Assessing the Outcome of Information and Communication Technology in Educational Development in Ghana

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Abstract

The value of teaching and education is of vital concern, principally at the point of educational development. This is because Information and Communication Technology (ICT) can boost the quality of education in various ways such as enhancing teacher training, facilitating the acquisition of basic skills and increasing learner motivation and engagement. This therefore makes it crucial for necessary stake holders associated with the implementation of ICT in education, to know the outcome of ICT in educational development. This paper assesses the outcome of ICT in educational development in senior high school education in the Akuapem North Municipality of the Eastern region of Ghana. The researchers employed questionnaire, and interview on students and teachers. The study concludes that there is improvement in performance when ICT is used in learning in almost all the high schools, most students can use ICT to store and retrieve information; most students can also use the computer to do assignments given to them by their teachers and majority (80.1%) of the respondents have ICT related facilities in their schools, which include internet connectivity, well-equipped ICT Laboratory, computers and television sets.

Keywords: ICT, Educational development, Akuapem North Municipality

1. Introduction

According to Inglis (2008), improving the quality of education and training is a critical issue, particularly at a time of educational expansion. ICTs can enhance the quality of education in several ways: by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training (Redecker, Ala-Mutka, Bacigalupo, Ferrari & Punie, 2009). According to Stukalina (2010), ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner-centered environment.

Ware & Warschauer (2005) indicated in their paper that, ICTs such as videos, television and multimedia; computer software that combines text, sound, and colourful moving images can be used to provide challenging and authentic content that will engage the student in the learning process. Again, Hill (2007) stated in his article thatinteractive radio likewise makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered. More so than any other type of ICT, Chaudhary, Sharma & Chaudhary (2012) stated that networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events.

Khan (2012) showed that ICTs have also been used to improve access to and the quality of teacher training. The government-funded CTTC, established in 1997, offers self-directed, self-paced Web-based courses for primary and secondary school teachers. Courses include "Computers in the Information Society", "Education Reform", and "Future Society and Education" (Oghogho & Ezomo, 2013). Online tutorials are also offered, with some courses requiring occasional face-to-face meetings. "Issues and Challenges of Providing Online In service Teacher Training: Korea's Experience" (Jung, 2001); In China, large-scale radio and television-based teacher education has for many years been conducted by the China Central Radio and Television (TV) University, (Tinio, 2003). The paper discusses the history, challenges, and implications of Television/Radio based teacher education for China in the 21st Century"; The Shanghai Radio and TV University and many other Radio and Television Universities in the country. According to Dessai & Kulkarni (2012), an Open University (India Gandhi National) satellite-based one-way video- and two-way audio-conferencing was held in 1996, supplemented by print-materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutes in Karnataka State. This according to (Tinio, 2003) explained that teachers interacted with remote lecturers using fax and telephone.

1.1 Radio and Television (TV) Broadcasting used in Education

According to Perraton and Creed (2000), there are three general approaches to the use of radio and Television broadcasting in education: The term "general children's programming" was used to refer to the broad target audience of basic education. Although their discussion is limited to this level of education, the broadcasting approaches they identify may also be applied to other educational levels: Direct class teaching,

where broadcast programming substitutes for teachers on a temporary basis; School broadcasting, where broadcast programming provides complementary teaching and learning resources not otherwise available; and General educational programming over community, national and international stations which provide general and informal educational opportunities.

According to Tinio (2003), the most important documented example of the direct class teaching approach is Interactive Radio Instruction (IRI). Tinio explained Interactive Radio Instruction to be consisting of "ready-made twenty to thirty minute direct teaching and learning assignments to the classroom on a daily basis. Kanhadilok (2013), explained in his paper that, the radio lessons, developed around specific learning objectives at particular levels of math's, science, health and languages in national curricula, are intended to improve the quality of classroom teaching and to act as a regular, structured aid to poorly trained classroom teachers in under-resourced schools.

1.2 Implementing ICT in Educational Practices

According to Oates (2007), the use of Information Technologies in various fields of society indicates the emergence of the 'information society'. Information / knowledge society is not a stable concept; it is strongly policy-oriented, and its content also has national peculiarities. The concept 'information society' has recently been replaced by 'knowledge society', and Brown and Duguid (2000) questioned whether this reflects that something is lacking in the first concept that is caught in the second one. They claim that knowledge, on the contrary to information, entails a knower; appears harder to detach than information, and entails the knower's understanding and a degree of commitment. From the learning point of view, 'knowledge society' is a far more attractive goal than 'information society'.

Hargreaves (2003) presents a knowledge society which has its basis in the knowledge economy. From that point of view, the knowledge society has three dimensions: first, it comprises an expanded scientific, technical and educational sphere; second, it involves complex ways of processing and circulating knowledge and information in a service-based economy; and third, it entails basic changes in corporate functions to enhance continuous innovation in products and services by creating systems, teams and cultures that maximize the opportunities for mutual, spontaneous learning.

The information society is based on the belief that knowledge is the driving force for technology development and thus also for economic growth; the knowledge work and knowledge workers form a relatively large proportion of the employment. For the knowledge economy it is not only a question of whether people can access information but also how well they can process this information (Hargreaves, 2003). Education becomes essential to answer the needs of technology and society, and it presumes, for example, the democratization of higher education (Waters, 1998). Education is regarded as the means to meet the ICT revolution, but also a means to keep pace with the continuing ICT development.

The rapid distribution of Information Technology in almost all areas of society has become true also in education, and all Organisation for Economic Co-operation and Development(OECD) countries have invested heavily in ICT for educational use (Kozma, 2005), mainly because, as Hargreaves (2003) says, the OECD has been one of the prime movers behind new knowledge economy initiatives. This interest in information technology is often even enthusiasm; Selwyn (2004) calls it for 'techno-romance'. He explained anyhow, the role of information technologies in educational development is established – even to the extent that it is believed there would be no educational development without ICT.

In policy discussions by Kozma (2008), the arguments for using ICT are often based on promoting the information society, which sets demands for improved teaching and learning. He pointed out that, in the information society, the new jobs require new skills, namely, skills of interaction with the new technology. According to Bundy (2004), ICT has also been regarded as a strategy to improve teaching and learning and to implement and facilitate the new pedagogy of the information society. This also has practical consequences. In the same year, in the USA, President Clinton laid out four similar goals: computers accessible to every student, classrooms wired to one another and to the outside world, educational software to be integrated with the curriculum, and teachers to be ready to use and teach with technology (Cuban & Cuban, 2009).

According to Lombardi (2007), Students ought to learn through authentic activities and real life contexts, in which knowledge is used to solve ill-defined and intricate problems. Sie (2012) argued that as computers in Information and Communication Technology became more user-friendly, more efficient and cheaper, it awoke interest among educators to pass on theoretical ideas by using ICT in the classroom.

According to Darling-Hammond & Bransford (2007), the expectations in the past were to make schools more efficient and productive, to transform teaching and learning into an engaging and active process connected to real life, and to prepare young people for future workplaces. Selwyn (2010) described the past expectations as utopias, the entities of strong positive expectations about ICT in education, which were expected to shake up teaching. He found six utopias: the utopia of the tireless and individual trainer, the utopia of the intelligent tutor, the utopia of micro worlds, the utopia of multimedia, the utopia of effectiveness, and the utopia of collaborative learning. As Selwyn stated, there is not yet convincing empirical evidence to support the fulfillment of any of

these**.**

1.3 The flow of ICT-Enabled Learning

The researchers tried to address the question of how widespread the flow of ICT-Enabled Learning is, in terms of access and use in education and training and also in terms of geographical spread. Moreover, there are different approaches to measuring the diffusion of ICT-enabled learning: Some look at its diffusion in specific sectors, such as tertiary education, while others compare these different sectors to see where diffusion is most widespread; other approaches look at differences between countries; Most studies seem to agree however that the traditional approach of counting the number of computers (with or without Internet) according to the number of students in the classroom is an interesting and useful comparative indicator but not sufficient to indicate the impact of ICT on education (Punie, Zinnbauer& Cabrera, 2006). They indicated that the usage should also be taken into account, both quantitatively (for example: frequency of use) and qualitatively (for example: how are computers used, and for what), as well as usage both by teachers/instructors and students. Also they stated that, looking at the different ICT sectors; most studies indicate that the use of ICT for learning is most widespread in tertiary education.

However, Tornero (2004) explained dedicated efforts are needed to get those who have not yet used eLearning services on board. Different factors must be taken into account when elaborating such efforts: access (to ICT and to eLearning providers), competence (ICT skills) and motivation (for engaging in learning via ICT). It also identified, specific combinations of these factors could then be developed to target specific groups in order to overcome the barriers that prevent these people from benefiting from the potential of the Internet for lifelong learning (Redecker, et al, 2009).

According to Bridge (2012), it might be true that changes are taking place at a much faster pace in informal learning than in the evolution of formal learning systems. Hence a much closer look at these activities, and at their implications for learning, employment and for fostering innovation, is needed. This paper takes a look at the outcome of the implementation of Information and Communication Technologies (ICTs)in educational developments in Ghana.

2. Methodology

According to (Leedy and Ormond (2005) as cited by Abilimi & Adu-Manu, 2013), if the population size is around 1,500sample size should be 20%, and if it is above a certain population size (approx N > 5000) a sample size of about 400 is adequate. The population is more than 5000 and thus 400 of the population were considered as the suitable samples size and were used for the study. The researchers administered 400 total questionnaires, interviews and focus groups discussions, and a sample of three hundred and three (303) respondents made up of eighty eight (88) teachers and two hundred and fifteen (215) students responded to them.

The researchers employed stratified sampling method to group the school population into two (2) main categories: teaching staff, and student. Random sampling was then employed to select 400 respondents for data collection. Stratified sampling technique was adopted as it embraced the distinct categories and organized them into separate strata. This technique was more efficient because it improves accuracy of estimates. Purposive sampling was also used as a technique in data gathering. The study started with a survey, and then finally, purposive sampling was done based on the survey of the population of students and teachers.

The data (primary/secondary sources) collections were done with data collection instruments such as questionnaire, interview and focus group discussions, and the collected data was analysed using Microsoft Excel and Statistical software called general statistical package (GENSTAT), and the results interpreted and discussed.

3. Results

3.1 Outcome of Educational Developments in Schools

3.1.1ICT Improves Learning Outcomes

The data collected was intended to find out from respondents whether ICT can improve learning outcome in their various schools. It is evident from *Table 1*that 287(95%) answered "Yes" to ICT improving their learning outcome and the remaining 16(5%) answered "No" to ICT improving their learning outcomes.

Table 1 ICT improves learning outcomes

		FREQUENCY	PERCENT
	YES	287	94.7
	NO	16	5.3
	TOTAL	303	100.0

3.1.2 ICT Tools

A question sought to find out whether some schools have ICT Tools and which of the devices they use.

Table 2 ICT Devices

		IF YES WHICH OF THE DEVICE DO YOU HAVE?					TOTAL
		INTERNET CONNECTIVITY	WELL EQUIPPED ICT LABORATORY	COMPUTERS	TELEVISION.	NONE	
DOES YOUR SCHOOL HAVE ICT DEVICES?	YES	13	49	163	20	0	245
	NO	0	0	0	0	58	58
TOTAL		13	49	163	20	58	303
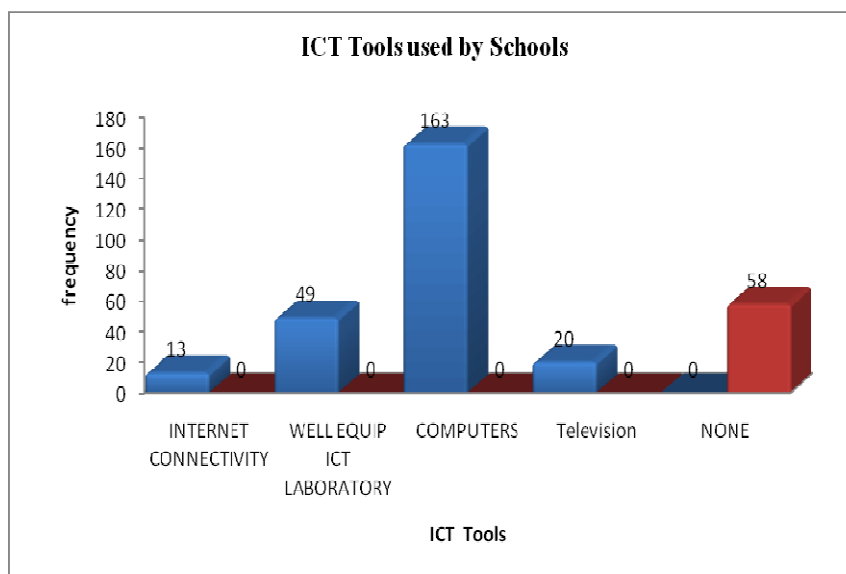
Figure 1: ICT Tools

From *Table 2* and *Figure 1*above, 245(80.1%) responded 'Yes' to their schools having ICT devices and some of the devices used are Internet Connectivity, well equipped ICT Laboratory, Computers and Television, 58(19.1%) indicated that their schools do not have ICT devices.

3.2 ICT as a Subject

This was also sought to find out from respondents if they learn ICT as a subject in their various schools.

Table 3 ICT as a Subject

	FREQUENCY	PERCENT
YES	290	95.7
NO	13	4.3
TOTAL	303	100.0

From *Table 3*, it indicates that 290 (96%) said their schools offer ICT as a subject, 13(4%) indicated that their schools do not offer ICT as a subject. From the analysis it is obvious that we cannot do away with Information and Communication Technology in this era where information is needed in all sectors of life through technological means. The researchers realize that majority of the schools in Akuapem North Municipality offer ICT because of the benefit they derive from using ICT. For instance they use ICT in planning and making progressive decisions.

3.4 Computer Assisting Learning

The analysis of data was posed to find out how the use of computers is assisting learning in the various schools.

Table 4 Computers Assisting Learning

|		Frequency	Percent
	YES	289	95.4
	NO	14	4.6
	Total	303	100.0

From *Table 4*,it is observed that 289 (95%) indicated that computers assist learning whereas 14(5%) stated that the use of computer does not assist in learning. The 289 respondents who said computers assist in learning stated that: The use of ICT makes learning easier and faster, they have regular lesson with information found on the web, they can find and organize information and the use of ICT broadens their knowledge.

3.5 Benefits Acquired from using ICT

The analysis was done in order to find out from respondents the benefits acquired since they started using ICT.

Table 5 Benefits Acquired from using ICT

	FREQUENCY	PERCENT
COMPUTER LITERATE	53	17.5
FINDING AND ORGANISING INFORMATION	23	7.6
GOOD PRACTICES WITH THE USE OF ICT	29	9.6
RESEARCHING	47	15.5
ACCESS TO RELEVANT SOFTWARE	23	7.6
ACCESS TO INTERNET	40	13.2
ACCESS TO INFORMATION EASILY	20	6.6
BROADEN KNOWLEDGE IN COMPUTER USE	40	13.2
KEEPING STUDENTS RECORD	17	5.6
TEACHING NOTES	11	3.6
TOTAL	303	100.0
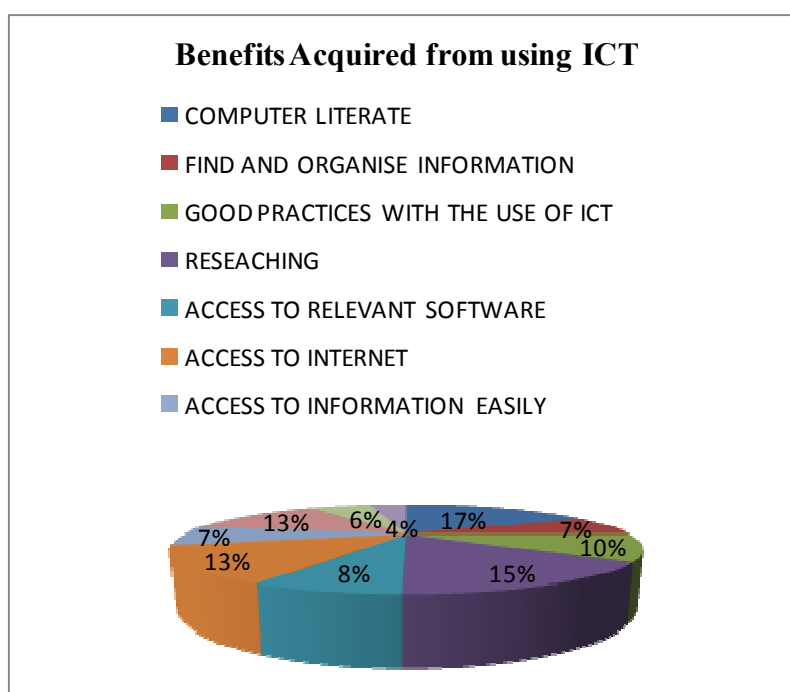
Figure 2: Benefits Acquired from using ICT

The respondents were further interviewed about the benefits of ICT they have acquired since they started using ICT equipment. 53 (17%) showed that some of the benefits they have acquired since they started using ICT equipment is that they are now computer literate, 23(8%) indicated that they can now find and organize information, 29 (10%) also indicated that they have good practices with the use of ICT, 47(15%) indicated that some of the benefit they have acquired since they started using ICT equipment is that they can now do research, 23(8%) indicated that they can now have access to relevant software, 40(13%) indicated that some of the benefits they have acquired since they started using ICT equipment is that they now have access to internet, 20(7%) indicated that some of the benefit they have acquired is access to information easily, 40(13%) indicated that some of the benefit acquired since they started using ICT equipment is that it has broaden their knowledge in computer use, 17(6%) indicated that some of the benefit acquired can also be it helps in keeping students records. Also 11 (4%) indicated that the use of ICT has helped them in preparing teaching notes.

3.6 The Use of ICTs in Schools:

3.6.1 Computer Assists in Teaching

A question sought to find from respondents how the computer assists in teaching.

Table 6
The Use of ICTs in Schools

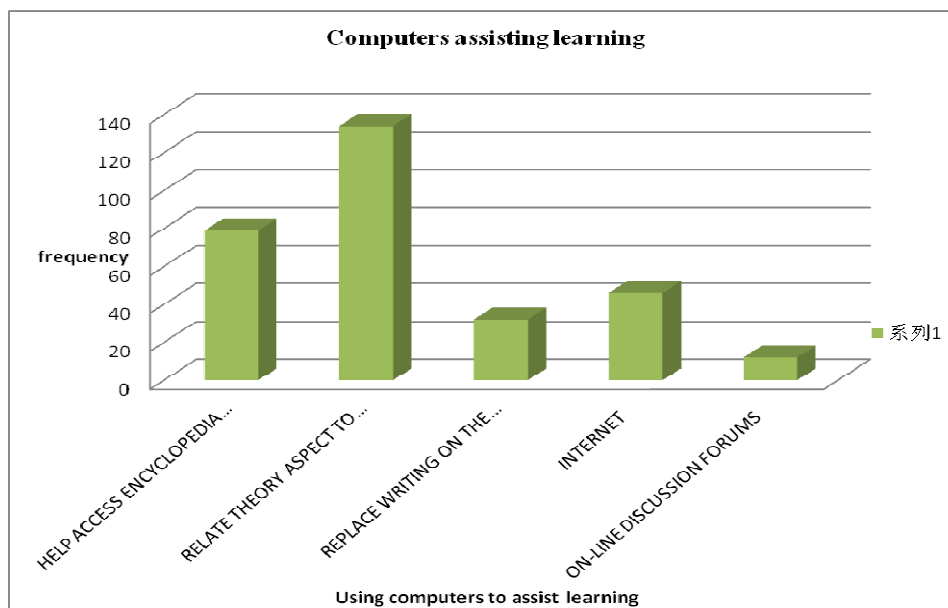|	FREQUENCY	PERCENT
HELP ACCESS ENCYCLOPEDIA FOR INFORMATION	79	26.1
RELATE THEORY ASPECT TO PRACTICAL WORK	134	44.2
REPLACE WRITING ON THE CHALKBOARD / WHITE BOARD	32	10.6
INTERNET	46	15.2
ON-LINE DISCUSSION FORA	12	4.0
TOTAL	303	100.0

Figure 3: Computer Assists in Teaching

From *Table 6* and *Figure 3* above, 79 (26%) said that using computers in teaching helps them access encyclopedia for information, 134 (44%) indicated that computers assist in teaching because you can relate theory aspect to practical work, 32 (11%) said that computers assist in teaching in the sense that it has now replace writing on the chalkboard/white board, 46 (15%) also said that computers can now assist in teaching because there is now online discussion for that you can join. In addition, computer assists in teaching because we can now use the computer to learn how to type example using Mavis Beacon Teaches Typing or Rapid Typing instead of the Typewriter.

3.6.2: ICT Enhancing Learning Outcomes
This also sought to find out if the use of ICT enhances learning outcomes in schools?
Table 7
ICT Enhancing Learning Outcomes

	FREQUENCY	PERCENT
YES	279	92.1
NO	24	7.9
TOTAL	303	100.0

From *Table 7*, 279(92%) indicated "Yes" to the use of ICT enhancing learning outcomes in their various schools. However, 24 (8%) said 'No' and that ICT does not enhance learning outcomes in their schools. From the analysis it is clear that most respondent said ICT enhance learning outcome, for instance ICT helps to do basic calculation, typing, sending and retrieving information, researching and a host of others.
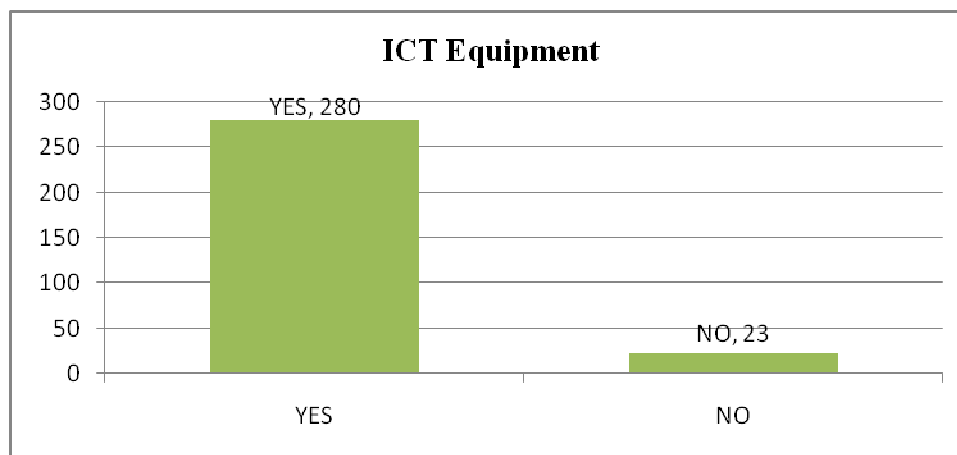
3.6.3 Computer or other ICT Equipment
The analysis of the data was done here to find out from respondent if they can use the computer to do basic work?

Table 8
Computer or other ICT Equipment

	FREQUENCY	PERCENT
YES	280	92.4
NO	23	7.6
TOTAL	303	100.0

Figure 4: Computer or other ICT Equipment

From *Table 8* and *Figure 4*, it is clear that 280 (92%) showed that they can use the computer or other ICT equipment to do basic work. However, 23(8%) showed that they cannot use the Computer or other ICT equipment to do basic work. It is obvious that, most respondent can use the computer or other ICT equipment to do basic work.

3.6.4 Eduational Outcome in Schools

The analysis of the data here was intended to find out from respondent if computers have positively affected educational outcome in their schools. From *Table 9*, it can be seen that 266 (88%) indicated that "Yes" computers have positively affected educational outcome in their schools, whereas 37 (12%) stated "No" computers have not positively affected educational outcome in their schools. From the analysis it is obvious that student can now use the computer to do basic work like typing, browsing on the Internet, storing and retrieving information.

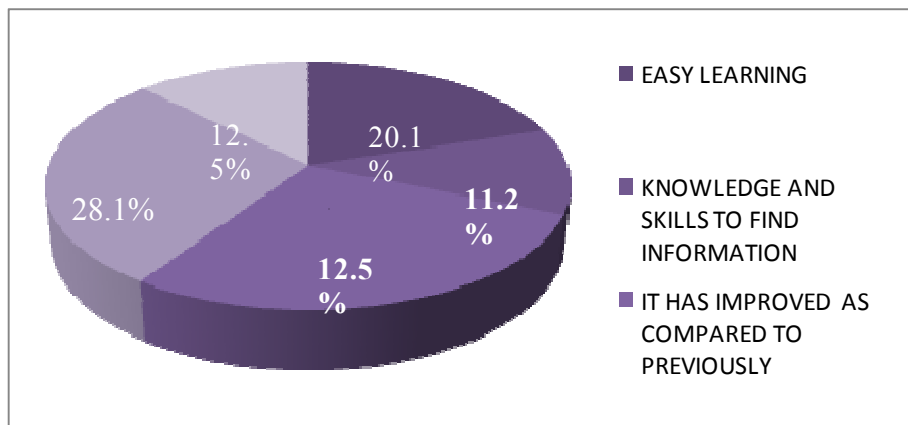**Table 9** Educational Outcome in Schools

	FREQUENCY	PERCENT
YES	266	87.8
NO	37	12.2
TOTAL	303	100.0

3.6.5 Before ICT and after ICT

A question was intended to find out from respondents what are the educational outcomes of schools before ICT and after ICT?

Table 10 Before ICT and after ICT

	FREQUENCY	PERCENT
EASY LEARNING	61	20.1
KNOWLEDGE AND SKILLS TO FIND INFORMATION	34	11.2
IT HAS IMPROVED AS COMPARED TO PREVIOUSLY	85	28.1
CURRENT AFFAIRS	85	28.1
EASY RESEARCH WORK	38	12.5
TOTAL	303	100.0

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Figure 5: Before ICT and after ICT

As depicted in *Table 10* and the *Figure 5* above, 61(20%) of the respondents indicated that the educational outcomes of schools before ICT and after ICT can be easy learning, on the other hand, 34(11%) indicated that knowledge and skills to find information is also one of the educational outcome of schools, 85(28%) respondents indicated that it has improved as compared to previous education in their schools, 85(28%) respondent indicated that current affairs is one of the educational outcomes, whereas 38 (12.5%) showed that it helps them for easy research work .

4. Discussion

This study found out that, there is an improvement using ICT in learning in almost all the high schools in Akuapem North Municipality. The data generated from Table 4.5.1 indicated that 94.7% answered "Yes" to ICT improving learning outcomes in almost all the schools in the Municipality. The research found out that, students store and retrieve information and also use the computer to do tasks given to them. It is evident in the way students perform at the end of each term examinations. Stukalina (2010) claims in his paper "Technology in Schools: Education, ICT and the Knowledge Society" that ICTs have been utilized in education ever since their inception, but they have not always been massively present. In a similar vein, Kozma and Wagner (2003) contend that the promise of Information and Communications Technologies to enhance the basic education is a tremendously challenging area of development work today, in both poor and wealthy nations.

The research sought to find out the benefit acquired from using ICT in various schools in the Akuapem North Municipality. *Table 2* and *Figure 1*showed that 80.1% responded yes to having ICT devices in their school and some of the device used are Internet Connectivity, well equipped ICT Laboratory, Computers and Television. The Internet connectivity affords the students the opportunity to download information from the Internet, and use e-mail to send letters to their friends and relations. As stated in the literature by Wadi Haddad and A. Drexler (Washington, D.C). The use of various multimedia devices such as television, videos and educational software can offer a more challenging and engaging learning environment for students of all ages.

From *Table 4*, 95.4% indicated that computers assist learning. The 95.4% respondents who said computers assist in learning stated that: The use of ICT makes learning easier and faster, they have regular lesson with information found on the web, they can find and organize information and the use of ICT has broadened their knowledge. As indicated by (Lima & Brown, 2007) "undoubtedly the internet and other ICT tools in general constitute a valuable channel for knowledge dissemination and opportunities for development and growth among nations in the world".

5. Conclusion

The conclusion drawn from the sections was that, there is improvement in using ICT in learning in almost all the high schools in Akuapem North Municipality. The research found out that students store and retrieve information; students also use the computer to do tasks given to them by their teachers.

The research concluded that various schools in the Municipality have ICT tools. *Table 2* and *Figure 1*show that 80.1% responded yes to having ICT tools in their school and some of the tools used are Internet Connectivity, well equip ICT Laboratory, Computers and Television. The Internet connectivity affords the students the opportunity to download information from the Internet, and e-mail to send letters to their friends and relations. The results also concluded that the computers assist in learning. Thus, the use of ICT makes learning easier and faster; they have regular lessons with information found on the web; they can find and organize information andthe use of ICT broadens their knowledge

The research also concluded that the benefits acquired from using ICT in the various schools in the Municipality are computer literacy, finding and organizing information, good practices with the use of ICT,

researching, access to relevant software, access to Internet, access to information easily and broadening of knowledge base in computer use.

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