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ICT EDUCATION IN GHANA: AN EVALUATION OF CHALLENGES ASSOCIATED WITH THE TEACHING AND LEARNING OF ICT IN BASIC SCHOOLS IN ATWIMA NWABIAGYA DISTRICT IN ASHANTI REGION

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Abstract:
Introduction: ICT offers teacher and students both technological tools and resources which are beyond the boundary of their classrooms. Therefore, when the policy is properly implemented, it could support and transform the learning situation in every country. However, the best intentions might not always achieve the reality as projects on making ICT education accessible mostly fail to achieve its objectives.
Objective: It is in line with this the study was conducted to ascertain some of the challenges associated with the implementation of ICT policy at Nwabiagya District in Ashanti region.
Methods: The study adopted case study design and a mixed method of data collection. In all, a total of 512 were recruited to be part of the study.
Findings: The study revealed that there is lack of computers, unqualified teachers, limited practical after teaching as well as lack of internet access. These challenges were confirmed by both the teachers and the students within the various schools sampled.
Conclusion: The study found that the teaching and learning of ICT in basic schools in Ghana is faced with barriers and efforts have to be put in place in order to provide the needed resources and personnel to handle the subject in the various schools.

Keywords: ICT, education, policy, teachers, headmasters, learning, implementation

Introduction

Information and communication technology, ICT, is pivotal in everyday life of many people around the globe. It became popular in education in the early 1980's when

microcomputers were readily available at the consumer market. The expectation was that computers would enhance education standards thereby making it more beneficial in both teaching and learning Amanortsu, Dzandu, and Asabere (2013). Hennessy, Ruthven, and Brindley (2005) observed that "*ICT has a huge potential to facilitate the acquisition of relevant life skills that buttress the development process in the prevailing economic and information order*." National Council for Curricula and Assessment in Ireland (NCCA) (2004) noted that technological skills are very important for making advances in education, leisure and work. NCCA (2004, p.4) further noted that "…*technology is increasing in importance in people's lives and it is expected that this trend will continue to the extent that technological literacy will become a functional requirement for peoples' work, social and personal lives*" (p.4). It is undoubted that the use of ICT in education has the ability to improve the quality of living of people through teaching and learning.

ICT offers teacher and children both technological tools and resources which are beyond the boundary of their classrooms (Almendarez, 2011; Moseley et al., 1999; Waite, 2004). Therefore, when properly implemented, it could support and transform the learning situation in the classroom. O'Dowd (2013) mentioned that ICT is essential to enable young people to develop the needed skills that correspond to the opportunities in the work environment to reflect and respond to the current pace of change. Furthermore, ICT help teachers to link with students as well as deliver the required teaching method that is deemed appropriate for the individual (Amanortsu et al., 2013; Hennessy et al., 2005). In relations to this, it offers teachers to be dynamic in using appropriate method that suit the unique needs and talents of students, especially, the less confident (Hennessey et al, 2010; Ministry of Education, 2013). The fact remain that children are growing up in a technologically advanced society so there is the need for them to catch up with happenings in the 21st century. Thus, the need to integrate ICT in education in schools at all levels (NCCA, 2004, O'Dowd, 2013; Uriah and Wosu, 2012)

It is therefore important for countries to propound ICT policies in education as it has proven to be critical in preparing individuals in school for the job market (Hennessy et al., 2010; Unwin, 2005). It is widely believed that in order for Ghana to make strives with regards to social, political and economic development, efforts at making ICT education accessible to all should be prioritized. In line with this, it is not surprising that the Government of Ghana has invested so many resources as well as promulgated policies to make ICT education accessible to all students in the country (Mangesi, 2007; Ministry of Education, 2008; Ministry of Education, 2013). The growth of ICT education in Ghana is attributed to ICT policy backed by legal and legislative frameworks which sought to integrate it into the educational system. Educational institutions therefore

have the responsibility to factor into their curriculum to ensure access to these resources for their students (Amanortsu et al., 2013; Ministry of Education, 2008). Similarly, such the ICT policy is supported by international and domestic conventions on ICT education such as World Forum on Education held in Dakar, ICT in Education Policy Framework (2002) and Ghana Education Strategic Plan 2003-15. This paved the way for programmes and deployment of resources to schools to enhance access to ICT education and improve the quality of education delivery (Ministry of Education, 2008)

However, the best intentions might not always achieve the reality as projects on making ICT education accessible mostly fail to achieve its objectives. Amanortsu et al. (2013) noted in Ghana that ICT education policies and programmes sought to achieve an enormous rise in relations to access and ICT usage in teaching and learning in schools but this has not been achieved yet. In addition, Mbodila et al (2013) noted that developing countries failure to institute an ICT education system is as a result of increased rate of enrolment, poor governance, rising cost of products, uneven distribution of infrastructure and inconsistent implementation approach. In Kenya, researchers have highlighted problems schools are encountering with regards to ICT education to include lack of finances for purchasing ICT equipment for schools, lack of school facilities, failed capacity building programmes and poor educational policy and planning (Kipsoi, Chang'ach, & Sang, 2012; Mungai, 2011). Wells and Wells (2007) identified reasons for such failure in Uganda to include "*projects may be poorly implemented, equipment may be improperly used, there may be a lack of follow-up, stakeholders may not receive adequate training to support the program, or it may simply be difficult to create and sustain a project within a shifting social and political context*."

The challenges to ICT education has been classified from different perspectives. According to Pelgrum (2001), barriers to successful ICT education into two circumstances characterized by material and non-material conditions. Material condition pertain the availability of materials like computers and important software whereas non-material challenges include the knowledge, skills and time of the teachers to facilitate the teaching process (Bingimlas, 2009; Pelgrum, 2001). In another development, studies have classified the challenges as extrinsic and intrinsic barriers (Ertmer, 1999). The extrinsic barriers are characterized by access, time, and resources and support whereas the intrinsic barriers are characterized by attitudes, beliefs, resistance and practices (Al-Alwani, 2005; Bingimlas, 2009). Other studies explain extrinsic barriers as the one relating to organizations whereas intrinsic barriers arise from the administrators, teachers and individuals (Al-Alwani, 2005; Almendarez, 2011). These barriers to ICT seem to affect students' basic level in most developing countries in Africa. The situation is likely to be the same or even worse in Ghana due to the

introduction of the programme in curriculums especially at the basic levels. For instance, Mubashir-Ahmed (2009) in a study in Ghana observed that there are challenges with the integration of ICT in schools because of factors such as lack of qualified teachers to teach ICT in schools, lack of internet connectivity, lack of computers, high cost of computes and lack of electricity in some communities which affect schools. It is in line with this that the study intends to focus on the challenges in the teaching of ICT in Atwima Nwabiagya as well as making a case for the prospects involve in the integration of ICT in education for students.

Materials and methods

Study design and type

This study employed case study design to examine ICT policy, implementation and outcomes within Atwima Nwabiagya District. The primary purpose of a case study is to understand something that is unique to an identified case (Creswell, 2013; Yin, 2009). The study employed both quantitative and qualitative methods of data collections. Case study design enabled the researchers chance to study a phenomenon in details and provide objectivity within the limited time frame. This is in line with the view of Osuala (2005) that a case study will enable the researcher to collect data from and within a geographical boundary to produce an understanding of the study subject. Therefore, case study provides an opportunity to study a phenomenon within a geographical boundary and the chances are that, there are other similar cases elsewhere but the researchers limit the study to a specified place for the purpose of the study.

Study area and population

Atwima Nwabiagya is among the 27 districts in the Ashanti region of Ghana. It is one of the biggest districts in the region and it shares boundary to south with Kumasi Metropolis, west to Ahafo Ano South and Offinso Municipal to the North. The Atwima Nwabiagya has been chosen for the study because it was logically convenient to conduct the study within the district due to proximity. Also, the researchers were very familiar with the terrain in the district which made it much easier to access than other destinations. Therefore, since the research study was expected to be completed within a specific time frame, limiting the study to the Atwima Nwabiagya district was appropriate. Also, the target population would consist of teachers and students in the selected schools within the district.

Data collection sources

Data for this study was obtained from primary and secondary sources. Data was sought from these sources as and when the researchers deem it prudent. Primary data for this study was gathered from the responses that were obtained from participants of the study. Secondary data was derived from published and unpublished reports, books, and relevant articles. They were obtained from libraries of KNUST, Ministry of Education, Journals, the internet and other sources.

Sampling and sampling technique

In conducting research, it is at times not possible or too costly to collect data from all potential respondents. Hence, a smaller number of units (sample) are chosen to represent the whole population. This study employed different sampling methods due to the multi-level participants. First, a purposive sampling was used to select schools within the district. With regard to purposive sampling, the researchers employed own expert judgment about who to include in the sample frame which is based on appropriate characteristics required from sample member (Babbie, 2013). In addition, David and Sutton (2004) added "the units are selected according to the researchers own knowledge and opinion about which ones they think will be appropriate to the topic area". Therefore, the researchers selected the sample on the basis of their suitability and purpose of the study. In line with this, teachers, headmasters within the selected schools in the district were enrolled in the study.

Also, the study used simple random sampling to recruit students within selected schools in the district to be part of the study. A simple random sampling is a technique that gives individuals in the population an independent and equal chance of being selected from the sampling frame in the study population (Onwuegbuzie & Collins, 2007). This would ensure that all prospective participants have equal chance of being selected to enroll in this study. In all, a total of 32 teachers and headmasters (eight each were selected from four schools in each town) as well as 480 students (30 from each of the four selected schools, thus, 120 students were selected from each town). Therefore, a total of 512 participants were recruited for the study.

Data collection Techniques and Tools

The study adopted both qualitative and quantitative method of data collection. Hence, both semi- structured interviews and structured questionnaires were used in the data collections. Teachers and headmasters were interviewed which were recorded with their permission. The administration of the instruments was based on variables under the objective of the study. This allowed them to share their opinion and knowledge

about the ICT policy being practiced in order for them to give thorough assessment about the policy. It allowed participants to share their views on the ICT policy, the performance of students as well as the resources available for them to use to teach in their respective schools. In the same way, students were guided to fill out questionnaires given to those selected to be part of the study.

Data management and analysis

All field data were kept confidential. Therefore, the filled questionnaires were kept under locked by the researchers at each day of data collection. Only the researchers had access to the data. Again, the researchers checked all forms to ensure completeness and consistency prior to submission for data entry. Double data entries and analysis was done using Statistical Package for Social Sciences Software 20 which made the data entry quick than manual process and reduced human errors. Result of the analysis was generated using descriptive and analytical statistics. Data were summarized in the form of frequency and percentage for categorical variables. Means, minimum, maximum, standard deviation were also used to summarize variables.

The recorded data were transcribed verbatim by the researchers since the participants spoke mainly in English Language. The researchers read through the final transcripts to make sense of the data. During the readings, concepts and statements that are related to the objectives of the study were marked out and labelled using alphabets. Similar concepts and statements were given the same alphabetical codes. Based on the codes, concepts and statements that are similar were put together to form the main themes. These themes formed the main sections of the final report.

Ethical Consideration

The researchers observed ethical issues while at the field, by moving with a letter of introduction to avoid suspicions, built relationships with the interviewees and dressed to suit the nature of participants. The researchers also respected the cultural values of the participants throughout the research process. The volunteers at the various schools were pleased because the researchers addressed them politely and explained the need for them to be part of the study.

Findings

Characteristics of participants

Both teachers and students from selected schools in the district participated in the study. Table 1 and II summarized the demographic characteristics of study participants.

Participants of the study, that is, ICT teachers and headmasters were recruited equally (25% each) from four schools in four towns within the district. In each of the towns, four basic schools were selected and two participants each, headmasters (50%) and ICT teachers (50%) were recruited to be part of the study. Also, over 60% of participants were males. On age, it was found that most participants were between 26-30 years compared to less than 10% who were between 46-50 years. The mean age of participants was 32.2 years. In terms of rank, most participants were ranked as Principal Superintendents (40.6%) based on Ghana Education Service ranking system while 21.9% were Senior Superintendent II. On working experience, half of the participants had worked between 1-5 years compared to 12.5% who had worked between 6-10 years. In relations to qualification, over 50% of participants have Diploma Degree while less than 20% had obtained their master's degree.

Table 2 presents the background information of students enrolled in the study. It is important to mention that the students were selected equally from their respective schools and towns. For instance in all four towns in the district, 120 (25%), that is, 30 students were selected from each of the schools. Out of the 480 students sampled, 69.2% were between 14 – 16 years while 5.4% were above 16 years. The average age was 14 years. On sex, 54% were males compared to 46% who were females. At least one third of the students came from various class; JHS 1, JHS 2 and JHS 3. On the average, the students had approximately 6 years knowledge on ICT through coursework. However, most students had learned it for 7 years and more.

Table 1: Characteristics of teachers' participants

Category	Number of Participants	Percentage%
Study area		
Abuakwa	8	25
Asoromanso	8	25
Nkawie	8	25
Sepaase	8	25
Total	**32**	**100**
Rank		
Assistant Director	9	28.1
Principal Superintendent	13	40.6
Senior Superintendent I	3	9.4
Senior Superintendent II	7	21.9
Total	**32**	**100**
Age		
21--25	**7**	**21.9**
26-30	**10**	**31.3**
31-35	**6**	**18.8**
36-40	**2**	**6.3**
41-45	**4**	**12.5**
46-50	**3**	**9.4**
Mean age	**32.3**	
Total	**32**	**100**
Qualification		
Master's Degree	5	15.6
Bachelor Degree	10	31.3
Diploma	17	53.1
Total	**32**	**100**
Sex		
Male	20	62.5
Female	12	37.5
Total	**32**	**100**
Years of Teaching		
1-5	16	50
6-10	4	12.5
11-15	12	37.5
Total	**32**	**100**

Source: Field Data, 2015

Table 2: Percentage distribution of background characteristics of students

Variable	*Frequency*	*Percentage*
Students from each area		
Abuakwa	120	25
Asoromanso	120	25
Nkwawie	120	25
Sepaase	120	25
Total	**480**	**100**
Age		
11 – 13	122	25.4
14 – 16	332	69.2
17 - 19	26	5.4
Total	**480**	**100**
Mean (SD); Min/Max	***14.40 (1.11); 11/19***	
Sex		
Male	259	54
Female	221	46
Total	**480**	**100**
Class Level		
JHS 1	172	35.8
JHS 2	143	29.8
JHS 3	165	34.4
Total	**480**	**100**
Years of Learning ICT course		
1 – 3	116	24.2
4 – 6	105	21.8
7 – 9	259	54.0
Total	**480**	**100**
Mean (SD); Min/Max	**5.9 (2.41); 1/9**	

Source: Field Data, 2015

Available resources and materials for successful ICT education: students' perspective

The available resources and materials for successful ICT teaching and learning were explored by students. As shown in Table 3, majority of students (91.5%) indicated that persons responsible for teaching ICT were a general classroom teacher while 1.9% mentioned having an ICT laboratory instructor. The study again found that most students were not currently having enough materials for ICT learning. Among the materials lacked by students were mostly limited computers and software, no internet access and computers without peripherals.

Table 3: Percentage distribution of available resources and materials for successful ICT education policy

Variable	Frequency	Percentage
Currently having enough materials for ICT learning		
Yes	133	27.7
No	347	72.3
ICT materials lacked by the school		
Limited computers	229	47.7
Limited software (Microsoft package, paint)	53	11.0
No internet access	116	24.2
Computers without peripherals	82	17.1
Person responsible for teaching ICT		
Classroom ICT teacher	439	91.5
ICT lab instructor	9	1.9
A teacher responsible for all courses	32	6.7
Availability of ICT laboratory for practical after teaching		
Yes	17	3.9
No	463	96.1
Enough time to do practical after teaching		
Yes	72	17.2
No	347	82.8
Barrier in accessing the ICT laboratory		
Yes	400	83.3
No	80	16.7
Type of barrier faced when accessing laboratory		
Small laboratory size	45	9.3
Limited computers at the laboratory	230	47.9
Limited time allocated to class	79	16.5
Other	126	26.25

Source: Field Data, 2015

On ICT laboratory, majority of the students (96.1%) revealed the non-availability of laboratory for practical after teaching, and 82.8% perceived that there is not enough time for them to do practical after teaching.

The students' further suggested that they indeed faced barriers when accessing the laboratory. Example of such barriers faced by students were mostly limited computers at the laboratory (47.9%), limited time allocated to class (16.25%) and small laboratory size (9.3%). Other 35.7% of the students experienced barriers including large class size and non-functioning computers. On the period allocated to ICT syllabus per week, the maximum periods were four whiles the lowest was one period. However, most (74.9%) students revealed they have two periods which last for 60 minutes.

Available resources and materials for successful ICT education: teachers' perspective

This section discusses resources available for the teaching of ICT in schools. The participants conceptualize that there are limited resources and materials for teaching ICT in the various school. Participants again mentioned the source of computers used for teaching. According to the teachers, the computers for teaching ICT do not come from the government. However, the sources are through donor agencies and funds mobilized from students. The teachers related that the school solicit funds and liaise with private computer providers to supply them with computers. The quotations below highlight how some teachers commented on the available resources:

> *It's unfortunate that we've not received materials from the government as to the teaching of ICT but the school has been able to liaise with other computer providers to establish a computer lab in the school. Most of the computers are not functioning well because of lack of money to repair the computers. In fact we teach them in the class but we manage to use our laptops to help them understand the practical. It is unfortunate that we didn't receive some of the ICT laptop shared by the government.*
>
> (Teacher)

> *We mobilize resources from the students to purchase computers to help in the teaching of ICT. First, we informed the PTA the need to get computers to support the teaching. We therefore agreed on an amount to be paid by each student particularly when the person is being admitted the first time into the school. Currently, our major challenge is how to get funds to repair the computers that are not working.*
>
> (Teacher)

> *We have computers over here but they were not provided by the government. The school solicited their own funds to buy the computers. It's not that appropriate, but we can't teach the students without the computers so the only option was to find ways of raising funds from students to make provisions for the computers.*
>
> (Teacher)

Some of the participants further related that due to the limited computers for teaching students, they are compel to use their own laptop to do most of the practical when teaching in the classroom. One of the participants narrated the teaching method used under this circumstance:

> *There are no computers so sometimes I bring my laptop to classroom to teach the students. Particularly, I call them individually and give them my laptop to practice. I also group and give the laptop to them to use when we are doing practical.*
>
> (Headmaster)

The participants again commented that teaching of ICT under circumstance whereby there are no resources will not help in achieving a desired outcome. Therefore, something has to be done about the current state of resources in schools. These quotations summarize the views of participants:

> *I think that the country [Ghana] cannot achieve its ICT target if measures are not taken to make provisions for ICT materials for teaching. This is because teaching without necessary materials, facilities and infrastructure will obstruct the process. It is therefore important that the Government comes to our aid to make provisions.*
>
> *(Headmaster)*

> *We have people to teach but the facilities are not there. Here is not a village but we don't have the facilities so what about those in remote places. I think Ghana is not prepared, in terms of personnel we are prepared but in terms of infrastructure and resources we are not*
>
> *(Headmaster)*

It is evident from the assertion of both students and teachers that basic schools within the district were hugely constrained when it comes to resources and materials available for teaching and learning of ICT.

Challenges associated with the teaching and learning of ICT: Students perspective. In Table 4, the challenges associated with the teaching and learning of ICT is presented. Most of the students admitted that they indeed faced challenges in teaching and learning of ICT in their respective schools which were characterized by inadequate infrastructure (44.6%) and poor linkage between classroom and practical (34.4%). Other 12.6% of the students disclosed challenges including lack of available teachers. The study further revealed that most students (65.0%) found some difficulties in understanding ICT when they are taught. Half of the students in the study attributed their difficulty to limited practical after teaching. The remaining students gave causes such as students not being serious, inadequate ICT teaching and learning materials, lack of internet access and power problems.

Table 4: Percentage distribution of challenges associated with the teaching and learning of ICT

Variable	Frequency	Percentage
Challenges in teaching and learning ICT		
Yes	404	92.9
No	31	7.1
Example of challenges		
Poor linkage between classroom and practical	139	34.4
Lack of qualified personnel	16	4.0
Lack of funds	18	4.5
Lack of infrastructure	180	44.6
Other	51	12.6
Difficulty in understanding ICT when taught		
Yes	280	65.0
No	151	35.0
Causes of the challenges in understanding ICT		
Limited practical	139	50.4
No internet connection	35	12.7
Students are not serious	45	16.3
Power problems	9	3.3
Inadequate ICT teaching and learning materials	40	14.5
Some ICT teachers are not qualified	8	2.9

Source: Field Data, 2015

In Table 4, the study established relationship between the challenges students faced and their difficulty in understanding ICT when taught in schools. The study disclosed that the ICT materials lacked by the school have a significant relationship with the difficulty of students understanding ICT when taught ($p=0.001$). The difficulty of understanding ICT was highest among students in schools that have limited computers and no internet access. Also, there was a significant relationship between barriers in accessing ICT laboratory and difficulty in understanding ICT among students ($p=0.05$). Students from schools that exhibited barriers in accessing the ICT laboratory were more likely to have difficulty understanding ICT when taught (84.7% versus 15.3%).

Table 5: Association between challenges in learning ICT and difficulty in understanding ICT among students

Variable	Difficulty in understanding ICT		Chi-square	p-value
	Yes N (%)	No N (%)		
ICT materials lacked by the school			20.24	0.001
Limited computers	117 (58.5)	58 (52.7)		
Limited software (Microsoft package, paint)	11 (5.5)	9 (8.2)		
No internet access	57 (28.5)	17 (15.5)		
Computers without peripherals	15 (7.5)	26 (23.6)		
Barrier in accessing the ICT laboratory			3.74	0.05
Yes	233 (84.7)	115 (77.5)		
No	42 (15.3)	34 (22.8)		
Type of barrier faced when accessing laboratory			3.98	0.26
	13 (5.6)	4 (3.5)		
Small laboratory size	93 (39.7)	35 (30.7)		
Limited computers at the laboratory	49 (20.9)	29 (25.4)		
Limited time allocated to class	79 (33.8)	46 (40.4)		
Other				
Challenges in understanding ICT affect performance			0.73	0.39
Yes	160 (58.0)	1 (100)		
No	116 (42.0)	-		

Source: Field Data, 2015

Challenges with ICT teaching and learning from teachers' perspective

This theme addresses the challenges faced by teachers in the teaching of ICT in schools. The study revealed that there are a lot of problems teachers are encountering in the teaching of ICT. The most common and mentioned challenge in schools was lack of computers for teaching. The study found that the inability of the government to supply the needed resources for teaching and learning of ICT has caused this problem. It was clear that there were enough and qualified teachers in all schools but resources to teach were the main challenge in almost all schools. These quotations summarize the views of participants:

> *There isn't any computer for the students for their practical. There are some petty things that I use my laptop to teach them. Yes, one laptop is not enough for a class of 30 or so it's not enough. Additionally, there's no internet access so when you are teaching, then you don't get anything to demonstrate. I still use my laptop and my modem*
>
> (Teachers)

> *Hardly can I say we don't have any challenges. Some of the challenges are limited computers/spoiled computers. Lack of internet access, if you want to access the internet you have to do it by our own modem. Then lack of peripherals, like printers, scanners and the rest. In fact we are lacking some of these things*
>
> (Headmaster)

Another problem confronting participants was the erratic power supply. The power crisis which has led to load scheduling has negatively affected the teaching of ICT in schools. This is so because ICT requires electricity before it can operate. Therefore, without it, would mean that teachers cannot perform their duty as expected. Some of the participants summarized as follows:

> *There are some problems. We don't have the computers, they are not enough. And the power outbreaks and those things does not help us when it is time to go and do some practical, you go and there's no power how can you teach it?*
>
> (Teacher)

> *Our computers are not enough. We have 40 students in JHS 1 & 2 and JHS 3 are 70 or 75. Right now we have only 7 computers. Sometimes we go in batches. It's not helping but what can we do? And sometimes when we are in the lab we have period for ICT but unfortunately, we do not have light.*
>
> (Teacher)

It is quite obvious that teaching and learning of ICT will be problematic looking at the current trend of events in the schools. It is obvious that lack of computers, internet, limited computers couple classroom size as well as the erratic power supply will largely impede against teaching and learning of ICT in the schools.

Discussion

The aim of the study was to examine from the perspective of both teachers and students the challenges faced by schools in Atwima Nwabiagya district in the Ashanti region of Ghana. The study revealed that there were a lot of challenges in the educational system in Ghana with regard to meeting the ICT Policy implementation. The results of the study revealed that there are challenges encountered in schools in the teaching and learning of ICT. These challenges are likely to have negative effects in Ghana's ICT policy which might undermine the achievement of the programme objectives. For

instance, the study found that most schools were not currently having enough materials for ICT learning. Among the materials lacked by students were mostly limited computers, no internet access and computers without peripherals. This finding implies that the schools might not have the necessary materials to support the effective ICT policy within the schools. The finding corroborates with previous study results where limited materials was found as a major barrier to successful ICT education policy among students (Almendarez, 2011; Bingimlas, 2009; Pelgrum, 2001). The availability of computers with necessary peripherals is critical when one want to achieve a successful ICT education policy. This might have a detrimental effect as the internet will further help students to get more insight into the concept of ICT (Ministry of Education, 2013).

The study further found that students within the various schools indeed faced barriers when accessing the laboratory. These barriers reinforce earlier limited resources and materials revealed by students. Problems related to accessing the ICT laboratory were Limited computers at the laboratory, Time allocated to class and Small laboratory size. This finding suggests that although schools may have physical structure as laboratory, but there are no materials and resources available. The limited resources might be as a result of the government inability to provide materials for teaching and learning ICT despite the introduction of the policy. The limited resources were confirmed by teachers when they commented on the source of their materials used for teaching. The study found that most schools have not received resources from the government to support the teaching and learning of ICT. This finding implies that the government has failed to lead the frontier to provide resources to most schools in the district to achieve the targets of the ICT policy. These problems relating to limited resources and materials for teaching ICT was shared by the teachers in their interview when they expressed that this has not supported the policy to achieve its target. The findings concur with previous study by Amanortsu et al (2013), Kipsoi et al (2012), O'Dowd (2013) and Unal et al (2012) which posited that teachers had limited access to computers such that computers had to be booked in advanced. It was further revealed that computers are mostly shared among teachers which make it difficult for ICT education particularly at basic schools. Consistently, Balanskat et al. (2006) collaborated with this finding. They found that it is required of any class who want to access the ICT classroom to have prior booking, or the internal school network cannot be accessed from outside. As a result teachers and students do not have the chance to use ICT at any time according to how they need the services. In a related study by Pelgrum (2001), four of the top ten barriers to ICT education among 26 countries were challenges relating to accessibility to ICT. These challenges were characterized by insufficient numbers of

computers, insufficient copies of software's, insufficient simultaneous use of internet and peripherals.

The study found in most of the schools that the person responsible for teaching ICT was a classroom ICT teacher. This implies that the teachers might not have special skills relating to ICT as their task was teaching ICT. This is a significant step as the teachers assign specifically for teaching ICT might not have up-to-date training in specific ICT skills (Balanskat, Blamire, & Kefala, 2006, Kipsoi et al, 2012, Mungai, 2011). Interestingly, even if teachers possess the need skills, they are challenged with time for teaching. The study found that most of the students within the selected schools have two periods which last for 60 minutes. The time allocated for teaching ICT is an important precondition to cover much syllabus in schools. The finding that students only had two periods lasting for 60 minutes for a week which appears to be small. Thus, students might not get enough time for teaching and doing practical.

The study results mentioned of large class size as a challenge to the teaching and learning of ICT in schools. Having more students in a classroom might not help teachers in reaching out or giving the students individual attention needed when it comes to the practical aspects of ICT training, this is likely to lead to a situation whereby teachers will not be in a position to assist students in getting the relevant ICT skills essential in the technology world. This is likely to result in a situation whereby teachers will not have enough time at hand to teach students due to larger size of the class. This finding corroborates with studies by Ministry of Education (2013), Kipsoi et al (2012) and Musbashr-Ahmed (2012) which posited that the presence of large number of students in a class hampers the teaching and learning of ICT. Moreover, the erratic power supply in the country has impacted on the teaching of ICT in schools. This might affect plans of teachers as there would not be time for teachers to take students through practical aspects of the subject. This is likely to impact negatively on the time allocated for teaching and learning of ICT in school.

Conclusion and Recommendations

The study revealed that there is lack of computers, unqualified teachers, limited practical after teaching as well as lack of internet access. These challenges were confirmed by both the teachers and the students within the various schools sampled. The non-existence of these facilities may put teachers in a position to teach in abstract without the children acquiring the practical aspects of the subject. This may probably lead to a situation where students might not gain the required knowledge needed for the job market. The study found significant association between ICT materials lacked by

the school and difficulty of students understanding ICT when taught. The study found that teaching of ICT under circumstance whereby there are no resources will not help in achieving a desired outcome. Particularly, difficulty of understanding ICT was highest among students in schools that have limited computers and no internet access.

The findings imply that students might not be able to put the ICT concept into practice when there are no adequate provisions tentative practical. The study findings further made a case for lack of constant power supply for the working of the few computers in some schools. Thus, there is the need for practical measures to be put in place to help arrest the situation to enable the policy achieved it goals.

The study has a number of implications for policy making on ICT education in Ghana. The study findings indicated teachers' lack of knowledge about the policy. The study signifies the insufficient availability of qualified teachers. Teachers are central in making accessible ICT education a reality for the student but the study findings indicated that there were few teachers who had the requisite qualification in teaching of ICT. Therefore, there is the need for teachers to be taken through workshops, seminars and in-service trainings for them to acquire skills on how to handle ICT. Secondly, there is the need for governmental commitment towards the implementation of the policy so as to achieve the objectives. Lack of political will manifested in the insufficient and lack of computers and laboratory in schools for practical's as revealed by the study. Therefore, government should provide enough equipment needed by schools. Supplying of computers to schools should not be a one time show but should be sustained. Moreover, government should consider building computer laboratories in schools and ensure that it is up to state of the art laboratories.

In addition solar panel should be supply to schools to enable continuous teaching and learning of ICT. Studies indicate erratic power supply as affecting the teaching and learning of ICT. The supply of solar panel will further increase the coverage area of the policy. Lastly, Ghana Education Service should perform their role as a major stakeholder of the policy implementation. In the first place, effective supervision of the programme is important in ensuring that teachers perform their role to satisfaction. Also, they should coordinate with the government by sharing their experiences with the government in terms of challenges teachers encounter in the teaching of ICT and schools. It is believed that should these policies be institutionalized, the teaching and learning of ICT in schools will be consolidated in the education system of Ghana.

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