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Information and communication technology access and use and competency level among second-cycle school teachers in Ghana

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One hundred second-cycle school teachers in Ghana (average age 38) were surveyed to explore their access to and the use of information and communication technology (ICT) tools, and their level of competence. The Global Citizenship Survey instruments were adapted to collect the data. The study adopted the descriptive research design and data was analysed using descriptive statistics and Chi square test. The findings of the study showed that majority of the teachers have access to ICT tools such as computers, mobile phones, the Internet and personal digital assistants. In addition, the results indicated that majority of the teachers use 1) mobile phones and e-mail for social communication; 2) the Internet for research and professional development, and 3) computer for teaching and learning. Furthermore, according to the results of the study most of them possess high competence level in ICT applications such as word processing, the Internet, and e-mail; but have low competency in database and multimedia application software required for the design of 1) activities related to classroom management and assessment and 2) activities to cater for individual learners' learning needs. The study provides new and relevant information for educational policy makers, practitioners, researchers and instructional design and technologists for effective planning and training towards successful implementation of ICT into education.

Key words: Information and communication technology (ICT) integration, ICT use; access to ICT tools; ICT competence, second-cycle teachers; Ghana.

INTRODUCTION

The integration of information and communication technology (ICT) in education, to some extent, has become one of the issues in improving the quality of educational systems. Kozma (2014) asserts that a

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common rationale for investing in educational ICT is the role it can play in preparing a future workforce and supporting economic development. He explains that in industrialised countries, ICT can advance an information economy and knowledge society through education; and in developing countries, ICT can support education and economic development (Kozma, 2014). The proliferation of ICT and more especially, the spectacular uses of ICT in the 21st century, have created and are still generating more and more expectations that ICT is the engine for achieving the modern aims of higher education. It has been predicted by Johnson et al. (2013) that new emerging technology such as massively open online courses (MOOCs), tablet computing, wearable technologies, learning analytics and 3D printing will have potential impact on teaching, learning and research in educational institutions in the next five years.

According to Prensky (2001), most teachers in educational institutions are classified as "Digital Immigrants" and they struggle to teach a population that speaks and behave differently who are known as "Digital Natives". There is a critical need to bridge the gap between digital immigrants and digital natives for successful integration of ICT into education. However, there are a number of factors that affect successful integration of ICT in teaching and learning, and also for bridging the gap between digital immigrants and digital natives to promote the development of the 21st century competencies. According to Land and Hannafin (2000) and European Schoolnet and University of Liege (2013), teachers' access and use of ICT tools as well as their competencies are among the critical factors that need to be considered for efficient and effective integration of ICT into teaching and learning

There are a lot of internet cafes in most cities and towns in Ghana and the use of different kinds of cell phones has become out of control in Ghana (Sarfo and Ansong-Gyimah, 2011). The Government of Ghana recognized the essence of computer technology and therefore introduced ICT in education to support quality teaching and learning (President's Committee on Review of Education in Ghana, 2002). However, unlike other advanced countries, in Ghana, there is scanty scientific evidence on the critical factors such as 1) teachers' access and use of ICT tools and 2) teachers competencies in the use of ICT tools, which have to be considered for successful integration of ICT in secondary education in specific. For instance, Sarfo and Ansong-Gyimah (2011) conducted a study on ICT access and use but the focus was on secondary school students but not the teachers. To fill the gap in the literature and to enable educational policy-makers and practitioners to plan for effective and efficient intervention for successful integration of ICT into education, the present study is aimed at exploring senior high or second-cycle school teachers' access and use of ICT tools for educational purposes and their competencies in the use of ICT tools.

ACCESS AND USE OF ICT AND COMPETENCY LEVEL OF TEACHERS

Information and communication technologies (ICT) is an extended term for information technology (IT) which focuses on the role of unified communications and the integration of telecommunications, computers as well as necessary enterprise software, middleware, storage and audio-visual systems, which enable us to access, store, transmit and manipulate information (Wikipedia, 2016). In the common usage, it is often assumed that ICT is synonymous with IT. ICT, in fact, encompasses any medium (e.g., magnetic tape/disk, optical disks (CD/DVD), flash memory, etc. and arguably also paper records) to record information; technology (e.g., radio and television) for broadcasting information; and technology (e.g., microphone, camera, loudspeaker, projector, telephone to cellular phone) for communicating through voice and sounds or images (Elen et al., 2010). It includes the wide varieties of computing hardware (PCs, servers, main-frames and networked storage), the rapidly developing personal hardware market comprising mobile phones, personal devices, MP3 players and many others (Elen et al., 2010). Toomey (2001) also relates ICT to those technologies that are used for accessing, gathering, storing, manipulating and presenting or communicating information. These include hardware (e.g. computers and other devices); software applications; and connectivity (e.g. access to the Internet, local networking infrastructure and video conferencing) that can be used for educational purposes. To Corbeil and Valdes-Corbeil (2007), mobile technologies have also penetrated into education though according to Alamäki and Seppälä (2002) and Motiwalla (2007), the use of mobile technologies in education is still in its infancy. In this paper, ICT would mainly refer to computers, the Internet, mobile phones and personal digital assistants such as iPad.

Bingimlas (2009) indicates that ICT will be an important part of education for the next generation. This may be due to the fact that the emerging ICT tools offer several means of supporting education across the curriculum and improving teaching and learning in the classroom. It is therefore envisaged that ICT in education has the potential of bringing about some changes in the manner of instructional delivery. Wong et al. (2006) pointed out that technology plays a part in supporting face-to-face teaching and learning in the classroom. Many researchers and theorists, according to Bingimlas (2009), assert that the use of computers can reduce the amount of direct instruction given to students, and give teachers an opportunity to help students with particular needs. Teachers can also use ICT tools to prepare and present their lessons.

By integrating ICTs in the education process, Voogt (2003) as cited in Mikre (2011), indicated that ICT is used as a tool for collecting data and documentation, communicating and conducting research. The use of ICT

in this case is typically independent from the subject matter. In the study conducted by Mwalongo (2011), it was revealed that ICTs are used by teachers for communication, personal development, research and entertainment. Furthermore, Mwalongo (2011) revealed that ICTs are used for preparing school announcements, reports, examinations and examination results, scheme of work, letters and student registration. According to Leshin et al. (1992), ICT is used for a) planning, organising and scheduling instruction, b) evaluating learner (testing), c) performing statistical data on learners, and d) collecting data on learners. These are common administrative ways of using ICT in education.

Moreover, according to Eze and Olusola (2013), technology has capability to improve the professional environment for educators. Through the application of internet and internet to research and collaborative planning, teachers can connect to both local and external resources for their professional activities rather than relying on the isolating environments that the teaching profession imposed on them in the past. As such educational writers are more and more promoting ICT mediated course delivery as a means of serving large, geographically dispersed populations of already busy teachers (Nichole and Watson, 2003).

According to Lima (2006), the Internet and other ICT tools in general constitute a valuable channel for knowledge dissemination and opportunity for development and growths among nations in the world. There is abundant evidence in the literature to support the proposition that the integration of ICT tools such as computer, mobile phone, Internet, iPad effectively in instruction can facilitate the acquisition of 21st century skills.

However, Land and Hannafin (2000) indicate that pragmatic factors (e.g. lack of access to CT) can inhibit full utilization of ICT like computers, mobile phone and the Internet in teaching and learning. Access and use of ICT are variable assets in effective education. Hence, the benefits of ICT in teaching and learning can be realized if students and teachers have access to ICT tools and use them pedagogically. Several studies show that lack of access to ICT, including home access, is a complex barrier to integration of ICT into teaching and learning (Pelgrum, 2001; Sicilia, 2005; Bingimlas, 2009). Pelgrum (2001) collected data from practitioners in 26 countries on what are the main obstacles to the effective and efficient use of ICT in schools. The results revealed that 4 of the top 10 obstacles are related to 1) insufficient numbers of computers, 2) insufficient peripherals, 3) insufficient software and 4) insufficient simultaneous Internet access.

In the literature on integration of ICT into education, the issue of access and use are related to the question of the “Digital Divide” (OECD, 2004). Digital Divide is defined as the disparity in ICT diffusion and use between industrial and developing countries.

Currently, OECD defines digital divide as the gap between those who are lost in the digital environments and those who have the skills to navigate efficiently and effectively through all information available to them through digital technologies (OECD, 2011).

It can be proposed that the second definition of digital divide more properly suits those in developed and developing countries which have minimal or no difficulties in the access and use. In developing countries such as Ghana, technology is financially expensive and as such teachers’ access to and use of technology in schools (senior high schools in Ghana) might be problematic as compared to what pertains to the developed countries. Access to and use of ICT tools in terms of ratio of teachers and students may differ significantly among the developing countries and advanced countries.

For instance, in the developed countries, a research study conducted by Smerdon et al. (2000), 84% of the teachers surveyed reported having computers in their classrooms, while 95% stated they had computers elsewhere in the schools. The researchers reported that 53% of the surveyed teachers said they used computers for teaching during class time, while 39% of the teachers used the computer for creating instructional materials.

Furthermore, Lau and Sim (2008) also reported in their study that 75% of teachers in the study either daily or weekly use ICT for teaching and instructional support, and 49% of teachers deploy ICT for classroom management activities. It was interesting to realize that teachers who use ICT for personal development and for communication with peers were 12 and 26% respectively. In addition, Lau and Sim (2008) revealed that teachers proved a higher level of competency in using word processing application, teaching courseware, and presentation tools in preparing teaching materials and presenting lessons at the percentages of 71, 63 and 50% respectively. Moreover, in a survey study, Gordon (2004) revealed that secondary school teachers in Scotland made use of ICT as much or more than for professional development and communication as in the classroom.

According to the report by International Tele-communications Union (2012), in the developed countries such as:

1) United Kingdom– 88.6 per every hundred people have access to the internet and for every hundred people, there are 130.8 mobile phones and 87 computers.
2) United States– 75.0 per every hundred people have access to the internet and for every hundred people, there are 98.2 mobile phones and 79.3 computers.
3) Australia– 81.4 per every hundred people have access to the internet and for every hundred people, there are 106.2 mobile phones and 85.2 computers.

In a survey study, European Schoolnet and University of Liege (2013) provide comprehensive report on teachers’ and students’ from 31 European Countries access and use of ICT tools as well as teachers competencies in ICT use in European schools. The results show that a significant number of teachers have access to technology (ICT tools) but they primarily use

technology to prepare for class (and not in class itself).

However, in developing countries such as Ghana, 11 per every hundred people have access to the internet and for every hundred people, there are 100.3 mobile phones, and 13.8 computers; and in Nigeria, 9.1 per every hundred people have access to the internet and for every hundred people, there are 67.7 mobile phones, and 11.4 computers (International Telecommunications Union, 2012).

According to Tella et al. (2007), the use of ICT tools in African countries such as Ghana and Nigeria is generally increasing and dramatically growing. However, specifically, while there is abundant scientific evidence about the availability and use of ICT tools among teachers and students in developed countries, there is not much information in the literature on the teachers' access and use of ICT tools in developing countries in general (Beukes-Amis and Chiware, 2007), and specifically in Ghana.

In Nigeria, as a developing country, Tella et al. (2007) conducted a study on the use of ICT tools among 700 teachers in secondary schools. The results show that 61% of the participants have access to a computer. However, according to the results, none of the respondents had access to the Internet access (Tella et al., 2007). This result, according to the researchers, may be due to the fact that these facilities are not available for access or perhaps the teachers lack the skills to access them. In Ghana, Sarfo and Ansong-Gyimah (2011) conducted a study on access and use of ICT tools among secondary school students. Their study did not reveal any findings about secondary school teachers' access and use of ICT tools and their competencies in the use of ICT tools.

Providing pedagogical training for teachers, rather than simply training them to use ICT tools (computer, mobile phone, internet, etc), is an important issue (Becta, 2004; European Schoolnet and University of Liege, 2013). In addition, teachers are expected to exhibit some level of ICT competencies and confidence to use emerging technologies with principles and methods to promote effective teaching and learning.

In the wake of technology pluralism, educational practitioners, particularly teachers, have no other choice than to learn and adopt ICTs in their routine work. Much deployment of ICT could be realized in schools based on the competence of teachers and this should not be over-emphasized. In reviewing the literature on factors affecting teachers' use of ICT, Mumtaz (2000) recounted the research carried out by Youngman and Harrison (1998) that sought to develop teacher competence and confidence in the use of ICT with portable computers. It was revealed that through training, teachers' confidence and competence changed for the better; they felt that their knowledge of IT had increased 'substantially', teachers changed their ways of working and their enthusiasm for their work increased. Other studies have revealed that ICT accessibility, training and support, and positive perception and motivation of teachers play major role in building up the competence and confidence of teachers to use ICTs to teach (Somekh, 1991; Standholtz et al., 1997). To support the above findings, the results of survey study conducted by European Schoolnet and university of Liege (2013) indicate that teachers' confidence, competence and opinions about the ICT use for teaching and learning affect the frequency of students' ICT use for learning.

As said earlier, it can be argued based on the above literature that there is rigorous evidence about the access and use of ICT tools among (secondary school) teachers and their competencies in the use of ICT tools in the developed countries. In this regard, concrete pedagogical instructional design models can be designed to match digital immigrants and digital natives towards effective integration of ICT in education in developed countries. In contrast, according to the literature, in developing countries, especially in Ghana, there is limited empirical information about access and use of ICT tools among secondary school teachers and their competencies. Therefore, in Ghana it might be difficult to make concrete decisions about effective design of innovative pedagogical models towards the successful integration of ICT in education. Access to and use of ICT tools and the level of competencies of teachers would 1) support the planning of successful integration of emerging technologies in Ghanaian education at the second-cycle school level and 2) close the knowledge gap in the literature on integration of ICT in teaching and learning. With regard to this the present study is aimed at finding out access to and the use of emerging ICT tools such as, computers, the Internet, mobile phones, iPad among secondary school teachers and their competencies in the use of ICT tools. More specifically, the main research questions are:

1. What ICT tools do teachers have access to?
2. What do teachers use ICT tools for?
3. At what competence level do teachers use ICT applications?

METHODOLOGY

Participants

One hundred teachers (71 males and 29 females) teaching in second-cycle schools in Greater Accra region of Ghana were selected for the study. Simple random sampling method (lottery) was used to select the hundred participants. Their average age was 38 years (range of 30 – 54 years). Sixty-nine percent of the participants were bachelors' degree holders, whereas those with other diploma holders constituted 31%. Thirty-eight percent (N=38) of the participants have taught for five years; 39% (N = 39) have taught for between 6 and 15 years; and 23% (N = 23) have over 16 years of teaching experience

Instrument

Based on Global Citizenship Survey instrument (Lima, 2006), a

questionnaire was developed to collect data on the use of ICT among second-cycle school teachers in Ghana. The questionnaire consisted of four (4) sections. The first section was made up of four (4) items of general background (sex, age, education, and teaching experience) of the respondents. The second section, consisted 7 items, sought to collect data on teacher's access to ICTs (such as computer, internet, etc). The third section had four (4) items which sought to find out the purposes for which teachers use ICT. The final section was made up of seven (7) items to tap information on the level of competence of teachers in using ICT applications. The Cronbach alpha was 0.79.

Procedure

Pilot study was conducted to validate the instruments to suit the context of senior secondary school teachers in Ghana. The questionnaire was reviewed after the pilot study. Permission was sought from the heads of the five selected schools to administer the reviewed questionnaire. Respective school heads arranged with the teachers in the school during the first break period for the researchers to explain the essence of the study. Twenty sets of questionnaires were administered in each of the five selected schools. In all, one hundred (100) questionnaires were administered. The administration of the questionnaire took place during the first and second break periods when the teachers were available at the staff common room. Two days were allocated for each school. The return rate was 100%.

Analysis

The answered questionnaires were scrutinized to ensure that responses were free from mistakes. The researchers further analyzed the response using SPSS version 16. Descriptive statistics, made up of frequency count, percentages and Chi square test were used to analyze the data.

RESULTS

The study focuses on ICT use among teachers in second-cycle schools in Ghana. In line with the research questions, the following were found:

Research question 1: What ICT tools do teachers have access to?

Eighty-nine percent (N = 89) of the participants have access to mobile phones; 77% (N= 77) have access to computers; 53% (N = 53) have access to the Internet; and 43% (N= 43) asserted that they have access to PDAs. Forty-one percent (N=41) of the participants indicated that they have access to all the ICT tools simultaneously. Table 1 shows the frequency and percentage of teachers' access to ICT tools.

Research question 2: What do teachers use ICT tools for?

The study revealed that an appreciable number of respondents (N = 40, 43%) use computers for teaching and instruction; 32.3% (N= 30) use computer for research and professional development; 15.1% (N= 14) use computers to manage classroom and students assessment; and 6.5% (N = 6) use computer for entertainment. Chi square analysis x^2 (4, N = 93) = 53.26, $p < 0.05$ indicates that a significant number of participants use computer for teaching and instructional purpose. Furthermore, more than half of the participants (N= 55, 58.5%) use the Internet for research and professional development; 23.4 (N=22) use the Internet for communication; only few teachers (11.7%, N = 11) use the Internet pedagogically; and 5.3% (N=5) respondents indicated that they use internet for communication. Chi square analysis x^2 (4, N = 94) = 99.05, $p < 0.05$ indicates that a significant number of participants use internet for research and professional development. In addition, a higher percentage of the respondents (N = 72, 78.3%) specified that they use mobile phones for communication purposes; 8.7% (N=8) indicated that they use mobile phones for research and professional development; 8.7% (N= 8) revealed that they use mobile phones for entertainment; and 3.3% (N= 3) indicated that they use mobile phones for teaching and instructional support. Chi square analysis x^2 (4, N = 92) = 191.20, $p < 0.05$ indicates that a significant number of participants use mobile phones for social communication. Moreover, 45.8% (N= 27) of teachers use PDAs/iPads for entertainment; 20.3% (N= 12) use PDA/iPads for research and professional development; 13.6% (N=8) use PDA/iPads for communication; and 15.3% (N= 9) use PDA/iPads pedagogically. Chi Square analysis x^2 (4, N = 59) = 22.73, $p < 0.05$ indicates that a significant number of participants use PDA/iPads for entertainment. Table 2 highlights the frequency and percentage of teachers' use of ICT tools.

Research question 3: At what competence level do teachers use ICT applications?

Thirty-one percent (N=31) of respondents indicated a very high level of competence in handling word processing application (such as MS Word); 29% (N=29) high competence; 24% (N=24) have average competence level; whereas 13% (N=13) have below average competence; and 3% (N=3) indicated poor competence. Chi square analysis x^2 (4, N = 100) = 27.5, $p < 0.05$ indicates that a significant number of participants have a (very) high level of competence in handling word processing. Again, 20.2% (N=20) of the teachers showed that they have a very high level of competence in handling spreadsheet application such as MS Excel; 22% (N=22) have a high level competency. Interestingly, the number of respondents representing 20.2% (N=20) also showed that their level of competence in using spreadsheet application is on the average level whereas those that indicated poor level in this category recorded 18.2% (N=18). For presentation graphics application such as MS PowerPoint and MS Publisher, only 25% (N=25) of

Table 1. Teachers' access to ICT tools (N= 100).

ICT tools	Frequency	Percentage
Mobile phones	89	89%
Computers	77	77%
Internet	53	53%
Personal Digital Assistant (PDAs)	43	43%
*Computers, Internet, Mobile Phones, and PDAs	41	41%

Table 2. Frequencies and percentages of teachers' use of ICT tools (N=100).

Uses of ICT	Computers		Internet		Mobile Phones		PDAs & iPads	
	N	Percent	N	Percent	N	Percent	N	Percent
Teaching and instructional support	40	43.0%	11	11.7%	3	3.3%	9	15.3%
Classroom management and assessment activities	14	15.1%	5	5.3%	1	1.1%	3	5.1%
Communication	3	3.2%	22	23.4%	72	78.3%	8	13.6%
Research and professional development	30	32.3%	55	58.5%	8	8.7%	12	20.3%
Entertainment	6	6.5%	1	1.1%	8	8.7%	27	45.8%
Total	93	100%	94	100%	92	100%	59	100%

teachers indicated that they have very high level of competence; 9% (N=9) indicated high level. On the average level, 24% (N=24) was recorded while 23% (N=23) indicated poor level of competence in using presentation applications. In relation to database application (ie MS Access) respondents indicated 14.1% (N=14), 12% (N=12), 17.2% (N=17) and 40.4% (N=40) of the respondents have a very high, high, average, and poor levels of competence respectively. Chi square analysis x^2 (4, N = 99) = 26.25, $p < 0.05$ indicates that a significant number of participants have low level of competence in data base application. With regard to internet browsers and download applications 32.3% (N=32) stated that they are competent (very high) in using such software. On the average level, 16.2% (N=16) was recorded whilst 3% (N=3) responded that they have poor competence level in handling internet browsers and download applications. Chi square analysis x^2 (4, N = 99) = 25.65 $p < 0.05$ indicates that a significant number of participants have high competence in the use of internet. Also, 34.0% (N=30) of the participants asserted that they use e-mail and communication software (i.e. Google mail, yahoo mail, etc) and other applications such as Skype, Facebook, etc for [social] communication at a higher competence level. However, 22% (N=22) and 4% (N=4) responded that they have average and poor levels of competence in e-mailing and communication software respectively. Chi square analysis x^2 (4, N = 100) = 24.40, $p < 0.05$ indicates that a significant number of participants have high competence in the use of emails and other social software for social communication. With multimedia packages that include video, audio, visuals, animated pictures, and DVDs 17% (N=17) and 18% (N=18) of the respondents indicated that they have very high and high competence levels respectively while 32% (N=32) constituting a significant group of respondents were in the below average level of competence. Table 3 shows the frequencies and percentages of teachers' levels of competencies in the use of ICT applications.using such software. On the average level, 16.2% (N=16) was recorded whilst 3% (N=3) responded that they have poor competence level in handling internet browsers and download applications. Chi square analysis x^2 (4, N = 99) = 25.65.26, $p < 0.05$ indicates that a significant number of participants have high competence in the use of internet. Also, 34.0% (N=30) of the participants asserted that they use e-mail and communication software (Google mail, yahoo mail, etc)

Table 3. Frequencies and percentages of teacher's level of competence in handling ICT applications (N-100).

ICT application	Total (N)	Very high		High		Average		Below average		Poor	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Word processing application	100	31	31.0%	29	29.0%	24	24.0%	13	13.0%	3	3.0%
Spreadsheet application	99	20	20.2%	22	22.2%	20	20.2%	19	19.2%	18	18.2%
Presentation graphic application	100	25	25.0%	9	9.0%	24	24.0%	19	19.0%	23	23.0%
Database appl.	99	14	14.1%	12	12.1%	17	17.2%	16	16.2%	40	40.4%
Internet browsing and downloading	99	32	32.3%	28	28.3%	16	16.2%	20	20.2%	3	3.0%
E-mailing and communicating	100	34	34.0%	24	24.0%	22	22.0%	16	16.0%	4	4.0%
Multimedia software application	100	17	17.0%	18	18.0%	15	15.0%	32	32.0%	18	18.0%

and other applications such as Skype, Facebook [social], etc for communication at a higher competence level. However, 22% (N=22) and 4% (N=4) responded that they have average and poor levels of competence in e-mailing and communication software respectively. Chi square analysis x^2 (4, N = 100) = 24.40, $p < 0.05$ indicates that a significant number of participants have high competence in the use of emails and other social software for social communication. With multimedia packages that include video, audio, visuals, animated pictures and DVDs, 17% (N=17) and 18% (N=18) of the respondents indicated that they have very high and high competence levels while 32% (N=32) constituting a significant group of respondents were in the below average level of competence. Table 3 shows the frequencies and percentages of teachers' levels of competencies in the use of ICT applications.

DISCUSSION

In the present study, 100 teachers were surveyed to explore their access to and the use of ICT tools, and their level of competence. The results show that all the respondents have access to ICT tools such as mobile phone, computer, internet and iPad/PDAs. There is a revelation that most teachers have access to mobile phone whereas PDAs recorded the lowest. However, some teachers have access to 4 devices (mobile phone, computer, the Internet and PDAs) at the same time.

The result of this study that most of the secondary school teachers have access to the emerging ICT tools is consistent with the findings of Smerdon et al. (2000) and Lau and Sim (2008). In addition, the present finding is partially in line with the finding of Tella et al. (2007) that in Nigeria most of the secondary school teachers have access to computer. However, the finding contradicts the assertion by Prensky (2001) that most of the teachers in the 21st century are recognised as digital immigrants. With regard to access to ICT tools, the situation of secondary school teachers in Ghana as revealed in the present study, to some extent, is not different from other advanced countries. Secondary school teachers in Ghana are as technologically savvy as their students as indicated by Sarfo and Ansong-Gyimah (2011). However, one major reason that may explain the result that teachers in Ghana have access to the emerging ICT tools is that the sample of the present study was selected from Accra, which is the capital city in Ghana. Therefore, the teachers might be more technologically enlightened since they stay in the city. It would be interesting to know the results of a replicated study that would expand the sample of the present study to include second-cycle teachers in the rural areas.

Furthermore, the result indicates that more teachers use computers in teaching and learning activities than for classroom management and assessment activities. The finding that secondary school teachers in Ghana use computer for teaching and learning purposes supports the research finding by Lau and Sim (2008) that teachers either daily or weekly use ICT to support teaching and instruction. However, the finding of the study that teachers do not often use computer to promote classroom management and assessment activities contradicts the assertion by Mwalongo (2011) that ICTs are used for preparing school announcements, reports, examination and examination results, scheme of work, letters and student registration. The result of the present study depicts that secondary school teachers in Ghana have low level competence in database application needed to perform computer tasks related to classroom management and assessment activities. This might explain why the teachers do not often use computer in classroom management and assessment. The result of this study also indicates that most of the teachers use internet for research and professional development. This finding supports the proposition of Eze and Olusola (2013) that technology has the potential to transform the professional development of educators. The positive trend of exploiting ICT for professional development on the part of teachers could be a response to the recommendation derived from the conception of 'digital natives' that teachers should be trained to use computer to support their teaching. In addition, the result indicates that most of the teachers use mobile phones and e-mail for social communication. This finding is similar to

research finding by Sarfo and Ansong-Gyimah (2011) that most of the secondary school students have access to mobile phones but they use it mainly for social communication. However, the finding is not consistent with that of Lau and Sim (2008) that teachers in Malaysia less frequently use ICT for social communication. Secondary school teachers in Ghana might not have adequate knowledge and skills in how to use mobile phones to support teaching and learning. Moreover, according to the finding of the present study, most teachers have access to iPads and PDA but they use them for entertainment. This finding is in line with Mwalongo (2011) that most of the teachers misuse the emerging technological tools. This device, iPad, could be used for lesson presentations and preparations.

In addition, the study reveals that more teachers have high competence in word processing applications. This finding supports the research findings of Lau and Sim (2008) and Jegede et al. (2007) that most of the teachers are competent in word processing as compared to other application software as in the case of the present study. According to the results of the present study, teachers have low competence in handling database application software (e.g., MS access) and multimedia package. It appears that teachers consider this application as specialized software and requires advanced skills from users. Furthermore, the result of this study depicts that more teachers have high competence in handling e-mail but they often use e-mail for social communication rather than teaching and learning.

It is argued from the discoveries of the present study that second-cycle teachers in Ghana are not digital immigrants; they have access to the emerging ICT tools such as computer, internet, mobile phones iPad or PDA. They often use computer to facilitate teaching and learning and also use internet for research and their professional development. This finding is very encouraging. Most of the secondary school teachers have access to mobile phones and have high competence in word processing and the use of e-mail.

However, they use mobile phones and e-mail for social communication but not for teaching and learning. They have low competence in database application required for classroom management and assessment; and low competency level of multimedia application required to cater for individual students' learning needs (or individual differences). This findings add new scientific knowledge, from Ghanaian context, to the existing literature on the integration of ICT into education. The results of the study also provide vital information for educational policy makers, practitioners and researchers for effective planning and training towards successful integration of ICT in secondary education (in Ghana). More importantly, based on the findings of the study that majority of the teachers have access to mobile phones and are more competent in the use of e-mail, it is suggested that instructional designers and educational practitioners should scientifically investigate into the pedagogical potentials of mobile phones; and find more efficient and effective means of helping teachers in designing pedagogical innovative teaching or instructional strategies that make use of mobile phones and e-mails. Based on the limitations of the study it is suggested that further research study within this context should be conducted by expanding the sample of the present study and consider factors such as gender, and geographical location (urban and rural second-cycle teachers).

Conflict of Interests

The author has not declared any conflict of interests.

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