Introducing Teachers to PowerPoint Presentation in a Technologically Challenging Environment: Action Research

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Introducing Teachers to PowerPoint Presentation in a Technologically Challenging Environment: Action Research

CECILIA BOAKYE AND ISAAC BUABENG

Abstract: *We tried to equip teachers with PowerPoint skills in the face of inadequate internet communication and technology (ICT) facilities through modeling and cooperative learning. The participants consisted of 20 part-time post-diploma teachers from the University of Cape Coast. Their ages were between 22 and 40 years and comprised 40% females and 60% males. It was a mixed methods sequential action research in which data was collected using a questionnaire, interview, observation and content analysis. The results showed the teachers were able to prepare their Power Points by sharing skills and resources. They were successful with the Power Point task as a team to a large extent but some of them had individual challenges, which were not met. The lack of ownership of computers was a major challenge. We concluded from the study that even in the face of challenges teachers can be equipped with some skills for PowerPoint through cooperative learning but the empowerment will be more effective if some of their challenges, notably lack of personal computers are met. It is therefore suggested that teachers should be helped to acquire computers and the skill of making Power Point presentations should be integrated into initial teacher training in Ghana.*

Our goal was to equip teachers who were post-diploma part-time students with Power Point presentation skills through modeling and cooperative learning so they could make their seminar presentations using PowerPoint. The study took place at the University of Cape Coast where like many African country institutions have poor internet connection and communication technology (ICT) facilities. Initially Ghana like many African countries depended on donors for the development of ICT infrastructure for education, which tended to be on experimental bases. However, that trend has shifted towards policy- guided integration, which is supported by the government. Although Ghana is making efforts to improve upon ICT facilities, there are still challenges.

Context of the Study

Ghana realizing the usefulness of technology in development has made frantic efforts to promote the use of ICT in the country. Ghana has been at the forefront of the information and communications revolution in Africa for more than a decade (International Telecommunication Union, 2009). The first ICT internet connection in Ghana was made in 1989 (Ministry of Health, cited by Achampong, 2012). Since then Ghana has been making efforts to improve upon the country's Internet Communication Technology. In October, 1998 Ghana made efforts to develop an ICT policy. This started with a National Communications Policy Conference dubbed COMPOL '98', which was held in Accra at the International Conference Centre. All stakeholders in the ICT sector attended the conference. The final ICT document was however finalised in September 2001 after another National Communications Policy Conference. This conference reviewed and updated the previous ICT document and this resulted in the production of a comprehensive ICT Policy known as Ghana Information and Communication Technology for Accelerated Development (ICT4AD). It is now referred to as Ghana ICT Policy for Accelerated Development.

The Ghana ICT Policy for Accelerated Development, led to the creation of the Ghana Investment Fund for Electronic Communications (GIFEC), (formerly the Ghana Investment Fund for Telecommunications (GIFTEL) as an implementing agency of the Ministry of Communications, in January 2004. The responsibility of GIFEC is to facilitate the provision of ICT, Internet connectivity and infrastructure, broadcasting, and multimedia service among other things to underserved and also un-served areas of the country (Republic of Ghana, 2003). The drawing up of a policy document for ICT and the machinery through which it can operate shows the seriousness Ghana attaches to ICT.

The overall policy objective is "to engineer an ICT –led socio-economic development process with the potential to transform Ghana into a middle income, information-rich, knowledge-based and technology-driven economy and society" (p. 24). With respect to education, the policy seeks to: (a) improve the educational system by infusing ICT into all levels of education to facilitate the delivery of educational services, and (b) promote the development of women by the removal of gender inequalities in education and other barriers that hinder girls and women through the use of ICT.

On January 17th, 2002, the President of Ghana inaugurated a Committee on Review of Education Reforms. Their task was to review the entire educational system of Ghana with the view of making it more responsive to current challenges. Among the things they were to investigate were issues that affected the development and delivery of education, which included ICT (Ministry of Education, Youth and Sports, 2004). The Committee raised a lot of issues on the state of ICT in Ghana. Some of the issues raised concerned the: (a) the provision of ICT training in educational institutions which they described as fragmented, unregulated, and uncoordinated, especially in pre-tertiary institutions; (b) absence of computers and computer science teachers in most schools; (c) absence of a unified course content for ICT training in second cycle schools; (c) inadequate ICT training in vocational schools, technical institutes and teacher training colleges, and (d) understaffing and lack of modern infrastructure and equipment in the universities and other tertiary institutions which are supposed to train high level ICT manpower for the requirement of the ICT industry (Republic of Ghana, 2002).

The government of Ghana embraced the recommendations that the committee made with respect to ICT and has been making efforts to incorporate ICT into various spheres of government machinery and education. A Kofi Annan Centre of Excellence in Information Technology (IT) has been established with the help of the Government of India, to promote IT education and usage in the country's development effort (Ministry of Education, Youth and Sports, 2004). Non-Governmental Organizations have also made contributions to promote the use of ICT in Ghana. For example One Laptop per Child, an American Non-Governmental Organization presented 75 mini laptops and furniture through the Child's Right Organization, to the Suhum Kraboa Coaltar District Assembly of Ghana (One Laptop Per Child News, 2011). Through that donation the district has been empowered to construct an ultra modern ICT center in an experimental school in that district. This and many other initiatives have equipped many educational institutions with ICT facilities in Ghana. Additionally Ghana "serves as a landing point for a number of huge submarine communications cable projects such as GLO1, SAT3, and WASC. These will boost overall connectivity and network speeds and push down prices. There are over 180 Internet Service Providers (ISPs) in Ghana out of which 30 companies are active. Under the Better Ghana ICT Project, laptops are assembled in Ghana and are distributed freely to schools and students by (CitiFm Online, 2012). There are many internet cafes in Ghana where most people access the internet and the number of people who can afford an internet connection at home is increasing (Ministry of Health, cited by Achampong, 2012).

In addition, a number of state organizations are involved in ICT in Ghana. The Ministry of Communications (MoC) oversees the general policy and state-sponsored initiatives. The National Information Technology Agency (NITA), established in 2008, is the MoC's ICT development and implementation arm. As of early 2011 NITA was working to revitalize ICT4AD to better reflect the country's current needs (Ministry of Health, Ghana. cited by Achampong, 2012).

These achievements notwithstanding, ICT integration is still a problem because there are several problems prohibiting the use of ICT in Ghana. Power blackouts, high cost of connectivity, and lack of ICT skills are among the highest ranked constraints in the country. Other constraints are: poor infrastructure, lack of

electricity urban-rural digital divide, lack of basic education, obsolete equipment, high cost of equipment {Ministry of Education and Science (MOES), 2006}, poor ICT infrastructure, weak policy and regulatory framework and limited human resources which have made it problematic for people to have access to affordable information gadgets such as computers, telephones and the internet (Owusu, 2011).

Yet in such an environment it is the expectation of the government to integrate ICT into teaching and learning. In pursuance of that objective, Ghana has developed a National Science and Technology Education Policy. Within this policy is an education policy. According to this policy, ICT should be integrated into teaching and learning at all levels. For that purpose, there is the need to train teachers to use ICT for teaching at all levels among other things. This should be done through in-service education and training (INSET) and pre-service training (National Science and Technology Education Committee, 2004). This has not been very successful because although ICT is an examinable subject in primary, junior high school, senior high school and all teacher training institutions and universities, teaching is done by chalk and markers and internet facilities leave much to be desired. At the University of Cape Coast, which is the leading higher institution for training teachers, most of the teaching staff do not use ICT in teaching. The lecture halls themselves are not equipped with such facilities. If you have a projector you can use ICT (computers) in teaching if there is no black out. The electricity can also be problematic since it is not totally reliable. Some of the high ranking members of the university system even label themselves as BBC (Born Before Computers) and therefore make no effort to learn how to use them effectively let alone introduce students to them. This situation frustrates the integration of ICT into teaching and learning. Thus in almost all teacher training institutions ICT has not been really integrated into teaching and learning. One area that has been seen as effective in promoting the integration of technology in teaching and learning is to equip teachers with such skills.

Problem

Realizing the importance of teachers in the integration of ICT in teaching and learning, we decided to introduce some of our teachers to PowerPoint presentation although there were no adequate ICT facilities in the lecture halls at the University of Cape Coast for teaching and learning.

For the second semester I (Principal Author) taught a course FDC 262: Integrated Science Two which covered the topics: Atomic Structure; Electronic Configuration; Ionisation Energy; Food and Nutrition; Dentition; and Digestive System in Human Beings. For the purposes of assessment each student took one quiz, one take-home assignment, one seminar presentation and a final examination. The final examination formed 60% of the final mark while the rest took the forty percent. The total number of the students I had for the 2011/2012 academic year was twenty-nine. I thought it would expedient to equip this group of students with PowerPoint skills. Realizing the abundance of information on science lessons on the internet, which were already in PowerPoint presentation format, I availed myself of some of them. Meanwhile there was only one projector, which was used by the whole of the department to which I belonged and the electricity supply was not reliable. In terms of ICT equipment the story was not different from the other departments. Even for the few departments that had projectors they had all broken down. Will it be possible to equip the teachers with skills in PowerPoint presentation considering the paucity of ICT facilities at the University of Cape Coast for teaching and learning?

The purpose of this study was to introduce the teachers to PowerPoint presentation in the face of poor ICT resources through modeling and cooperative learning and then evaluate the exercise. The study specifically answered the following questions:

1a. Will teachers be able to make their Power Points using cooperative learning?
1b. How successful will the teachers be with the Power Points?
2. Will the PowerPoint experiences be useful to the teachers?
3. Will the teachers face challenges in (a) making the Power Points and (b) in learning with PowerPoint?
4. What will be the perceptions of the teachers about teaching their pupils using Power Point?
5. What is the attitude of the teachers towards teaching and learning using PowerPoint?
6. What improvements will the teachers expect in future PowerPoint lessons?

Literature Review

Cooperative Learning

Cooperative learning, is individuals learning in a group toward a common goal in which each person contributes to the outcome (Felder & Brent, n.d.; Li & Lam, 2013; Neo, 2005, Taylor, 2012). Some of the characteristics of cooperative learning are: (a) team members contribute what they possess, (b) team members rely on one another, and (c) team members are accountable towards the group's success (Johnson & Johnson, Johnson, Johnson & Holubec; Kagan, cited by Li and Lam, 2013). Cooperative learning can be used in the following situations: assignment given to students with respect to class lectures, laboratory or project work (Felder & Brent n.d.). Because the members of the group share resources, it has been used successfully in teaching and learning with respect to ICT (Cebrian-de-la-Serna, Serrano-Angelo, & Ruiz-Torres, 2014; Johnson, Johnson, Stanne & Garibaldi, 2001; Neo, 2005; Neo, Neo, Wai-Jing, 2012; Trytten, 2001). Cooperative learning provides students with structure and guidance, and also provides teachers with control (Cebrian-de-la-Serna, 2014).

The main underpinning theory of cooperative learning is social constructivism (Akcay & Yager, 2010) proposed by Lev Semyonovich Vygotsky (1896-1934). According to Vygotsky learning is based on culture, society and language. He considered the roles of culture and society, language, and interaction important in understanding how humans learn. This means we learn by interacting and communicating with others. Upon an examination of the influence of our social environment on our learning process, Vygotsky suggested that learning takes place through the interactions students have with their peers, teachers, and other experts. The implication of this, is teachers can create learning environments which optimise the learner's ability to interact with (Neff, n.d.).

ICT in Education

Literature reveals the importance of ICT in education (Osborne, & Hennessy, 2003; Valk, Ahmed, Rashid, & Elder, 2010). In some countries like the United States and Canada ICT has been incorporated in the education sectors as a tool for administration, management and in curriculum for both teaching and learning processes (Kamau, 2012). For the survival of any country into the 21st century, ICT needs to be integrated into its education system (James, 2011). It is believed that ICTs can generally transform teaching and learning processes by: (a) empowering teachers and learners; (b) facilitating communication and interaction; and offering new modes of delivery (Valk, Ahmed, Rashid, & Elder 2010). ICTs have been used for teaching and learning in secondary schools (Nganji, Kwemain, & Taku, 2010) primary schools (Beauchamp & Parkinson, 2008) and in institutions of higher learning (Zare-ee, 2011). In school science for example, there is a wide range of ICT tools that can be used. Some of these are: for capturing data, processing and interpretation, data logging, databases and spreadsheets (Osborne & Hennessy, 2003).

Despite ICTs importance in education there are constraints in its availability and use for teaching and learning. These are more pronounced in developing countries (Williams, Emma, Pitchforth, & O'Callaghan, 2010). In these countries the constraints of ICT in higher education are mainly those of implementing e-learning (Sife, Lwoga & Sanga, 2007). For example, universities in Africa are not playing their leadership role in the ICT revolution because they themselves are not well prepared. This is because of the poor development and inadequacies in the development of ICT infrastructure and inequalities in its distribution (Association of African Universities cited by Sife, Lwoga & Sanga, 2007). Some of the challenges of ICT in education in developing countries in general range from inadequate facilities (Kamau, 2012) poor download speeds (Williams, Emma, Pitchforth, &O'Callaghan, 2010), to lack of expertise, financial constraint and traditional mindset regarding teaching and learning (Park, & Moser, 2008).

There have been efforts in developing countries such as Africa to promote the use of ICT in education through the use of public-private partnerships (PPP) in the form of complex partnership between companies, government ministries, development agencies, schools and civil society organizations and simple bilateral partnerships between IT companies and national ministries of education. According to literature the efforts are yielding fruitful results (Information for Devlopment Programme, 2008).

Empowering Teachers with Computer Skills.

Because of the impact ICT has on teaching and learning, and the need to integrate it into classrooms, it is necessary to equip teachers with ICT skills. This is because enriching of lessons with ICT to make them effective and monitoring of the lessons mediated by ICT depends on the teacher (García-Valcarcel, 2010). Recognizing the importance of ICT in teacher training because of the role teachers play in its integration, many countries have made efforts to train teachers in ICT (Jung, 2005). This is done in pre-service training or through in-service training (Nussbaum-Beach, 2003). Literature (Gaible & Burns, 2005; Nussbaum-Beach, 2003) suggests guidelines to use in such training such as hands-on and/or job-related**.** There are however hindrances to the integration of ICT into teacher training. In a survey on the use of technology in teacher education in the US, it was found that many of the faculty members did not model or practice effectively technology use in the classroom. With respect to the field experiences of the pre-service teachers although technology was available in their schools of practice they seldom used them. Even in some developed countries some teachers are not competent to use technology and there is unwillingness on the part of some to integrate technology in their instruction (Kadzera, 2006, Milken Family Foundation, 2000).

Thompson cited by Kadzera (2006) observed that even in the universities not everyone uses technology in their instruction. However in some cases training teachers in technology has yielded positive results (Nussbaum-Beach, 2003; Zhao, & Bryant, 2005). One reason why teachers do not like using computers is because they do not believe in its effectiveness (Royer, 2002). Royer further added that engaging in action research is one avenue that can help teachers to know the effectiveness of ICT in teaching and learning and therefore use it.

The Use of PowerPoint in Education

PowerPoint is a widely used presentation program that originated in the world of business but has now become commonplace in the world of educational technology. However, its use is far from controversial in the educational context and opinions as to its use range from highly supportive to significantly negative (Lowry, 2003; Szabo & Hastings, 2000). One of the major problems is that its current use is frequently limited to an information transmission mode, often with excessive content, a usage that obscures the wider potential for diverse professional and pedagogically-sound presentations (Allan, 2003). In the educational sector, especially at the university level, PowerPoint is used to deliver lectures, as well as delivering staff development sessions. It is our contention that PowerPoint is a valuable aid to teaching and learning and therefore must be embraced as such.

PowerPoint presentation has some more benefits. Some of the benefits are:(a) It can enhance the teaching and learning experience for both staff and students; (b) It provides encouragement and support to staff by facilitating the structuring of a presentation in a professional manner; (c) The electronic file format allows distribution and modification for/by students unable to be present or who have impaired visual or auditory difficulties; (d) Editing of each PowerPoint file is very easy with minimal associated reprinting costs, and (e) the portability of the files, allows presentations to be given wherever the technology is available or distributed where appropriate (Allan, 2003; Beakes, 2003; Mills 2003; Mottley, 2003; Race 1999)

In terms of its use within the curriculum, there are many potential options available, limited only by the nature of the subject and the creativity of the user (Mills 2003). Clearly it is most commonly used in lecture/seminar situations, often largely in information transmission mode. There are diverse ways that PowerPoint can be used, even during lectures and seminars, including: delivering automated instructional protocols in laboratory sessions; gathering the outcomes of discussions and polls during class activities; providing tests and options for consideration during class sessions; question and answer sessions; and provision of self-study sessions with feedback after the class activity (Forsyth, Jolliffe, & Stevens, 1995; Maier, Barnett, Warren, & Brunner, 1998; Mottley, 2003).

PowerPoint presentation provides a whole range of pedagogical options (Maier et al, 1998) that can be incorporated in the curriculum to facilitate learning by those with different learning styles. In fact, PowerPoint

presentation, if integrated and used properly, encourage and support more professional delivery of teaching and learning materials and thus facilitate student learning.

Method

Participants

In all, 20 teachers formed the sample for the study. This formed 69% of the population of the teachers. They were all level 300 students who had already completed the initial teacher training in the Colleges of Education where they obtained a diploma in Basic Education. Their highest academic qualification was West Africa Senior Secondary Certificate (WASSSC). This is the certificate acquired on completion of the Senior High School. Their highest professional qualification was Diploma in Basic Education. They were pursuing a post-diploma degree program in Basic Education. Science was their minor subject. The sample comprised 12 (60%) males and 8 (40%) females. Nine of the teachers, representing 45% taught at the Junior High School (JHS) whereas 11 (55%) taught at the primary school level. Out of the 11 who taught at the primary schools, eight (40%) taught at the upper primary level while the remaining three (15%) taught at the lower primary level. In Ghana the basic school consists of 6 years of primary education 3 years of JHS education. The primary school comprises 3 years of lower primary and 3 years of upper primary.

All the respondents were Senior Superintendents who had taught for various years. The distribution of the teaching experience of the respondents ranged from 2 to 10 years. The majority (30%) of the teachers had taught for two years. Twenty five percent had taught for seven years. Only 10% had taught for ten years.

Research Design

The study was an action research in which we used qualitative and quantitative methods for data collection. The qualitative methods were interviews and observations. The instrument used for the collection of the quantitative data, was a questionnaire. The questionnaire consisted of four sections, namely Sections A, B, C and D. Section A sought information on the background characteristics of the respondents. Section B gathered information on the respondents' perceptions of learning with PowerPoint presentations. In Section C, information was sought on the respondents' experiences with PowerPoint presentation and in Section D the respondents' attitude toward teaching and learning using PowerPoint presentations was sought. Both open and close ended items were used in constructing the questionnaire. There were 16 statements on attitude to teaching and learning using Power Point for Section D, with the options: Strongly Agree, Agree, Uncertain, Disagree and Strongly Disagree. It was a 5 point scale in which Strongly Agree was 5 and Strongly Disagree was 1. The attitude section of the questionnaire had a Chronbach's alpha reliability coefficient of 0.76. We developed the instrument ourselves based on information from the observations we made during the presentations and by interviewing a few of the teachers.

Procedure

There were three main stages to this section. In the first stage I the principal author used PowerPoint presentation to teach (model) the topics with respect to the chemistry aspect of the course content to the teachers for them to observe. In the second stage the teachers taught the topics related to the biology aspect of the course content using PowerPoint. Then the third and final stage was the evaluation of the first two stages. I (Principal Author) downloaded a number of PowerPoint presentations on the topics for the second semester: Atomic Structure, Electronic Configuration and Ionisation Energy. I then modified them by deleting or adding more slides to produce the results I wanted. Using the Power Points, I taught: all the chemistry content. I also made them aware that they were going to make Power Points for their presentations therefore they should observe how I taught using the Power Points.

In the course of my teaching I demonstrated some of the advantages of teaching with PowerPoint such as going backwards and forwards to previous and current slides and showing pictures of scientists with respect to the historical accounts. I also tried to involve them by asking them questions related to the information on the

slides at times I asked them to use their own words to explain information on some of the slides. After I had completed my portion of the teaching which took four weeks, the teachers had their turn to make their seminar presentations in Power Point based on the Biology topics: Food and Nutrition, Dentition, and Digestive System in Human Beings. The teachers formed groups of their choice. There were 6 groups. Two of the groups made presentations on Food and Nutrition, two on Dentition, and two on the Digestive System. Each group made one presentation. My co-author and I handled the seminar presentation aspect. We observed them and took turns to video tape their presentations. At the end of the Power Point presentations the teachers were given evaluation forms (questionnaires) to complete.

Results and Discussion

Will the teachers be able to make their Power Points using cooperative learning?

The teachers obtained information from three main sources. Out of 30 responses the majority (40%) of the teachers mentioned internet as their main source of information and this was confirmed by the observations we made. This was followed by science text books (30.0%) and the handout given to them (25%). Very few of them (5%) indicated that they relied on friends from other departments. The nature of the reliance was not established but probably they relied on them for laptops. This is because one of the participants when interviewed said this:

> *My roommate has a laptop, so although he does not do the same course with me I borrowed his laptop, which had a modem to download information for the presentation.*

The responses indicate that students have access to the internet, which is an improvement in ICT availability in Ghana (Achampong, 2012) and also concurs with Information from Development Programme, (2008) about improvement in ICT availability in developing countries. The responses from the questionnaire and the interview revealed that the teachers could access the university wi-fi or use an internet café. Only one of them, a female (who lived off campus) owned a modem and used it as a source of internet. Since the majority 13(65%) of them did not own laptops as was revealed from the questionnaire, it is expected that some of them will use the textbook. Of the six groups in which each group had a composition of no less than 4 teachers and no more than 5 teachers, the interview revealed the maximum number of those who owned their own laptops in a group was two and this was in only one group. In each of the other groups, only one of the members of the group owned a laptop. Some of them as indicated in the interview borrowed laptops from friends who were not their course mates. The responses reveal they worked as a team and their contributions depended on the resources and skills they had or borrowed. Those who were skilled in making animations contributed in that respect. Data from the questionnaire revealed that some of them arranged the slides, others typed the information on the slide, others offered their laptops, some of them designed the background and some of them provided information from the internet. These were responses given in their answer to the role they played in the PowerPoint task. Thus the teamwork helped to solve the challenges they would have encountered if they had worked alone. This is in line with learning in which students become teachers through peer tutoring and reciprocal mentoring (Computer Aid International, 2011). Also the benefits of cooperative learning of pooling resources to achieve a common goal are manifested (Johnson & Johnson, Johnson, Johnson & Holubec; Kagan, cited by Li and Lam, 2013).

How successful will the teachers be with the Power Points?

The yardstick for success was the ability to produce PowerPoint slides on the topic in a logical manner and presenting the information by talking to the Power Points. All the teachers were able to develop Power Points. But other observations were made based on the lesson observation and content analysis of the videotapes on the lessons. Some of the slides for example, in one of the groups that worked on "Dentition" were not very

clear. Three of the groups produced animations, which we were not expecting.   In one group it was sound animation. One of the groups that worked on digestion produced motion pictures. About 50% of the slides which, were diagrams, were downloaded directly from already prepared PowerPoint lessons from the internet. This means that they have learned to avail themselves of teaching and learning resources on the internet. With respect to the presentations the members of each group took turns. The presentations in almost all cases were read directly from the slide. This tended to make it more of a lecture, which is a negative use of PowerPoint presentation (Allan, 2003). In all the presentations only one teacher operated the computer. Whether the rest knew how to operate the computer in PowerPoint presentation was not investigated. Individual success in making Power Points was not assessed.

Will the PowerPoint experiences be useful to the teachers?

When asked to indicate whether PowerPoint presentation was useful or not, all the respondents responded in the affirmative. The teachers were then asked to offer at least three reasons for their responses. Table 1 shows how the teachers found the PowerPoint presentations useful.

Table 1
Usefulness of PowerPoint presentations to Teachers (N = 20)

Usefulness	f	%
As a teaching tool	9	45.0
An eye opener	5	25.0
Demystifies teaching learning of science	5	25.0
For summarizing lessons	1	5.0

It can be seen from Table 1 that the main reason why the teachers found PowerPoint presentations useful was because PowerPoint can be used as a tool for teaching. The issue of using PowerPoint presentation to summarize lessons did not matter to most of the teachers. Generally all the reasons have relevance for the teaching and learning of science which is good. Some of the examples of responses offered by the teachers in relation to the reasons given in Table 1 are presented in Table 2.

Table 2
Category and examples of responses by teachers on usefulness of PowerPoint Presentation

Usefulnesss	Example of response
As a teaching tool	All teachers must be encouraged to use PowerPoint in teaching. Should I get the facilities, I will always use PowerPoint in teaching.
An eye opener	It was the first time in my life to use PowerPoint to teach. It has made me feel proud that I am now part of the modern teachers who use technology to teach.
Demystifies teaching/learning of science	It enhances understanding especially when the presentation incorporates diagrams and pictures. It makes lesson interesting and colourful. It was able to attract and sustain my interest throughout the lesson.
To summarize lessons	The main points in the lesson are projected. It helps to highlight the main points. It makes lessons real as the main points in the lesson are projected.

One teacher who was interviewed had this to say about using PowerPoint in teaching:

> *It makes the lesson interesting. You don't need to write a lot on the board. You the teacher it helps you to learn a lot because only points are used in PowerPoint but you have to explain.*

Another teacher said that:

> *It reduces the pressure on the teacher. It makes the whole lesson very simple.*

That PowerPoint highlights the main points in a lesson and also the favorable view to PowerPoint reported in this study is in line with Weimer (2012). Contrarily a poll of 4500 undergraduates revealed significantly that students were unhappy with the way technology especially, PowerPoint, is used in lecture halls (Young cited by Adams, 2006). The fact that the teachers found the PowerPoint presentation useful is in line with what Patel (2007) found that more than 90% of teacher trainees found lectures with PowerPoint interesting and meaningful.

Will the teachers face challenges in (a) making the Power Points and (b) in learning with Power Points?

The teachers were also asked to state some of the challenges they faced during the preparation of the PowerPoint presentation. The responses are shown in Table 3.

Table 3
Challenges Faced by the Teachers in PowerPoint Preparation (N = 20)

Challenge	f	%
Difficulty in slide preparation and arrangements	9	45.0
Access to computer	5	25.0
Time consuming	1	5.0
Group meetings	4	20.0

As indicated in Table 3, the main challenge faced by the teachers in preparing Power Points was difficulty in slide preparation and slide arrangement. This is not surprising since to some of them as the interview and the questionnaire revealed that was their first time. Examples of these responses we obtained from their responses in the questionnaire are shown in Table 4.

Table 4
Category and example of responses by teachers on challenges of using PowerPoint presentation

Category	Example
Difficulty in slide preparation and arrangements	At first we did not know how to arrange the information. How to create various slides for each sub-topic was a problem. The use of animations and slide effects was our major challenge.
Access to computer	We were using only one laptop and this prevented us from practicing how to do it on our own. I had to wait to use a friend's laptop since I do not have one. Unwillingness of friends to give us their laptops.
Time consuming	It was difficult and time consuming. It was really tiresome.
Group meetings	As we are all teachers, coming together as a group was a problem. Inability mobilizing group members.

The interview corroborated some of the teachers' challenges. The teachers who were interviewed expressed their challenges in the following ways:

First exposure I found it difficult to write anything. By the end of the lecture I wouldn't have written anything. Because I listened to the explanation before writing. By the time I am ready to write a new slide appears. But now I have adjusted to it. I make sure I write the notes before getting the understanding. Then whatever I don't understand I ask friends.

We were 5 in the group and only 2 had laptops so contribution was less since those who couldn't get access to laptop could not contribute.

I have not owned a laptop before. I want to own a laptop but I do not have money. Secondly I was posted to a village without electricity and thus the motivation to own one was not there because of lack of electricity. It was when I came to read the course that I saw the need for it. But I cannot afford it because I have to pay school fees.

There was a time I needed the laptop and he (roommate) was also doing his assignment with it therefore I had to wait for him to finish. When he got tired of working I then had access to the laptop.

I want to own a laptop but I cannot afford it. Although I am on study leave with pay I cannot afford it because I have a lot of responsibilities.

Sometimes we decide to meet and then he can't come and because he owns the computer we had to leave. This happened about 5 times.

The group work posed problems because of absenteeism of some of the group members because they have extra classes.

While the challenges of getting information from PowerPoint presentations were overcome the lack of cooperation and lack of computers remained as real challenges. The lack of computers made some of them free-riders (Dobson, 2006).

Some of the responses show that some of the digital divide identified by Dijk and Hacker cited by Fusch, (2008) were at work among the teachers. These are: (a) The lack of material access; (b) The lack of skill access, and the lack of usage access. The situation confirms the challenges in ICT faced by developing countries (Panos, 2010; Williams, Emma, Pitchforth, & O'Callaghan,2010) and for that matter Ghana (Ministry of Education and Science, 2006; Owusu, 2011). The lack of computer competences by teachers is not strange because this has also been observed in teachers in developed countries (Milken Family Foundation, 2000). This situation does not augur well for the integration of ICT into teaching and learning. There is the need to help teachers learn computer skills because it is useful in the teaching and learning situation.

What will be the perceptions of the teachers about teaching their pupils using Power Point?

Majority of the teachers (70%) expressed the desire to use PowerPoint for teaching in their schools. But they felt handicapped because of the problems they encountered in their schools some of which they stated in the questionnaire as:

My school does not have electricity. My children will like it because they are fascinated by computers and visit private cafes. During holidays people from Accra come there to offer computer classes.

I want to teach with PowerPoint but school, we do not have the facility.

In a study it was found that out of the 45 primary schools sampled in Cape Coast metropolis in Ghana, only 9 of them had computers and out of the nine only 3 had internet connectivity (Boakye, 2010). Some of the teachers in this study taught in primary schools in Cape Coast metropolis therefore their complaints are likely to be genuine. Their desire to use PowerPoint is in contrast with the unwillingness on the part of some teachers to integrate technology in their instruction (Kadzera, 2006; Milken Family Foundation, 2000). The intervention of observing the lead author model Power Point presentation and their involvement in the making and presentation using PowerPoint probably made them to desire to use that skill in their lessons.

What will be the attitude of the teachers to teaching and learning using PowerPoint?

A research question was formulated to determine teachers' attitude towards teaching and learning using PowerPoint presentation. From the mean scores obtained on the 16 items, the teachers were found to have a positive attitude towards teaching and learning using PowerPoint presentation. The mean, standard deviation and percentage responses by teachers are presented in Table 5.

Table 5
Mean, Standard Deviation and Percentage Responses of Teachers' Attitude to Teaching/Learning Using PowerPoint Presentation (N = 20)

Item No	Statement	Percentage responses					Mean	Std. dev
		SA	A	U	D	SD		
25	PowerPoint lessons are interesting.	65	35	0	0	0	4.7	0.5
26	For enhancing understanding, PowerPoint lessons are useful.	40	55	5	0	0	4.4	0.6
27	PowerPoint should be for teaching when there are no better options.	15	40	5	20	20	3.1	1.5
28	It is preferable to receive notes from a lesson than to be taught using PowerPoint	0	10	30	55	5	2.5	0.8
29	It is easy to concentrate in lessons presented by PowerPoint	55	40	5	0	0	4.5	0.6
30	Too much work has to be done by the students after attending PowerPoint lessons to capture what was taught	5	20	20	45	10	2.7	1.1
31	It is frustrating to be in a class where delivery is by PowerPoint	0	0	25	30	45	1.8	0.9
32	If I had my own way I shall not attend lectures presented by PowerPoint	0	0	5	25	70	1.4	0.6
33	Difficult lessons become understandable when PowerPoint is used	20	45	15	15	5	3.6	1.1
34	When a teacher is not fully prepared to teach then PowerPoint is the best option	0	10	20	35	35	2.1	1.0
35	The burden of preparing slides for lessons using PowerPoint far outweighs its usefulness	5	10	40	25	20	2.6	1.1
36	All teachers should learn to teach using PowerPoint	65	35	0	0	0	4.7	0.5
37	If I have to change schools I shall want one with facilities so that I can teach using PowerPoint	70	30	0	0	0	4.7	0.5

38	Teachers must own computers to enable them prepare lessons using PowerPoint	70	20	5	0	5	4.5	1.0
39	Teaching with PowerPoint does not make a teacher creative	0	0	15	30	55	1.6	0.8
40	Teaching with PowerPoint is exciting	55	45	0	0	0	4.6	0.5

SA-Strongly Agree	A-agree	U-Uncertain	D-Disagree

SD-Strongly Disagree

It can be seen from Table 5 that teachers on the whole liked teaching and learning with PowerPoint except that majority (55%) of them felt if there were better options, then PowerPoint should not be used (Item 27). This is understandable because for science there are better options than PowerPoint that can help students have firsthand experience and also manipulate equipment. This reinforces the criticisms about PowerPoint in teaching and learning that Hennesy, Ruthven and Brindley (2005) found that involving English, mathematics, and science teachers with respect to the integration of ICT would prevent them from imparting subject-specific skills that students needed to acquire.

The maximum (excellent/high) attitude expected of the participants is valued at 1600 ($5 \times 16 \times 20$) and the minimum (low) attitude value is 320 ($1 \times 16 \times 20$). The uncertain value is also valued at 960 ($3 \times 16 \times 20$). It can be calculated from Table 5 that the total mean obtained for the 20 participants was 1070 (53.5×20). This mean value is less than the maximum attitude value but greater than the uncertain value which means that the participants' attitude toward teaching and learning of science using PowerPoint presentation is positive.

A null hypothesis was tested to find out if any significant difference exists between female teachers and their male counterparts with respect to their attitude to teaching and learning using PowerPoint presentation. From Figure 1, there was a difference between female teachers and male teachers concerning their attitude to teaching and learning using Power Point.
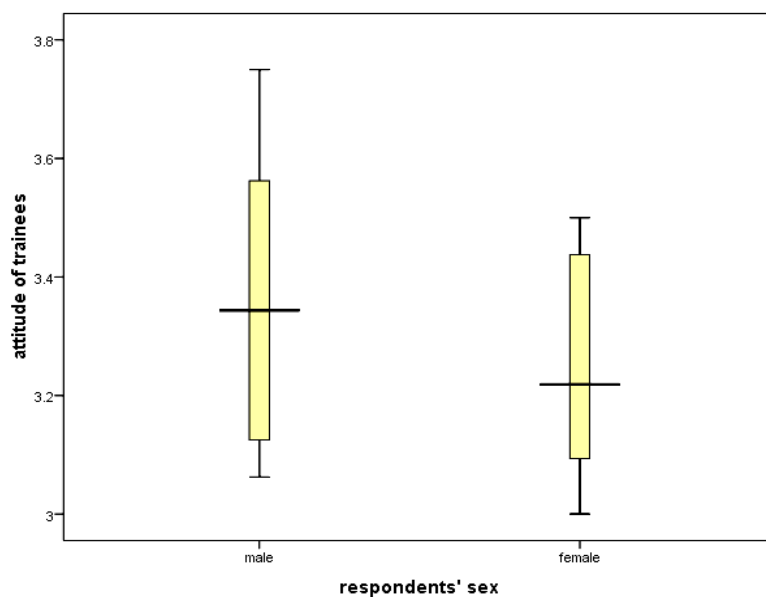

Figure 1: Boxplot showing the distribution pattern of female and male teachers' attitude to teaching/learning using Power Points

An Independent samples t-test was further conducted to investigate if the above observed differences were statistically significant. Table 6 shows that the results of the test were not statistically significant, $t(18) = 1.01$, $p = 0.33$. Female teachers ($M = 3.25$, $SD = 0.19$) and their male counterparts ($M = 3.36$, $SD = 0.26$) do not differ in their attitude to teaching and learning using PowerPoint presentation.

Table 6
Independent Samples t-test on attitude teaching/learning using Power Point presentation between male and female teachers

Variable	Group	Mean	Std dev.	t	p-value
Teachers attitude to teaching and learning using PowerPoint presentation	Male	3.36	0.26	1.01	0.33*
	Female	3.25	0.19		

*Not Significant, p > 0.05   degree of freedom (df) = 18

What improvement will the teachers expect in future PowerPoint lessons?

The final question sought information from the teachers about how to improve future PowerPoint presentations. In all, the respondents provided 25 suggestions and they are categorized as shown in Table 7.

Table 7
Improvements Teachers Expect in Future PowerPoint Presentation (N=20)

Category	f	%
Provision of facilities to both teachers and students	7	35.0
Slide preparation and arrangement	6	30.0
Notes taking	4	20.0
Time allocation	3	15.0

It can be seen from Table 7 that the major improvement they expected was the provision of facilities. This is expected in view of the challenges they faced in the slide preparation because the majority of the participates did not have computers. This is also because the interview revealed that after they were introduced to PowerPoint presentation in the lead author's lessons, they attempted to make their presentations for other lecturers in PowerPoint but they could not obtain a projector for that despite the many attempts they made. This shows that the intervention motivated them to the use of Power Points in presentations.
Detailed examples of the suggestions for improvement are provided in Table 8.

Table 8
Suggestions and Examples of Responses by Teachers on Improvement of Future Presentations using PowerPoint Presentation

Category	Example
Provision of facilities to both teachers and students	Equipment like projectors and laptops must be provided at all lecture halls.
Slide preparation and arrangement	Slide preparation and arrangements should be taught as a course to all students. Students should be taught on how to use PowerPoint before doing it on their own since it was most of us our first time. Too much information on a slide. Number of slides should be plenty.
Note taking	Students should be allowed to make notes before moving to the next step. Presenters should take time for the learners to understand and put something down before moving to the next slide.
Time allocation	Enough time must be given to each group during the presentation. More time should be allocated for the presentation.

The need for slide preparation to be taught is in the right direction because for most (60%) of them that was their first time of making Power Points and in introducing them to it they were not formally taught how it was done they depended on the expertise in the group and they also sought help from colleagues in other departments as was given in their responses in the questionnaire. I, the lead author only taught them how to access PowerPoint lessons on the internet and how to modify them by deleting and inserting slides.

On the time allocation one interviewee suggested this:

> *I suggest that enough time should be given for copying before explanation or explanation should be done before copying.*

This shows one of the negative effects of PowerPoint where it becomes a lecture and students write notes verbatim (Allan, 2003).

Conclusions

The study revealed that with the help of cooperative learning, the teachers were able to make and use PowerPoint in their presentations. But this was not without individual and group challenges. Some of the teachers have challenges with making Power Points, which are still not met. The teachers generally find learning with Power Points interesting and have a positive attitude towards teaching and learning with Power Points. They expressed the desire to be formally taught the making of Power Points.

The lack of individual computers compounded the challenges of the teachers to effectively learn the needed skills. Although cooperative learning was good for achieving the group task of developing PowerPoint skills, the lack of individual computers did not make it useful for mastering the skills individually. The modeling did not influence their presentation much because they all read verbatim the information on the slides.

Recommendations

Although the study used a small sample of teachers that was not randomly sampled and therefore the findings are not generalizable, nonetheless it provides important considerations for equipping teachers with PowerPoint skills in a technologically challenging environment like Ghana.

Because one of the main findings is the general lack of PowerPoint skills among the teachers, there is the need to impact PowerPoint skills to basic school teachers in Ghana through in-service training programmed which can make use of cooperative learning so that the teachers can help one another. But teachers need to own their own computers for effective learning of the skills through cooperative learning. The Ghana Education Service can address the need of some of the teachers for computers by forming partnerships with Non Governmental Organizations such as Computer Aid (Computer Aid, 2011) to donate computers to some of the basic school teachers in need of them. Alternatively all basic schools should be equipped with ICT facilities so that the teachers can avail themselves of them. One other avenue for equipping basic school teachers with the skill is for pre-service training to equip basic school teacher trainees with Power Point skills so that the teachers come out already equipped with the skills.

The basic schools in Cape Coast metropolis and for that matter all basic schools in Ghana should be equipped with ICT facilities because the teachers expressed the desire to use PowerPoint in their teaching but the lack of these facilities in their schools poses a challenge.

Since none of the lecturers in my department uses PowerPoint in their lectures we are going to impress upon them the need to do so. Some of them have even started emulating our example. We are also going to impress upon our Heads of Department to make available ICT for teaching and learning. It is one of the strategic plans of the University of Cape Coast to provide ICT facilities for teaching and learning. Hence we are going to use PowerPoint for teaching and also we shall make our students do their presentations by using PowerPoint.

Because some of the teachers were not able to learn effectively from the intervention and some of them expressed the desire to learn Power Point formally, we decided that for the next cohort of students we were going to let them have formal training in PowerPoint presentation.

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