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Information and Communication Technology Assess and Use by Teachers of Community Health Nurses Training School in Adansi Fomena

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Introduction

Technology has changed our world and continues to alter the way we do things, bringing with it not only tremendous benefits, but also tough challenges. Technology integration in the classroom has become an important aspect of teaching and learning. It has triggered many researchers to investigate different aspects of such integration (Zhao, 2007; Gulbahar, 2007; Abbit & Klett, 2007; Wood & Ashfield, 2008). This is because it allows students to learn more in less time and allows schools to focus on global learning environments if used appropriately. In addition, it could be an effective teaching tool when used to engage all students in the learning process (Almekhlafi, 2006).

Information and Communication Technology (ICT) is a multi-facet concept. According to United Nations Development Programme (2001), Information and communication technology (ICT) refers to information-handling tools used to generate, store, process, spread and share information. The integration of information and communication technology (ICT) in education, to some extent, has become one of the tools in improving the quality of educational systems. There are many pieces of evidence that shows the use of ICT in education provides useful pedagogical, social and economic benefits to students (Rodrigo, 2009).

It has been predicted by Johnson, Adams, Cummins, Estrda, Freeman and Ludgate (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. Teaching using technologies has helped in making learning more flexible, accommodating and increases the range of potential learners. E-learning, blended learning, open and distance learning, learner centered environment, and mobile learning are just a few significant changes in teaching and

learning using technology. The use of ICT does not only change the way teachers teach, but the way the students learn as well (Loxley, 2004).

Teachers must gain suitable knowledge and abilities to use ICT to effectively teach students. To live, learn and work successfully in an increasingly complex, information-rich and knowledge based society, teachers must utilize technology effectively. 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 health 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 ICT in Ghana health institutions. Without adequate ICT skills health teachers will be increasingly squeezed out from the teaching field (The United Nations Educational, Scientific and Cultural Organization, 2008). Again, Sampson and Fytros (2008) defined competence as a personal characteristics (e.g. skills, knowledge) that an individual possesses or needs to acquire, in order to perform an activity in a specific context, whereas performance may range from the basic level of proficiency to the highest levels of excellence. In turn, Bibik and Vashchenko (2004) define competence as the ability of an individual to act and perform task with competency based on cognitive, practical skills and behavioural knowledge and skills for active action. Regardless of the quantity and quality of technology placed in classrooms, the key to how those tools are used is the teacher; therefore teachers must have the competence and have the right attitude towards technology.

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 teacher's access and use of ICT tools and teachers competencies in the use of ICT tools in Health Community Nursing Schools (Sarfo, Amankwah, Oti-Agyen & Yidana, 2016).

In response to global policy changes in the ICT industry, Ghana was among the first African countries to reform its ICT sector and institute the required legal and regulatory framework to upkeep the growth of the sector. Since 1990, the government of Ghana has liberalized the telecommunications sector with the aim of enabling the private sector to actively participate in the provision of services to increase access and coverage, introduce value-added services and boost consumer access to the state-of-the-art technology (Frempong & Atubra, 2001).

Due to the role of technology in the advancement of society in general and educational sector in particular, effective technology integration into teaching and learning has become the focus of many educators. However, in spite of the benefits of using ICT in health training schools with all these policy objectives in place, very little in ICT integration has been achieved in the community health nurses training schools in Ghana. There are numerous challenges which continue to affect effective teaching of ICT in these health training schools. Owing to the importance of ICT to national development and the future of education, it is very prudent to identify the challenges undermining the use of ICT in the community health nurses training school in Adansi Fomena in Ghana. Therefore, this study looks at the competence level of

teachers, the device they use to access ICT and the challenges undermining ICT usage by teachers to fill the research gap.

More specifically, the main objectives of the research are to:

1. Assess the competence level of teachers in using ICT applications for teaching.

2. Identify ICT devices that teachers use for teaching.

3. Find out barriers to ICT usage by teachers.

The following hypotheses were formulated to be tested:

H_o 1: There will be a statistically significant correlation between ICT competence level and access to ICT devices.

H_o 2: There will be a statistically significant difference in the ICT competence level between male and female teachers.

Review of Related Literature

In the wake of technology pluralism, educational practitioners, particularly health teachers, have no other choice than to learn and adopt ICT in their routine work. Much deployment of ICT could be realized in health institutions based on the competence level of teachers and this should not be over-emphasized. 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, teacher's competence changed for the better and their knowledge of IT had increased substantially.

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 level of teachers in using ICT (Somekh, 1991; Standholtz, Ringstaff & Dwyer, 1997). To support the

above findings, the results of survey study conducted by European School net and University of Liege (2013) indicate that teacher's confidence, competence and opinions about the ICT use for teaching and learning affect the frequency of students ICT use for learning.

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. 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.

Technology Integration Barriers

A number of barriers that hinder technology integration have been documented (Flores, 2002; Earle, 2002; Brinkerhof, 2006). According to Flores (2002), teachers face many barriers in their quest to incorporate technology. In addition to time scheduling for technology use and administrative support, equity is another important issue. The introduction of technology is particularly difficult when there are few resources.

Earle (2002) pointed out some barriers to the integration of technology in the classroom including both restraining forces that are extrinsic to teachers such as access, time, support, resources, and training and forces that are intrinsic such as attitudes, beliefs, practices, and resistance. Brinkerhof (2006) pointed out that barriers are grouped into four main categories: resources, institutional and administrative support, training and experience, and attitudinal factors.

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.

Theoretical framework

The study is underpinned by the didactic component of competence level. The theory stipulates the ability to adapt ICT into educational practice. The integrity of the didactic component is ensured by teachers in their teaching. The flow of ICT technologies to educational practice shows how the teacher's needs may vary from training in using ICT to the need for how to learn ICT integration into educational practice (Troter & Ellison, 2001).

Competence level in ICT is dynamic and dependable on the alterations in educational technologies and the factors of teacher's work environment (Li, 2006). Four stages of integrating ICT technologies can be marked: introduction, application, inclusion and transformation (Dasiense, 2004). Concerning the four stages of ICT integration, the competence level structure of the teachers' ability to use ICT falls into four levels: behaviouristic, enclosed, integrated and holistic.

Research Methodology

The study engaged a case study design which allowed the realization of an in-depth investigation of the study constructs. The population of the study comprised of all Community Health Nurses Training School teachers in Adansi Fomena. The study used purposive sampling technique to select all the thirty teachers. Questionnaire was the main instrument used for data collection. Semi structured questionnaires were used for the study. For the psychometric properties, factor analysis in Statistical Package for Social Sciences (SPSS) version 21.0 was used to check the construct validity whiles Cronbach alpha coefficient was used to assess the reliability of the questionnaire. The reliability of the questionnaire was therefore .70.The data

attained was prepared, edited to guarantee unambiguousness and coded according to the research questions.

Result and Discussion

The entire 30 questionnaire were retrieved from respondents thereby recording 100% return rate.

Table 1: Demographic Characteristics of the Respondents

Variable	N = 30 Frequency	Percent
Gender		
Male	20	66.7
Female	10	33.3
Age		
21 – 30 years	5	16.7
31 – 40 years	12	40.0
41 – 50 years	9	30.0
Above 51 years	4	13.3
Marital status		
Single	9	30.0
Married	21	70.0
Educational Qualification		
Degree holders	9	30.0
Master's holders	20	66.7
Other	1	3.3

Source: Field data, 2019.

According to Table 1, regarding the gender of the respondents, 20 (66.7%) of the respondents were males whereas 10 (33.3%) of the respondents were female. This suggests most of the respondents used in the study are male. This result finding support available research that the formal sector of the Ghanaian economy is mainly dominated by male (Danso & Kesseh, 2016).

In term of the respondents' age, those within the ages of 31 – 40 were 12 representing 40.0% of the respondents, those above 51 years were 4 representing 13.3, and respondents within the ages of 41-50 years were 9 constituting 30.0% whereas those within 21-30 years were 5 constituting 16.7% of the respondents. The results of this analysis shows teachers used for the study spread across all categories of age group, that is young, middle age and those preparing to retire from active teaching service. They therefore cater for all the age interest needed for this study.

Regarding the marital status of the respondents, 21 (70.0%) were married whilst 9 (30.0%) were single. On the subject of the highest educational qualification of the respondents, majority of the respondents representing 66.7% were master's degree holders, 30.0% of the respondents were degree holders and those with other professional certificate were 3.3%.

Research Question 1: What is the competence level of teachers in using ICT applications for teaching?

In order to address this, teachers were asked to express their opinion on their competency levels on word processing application, spreadsheet application, presentation graphic application, database application for teaching, Internet browsing and downloading, e-mailing and communicating and multimedia software application. Table 2 represents teachers perceived competency level in their personal use of ICT applications.

Table 2: Teachers Competency level in Using ICT Applications

ICT application	VH F	VH %	H F	H %	A F	A %	BA F	BA %	P F	P %
Word application	10	33.3	8	26.7	5	16.7	4	13.3	3	10.0
Spreadsheet application	7	23.3	8	26.7	7	23.3	6	20.0	2	6.7
Presentation graphic application	10	33.3	2	6.7	6	20.0	3	10.0	9	30.0
Database application	3	10.0	2	6.7	8	26.6	5	16.7	12	40.0
Internet browsing and downloading	11	36.7	8	26.6	3	10.0	6	20.0	2	6.7
E-mailing and communicating	10	33.3	7	23.3	6	20.0	4	13.4	3	10.0
Multimedia software application	6	20.0	5	16.7	4	13.3	10	33.3	5	16.7

Key: Very high = VH; High = H; Average = A; Below Average = BA; Poor = P

Source: Field data, 2019.

The data in Table 2 reveals that 10 (33.3%) of respondents indicated a very high level of competence in handling word processing application, 8 (26.7%) have high competence, 5 (16.7%) have average competence level; whereas 4 (13.3%) have below average competence; and 3 (10.0%) indicated poor competence. Chi square analysis x^2 (4, N = 30) = 17.5, p < 0.05

indicates that a significant number of the respondents have a very high level of competence in handling word processing.

Again, 7 (23.3%) of the respondents showed that they have a very high level of competence in handling spreadsheet application, 8 (26.7%) have a high level competency. Interestingly, 7 (23.3%) of the respondents 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 6.7%.

For presentation graphics application, 10 (33.3%) of the respondents indicated that they have very high level of competence, 2 (6.7%) indicated high level and 6 (20.0%) recorded average score. On the below average level, 3 (10.0%) was recorded while 9 (30.0%) indicated poor level of competence in using presentation applications.

In relation to database application, 10.0% (3), 6.7% (2), 26.6% (8) and 40.0% (12) of the respondents have a very high, high, average, and poor level of competence respectively. Chi square analysis x^2 (4, N = 30) = 16.35, 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 11 (36.7%) stated that they are competent (very high) in using such software. On the average level, 3 (10.0%) was recorded whilst 2 (6.7%) responded that they have poor competence level in handling internet browsers and download applications. Chi square analysis x^2 (4, N = 30) = 15.35 p < 0.05 indicates that a significant number of participants have high competence in the use of internet for browsing and downloading.

Also, 10 (33.3%) of the respondents asserted that they use e-mail and communication software and other applications for communication at a higher competence level. However, 6

(20.0%) and 3 (10.0%) responded that they have average and poor levels of competence in e-mailing and communication software respectively. Chi square analysis x^2 (4, N = 30) = 14.25, p < 0.05 indicates that a significant number of participants have high competence in the use of emails and other communication applications.

With multimedia packages, 6 (20.0%) and 5 (16.7%) of the respondents indicated that they have very high and high competence levels respectively while 10 (33.3%) constituting a significant group of respondents were in the below average level of competence using such software. On the average level, 4 (13.3%) was recorded whilst 5 (16.7%) responded that they have poor competence level in handling multimedia software applications.

The study reveals that majority of the teachers have high competence in ICT applications for teaching. This finding supports the research findings of Hrinh, Trinh and Tran (2016), Lau and Sim (2008) and Jegede, Odusola and Ilori (2007) that most of the teachers are competent in using ICT in their teaching. According to the results of this study, teachers have low competence in handling database application software and multimedia package. It appears that teachers consider this application as specialized software and requires advanced skills from users. However, the findings agree with the work done by Yusuf (2011). He concluded that the majority of student-teachers at the Nigerian secondary schools are not competent in the use of database application. Furthermore, the result of this study depicts that more teachers have high competence in handling e-mail and communicating software's.

Respondents were further asked to indicate in their scope of work how they use ICT applications in their teaching. The details of their responses are provided in figure 1.
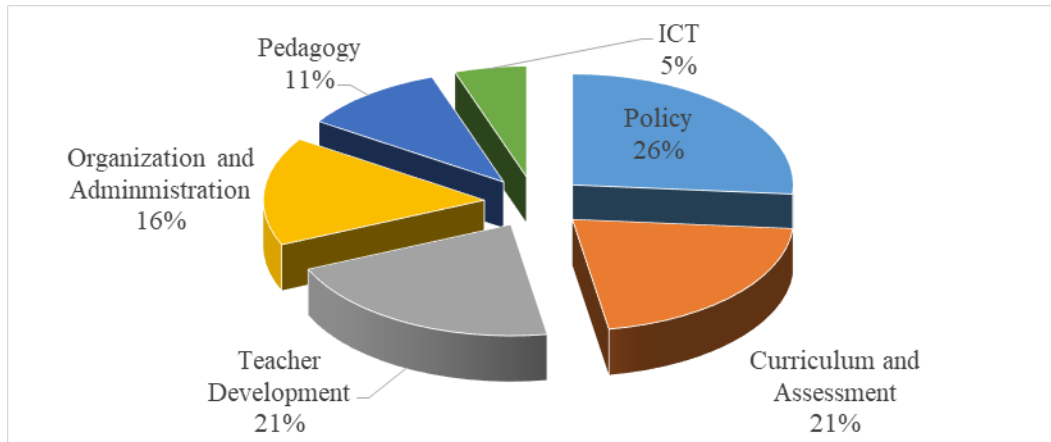
Figure 1: Distribution of Competency Standard Domain Usage

Source: Field data, 2019.

The data reveals that the three aspects of teachers work using more of ICT application are in policy implementation standards, curriculum and assessment, and teacher development training tools. This is encouraging since most of the teachers have the competency to use these standard domains in their teaching. This result supports the work of Mwalongo (2011) and Cachia and Ferrari (2010), who concluded that teachers combine different ICT resources in their teaching. They further revealed that teachers use ICT resources for preparing school announcements, reports and examination results.

Research Question 2: What device does teachers' use to assess ICT Facilities?

In trying to answer the research question above, respondents were asked to indicate the devices they use to access ICT. The details are provided in Table 3.

Table 3: Distribution Device Teachers Use to Assess ICT Facilities

ICT Device	Frequency	Percent
Mobile phones	20	31.8
Computers	17	26.9

Personal Digital Assistant (PDAs)	10	15.9
Computers, Mobile Phones, and PDAs	16	25.4

Source: Field data, 2019.

The findings in Table 3 shows that 20 (31.8%) of the respondents have access to mobile phones, 17 (26.9%) have access to computers, and 10 (15.9%) asserted that they have access to PDAs. Again, 16 (25.4%) of the participants indicated that they have access to all the ICT tools simultaneously. The results show that the respondents assess ICT using tools such as mobile phone, computer and PDAs. There is a revelation that most teachers have access to mobile phone whereas PDAs recorded the lowest. The result of the study is consistent with the findings of Sarfo and Ansong-Gyimah (2011) and Lau and Sim (2008).

In addition, the present finding is in line with the finding of Tella, Tella, Toyobo, Adika and Adeyinka (2007). They concluded that most school teachers have access to personal computers for their lesson delivery. However, the finding contradicts the assertion by Prensky (2001) that most of the teachers in the 21st century are recognised as digital immigrants and they do not know how to use these ICT facilities. Also, the study is at variance with the study of Mwalongo (2011) who concluded that teachers do not like using ICT facilities in their teaching.

Research Question 3: What are the barriers to ICT usage by teachers?

The effort and commitment towards using ICT facilities in classroom delivery are sometimes challenged by some obstacles which can in the long run cripple teacher's motivation to adopt technologically-informed pedagogical tools in their teaching. In order to know the exact challenges teachers face in using technology in their instruction, teacher's views were sought. The details of their responses are provided in Table 4.

Table 4: Factors Preventing Teachers from Using ICT Facilities

Barriers	Frequency	Percent
Inadequate teaching and learning materials	18	22.5
Lack of ICT infrastructure	11	13.7
Lack of constant supply of power	12	15.0
High cost of internet connectivity	10	12.5
High cost of ICT equipment	14	17.5
Lack of time	15	18.8

Source: Field data, 2019.

The findings revealed that teachers face a major challenge with inadequate teaching and learning materials. Another challenge was the lack of time to use various technological applications in class as well as high cost of ICT equipment. One could thus say that these challenges, to a great extent, hinder teachers from using ICT. This finding therefore confirms the results obtained by and Nuuyoma (2012) and Maholwana-Sotashe (2007) that unavailability of infrastructure, lack of hardware and software, lack of internet access and other of ICT resources are factors for low technology patronage among teachers.

Test of Hypotheses

Hypothesis 1: There will be a significant correlation between ICT competence level and access to ICT devices.

Table 5 shows a one-tailed hypothesis of the correlation between ICT competence level and access to ICT devices of teachers. The hypothesis was tested using a Pearson correlation method. As shown in the table, ICT competence level of teachers significantly correlated with their access to ICT devices ($r = .210$, $p < 0.001$). This implies that ICT competence level have a

relationship with access to ICT devices. The positive significance also suggests that the more a teacher have an excellent ICT competence level, the higher they may have access to ICT device. The details are provided in Table 5.

Table 5: Linear Regression Analysis of Teachers ICT Competence Level and Access to ICT Devices

Variable	b	Beta (β)	R	R^2	t	Sig (t)
Step 1						
Constant	3.155				14.402	.000
ICT competence level	.220	.210			2.967	.003

$P < 0.01$ (1-tailed)

Source: Field data, 2019.

The findings of the study support the work of Sarfo, Amankwah, Oti-Agyen and Yidana (2016) and Olatokun (2007), who concluded that there is a link between teachers' ICT competence level and access to ICT devices.

Hypothesis 2: There will be a significant difference in the ICT competence level between male and female teachers.

Table 6 shows the results of the independent sample t-test on the ICT competence level of male and female teachers. As shown in the table, comparison of the mean ICT competence level from the two independent groups would suggest that the male ICT competence level (mean

= 2.6562) was similar or almost identical to the female (2.6553). In testing whether the difference in mean ICT competence level of the teachers between the two groups was statistically significant, independent samples t-test was performed. The test revealed that there was no statistically significant difference in the mean ICT competence level between male and female teachers (t = .006, df = 28, p = 0.50 one-tailed). Therefore, the hypothesis that there will be a significant difference in ICT competence level between male and female teachers is rejected and the null hypothesis that there will be no significant difference in the ICT competence level between male and female teachers is accepted. The details are represented in Table 6.

Table 6: Summary Statistics and Independent Samples T-test on Teachers ICT Competence Level

	Mean	SD	N	t	df	Sig (1-tailed)
Sex Male	2.6562		20	-.006	28	0.50
Female	2.6553		10			

Source: Field data, 2019.

The result in this study was supported by the findings of Fomsi and Orduah (2017), Barfi and Ahiatrogah (2016), Şad and Nalçacı (2015) and Yavuz Mumcu and Dönmez Usta (2014). Both researchers concluded that gender do not affect teachers' competence level towards the use of ICT facilities. However, the findings of the study contradicts the work of Akgül, Küpeli and Kır (2015), Yılmaz, Üredi and Akbaşlı (2015) and Menzi, Çalışkan and Çetin (2012). They concluded that there are significant difference between teachers ICT competence level and gender.

Recommendations

1. There is the need to implement policy direction to deal with it issues such as provision of computer laboratories, staffing the laboratories with technology assistants in supporting ICT usage by teachers.

2. Again, for the purpose of technology integration to be achieved, the education ministry and other stakeholders in education must provide the various technology resources needed by community health training schools. This is because it is only when such resources are available that teachers can use them to teach.

3. For successful technology integration in health institutions, teachers need to be sensitized on the different types of technologies that can be used to enhance teaching, since most of the teachers have low competence in handling database application.

4. The Ministry of Education and school management who make available policy direction to health training schools should come together to address challenges opposing the usage of ICT in teaching.

The researchers hope these issues will be considered as decisions are made about ICT usage and as educators make decisions about the future shape of the health institutions in Ghana.

Conclusions

Teachers are pivotal stakeholders for an effective delivery of education. Moreover, these teachers should acquire the needed competence in using ICT for teaching. The results of the study showed that majority of the teachers have high competence in word processing applications. According to the results of the study, teachers have low competence in handling database application. Furthermore, the result of this study depicts that more teachers have high competence in handling e-mail and communicating. It is argued from the discoveries of the

present study that teachers of community health nurses training school in Adansi Fomena are not digital immigrants; they have access to the emerging ICT tools such as computer, internet, mobile phones or PDA.

The three major barriers hindering the integration of the use of ICT by teachers are inadequate teaching and learning materials, lack of time and high cost of ICT equipment. The results showed that ICT competence level positively and significantly correlate with access to ICT device. Again, male and female teachers ICT competence level were not significantly different from each other.