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ANALYSIS OF DATA WITH STATISTICAL EVIDENCE OF EDUCATIONAL TECHNOLOGY STANDARDS IMPLEMENTATION IN BASIC SCHOOLS IN GHANA

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ABSTRACT: *At a time of educational expansion, improving the quality of education and training is a critical issue and ICT is known in enhancing the quality of education in several ways by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, as well as a transformational tool which, when used appropriately, can promote the shift to a learner-centered environment. The research aimed in bringing out how technology is to be incorporated into education as a means of Transforming Learning Environments for a better achievement of educational standards Analysis of data gathered gave a statistical evidence of Educational Technology implementation in basic schools in Ghana by teachers and the aspiration to promote an environment of professional learning using ICT by Administrators.*

KEYWORDS: Data, Statistical Evidence, Educational Technology, Standards, Basic Schools

INTRODUCTION

Educational technology standards are the roadmaps to effective teaching, developing competent and professionally skillful human resource base in this digital age. Technology literacy is a crucial component of modern society. In fact, the globalization of the economy and technological advances continue to place a premium on a highly skilled labor force [7].The educational sector has not been proactive enough to plan for this new drive of the world's socio-economic environment. As a country how to integrate technology across core curricula, and provide realistic examples adaptable to all indicators and determine what students should know and be able to do in the world of technology should be our ultimate goal. With the International Society for Technology in Education (ISTE), the National Educational Technology Standards (NETS) require that administrators and teachers must be equipped with needed skills and knowledge to integrate technology into the classroom. However, there is no enough evidence of educational technology standards implementation as well as administrators aspiration to ensure proper evaluation and monitoring of ICT integration in teaching and learning in the basic schools in Ghana.

As technology dramatically keeps on changing virtually all facets of our social and economic life, educationists and other academicians need to bring these knowledge and skills acquired to bear in this digital-age to help transform the economy. Competence with technology is the foundation in the sense, because societies are changing, expectations are changing, and teaching and learning must change with technology.

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Background to the Study

What effect will educational standards have on student achievement? Will regulations determine what technology will be available to deliver education? Do teachers feel adequately prepared to integrate the technology in the classroom or teach with technology? Continual proactive involvement in the development of the staff in the area of technology is critical [1]

In the case of Ghana, the little background study has shown that most teachers in the basic level have never used any technology tool/device in teaching and learning. Most schools do not have even a single computer yet they teach ICT. This shows that teachers who are at the center of implementation lack the skills to use the technology in the teaching process. In a technology staff development model, critical consideration should be given to follow-up sessions. The best follow up is to visit the teacher's classroom [3]

Research Objectives

The objective of this project is to contribute to the ongoing research on how technology is to be incorporated into education as means of Transforming Learning Environments with Technology for a better achievement of educational standards. Specifically attention was focused on conducting a research on the evidence of implementation of educational technology standards in basic schools in Ghana and report the findings and to provide evidence of teachers', students', and administrators' level of computer competence or literacy in basic schools in Ghana

METHODOLOGY

This study was designed to examine administrators, teachers and students responses about the implementation of educational technology and the roles play by the major indicators to ensure its proper implementation therefore three different kinds of questionnaires for the quantitative and qualitative data collection presentation from the administrators, teachers and students on evaluation and monitoring of educational technology standards in basic schools in Ghana were administered.

REVIEW OF LITERATURE

Ghana and ICT: Strides, Challenges and the way forward (Opoku, Thursday 18 March, 2004)

A Wide Area Network called the Research and Educational Network (REN) was also established in 2000 with the help of the World Bank INFODEV project where Ghanaian Universities and local research institutions such as CSIR and Ghana Atomic Energy Commission were linked to serve as nodes for the broad network. This network among other things, was to create an enabling environment for the use of ICT, foster information exchange among local scientists and to facilitate the interactions and collaboration between researchers in institutions and the world.

Ghana also signed an agreement with Microsoft Corporation under which the largest and richest ICT Company in the world would provide resources to improve ICT education in

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Ghana. To recap, it is important to note that Ghana in 1995 became the first country in the Sub –Saharan Africa to have full internet connectivity.

Use of ICT for Education, Research and Development in Ghana: Challenges, Opportunities and Potentials (Joseph Intsiful, Dr. Philip Fosu Okyere, Dr. Shiloh Osae)

The major challenge facing the development of the full potential of ICT for education, research and development in the county is brain drain which has resulted in the lack of the critical mass of ICT-engineers and scientists relevant for undertaking ICT-related project professionally. Another major obstacle is the lack of an enabling environment and a sound ICT-roadmap and strategies by policy makers resulting in uncoordinated and unsustainable ICT-development activities. Other problems include:

- High running and subscription costs
- Lack of good publicity and incentives to attract potential users
- Identification of information sources that meet the needs of users
- Poor Quality of Service of the internet and telecommunication services
- Regulatory issues (exclusivity policies and ban on use of VOIP)
- Effective management of network traffic and infrastructure

To develop the full potential of ICT in Ghana there is the need for an ICT Taskforce with representatives from all stakeholders:

- To assist policy makers in the formulation of sustainable ICT programs- roadmap
- To manage and co-ordinate activities of the research and educational network
- To develop innovative ideas for the efficient utilization of the ICT infrastructure
- (e.g. distance education and virtual laboratories for teaching and research)
- To provide training in the use of new ICT tools and
- To promote the use of cost-effective ICT-Technologies such as Open-Source (e.g., www4mail and eJDS) and Wireless Technologies.

The need for Pursuing an ICT-Led Development Agenda

The Ghana's National ICT Development Policy (ICTAD), developed under the able chairmanship of Prof. Clement Dzidonu has been passed by Parliament to be implemented. The ICT policy referred to as ICTAD has four year rolling plans and an operational life span of between 15 to 20 years. The 14 priority areas of the Policy referred to as the "14 ICTAD" would concentrate on promoting rapid ICT physical infrastructure development, modernize agriculture and facilitate development of the private sector.

During the launch Prof. Dzidonu stated; Information and communications technologies can be a key factor for achieving progress in economic and social development in Ghana.

Fundamental Reasons for Technology Integrating in Education

Technology integration education can be advantageous for teachers, students, administrators, and parents. Technology enables dynamic media like audio, video, and interactive software to

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be more readily exploited, allows students to collaborate in ways that were previously impossible, and provides tools to increase teacher productivity.

Expansion of time and place

In a typical high school a student has access to a teacher 40 minutes per day. That means she has access to that teacher 5% of her waking day, and even that time is shared with other classmates. She has access to the Internet 100% of the time. Information technology allows learning anywhere, anytime; not just in one particular classroom for forty minutes a day. Technology is no substitute for an inspiring teacher.

Depth of Understanding

Interactive simulations and illustrations can produce a much greater depth of understanding of a concept. When virtual manipulates are used in a classroom setting they can go far beyond chalk and talk. Using a projector, the teacher can conduct onscreen investigations and demonstrate concepts far more easily than with just words and arm-waving.

Learning vs. Teaching

Technology allows the tables to be turned. Instead of teaching (push), students can be given projects that require them to learn (pull) the necessary material themselves. Key to this is the ability to get the information they need any time anywhere, without being in the physical presence of a teacher.

New media for self-expression

In the olden days, students could write in a notebook, and what they wrote was seen only by the teacher. Using modern technology they can: Make a PowerPoint presentation, record/edit spoken word, do digital photography, make a video, run a class newspaper, run a web based school radio or TV station, do Claymation, compose digital music on a synthesizer, make a website, create a blog.

Collaboration

A vital skill in the new digital world is the ability to work collaboratively on projects with others who may not be physically close. This can best be done using modern computer tools such as the web, email, instant messaging and cell phone. Rather than laboring alone on homework, students can work in small groups wherever they happen to be and at any time. They are doing this already (it used to be called cheating) - it can now be formalized and taught as a vital skill. Many university projects are undertaken by teams spread around the world. Our students need to be prepared for this.

Going Global

The worldview of the student can be expanded because of the zero cost of communicating with other people around the globe. The Internet permits free video conferencing which permits interaction in real time with sister schools in other countries. From an educational viewpoint, what could be more important than understanding other cultures through direct dialog and collaboration?

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Individual pacing and sequence

Students are, of course, all different. Information technologies can permit them to break step with the class and go at a pace and order that suits that student better. Without disrupting the class, they can repeat difficult lessons and explore what they find interesting. With time, it will become more like having a private tutor rather than being lost in a large class.

Personal Productivity

Students need productivity tools for the same reasons you do. They need to write, read, communicate, organize and schedule. A student's life is not much different from any knowledge worker, and they need similar tools. Even if they are never used in the classroom, portable personal computers will make a student's (and teacher's) life more effective.

Evaluating the Impact of Technology

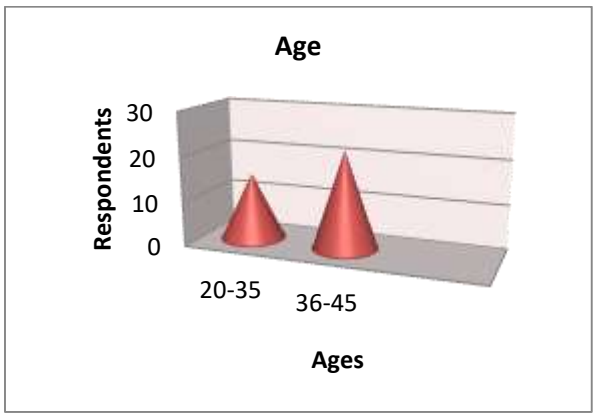
Assessment of this technology use, for me at least, needs to be done not to satisfy a state department, legislature, or academic body, but to inform the students themselves, their parents, and the community in which they live. It means using technology to build personal portfolios of thoughtful, creative work which students and teachers can share with parents; to present worthwhile and authoritative reports to classmates; and to make meaningful contributions to efforts aimed at solving school or community problems. It means being able to determine if the use of technology is making our children better citizens, better consumers, better communicators, better thinkers - better people. [2]

FINDINGS AND DISCUSSIONS

This research was conducted on Teachers, Students, and administrators as the major indicators in education. Below are the presentation and discussion of collected data.

Findings and Discussions on Teacher's data

Figure1.3



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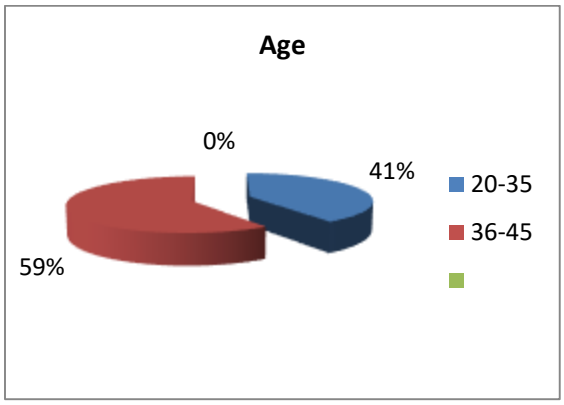
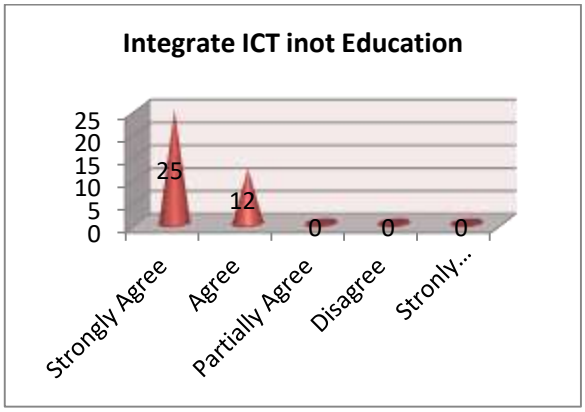


Figure 1.3 shows the ages of the respondents which fall between 20-35 years representing 41% and 36-45 representing 59% of the total respondents.

Figure 3.2



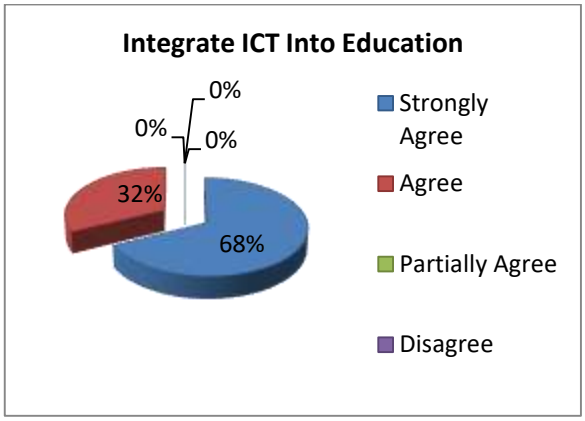


Figure 3.2 reveals that 25 people representing 68% strongly agreed that it is appropriate to integrate ICT into teaching and learning, 12 people representing 32% agreed to that but none disagreed.

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Figure 3.3

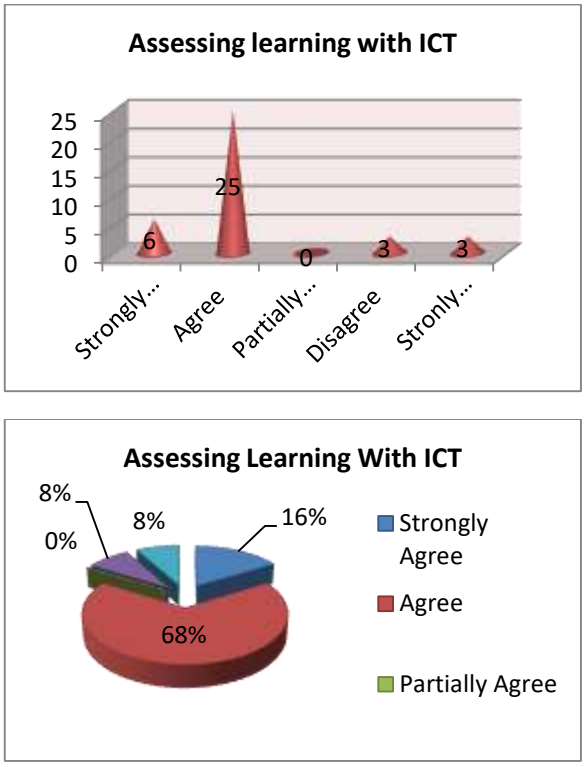

Figure 3.3 reveals that 6 people representing 68% agreed that it is appropriate assessing learning with ICT, 6 people representing 16% strongly agreed, 3 people disagreed, and 3 people also strongly disagreed representing 8% respectively.

Figure 3.4

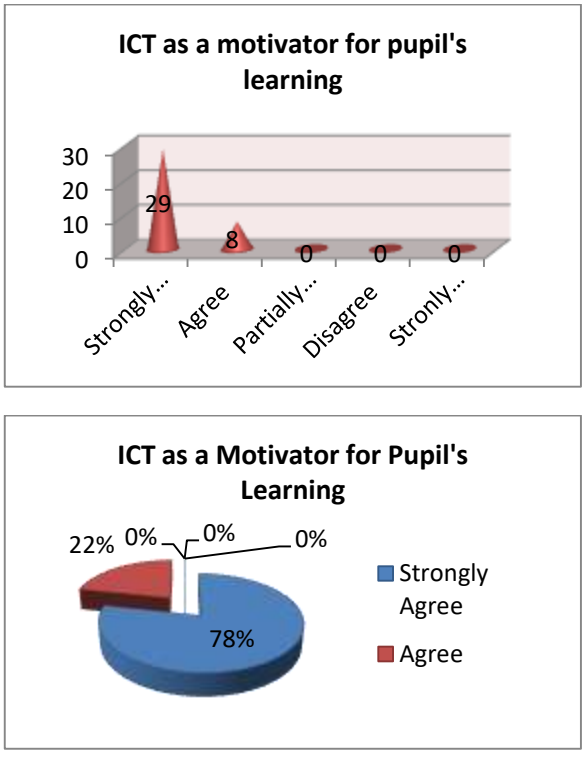

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Figure 3.4 reveals that 29 people representing 78% strongly agreed that ICT can motivate pupils to learn, and 8 teachers representing 22% also agreed, and none disagreed.

Figure 3.5

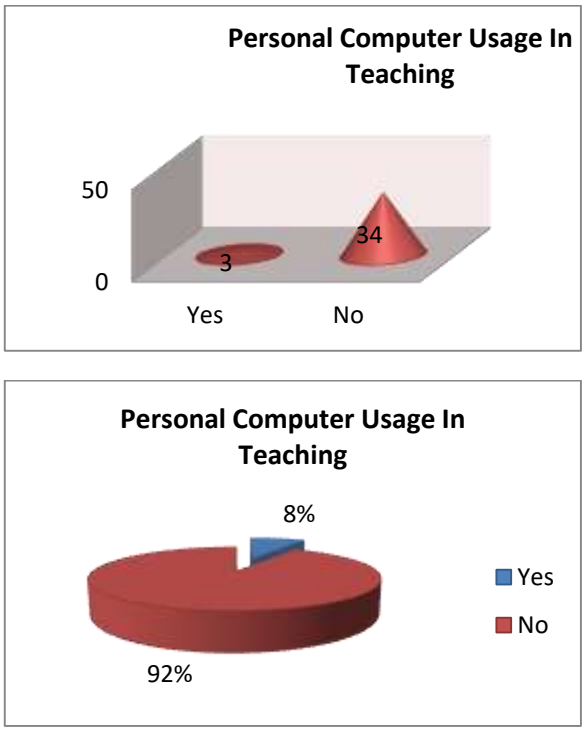

Figure 3.5 reveals that 3 people representing 8% use personal computers and 34 people representing 92% do not own personal computers.

Figure 3.6

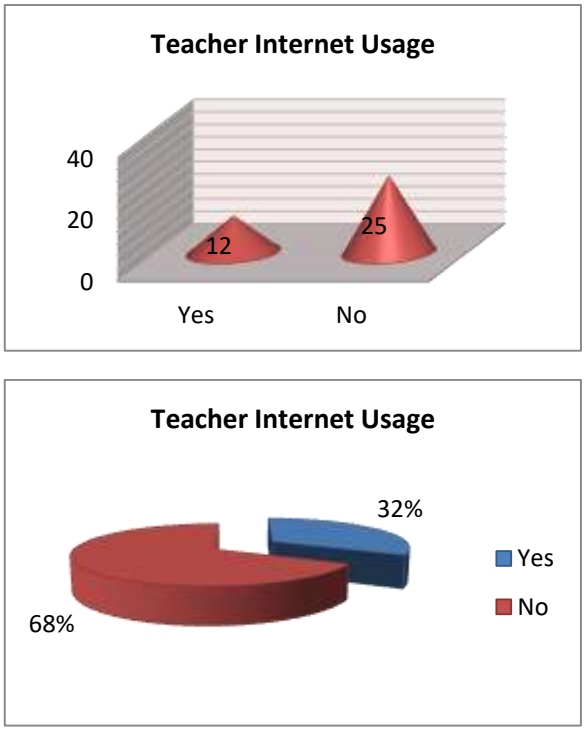

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Figure 3.6 reveals that 12 respondents representing 32% said YES to the use of the internet and 25 people representing 68% do not surf the internet for anything.

Figure 3.7

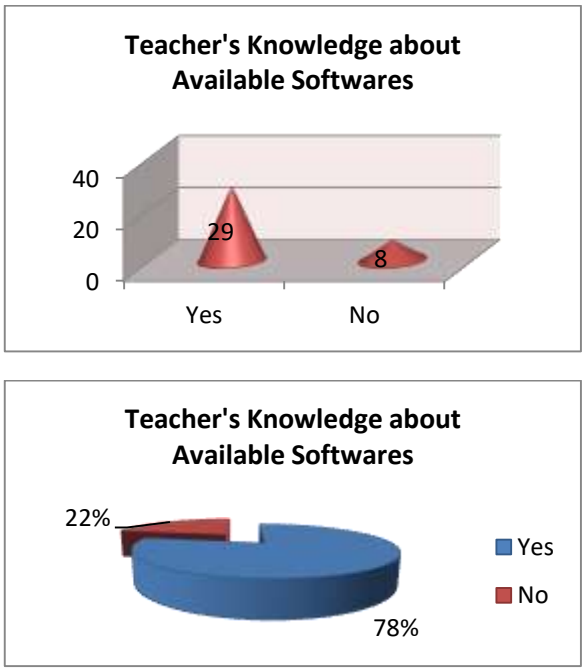

Figure 3.7 reveals that 29 teachers representing 78% said yes on the knowledge to any computer software and 8 people representing 22% have no knowledge about any computer software.

Figure 3.8

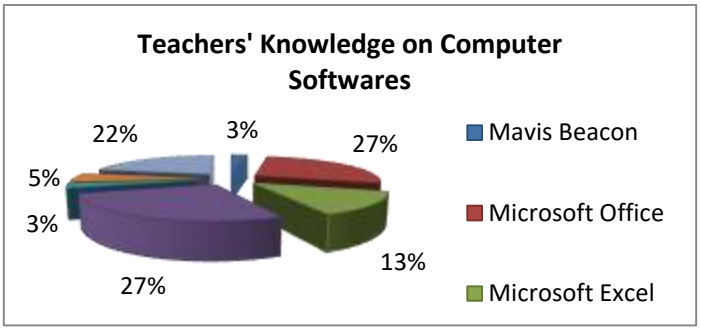

Figure 3.8 reveals that 1 teacher, representing 3% mention Mavis Beacon, 10 teachers representing 27% mention Microsoft Office as a computer software, 5 representing 13% mention Microsoft Excel, 10 representing 27% mention Microsoft Encarta, 1 mention Wikipedia, 2 people mention Microsoft Power point 8 people representing 22% had no idea about any computer software.

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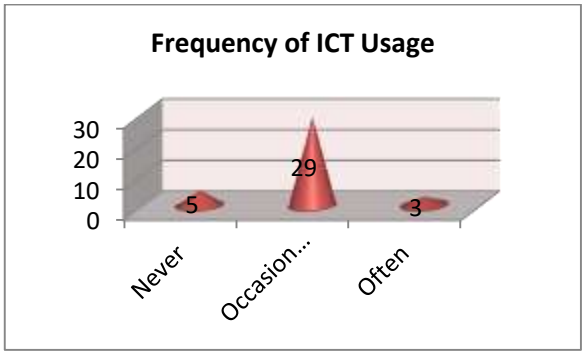
Figure 3.9



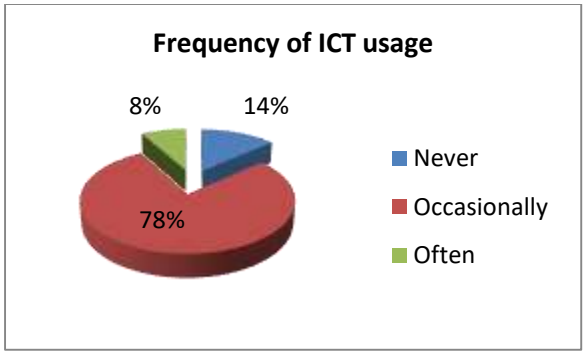
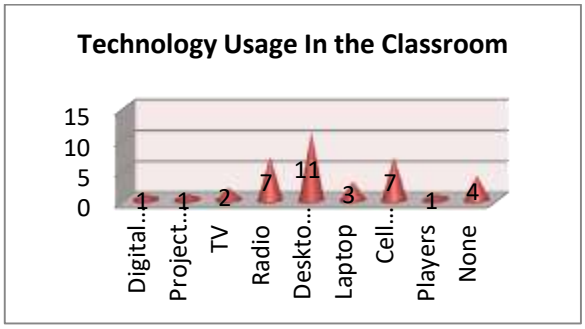


Figure 3.9 reveals that 5 people representing 14% said they have never used any ICT tool in the classroom, 29 people representing 78% said they use it occasionally and only 3 people said they often use technology in the classroom.

Figure 3.10



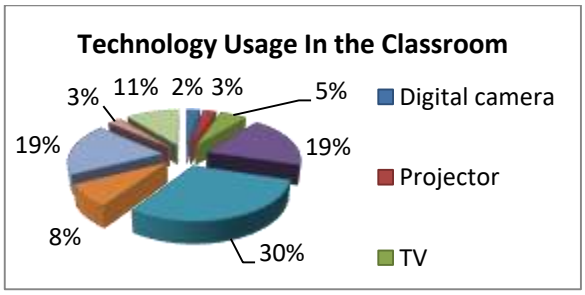


Figure 3.10 shows the all the kinds of technologies use by the respondents and their respective percentages.

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Figure 3.11

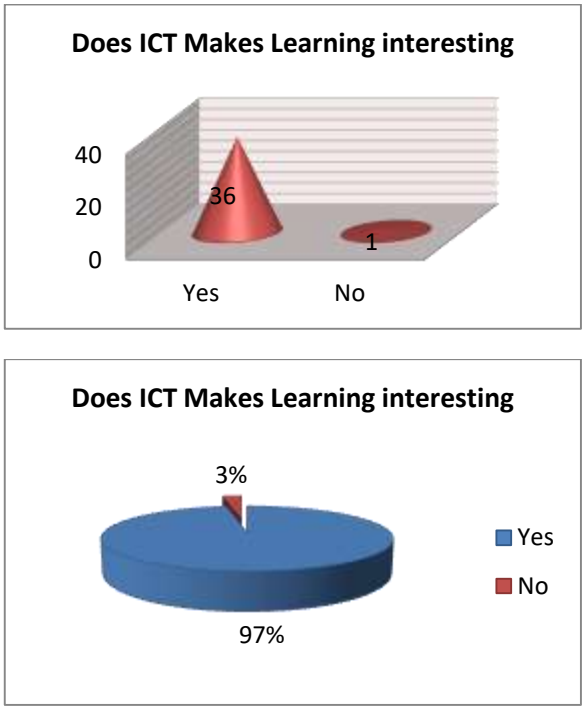

Figure 3.11 shows that 36 people representing 97% said the use ICT tool in the classroom makes lessons very interesting, and 2 people representing 3% said NO to that.

Figure 3.12

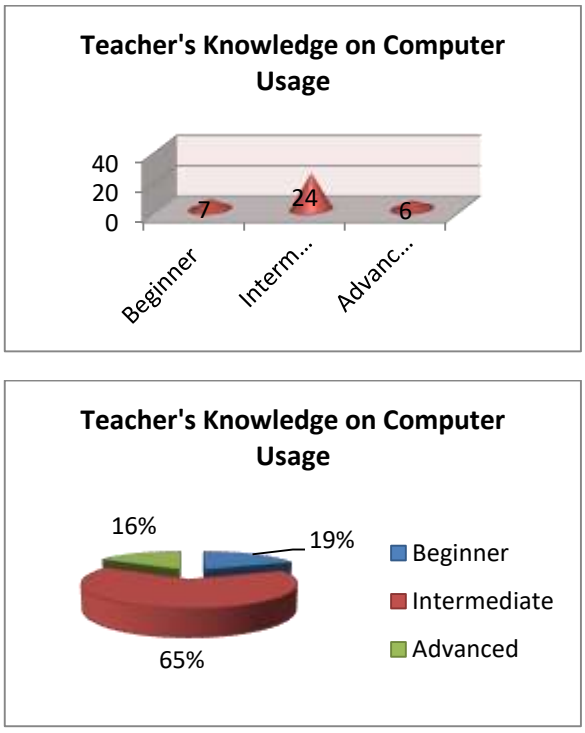

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Figure 3.12 shows that 24 teachers representing 65% said their knowledge of the use of the computer system is still at intermediate level, 7 teachers representing 19% said they are still at beginner's level while 6 teachers said they are at the advanced level.

Figure 3.13

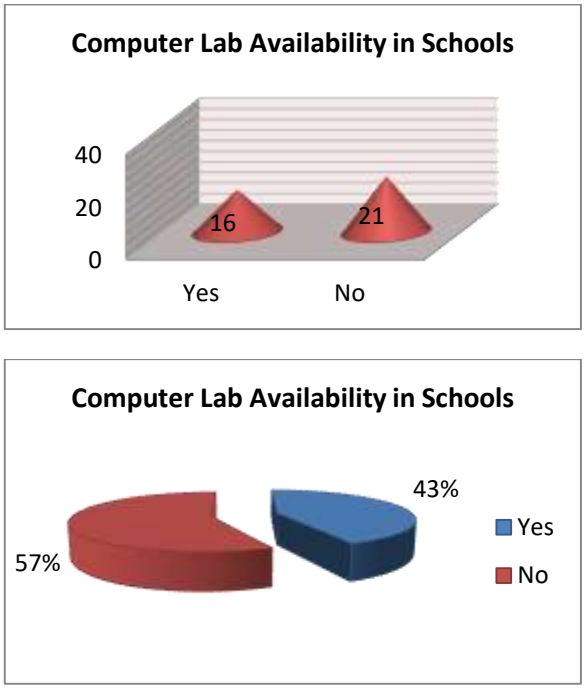

Figure 3.13 shows that 16 teachers representing 43% said their schools have computer labs, 21 teachers representing 57% said NO.

Figure 3.14

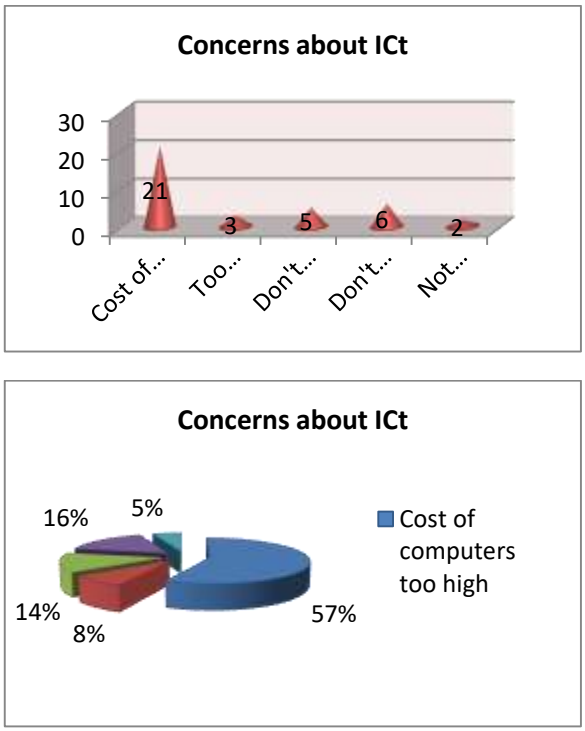

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Figure 3.14 shows that 21 teachers representing 57% said computers very expensive and that seems to be the major hindrance to the use computers; 6 teachers representing 16% said they don't have access to computer training, 5 of them representing 14% said they don't know how to use the computer.

Figure 3.15

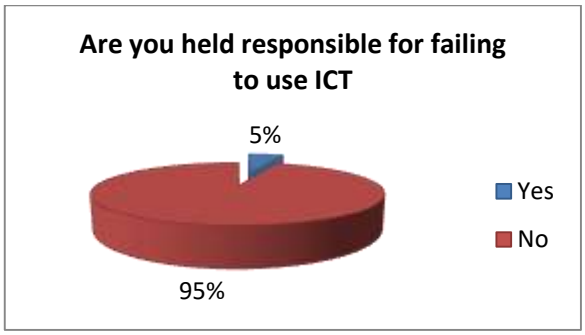
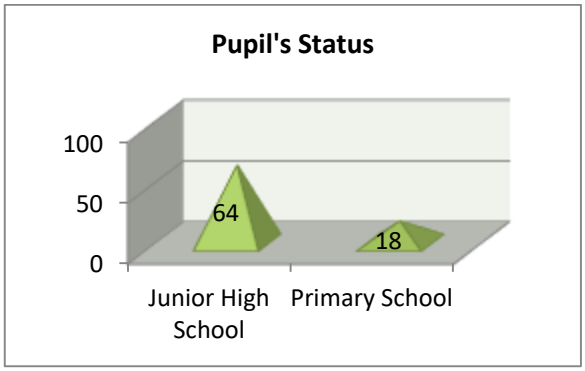


Figure 3.15 shows that 35 out of 37 teachers representing 95% said they are not held responsible for failing to integrate ICT into their teaching. Only 2 teachers representing 5% said they are held responsible for not applying ICT in their teaching.

In summary, in **Figure 3.11**, the teachers shared the view that computers make teaching and learning very interesting but their concerns were seen in **Figure 3.13** where most of them said their schools lack computer laboratories. **Figure 3.12** also shows most of the teachers still having low knowledge about the use of computers; hence, in-service training is required to equip them with necessary skills needed to enhance their use of the computer in their teaching and learning. The theory of Gregoire, Bracewell and Lafarriere in John and Sutherland [4] states that the "benefit to students of using new technologies is greatly dependent, at least for students the moment, on the technological skill of the teacher and the teacher's attitude to the presence of the technology in teaching," this is to say that if the teachers are not technologically inclined, then the benefits of ICT to students are definitely going to be minimal.

Findings and Discussions on Students' Data

Figure 4.1



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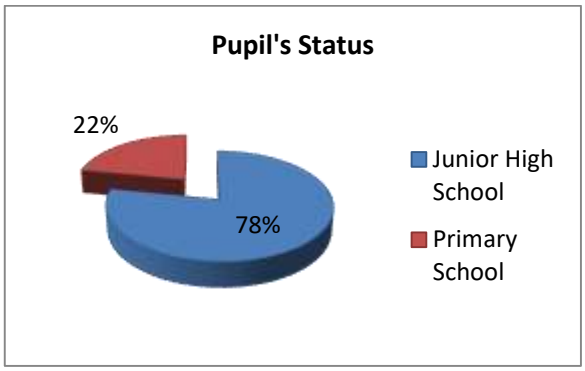
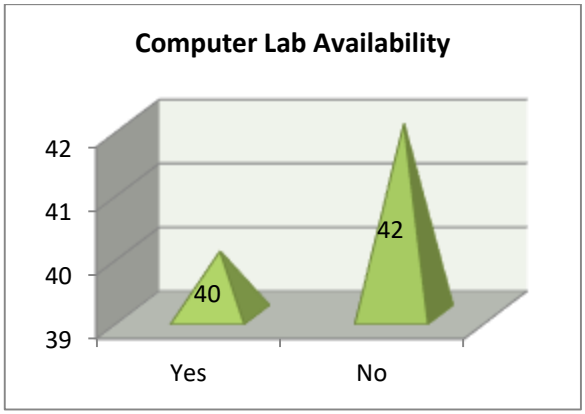
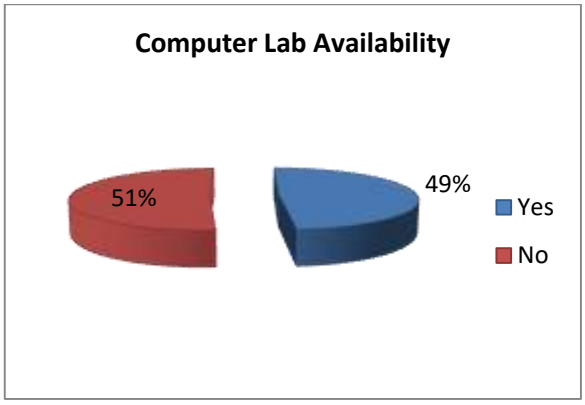


This research was conducted in the basic school which involved Junior High and Primary school pupils. In this research, 64 JHS pupils representing 78% out of the total respondent while 18 Primary school pupils representing 18% took part.

Figure 4.2





Considering **Figure 4.2**, 42 pupils representing 51% of the respondents said their schools do not have any computer labs whiles 40 representing 49% said their schools have computer labs.

Figure 4.3

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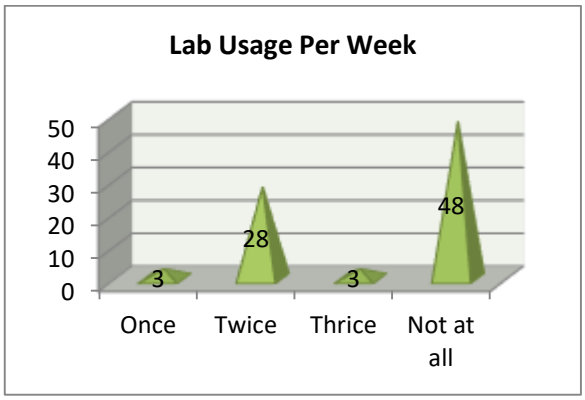
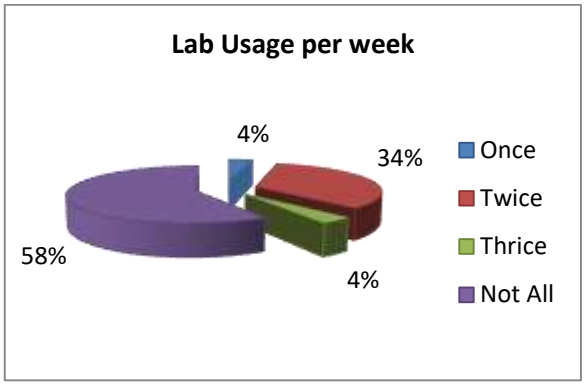
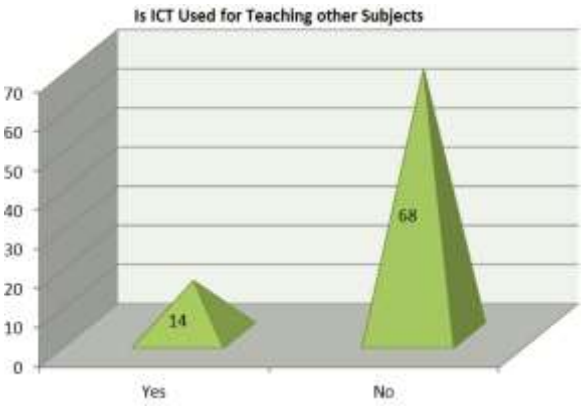




In **Figure 4.3** above, 48 representing 58% of the pupils said they don't take any lesson in a computer lab, 28 pupils representing 34% said they take lessons in the lab twice a week while 4% said take lessons once or thrice respectively a week.

Figure 4.4



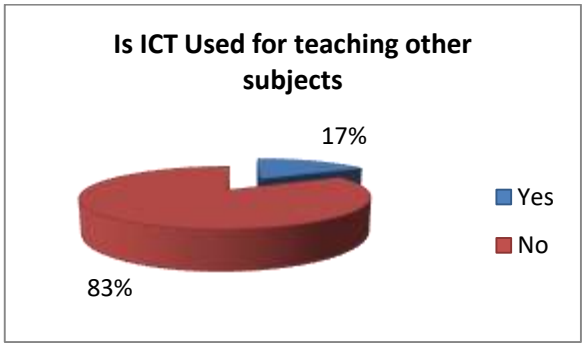


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Figure 4.4 show 68 representing 83% of the pupils saying that apart from ICT subjects they don't learn others subjects using ICT tools such as the computer and only 14 representing 17% said they learn other subjects using ICT tools.

Figure 4.5

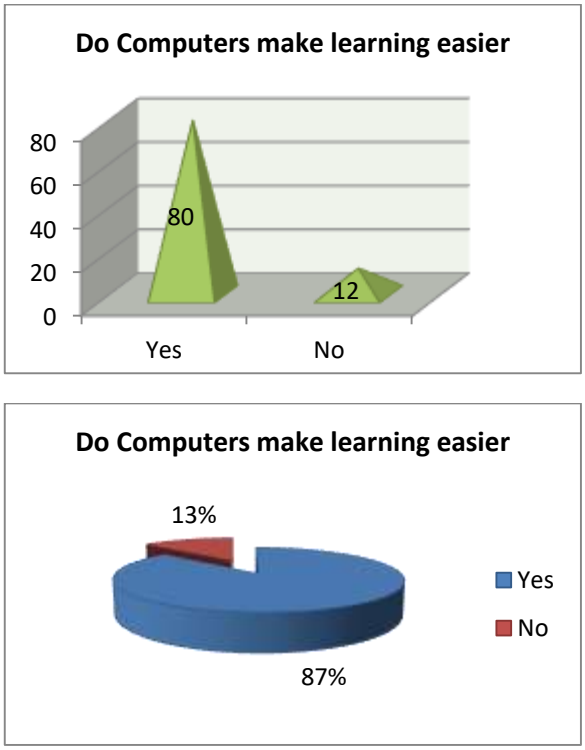
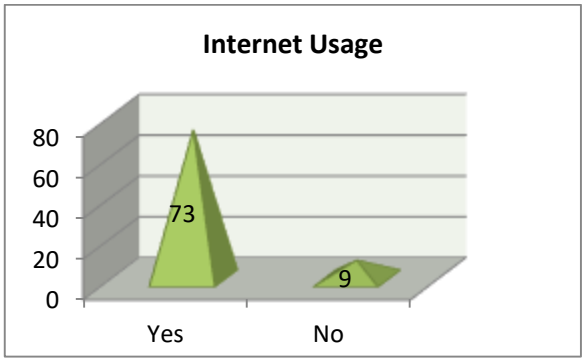


Figure 4.5 showing 80 representing 87% of the pupils think using computers as a tool make lesson very easier and interesting while only 12 of them representing 13% said they don't think so.

Figure 4.6



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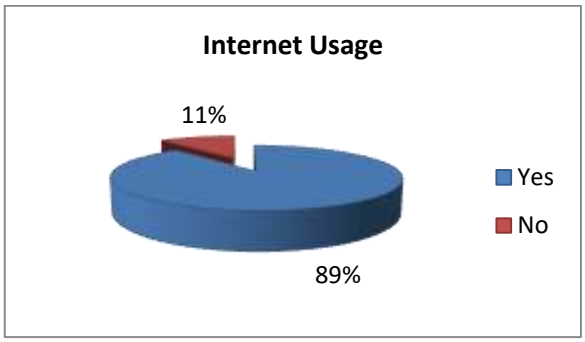
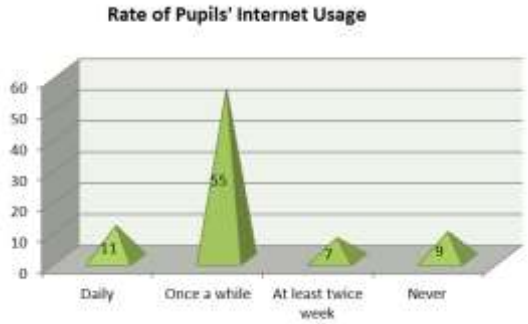


Figure 4.6 shows 73 out of 82 pupils representing 89% search the internet one way other whiles the remaining 11% said they don't use internet.

Figure 4.7



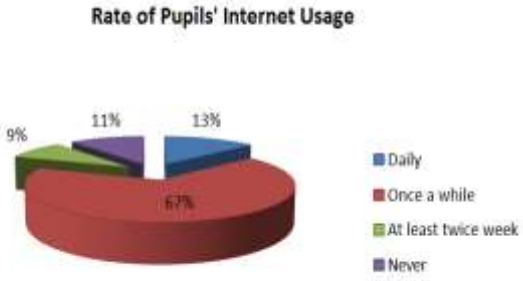
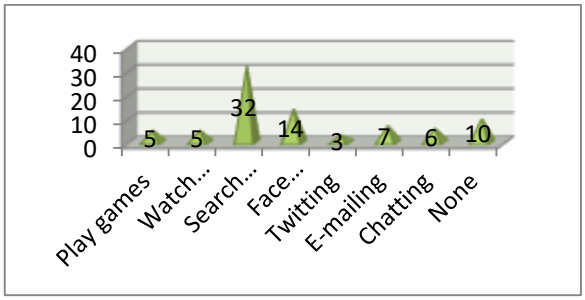


Figure 4.7 show 55 representing 67% of the respondents searching the internet once a while, 11 pupils representing 13% who also search the internet daily, and 9 pupils representing 11% don't surf the internet at all.

Figure 4.8



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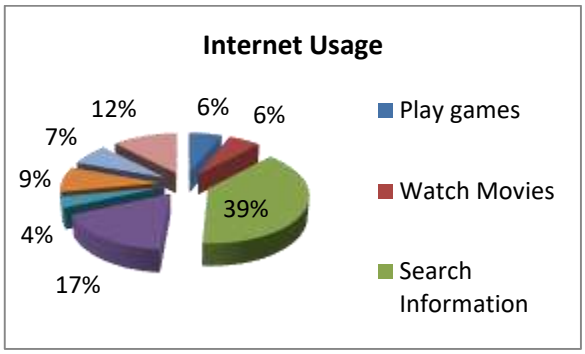

Figure 4.8 shows the following activities performed by pupils using the internet. 32 pupils representing 39% said they use the internet for searching information, 14 pupils representing 17% use it for face booking, and 10 pupils representing 12% don't use the internet for anything.

Figure 4.9

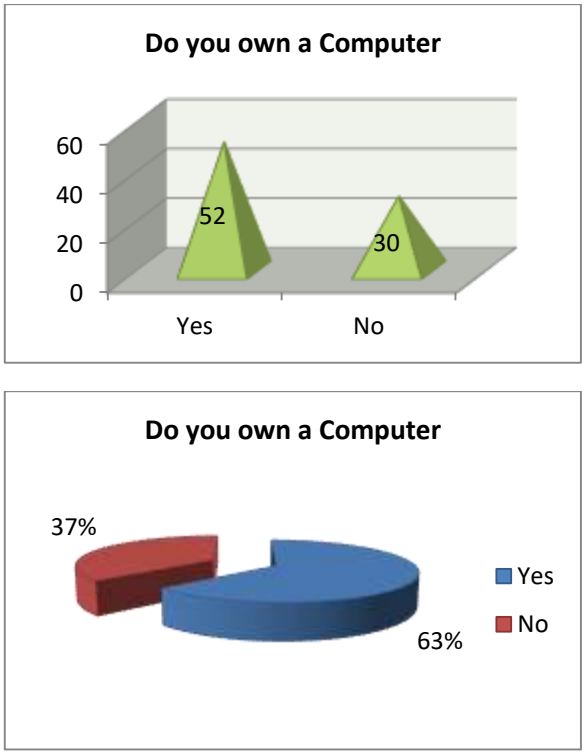

Figure 4.9 show 52 of the respondents saying the own computer system which represents 63% whiles the remaining 37% don't own any computer system.

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Figure 4.10

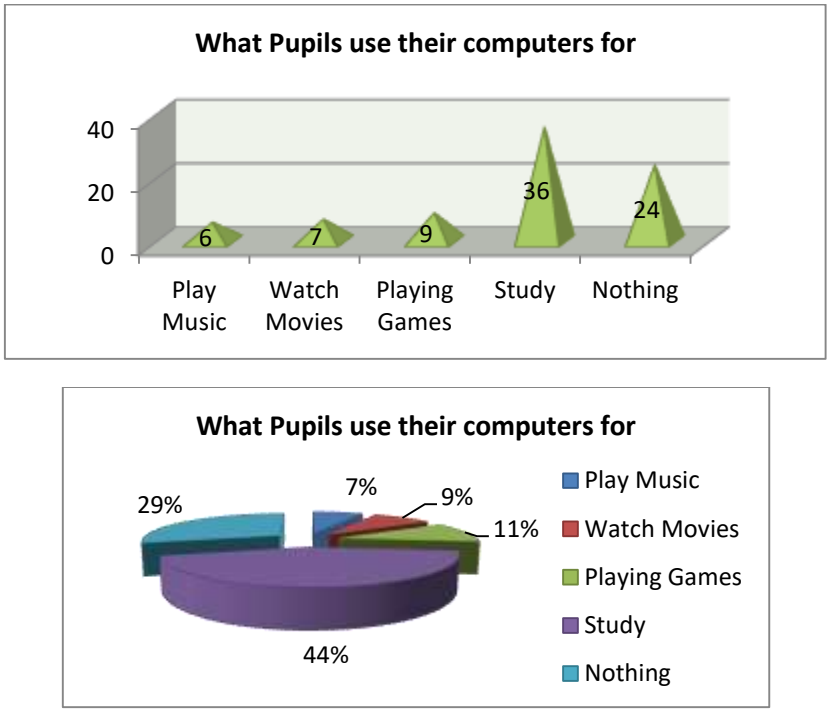


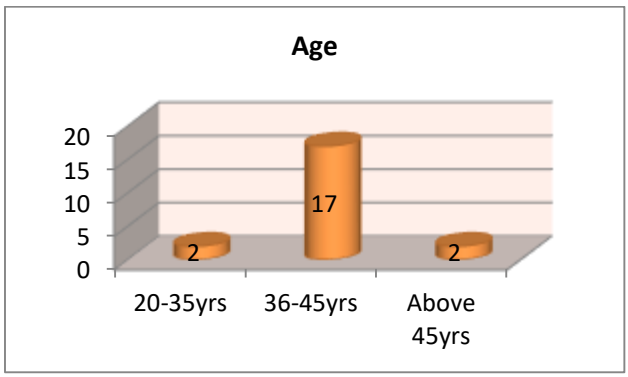
Figure 4.10 above shows 36 of pupils who say they use their personal PCs for studies which represent 44 of 82 pupils, 11% of the pupils play games with their computers, 9% Watch movies with their PC whiles 24 representing 29% of the pupils said they do nothing because they don't own PCs.

In summary, the data collected from respondents (pupils) shows the pupils' readiness to learn using ICT but most of the schools do not have computer labs to support these pupils.

Papert in 1987 mentioned that children in general are very quick learners and when it comes to ICT, it is a matter of curiosity, imagination and adventure. Therefore, students need to be supplied with non-threatening computer environments in which they may explore their own potential. In this way students will develop workable conceptual frameworks for computer use.

FINDINGS AND DISCUSSIONS ON ADMINISTRATOR'S DATA

Figure 5.1



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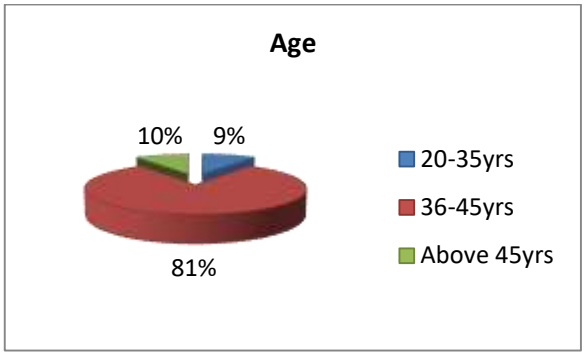
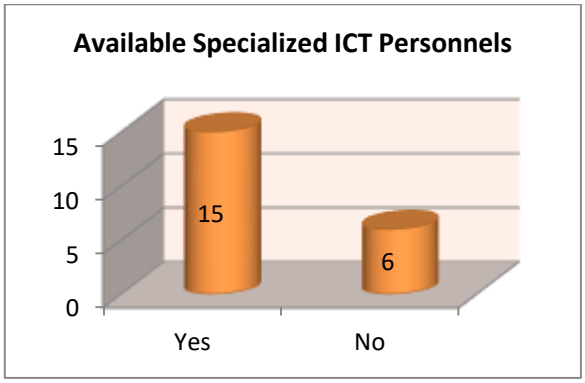


Figure 5.1 shows 17 of the total administrators representing 81% between the ages of 36-45years whiles 10% is above 45years, and 9% is between the ages of 20-35years.

Figure 5.2



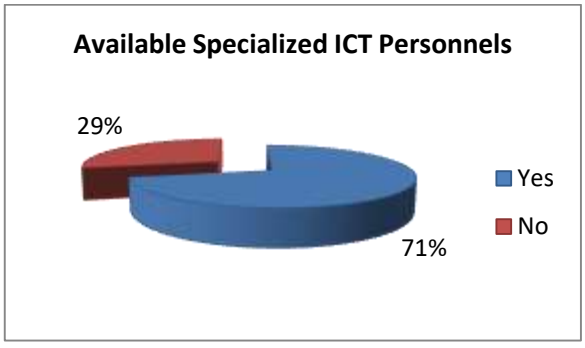


Figure 5.2 shows 15 administrators out of the 21 representing 71% who say they are aware of some teachers who are specialized in ICT. The remaining 6 representing 29% answered NO.

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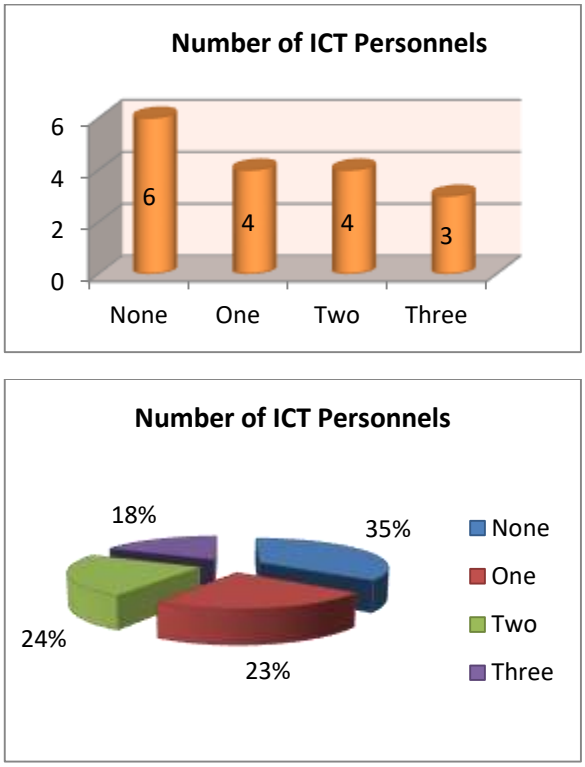
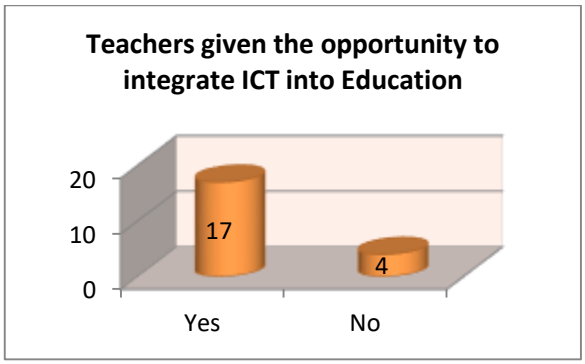
igure 5.3



Looking at the **Figure 5.3** above, 6 of the administrators representing 35% said they are not aware of any teacher who is said to be specialized in ICT, 4 said they know of one person and other 4 also said they know of two people, and lastly, 3 representing 18% said they are aware of three teachers who are specialized in ICT.

Figure 5.4



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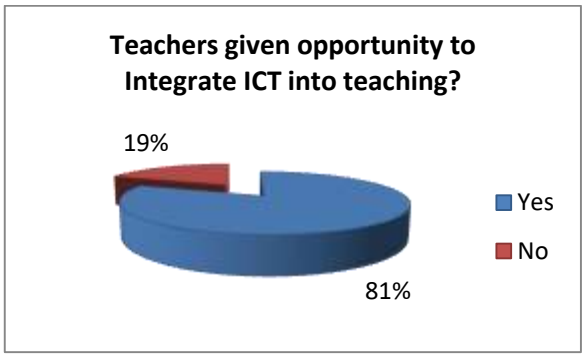
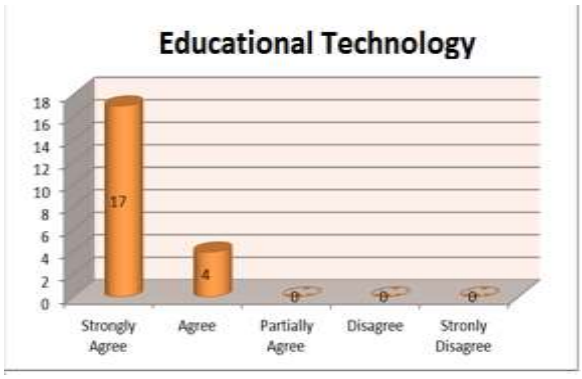


In **Figure 5.4**, 17 administrators representing 81% said teachers are given opportunity to learn and integrate ICT into their teaching and learning and 4 of them representing 19% said NO.

Figure 5.5



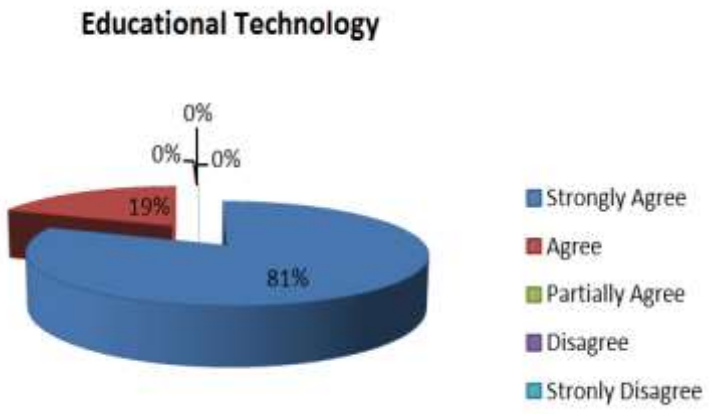


Figure 5.5, out of the 21 administrators, 17 of them representing 81% strongly agreed that ICT should be integrated into teaching and learning whiles the remaining 4 of the administrators agreed, but none disagreed.

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Figure 5.6

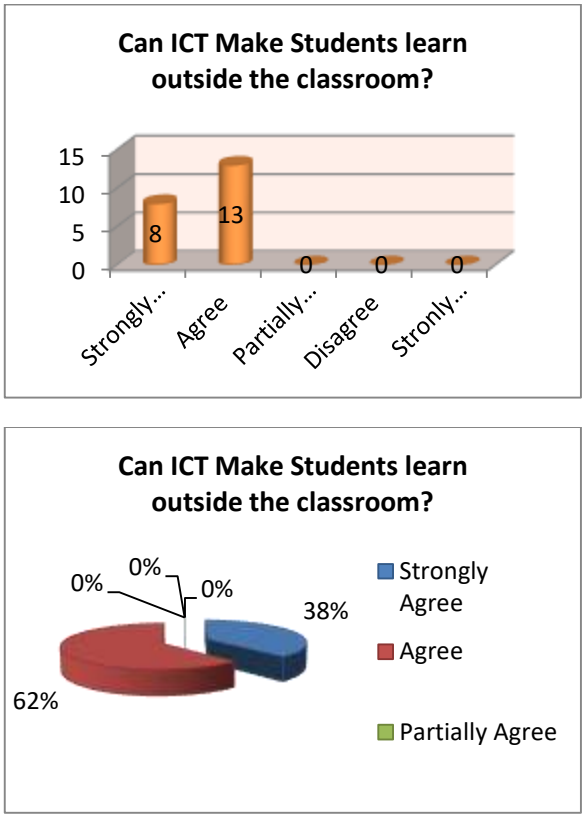
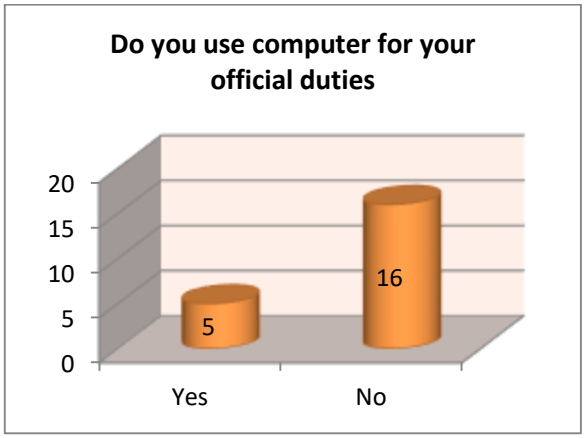


Figure 5.6 shows 13 of the administrators representing 38% agreeing to the fact that with ICT, pupils can extend their learning beyond the classroom and 13 representing 62% also strongly agreed to the same fact.

Figure 5.7



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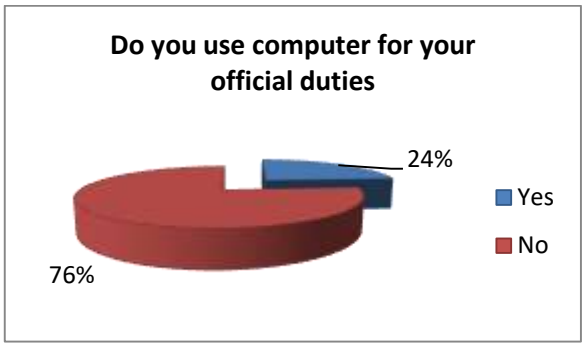
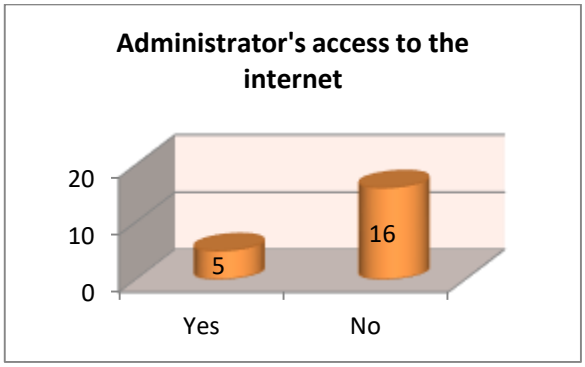


Figure 5.7 shows that 16 out of the 21 administrators representing 76% don't use computers in their official duties, and only 5 representing 24% use computers in their official duties.

Figure 5.8



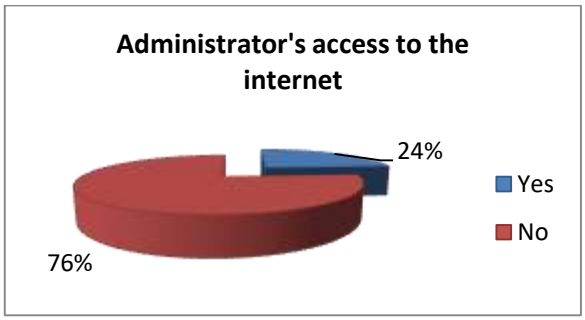
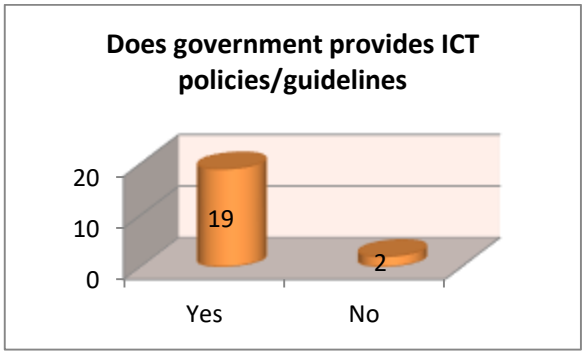


Figure 5.8 shows that 16 representing 76% of the administrators do not access the internet and only 5 of the 21 administrators representing 24% who answered these questionnaires access the internet

Figure 5.9



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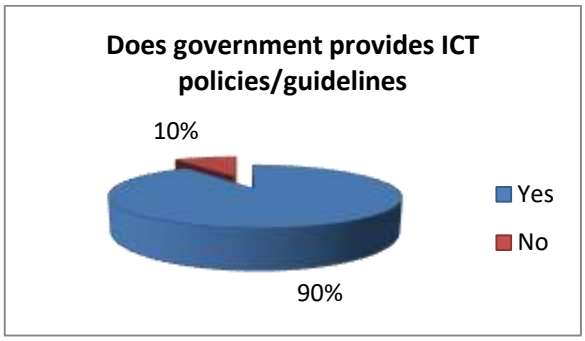
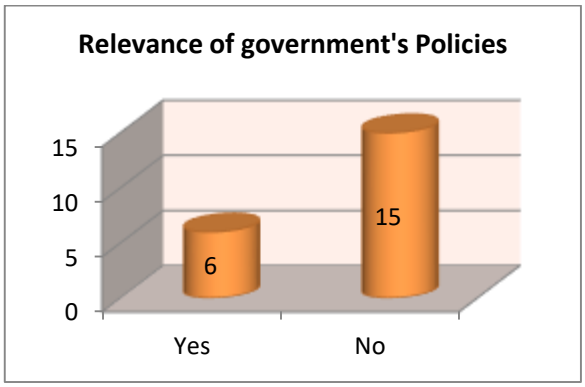


In **Figure 5.9** shows that 19 out of the 21 administrators who represents 90% said there are government policies/guidelines on ICT while 10% said there are no policies/guidelines.

Figure 5.10



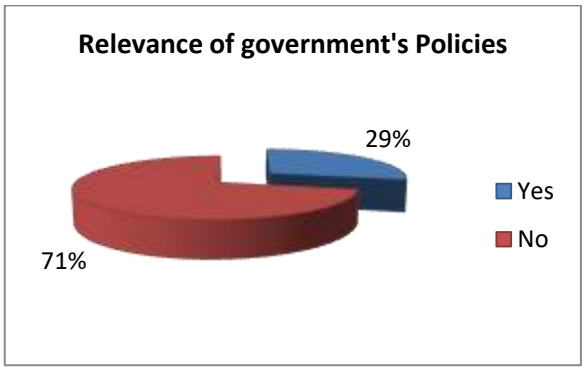


Figure 5.10 shows that upon all the government policies/guidelines, 15 of the administrators representing 71% said they are not relevant to the teaching and learning of ICT whiles 6 representing 29% says they are relevant.

Figure 5.11

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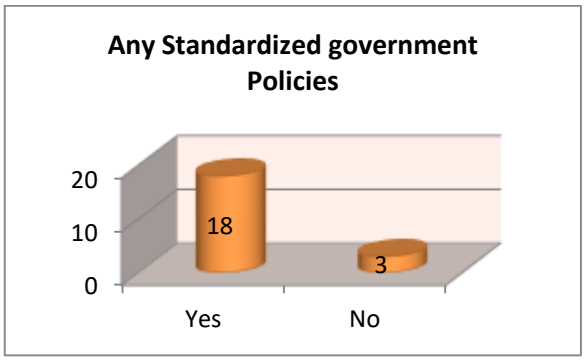
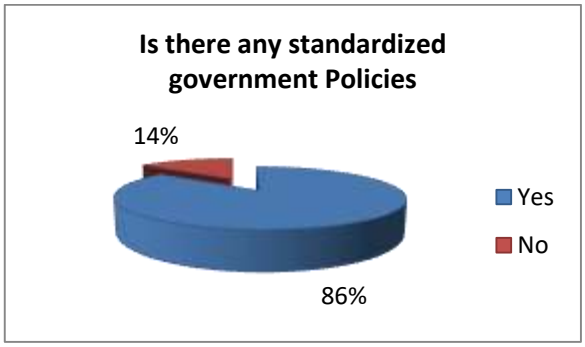
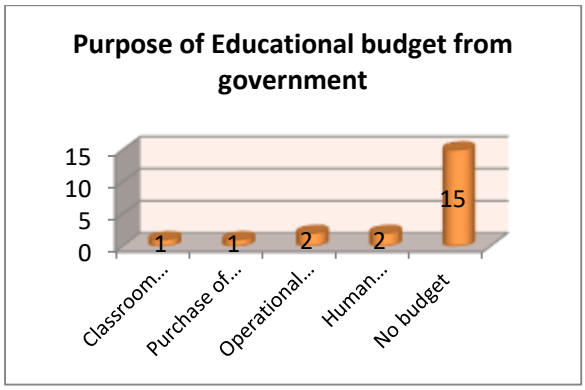




In **Figure 5.11**, 18 of the respondents representing 86% answered YES to show that there is standardization of government policies for teaching and learning.

Figure 5.12



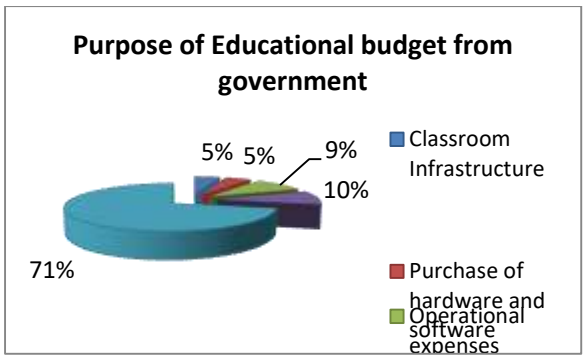


Figure 5.12 shows 15 respondents representing 71% said there is no budget, 2 respondents representing 10% and 9% said there is budget for human resources such as training of teachers and purchasing of hardware and software respectively.

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Figure 5.13

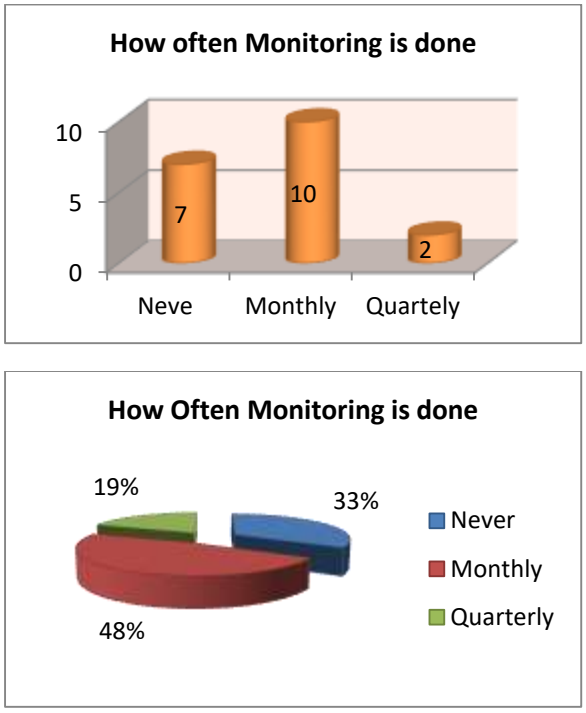
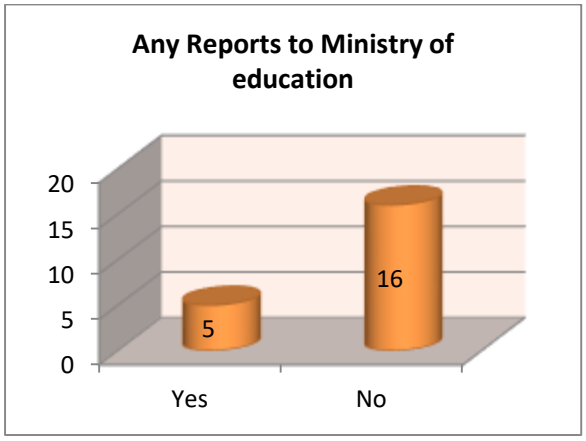


Figure 5.13 shows 10 of the respondents representing 48% who said they do monthly monitoring to ensure technology is applied to teaching and learning, 7 representing 33% said they don't do such a supervision whiles only 2 said they do it quarterly.

Figure 5.14



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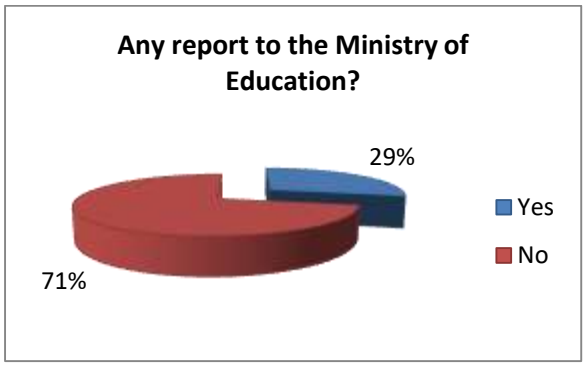
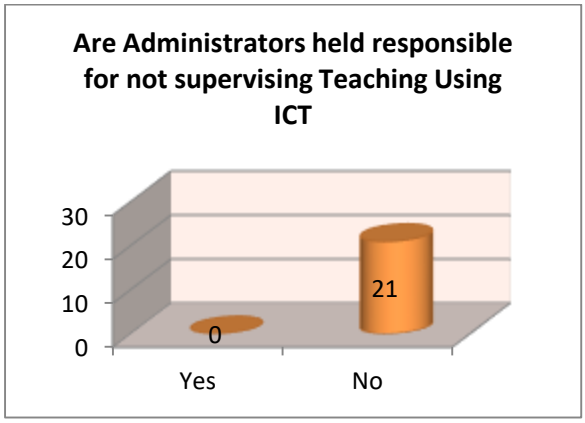


In **Figure 5.14**, 16 of the respondents representing 71% said they do not report to the Ministry of Education whiles 5 representing 29% said send reports to Ministry of Education.

Figure 5.15



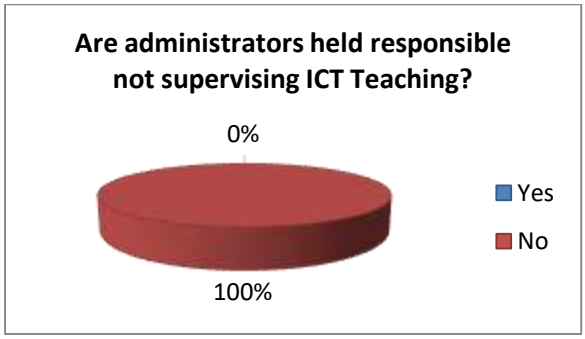


Figure 5.15 shows all the 21 respondents representing 100% said they are not held responsible for failing to supervise ICT integration in teaching and learning.

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Figure 5.16

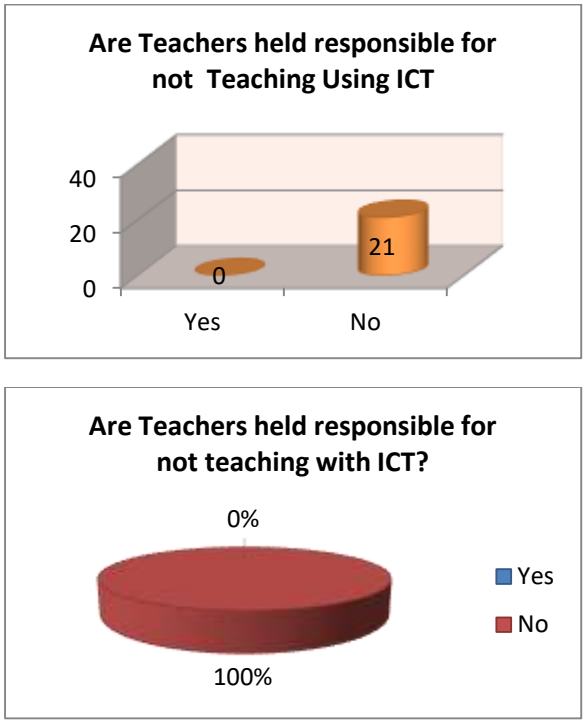

Figure 5.16 shows all the 21 respondents representing 100% said teachers are likewise not held responsible for failing to integrate technology in teaching and learning.

Figure 5.17

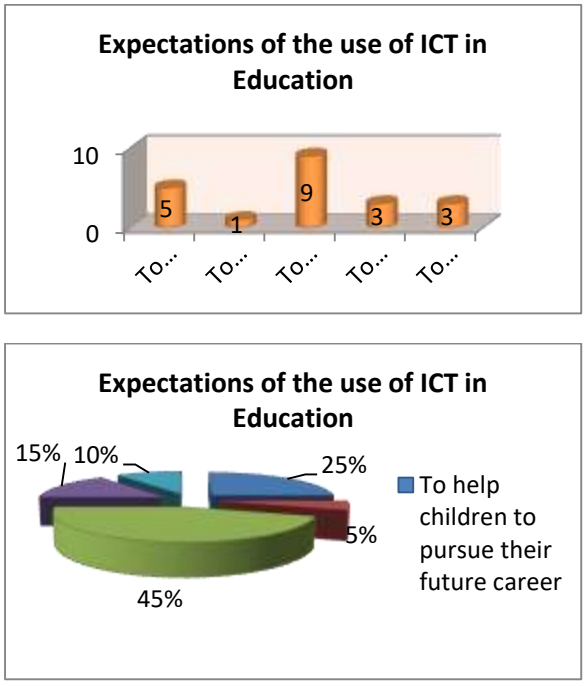

Figure 5.17 shows the following expectations of the respondents as follows: 9 of the respondents representing 45% think that ICT will enhance children's knowledge, 5 of them

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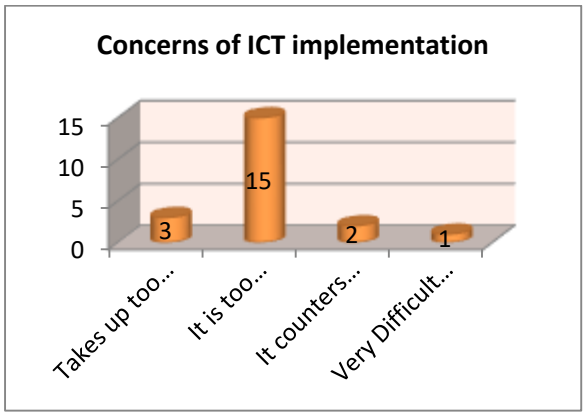
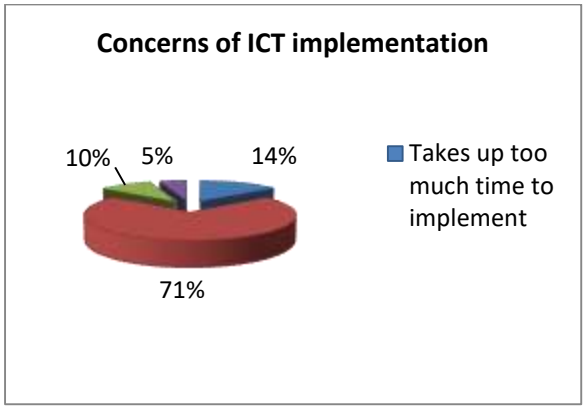
representing 25% think ICT will help children to pursue their future career, 3 of the respondents said ICT will enhance students communication ability etc.

Figure 5.18





In **Figure 5.19** displays concerns of these respondents, which includes:

15 of the respondents representing 71% said ICT implementation is too expensive.

3 of the respondents representing 14% said ICT implementation takes too much time.

2 of the respondents representing 10% said ICT implementation counters productivity due to insufficient technical resources.

In summary, **Figure 5.2** shows 15 administrators out of the 21 representing 71% who say they are not aware of any teacher who is specialized in ICT, this show that teachers lack the necessary skills to transform classroom teaching and learning through ICT. In **Figure 5.4** administrators representing 81% said teachers are given opportunity to learn and integrate ICT into their teaching but the researcher thinks it should not only be opportunities given teachers, but ICT skills should be a pre-requisite for teaching for all teachers.

Figure 5.6 shows all the administrators agreeing to the fact that with ICT, pupils can extend their learning beyond the classroom and 13 representing 62% also strongly agreed to the same fact.

Figure 5.7 shows that 16 out of the 21 administrators representing 76% don't use computers in their official duties, and only 5 representing 24% use computers in their official duties,

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hence, how will they supervise this ICT integration when they are not equipped themselves. **Figure 5.8** shows that 16 representing 76% of the administrators do not access the internet which is a one the major source of information for teaching and learning today. Clearly, most of these administrators are yet to experience the rich impact of the internet; hence, they lack the necessary skills and experience to direct their subordinates to take the challenge of using the internet for teaching.

CONCLUSION

The research has shown that right from the administrators down to the pupils in the classroom ICT integration in education is very vital. For instance taking the teachers into consideration, irrespective of the ICT implementation into teaching and learning being high in terms of cost as said by 58% of the respondents, ICT makes teaching and learning very easy as 68% of the respondents (teachers) also agreed to the assessment of teaching learning with ICT.

Also the data collected from respondents (pupils) shows the pupils' readiness to learn using ICT but as they complained, most of the schools do not have computer labs to support teaching and learning. 89% of the pupils who filled these questionnaires said they use the internet in one way or the other. 63% of the pupils own personal computers which the majority i.e. 44% said they use theirs for studies.

With the administrators, 62 % strongly agreed to the fact that with ICT, pupils can extend their learning beyond the classroom. But unfortunately 76% of the administrators do not use computers for their official duties or have ever access the internet. Hence, the capacity to supervise ICT integration in education is not there. ICT in schools should not be used as an add-on, but should be the integral part of the pedagogy.

RECOMMENDATION

For Educational Technology to be fully implemented in teaching and learning in the basic school in Ghana, it is recommended that:

1. The implementation of Educational technology should not be sole responsibility of the government alone but other cooperate bodies must also play their part in this regard.
2. Ministry of Education should encourage the use the tool developed by the researcher as a means to monitor the teaching and learning with technology to ensure proper implementation and measurement of achievement rather than just accessibility.

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