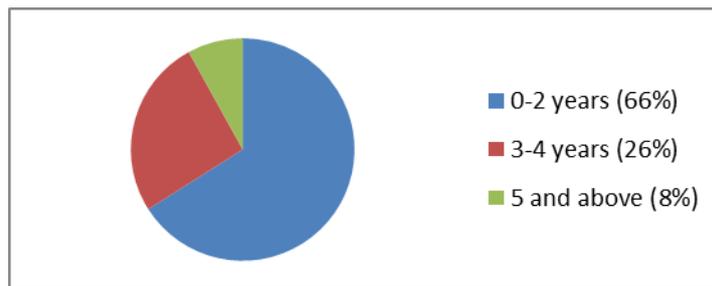


Figure 4. 4: ICT Knowledge Skills among Student

Figure 4.4 above shows most students computer usage experience was between 0 and 2 years at 66%, while at 26% had 3 – 4 years using computers and, very small number at 8% had 5 and above experience in using computers that represents 8%. Consequences of these findings indicate students had a lesser experience with using computers. This agrees

with Pedesen *et al.*, (2006) who suggested that a gap between in terms of culture between teachers and students exists in terms of using digitalized devices. The incapability of students in using computers poses a challenge to teachers as it is a basic need today that supports learning and teaching.

ICT Experience among Teachers

Table 4. 11: ICT Experience among Teachers

| Experience in years | Frequency | Percentage |
|---------------------|-----------|--------------|
| 1 – 2 years | 4 | 16.7 |
| 3 – 4 years | 13 | 54.2 |
| 5 – 6 years | 4 | 16.7 |
| 7 years and above. | 3 | 12.5 |
| Total | 24 | 100.0 |

From the above results, most of teachers had an understanding between 3 – 4 years, a few of them having an understanding between 1 and 2 years

with another 16.7% having a 5 – 6 years’ understanding. However, three respondents making a 12.5% had an understanding of more than 7 years.

This results show that more teachers possess experience of 3 to 4 years. As to whether teachers had

previously attend ICT course for training, the below table shows their responses.

Number of teachers attending ICT training or Course

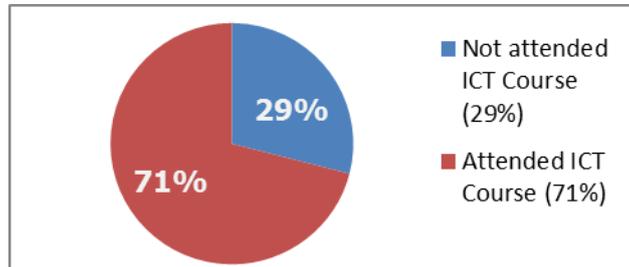


Figure 4. 5: Number of teachers attending ICT training or Course

The above results, shows that most of the respondents had in their life attended a training course in ICT. A few had not attended any ICT training or course. A bigger number of them had acquired ICT skills and therefore were compete in ICT. The teachers

were also queried to reveal the principal subject in the ICT training or course which they had participated in. The findings of the study question were presented as shown in the following table 4.12.

Table 4. 12: Teachers’ core ICT Training/ Course Theme Attended

| Core Theme of Training | Frequency | Percentage |
|--|-----------|--------------|
| Basic computer literacy, not essentially related to Learning and Teaching | 10 | 41.6 |
| Use of ICT hardware and software linked to learning and Teaching | 8 | 33.3 |
| ICT usage in improving pedagogy in teaching various Subjects and management of the classroom | 6 | 25.0 |
| Total | 24 | 100.0 |

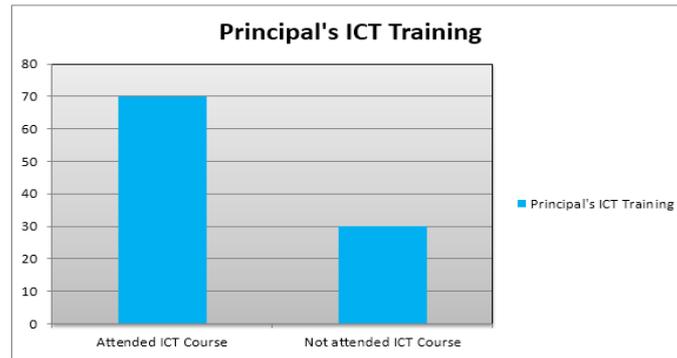
The result shown in table 4.12 postulate that most teachers had previously attended trainings aimed at equipping them with the basic skills in using computers unnecessarily without learning and teaching connection. A section of teachers also had undertaken an ICT software and hardware course that had a connection with learning and teaching. Another section undertook ICT training to improve their pedagogy in teaching various subjects and help in the management of their classrooms. The study results postulate that most of the respondents were computer literate and these findings are consistent with Nordic (2006) study on e-learning that postulates that to meet

the educational requirements of this 21st century, teachers are striving towards acquiring literacy in computer. Also, the results ICT adoption to improve learning and teaching among secondary schools has not been adequately embraced. If this trend continues, it may affect the teachers’ approaches in learning and teaching thus influencing the literacy of their students (Belta, 2003).

Principals’ ICT Training and Courses

The principals were requested to reveal if they ever attended any training or course in ICT. Their perceptions are presented in figure 4.6 below;

Figure 4. 6: ICT Training for Principals



The figure 4.6 indicates that most principals undertook a training or course in ICT. However, of the interviewed principals, two had not undertaken any ICT training or course. Consequently, a vast majority of the principals had made efforts to acquire skills in ICT and thus were literate. Among those who had

acquired ICT skills used them to frequently support learning and teaching activities. When the principals were requested to identify the key training or course theme they had completed, their responses were summarized as shown in table 4.13.

Table 4. 13: The ICT Course Core Theme or Training which school heads Attended

| Core theme of training | Frequency | Percentage |
|---|-----------|--------------|
| Baste computer literacy, unnecessarily related to Learning and teaching. | 6 | 75.0 |
| ICT software and hardware usage and related to Learning and teaching | 1 | 12.5 |
| Enhancing pedagogy in teaching through ICT usage Different subject areas and classroom management | 1 | 12.5 |
| Total | 8 | 100.0 |

The above results as presented in table 4.13 show that a higher number of school heads undertook a training or course with a key theme in basic literacy in computer unnecessarily related to learning and teaching. A few of them also had undertaken an ICT training or course about ICT use in supporting both learning and teaching. These study results have revealed that most of the school principals are computer literate. Nevertheless, their literacy in ICT was sought for other reasons apart from being applied in teaching hence do understand how ICT can be essentially being applied in learning and teaching.

Use of ICT in Teaching and Learning

The school heads were required to reveal if teachers in their schools can use ICT in teaching. School heads (50%) said teachers can use the technology in both learning and teaching activities. 37.5% of the school principals suggested that teachers could use PowerPoint presentations, with 12.5% (1 principal) stating that no teacher was able to use ICT

in learning and teaching activities in their school. This finding indicates most of the teachers (50%) can comfortable use ICT in their teaching activities. This implies that teachers are increasing advocating for ICT integration into education, which can encourage development of the country (Okebukola, 2000). From these findings, findings is clear that teachers in the secondary schools had taken steps to gain computer skills and literacy, ICT is less adopted in school for both learning and teaching activities.

**Attitude and Perception towards ICT
The Perception of Teachers on the Application of ICT in Learning and Teaching**

Respondents were encouraged to record their perception on a Likert scale with a range between strongly agree (5) strongly disagree (1) on the role of ICT in transforming in their learning and teaching situations. The feelings were recorded and presented in table. 4.14.

Table 4. 14: Teachers Perception on ICT Application in Learning and Teaching

| Variables | SA (%) | A (%) | U (%) | D (%) | SD (%) |
|---|--------|-------|-------|-------|--------|
| ICT improves learning and teaching processes. | 12.5 | 8 | 7.5 | 1.5 | 1.32 |
| Computers can enhance the students' critical and thinking skills | 75 | 12.5 | 12.5 | 4.625 | 0.696 |
| ICT enhances students' participation as well as feedback to teachers. | 12.5 | 12.5 | 12.5 | 50 | 12.5 |
| ICT Students enhance collaboration among | 12.5 | 12.5 | 12.5 | 50 | 12.5 |
| ICT can enhance teacher and student interaction | 62.5 | 37.5 | 0 | 0 | 0 |
| Internet can offer opportunities to teachers for obtaining learning resources to improve course content | 62.5 | 25 | 12.5 | 0 | 0 |
| ICT tends to boost students learning motivations | 75 | 12.5 | 12.5 | 0 | 0 |
| ICT can enhance students' and writing language skills | 50 | 25 | 12.5 | 12.5 | 0 |

Scale: SA = Strongly Agree; A = Agree; U = Undecided; D= Disagree; SD = Strongly Disagree

The results of this study established that (75%, mean = 4.625) respondents felt that using computers in both learning and teaching can help in enhancing their skills towards thinking critically among students. It is also revealed that (62.5%, mean = 4.5) of the study respondents felt that can in enhancing the interaction between students and teachers with internet having the ability to present teachers with opportunities for acquiring better resources for learning that can improve the content of the course for their students. This finding affirms that most of the study respondents held a positive feeling about ICT application in both learning and teaching. Conversely, (87.5%, mean = 1.5) disagreed strongly that ICT has the potential of enhancing both learning and teaching.

Students Perception towards ICT Application in Learning and Teaching

The respondents in the study were further requested to register their attitude towards the application of ICT in learning and teaching. The study results went ahead and revealed that most of them (77.8%) found it enjoyable doing their assignments by

use of computers. A second group of respondents (72.8%) agreed strongly that they enjoyed presented to them through power-point presentations than those presented through traditional presentation methods. Additionally, the students (72.3%) agreed strongly that application of ICT would encourage creativity among them. The study findings infer that the students believe there is a need to acquire more ICT skills since it is rapidly integrated in learning and teaching in today's world. Furthermore, the today's students find themselves in different environment compared to past generations due to the existence of ICT (Erstad, 2007). Due to lack of the essential skills in ICT a majority of the students (58.4%) find the use of ICT to be difficult. As a result, this makes students conscious about their work and thus may fear being mocked in case they make errors.

Teachers perceived skills in using ICT

Teachers were also required to indicate their level of expertise in ICT usage using the Likert scale which ranged from Very good (5) to poor (1).

Table 4. 15: Result of Teachers' perceived ICT skills.

| ICT Skills | V.G. | G | A | W | P | MEAN |
|--|------|----|------|-----|-----|-------|
| | % | % | % | % | % | |
| ICT skills in spreadsheet packages e.g. (MS Excel) | 62 | 25 | 12 | 0.5 | 0.5 | 4.475 |
| Search Engine (e.g. Google, Opera mini) | 72 | 12 | 15 | 0.5 | 0.5 | 4.55 |
| Word processors (e.g. Microsoft Word) | 78 | 12 | 10.5 | 3.5 | 0.5 | 4.77 |
| Communication (e.g. Email) | 67.5 | 16 | 12.5 | 1.5 | 2.5 | 4.445 |
| Presentation Packages e.g. Power Point | 78 | 12 | 7 | 1.5 | 1.5 | 4.655 |
| Database applications e.g. Microsoft Access | 50 | 25 | 12.5 | 7.5 | 5 | 4.075 |

As presented in table 4.15 above, a high number of the respondents rated themselves as very good in using word processors (78%, mean = 4.77) as

well as the use of power point presentations in class settings (78% mean = 4.655) since both these applications provide an educative potential (OECD,

2005). A big number of the respondents (50% mean 4.075) also rated their database skills as average. These results are consistent with both (Jegade *et al* 2007) and (Lau & Sim, 2008) studies who indicated that most teachers tend to be more proficient in using processors as compared to other applications.

ICT General Use

The Teachers were requested to provide their response to the degree to which they try to integrate ICT into their teaching activities. A Likert- type scale that ranged from “always” (4) to “never” (1) was used. The study results were tabulated in table 4.16 as follows;

Table 4. 16: Descriptive Statistics of Hardware used by Teachers

| Hardware | A (%) | O (%) | S (%) | N (%) | Mean | St. Dev. |
|--------------------|-------|-------|-------|-------|-------|----------|
| Computer | 20 | 3 | 1 | - | 3.79 | 0.498 |
| Internet | 15 | 5 | 3 | 1 | 3.417 | 0.861 |
| Printer | 18 | 4 | 2 | | 3.667 | 0.622 |
| Overhead Projector | 19 | 3 | 2 | | 3.708 | 0.613 |

Scale: A= Always O = Often S= Sometimes N= Never.

These study results established that computers were almost used always by the teachers (mean = 3.79) as presented in the table. Overhead projectors was the second best used hardware with a mean of (mean= 3.708). Internet was least used by teachers as recorded in the table (mean = 3.708). Overall, the mean was 3.646 with a standard deviation

of 0.649 which demonstrates that teachers moderately use hardware tools in their teaching.

Students involvement in using ICT

Teachers were requested to rate at which they involved their students in ICT usage. The findings of the question were recorded as shown in table 4.17.

Table 4. 17: Involvement of Students in using Computers

| Rating | Frequency | Percentage |
|-----------------------|-----------|------------|
| Everyday | 13 | 54.2 |
| Once a week | 8 | 33.3 |
| Once or twice a month | 2 | 8.3 |
| Never | 1 | 4.2 |
| Total | 24 | 100 |

The findings in table 4.17 suggest that many teachers have been involving students in carrying out tasks using laptops and computers almost every day. However, a few of them tend to involve their students as low as one within a week. These findings show that a small number of teachers were not involving their students in computer tasks. This finding relates to Chapman (2003) finding who established that majority of teachers advocated for ICT integration in teaching activities.

Challenges or Barriers to Effective ICT Implementation in Schools

This section of the analysis attempted to determine the challenges influencing ICT usage as an approach towards enhancing learning and teaching in schools. Both the principals and the teachers were asked relevant questions and then their responses were analyzed. The barriers were placed in three broad categories including teacher level barriers which are barriers that relate to approach to ICT and attitudes from teachers, the school-based barriers, which are barriers relating to institutional contexts and system-level barriers, which relate to the entire framework of education.

Table 4. 18: Challenges or Barriers to Effective ICT Implementation in Schools

| POTENTIAL CHALLENGE | Not a challenge | | A minor challenge | | A major challenge | |
|---|--|---|-------------------|------|-------------------|------|
| | N | % | N | % | N | % |
| | Lack of motivation and confidence in using ICT | 7 | 22 | 0 | 0 | 25 |
| Lack of ICT skills | 0 | 0 | 9 | 28 | 23 | 72 |
| Inappropriate teacher training | 0 | 0 | 3 | 8.3 | 29 | 91.7 |
| Limited access to computers | | | 6 | 19 | 26 | 81 |
| The Poor Quality and Absence of ICT Infrastructure | 2 | 6 | 6 | 19 | 24 | 75 |
| Absence of ICT Mainstreaming into Schools' Strategy | 0 | 0 | 8 | 25 | 24 | 75 |
| Lack of adequate technical support for ICT | 0 | 0 | 10 | 32.5 | 22 | 67.5 |
| Lack of internet connection in school | 2 | 6 | 6 | 19 | 24 | 75 |

Lack of Motivation and Confidence

In this part both teachers and the principals were required indicate their thought on whether lack of confidence and motivation was a minor, major or not a challenge. As show in table 4.18, the teachers (87.5%) showed that lack of confidence and motivation remained a major challenge with 50% (4) principals having a similar opinion. These finding are consistent with Becta (2000) conclusions on the barriers that are perceived on ICT uptake among teachers and therefore affirming the fear of teachers in admitting that they have limited knowledge about ICT to their students. Conversely, 25% 4.2% of the principals and teachers respectively opined that this did not stand out as a challenge.

Lack of ICT Skills

From the findings tabulated in table 4.18, a proportion of 72% stated that lack of the ICT skills was also a major challenge. These results are indicative that most of the study respondents recognized the lack of ICT skills as one of the challenges that deter ICT full integration learning and teaching. The E-learning Nordic research established that in sometimes the reasons behind the selection of given a technology is influenced entirely by the skills of teachers even beyond professional considerations. These findings of also confirm this is true.

Inappropriate Teacher Trainings

From table 4.18, it was found that 91.7% of the respondents felt that training that is inappropriate offered to them poses a major challenge that hinders ICT full implementation in learning and teaching settings. Programs that are not suitable for training teachers are characterized with failure in engaging them when using ICT both in prior lesson preparation and during the lessons. This finding hence agrees with Becta, (2004) study finding which established that despite that some teachers possess outstanding skills in ICT which they use for their personal benefit; they find it difficult to transfer them in classrooms through ICT applications.

Additionally, when looking at inability to access ICT equipment, 83%of the principals and teachers opined that this was a major challenge to ICT integration in both learning and teaching. As a result, students and teachers never get the opportunity of using ICT at all times according to their specific needs.

The Poor Quality and Absence of ICT Infrastructure

Three quarters of the respondents opined that the poor quality and absence of ICT infrastructure in the schools was a major interference to ICT implementation. This finding tallies with E-learning Nordic finding, which postulated that technology absence is a key hindrance.

Absence of ICT Mainstreaming into Schools' Strategy

Respondents tallying to 75% opined that absence of mainstreaming of ICT into strategies of the schools was a major deterrent in school, shown in table 4.18. Unsuccessful ICT implementation is problem that these schools face since ICT is not perceived as an important focus at the general school level strategy. Even in cases where some schools tend to have well developed strategies in ICT, they tend to be not incorporated into the overall strategy of the schools.

Lack of Technical Support

Table 4.18 indicated that, majority of the respondents (67.5%) held that absence of technical support posed as a key barrier in ICT full implementation into both learning and teaching. This can be studied in terms of, implementation supporting users and suitable pedagogy such that problems among users are possibly the obvious reasons. This means that classroom teachers' resistance to computers user across the entire curriculum can be associated to the deficiency of skills and knowledge in utilizing the ICT technologies (Becta, 2002).

Lack of Internet Connection in School

Respondent's equivalent to 75% exclaimed that, lack of access to internet connectivity in their schools was another key challenge as shown in table 4.18. In contrast, a quarter of the respondents felt that this was just a minor challenge. These results suggest that most of the teachers and principals in the study recognized lack of connection to the internet connection in their schools as the major challenge. These results would hence concur with the AAU (2000) survey which established that Connectivity to the Internet in African Institutions of Tertiary education was expensive and inadequate to install.

Summary of findings

The purpose of this study was to investigate the application of ICT in learning and teaching in primary schools with specific focus on Huye South District. The study was founded on six specific aims from which six questions were developed for the purpose of guiding this study. The first research question in the study focused on examining the degree to which primary schools have adopted the one-laptop-per-child program into use and enhancing learning and teaching. The second question focused on assessing the degree at which teachers have been empowered with the relevant ICT skills to use in improving learning and teaching. The third research question was focused on establishing the teachers and head teachers' approaches and attitudes towards computer use in learning and teaching. The fourth research question was focusing on determining the attitude of students towards using computers in learning and teaching. The fifth research question was focused on determining the challenges facing ICT usage in enhancing primary school learning and teaching. The sixth and last research question was focused on assessing the factors encouraging ICT use in enhancing learning and teaching process in the primary schools. To carry out the research, a self-report questionnaire was formulated. The participants in the study comprised 320 students, 24 teachers and 8 head teachers.

The background looked at common ideas and comments that relate to integration and competence ICT skills in learning and teaching across the world and Rwanda. A review of literature on what application of ICT in learning and teaching involves, a theoretical background and conceptual framework was developed. Descriptive survey design was used in the study. The study's target population comprised 24 teachers, 320 students and 8 principles selected from both public and private primary schools spread across Huye District. For assessment, an observation schedule was developed which was supported by a self-report questionnaire. Questionnaires were therefore used to collect data from students, teachers and school principals who were accompanied with the observation schedule.

The study results established that there were inadequate computers to help in full ICT integration in learning and teaching. Five schools (62.5%) reported this. The study therefore identified the problem of low usage of hardware tools. Concerning the application of hardware the study results established that both students and teachers almost used computers always (Mean 3.79). Internet was recognized as the least (Mean= 3.417) used resource.

It was established that most teachers were proficient in using word processers (78%, Mean 4.77) as well as PowerPoint presentations in class settings (78%, Mean 4.655). These two applications were seen as an achievement in ICT usage in learning and teaching because of their educative potential (OECD, 2005). The study also suggested that the process-base environment of learning and the massive ICT use are supportive towards developing the expertise of students in ICT and enhancing skills of critical thinking (Mean 4.625). They also enhance student and teacher intervention (Mean= 4.625) and boost the motivation of students towards learning. Moreover, it was established that ICT has the capability to provide teachers with opportunities for acquiring other resources for education from the internet and enrich the content of the courses (Mean 4.5). The study results also established that majority of the teachers (54.2%) found it helpful to involve their students in using the computers every day. This finding was consisted with Chapman (2003) who suggested that majority of teachers embrace ICT integration in their teaching processes.

The study findings also established that a huge number of students (66%) were experienced in using computers at school. A positive relationship between competences and ICT was revealed which concurred with Petrogiannis (2010) suggestion who stated that teachers who are experienced in using computers were willing to make use of ICT in classes compared to those who were not experienced. It was further revealed that inconsistency between the beliefs among teachers and their actual technology use in their classrooms. The study also identified several barriers that hinder the success of ICT interaction and achievement of higher impacts.

The barriers according to the study include lack of the ICT skills as indicated by majority of principals (75%) and teachers (66.7%). The teachers and principals also indicated that unavailability and insufficiency of computers was key challenge that hindered successful ICT integration in learning and teaching. Technology availability alone cannot be the only determinant for successful ICT integration because its maintenance is equally important. Schools that do not have sufficient resources are unable to acquire the additional opportunities for education that are offered by ICT. The study analysis has indicated that the majority respondents 87.5% felt that lack of

confidence and motivation was a key issue that hampers schools in implementing integration of ICT successfully across the schools. Moreover, it was also established that majority of the participants 97% felt that inappropriate training of teachers was another key barrier to ICT integration in learning and teaching. The analysis in the study also indicates that lack of technical support in the schools hindered the enhancement of successful ICT integration in schools.

CONCLUSION

The connection of education to computers across the globe has become popular among people since it is perceived that ICT significantly impacts on learning and teaching. As a result, institutions of learning are facing a significant shift that is driven by using ICT such that some people have begun to view ICT as a completely indispensable resource and tool to facilitate learning and teaching in the current world. The findings of this study have therefore established that students should be constantly being exposed to ICT capabilities hence influencing their perceptions on changing. The perception towards the uses ICT among teachers should positively change towards its integration in learning and teaching. From the study findings, it is now evident that a section of schools are putting a lot of efforts towards integrating ICT into their learning and teaching activities. Due to this, teachers have a responsibility of utilizing ICT that ever before. The study findings have also established that it is high time teachers should recognize the need to shift from the traditional teaching methods and adopt new ones through implementation of ICT. This will help teachers to cater for learners' needs in the 21st century.

Recommendations

From the study findings and results, the following are the recommendations;

- i. Teachers should be provided with sufficient on using ICT learning and in teaching processes so that they can acquire the necessary skills and knowledge towards integrating technology in class settings.
- ii. Teachers need sufficient, technical support technological resources and support from the administrations an approach towards encouraging them to use ICT in successfully learning and teaching.
- iii. Involved of students in using ICT in their learning activities including doing internet searches for resources for learning and assignments since ICT is believed to have the ability of enhancing student and teacher interaction as well as increasing the learning motivations of students.
- iv. Lastly, there is a need to equip students with relevant ICT skills like Microsoft software applications including access, word, and excel.

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