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Teacher Trainees Cognition of Information and Communication Technology (ICT) in the Colleges of Education in Ghana

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Abstract:

The integration of Information and Communication Technology (ICT) into education had become very necessary in this 21st century. An assessment of Information and Communication Technology usage among teacher trainees in selected Colleges of Education in the Ashanti Region of Ghana was the main focus of this study. Descriptive research was the design for study. The population of 120 mentee teacher-trainees were sampled from three colleges of Education for the study. The study employed the multistage sampling techniques. Convenient, purposive, Simple random and stratified sampling techniques were used to select the three colleges of Education and the third year group of the three (i.e. two single sex and one mixed) out of the eight Colleges of Education in the Ashanti Region. The main instrument for data collection was questionnaire. The study revealed that, most mentee teacher trainees had computer training prior to enrolling into the colleges and can use the computer to type letters or document. Teacher trainees surf the internet to do their work but the hours they spend per week is less than that of the average internet user. It is recommended that all the teachers in the colleges of education should be given refresher courses in ICT use, at least once a year. This will boost teachers' confidence in the use of ICT facilities in their teaching so they can help their students to develop ICT skills.

Keywords:

Teacher Trainees, Cognition, Information and Communication Technology (ICT), Colleges of Education, Ghana

1. Introduction

The development and exploitation of Information and Communication Technology (ICT) in schools in Ghana has had an operational history that is just over a decade or two old. Although at the beginning, there had been several efforts at developing ICT in schools, there had not been clearly defined policy direction for ICT in education as to what specifically was needed to be achieved and the strategy for it. In the process, several initiatives on ICT in education were started by different interest groups to meet different needs. Towards the end of 2003, the tempo increased Ghanas ICT for Accelerated Development (ICT4AD) Policy, that recognises education as a cross-cutting issue within the national framework crucial to the support of the thirteen other national pillars [1].

The use of ICT (computer) is becoming more persuasive in Ghana and the number of computers for educational purposes in our institutions is growing. In the process, there is a proliferation of equipment standards for seemingly different goals. This situation has arisen because even though government has come out with a national policy for ICT, there is the need for a well-defined policy direction in the development and exploitation of ICT in the arena of education. It is on these premises that the government of Ghana is committed to the transformation of the economy through the agro – based economy of Ghana into an information rich and knowledge based economy and society using the tools of information and communication technology (ICT). The government has acknowledged the need for ICT training and education in the Schools, Colleges and Universities and the improvement of the education system as a whole.

The development of ICT in education will result in the creation of new possibilities for learners and teachers to engage in new ways of information acquisition and analysis. ICT however will enhance access to education and improve the quality of education delivery on equitable basis. Hence, the government's commitment to a comprehensive program of rapid development and utilization of ICT within the education sector to transform the education system and hence improve the lives of people. It is a common knowledge that Information and Communications Technology (ICT) offers the potential to meet the learning needs of individual students; to promote equality of opportunity; to offer high-quality learning materials; and to increase self-efficacy and independence of learning amongst students of all ages. For the teaching profession, ICT is not only an essential tool for teachers in their daily work, but it also offers them opportunities for their own professional development.

The pressures placed on our society as it changes from a manufacturing to an informational and technological economy are well documented. Industries and businesses are hard pressed to stay ahead of the learning curve with regard to sta6ying competitive. Computers are one of the main ICT tools driving this change to an information age. It is within this climate that teachers are asked to prepare students for the next century by training the next generation of information "hunters and gatherers." Nationally, the push to integrate computers into our classrooms comes from government, business, and industry.

It is in this context that the Government of Ghana, with the help of the Government of India, established the Kofi Annan Centre of Excellence in Information Technology (IT) to promote IT education and usage in the country's development effort. But the global march of IT is of enormous economic strength. Coming in late as a junior participant with little or no intellectual propriety to bargain with, Ghana risks being

swallowed up in huge foreign exchange costs for the acquisition 'of hard and soft ware. IT education must help to avert this. For example, with respect to one of the competencies related to working with ICT and new media, the Dutch Government has determined that new teachers should be able to prepare, carry out and evaluate a few different educational situations that make use of ICT and multimedia [2]. Indicators for this competence are: ICT as aspect (aid for problem solving) and as medium (tool for the educational process); choose from one or more of the following 'tool types': structured learning tasks via simulations, data sets, hypertext, cognitive tools, computer as tutee, video conferencing, distance education (email; tele-learning via intranet; Internet learning); multimedia (from transparencies and PowerPoint® to manipulable CDROM and virtual reality) [2].

Many countries around the world are taking action to ensure that their educational systems are updated to permit equality of access and to ensure that the key ICT skills are developed in schools and other educational institutions [3]. It has become abundantly clear that the training of teachers in ICT skills and appropriate pedagogical approaches is essential. Preparing teachers is perceived as the main critical success factor in deploying ICT in education [4]. The changes brought about by the technical and social mutations affect the education field, but the characteristics of education today still correspond to what were the needs of the industrial system of the 60s and do not anticipate on the future needs of the information society. European educational systems and training organisations need therefore to transform the professionalism of teachers and trainers.

Developing future teachers who know how to use modern learning technologies to improve student learning is key to our national development. Even though Information and communication technology is now an examinable subject at the basic school level, teachers teaching in the basic schools have not received adequate training in the use of computers, (i.e. Information and Communication Technology tool). In fact, no college of Education in Ghana specialises in the teaching of ICT. All students at this level take only two courses, one for first year and the other for second year. Students are 'digital natives' and teachers tend to be 'digital immigrants' who struggle to adopt new technologies that can better serve their students [5].

Ending of the 1980's the term computers was replaced by 'IT' (Information Technology), signifying a shift of focus from computing technology to the capacity to store and retrieve information [6]. This was followed by the introduction of the term 'ICT' (Information and Communication Technology) around 1992, when e-mail became available to the general public. ICTs cover Internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other related information and communication activities [7]. ICTs are embedded in networks and services that affect the local and global accumulation and flows of public and private knowledge.

Simply put, ICT is an accepted acronym for information communication technology. It is a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information [8]. This means that ICT helps in the storage and management of information. The emerging phenomenon was welcomed in the 1980's that educational systems needed to prepare students to adjust to and survive in this new technologically driven society. This meant preparing

students for "lifelong learning in an information society" [6]. Allied to this, early advocates of ICT integrated education, saw it as a catalyst for change, fostering skills in problem solving and critical thinking, as well as the development of student centred learning.

One of the principal advantages of the use of ICT in teaching and learning is that it enables schools and colleges to cater for the needs of the individual rather than to the average needs of the class. Another major advantage is that ICT can dramatically improve access to information for, and communication of ideas by students with special learning needs. ICT can be used across the curriculum to enhance student learning. For example, students can improve the quality of their written work in any subject by using word processing, which allows them to reflect on what they have written and make changes easily. Difficult concepts can be made simpler to understand when illustrated with animated graphics and computer simulations. Students can access high-quality information more easily using CD-ROMs and, to some extent, the Internet [6]. New technologies have provided new possibilities for the teaching profession. However, teacher educators and teacher trainees have to learn how to use these new technologies in the classroom situations. Most of the teacher education institutions are facing difficulties like shortage of ICT trained qualified teacher educators, weak curricula, lack of ICT equipment etc. Perhaps one of the greatest challenges facing teacher education today concerns the preparation of good quality teachers capable of using ICT effectively. Unless and until they are trained we cannot expect any qualitative changes in teaching [6].

Despite the impact of ICT on society in general and the advantages of using it in teaching and learning, few schools and colleges are using ICT to its full potential. A major report from OFSTED concluded that:

> "*The breadth of ICT experience intended by the National Curriculum is yet to be achieved in the majority of schools. Much remains to ensure that pupils are not just 'exposed' to sophisticated ICT systems but achieve the levels of ICT capability required by the National Curriculum and understand the main implications of their use*" [9].

Research findings suggest that ICT is significantly under-used by student and teachers. The problem is worldwide and many explanations are offered. Lack of resources or lack of access to resources in schools / initial teacher training (ITT) institutions has been suggested by [10].

Although, ICT is being taught in Junior High Schools in Ghana as a subject which is examinable and may be used as an elective subject to be examined in the near future. But the question is how is ICT used by other teachers in their day to day teaching activities? This, however, can be done by the use of power point and other presentation software's: Internet connectivity of the school, the use of Skype in linking other interesting areas or institutions, and software with maps animation, market scenes, teleconferencing formulae, audio conferencing etc. for subjects like Mathematics, Geography, Economics and the like [2].

The effect of gender on computer use is also in dispute. A study reports that male students are less anxious about ICT and make more frequent use of it [11]. Several other studies have reported that female students are less confident or knowledgeable than males about using computers [12]. In contrast, there are also many reports which indicate that there are no significant differences between the attitudes of male and

female students towards ICT usage [13]. Gender education, and social class will definitely have an imperative role in explaining the users' awareness of Internet resources [14]. In this regard, a study carried out on the use of Internet information resources in S.V. University Tirupathi, India, and did not find any significant difference between male and female awareness of diverse online journals, databases and e-books [15]. Notwithstanding, there is high gender difference in awareness of Internet resources in the deprived regions in Accra than the endowed regions. He noted that gender breakdown revealed that awareness of Internet resources is relatively higher amongst men than women in the most endowed region, in Accra, than the deprived regions [16]. Conversely, more males than females are aware of e-journals availability on the Internet [17].

However, a survey conducted at Calicut University and indicated that students, research scholars and faculty members are aware of Internet materials in their specific interest areas irrespective of gender differences [18]. Furthermore, most research scholars at Delhi University are aware of information resources [19]. Increasingly, surveyed reported that, the awareness level of the National Virtual Library of Nigeria in some selected universities in South-West, Nigeria, and reported that both male and female library users are significantly aware of electronic resources available in the virtual library [20]. A study pin-pointed that there is a high degree of awareness and acceptance of electronic resources in seven Israeli universities among male and female Internet users. They however stated that disparities in awareness exist between disciplines and ages [21]. In another development, a similar study discovered significant lack of awareness of open access journals among male and female editors in Ahmadu Bello University Zaria, Nigeria.

Therefore, there is the need for a powerful role of mentee teacher trainees in the process of educational innovation and the implementation of ICT. The colleges of education produce teachers for the future with the prelude that teachers are the key figures in arranging learning processes. It is imperative to understand the importance of ICT among colleges of Education. Teacher trainees are those who are going to disseminates the knowledge of ICT to their students. ICT is being used as an integrated component of the teaching and learning environment; teacher trainees should therefore develop understanding, skills, and dispositions with regard to technology integration into teaching and learning. A teacher trainee is supposed to continue to develop the capacity in his work, to develop more opportunities and to help students to build upon what they have learned. Teacher trainees, in order to provide for the need of their students, need to be aware of current thinking about good practice. It is therefore the need to assess the level of skills and awareness of information and communication technology among teacher trainee in Colleges of Education in the Ashanti Region of Ghana. The study sought to answer these research questions - 1. What is the level of mentee teacher trainees' ICT (i.e. computer and internet) skills? 2. What is the level of awareness about ICT among male and female mentee teacher trainees?

2. Materials and Methods

The research design that was used in this study was the descriptive research. The choice of this research design is deemed suitable, as an attempt is made to assess the Information and Communication usage among teacher trainees in selected colleges of education in the Ashanti Region of Ghana. The population for the study comprised all the third year teacher trainees in Colleges of Education in the Ashanti Region of

Ghana. These are, Akrokerri, Offinso, Agogo, Wesley, St. Louis, Mampong Technical, St. Monica's and Cambridge College of Education. The targeted population were, however, the students of the three colleges of Education sampled for the study.

The study employed the multistage sampling techniques. Convenient, purposive, Simple random and stratified sampling techniques were used to select the three colleges of Education and the third year group of the three (i.e. two single sex and one mixed) out of the eight Colleges of Education in the Ashanti Region. The selected colleges were, Wesley College of Education, St. Louis College of Education and Mampong Technical College of Education. Apart from Wesley College of Education which is a mixed school, St. Louis College of Education and Mampong Technical College of Education are single sex, (Female and male Colleges respectively).

Simple random sampling technique was employed in selecting Forty Teacher Trainees out of the three hundred and seventy and three hundred and ninety third year students from St. Louis and Mampong Technical respectively. The simple random sampling technique was employed because ICT is a core subject at all Colleges of Education. While stratified non proportional sampling was used to select twenty females and twenty males out of four hundred trainees from Wesley College of which two hundred and thirty-five were males and the rest (i.e. 165) female. The stratified non proportional sampling was used at Wesley College because the researchers wanted to get the same number of male and female trainees. In all, one hundred and twenty mentee teacher trainees were selected for the study. As shown in the Table 1 below:

Table 1. *Gender Distribution of Respondents for the study.*

Name of College	Males	Females	Totals
St. Louis		40 (100%)	40 (33.33%)
Wesley	20 (50%)	20 (50%)	40 (33.33%)
Mampong Technical	40(100%)		40 (33.33%)
Total	60 (50.0%)	60 (50.0%)	120 (100%)

The main instrument for data collection was questionnaire. The questionnaire consisted of ten items and was in two sections. The first section made up of seven (7) questions, asked questions on mentee teacher trainees ICT (computer & Internet) skills. Whiles the second section also made up of three (3) items to find out the level of awareness about ICT among male and female mentee teacher trainees. The quantitative data entry and analysis was done by using the Statistical Package for Social Science (SPSS) software, version 21. The data was numbered serially, edited, coded and analysed into frequencies, percentages with interpretations.

3. Results and Discussion

This section presents findings and discussions on Teacher Trainees Cognition of Information and Communication Technology (ICT) in the Colleges of Education in Ghana. A total of 120 teacher trainees participated in the study. Sixty, representing 50% of the student respondents were females and sixty, representing 50% were males. All Colleges had the same number of respondents. Two research questions were employed by the researchers to ascertain mentee teacher trainees' cognition of ICT. The first research question - What is the level of mentee teacher trainees' ICT (i.e. computer and internet) skills? sought to identify the level of teacher trainee's computer (ICT) skills. Items 1 - 7 on the questionnaire sought to obtain information on teacher trainees' computer skill.

Table 2. *Level of Mentee Teacher Trainee Skills.*

Item	No Response	Yes	No
Did you have any computer training before enrolling into the College of Education?	01 (0.8%)	65 (54.2%)	54(45.0%)
Have you used the computer to type a letter or document?		80 (66.7%)	40 (33.3%)
Do you surf the internet to do your work?		102 (85.0%)	18 (15.0%)

Source: Field data, 2014

Table 2 shows that 65 (54.2%) of teacher trainees answered yes to having any form computer training prior to enrolling into the colleges of education while 54 (45.0%) answered no to the same question. This shows that although majority of teacher trainees had computer training before being admitted into the colleges of education, the difference is not that much. A study supported the current research and asserted that solid experience in the use of ICT and the changes related to ICT, support the development of a learner centred pedagogical practice [23]. As indicated in Table 2, 80 (66.7%) of teacher trainees said they have use computers to type a letter or document as against 40 (33.3%) who answered No, to having use computer to type a letter or document. The information on Table 2 clearly shows that majority of teacher trainees Have use computers to type document. The information on Table 2 also shows that 102 (85.0%) of teacher trainees indicated that they surf the internet to do their work. Only 18 (15.0%) of trainees indicated they do not surf the internet. From the information on Table 2, it clearly reveals that majority of the teacher trainees surf the internet.

Table 3 provides responses on how the teacher trainees' rated their experience in computing.

Table 3. *Rating of Mentee Teacher Trainee Computer Experience.*

Responses	Frequency	Percent
No Response	5	4.2
Quite Good	46	38.3
Good	54	45.0
Very Good	15	12.5
Total	120	100.0

Source: Field data, 2014

Information on Table 3 indicates that 54 (45.0%) of teacher trainees responded that they would rate their experience with computers as good while 46 (38.3%) rated their experience with computers as quite good. As it clearly shown on Table 3, most trainees rated their experience with computers as good. A previous research supported study that, computer usage by teachers, as one of the key determinants, in their classification of teachers, as either 'exemplary computer-using' or 'non-exemplary computer-using' [23].

Table 4 provides responses to the question on the number of years' teacher trainees had use computers.

Table 4. *Teacher Trainees Years of Computer Usage.*

Responses	Frequency	Percent
Less than a year	24	20.0
1 – 3 years	47	39.2
4 – 6 years	40	33.3

7 – 9 years	4	3.3
Above 10 years	5	4.2
Total	100.0	

Source: Field data, 2014

As can be seen from Table 4, 47 (39.2%) of teacher trainees have been using computers between 1 - 3 years now and 40 (33.3%) of the sample population have been using computers for 4 - 6 years now. As much as 24 (20.0%) started using computers less than a year now. The results show clearly that the number of years that teacher trainees started using computers is between 1 - 3 years.

Table 5 provides responses to the question how teacher trainees get access to internet connection.

Table 5. *Mentee Teacher Trainees Access to Internet Connection.*

Responses	Frequency	Percent
No Response	19	15.8
Personal Modem	58	48.3
Colleges Online	28	23.3
Internet Cafe	9	7.5
Others	6	5.0
100.0	100.0	100.0

Source: Field data, 2014

When teacher trainees were asked on how they get access to internet connection, from the data in Table 5, 58 (48.3%) indicated that they get internet access via personal modem whereas 28 (23.3%) indicated that they access internet through the colleges online. From the data on Table 5, it clearly shows that most teacher trainees access internet through personal modem. This, from the information gathered from the colleges, is due to the fact that the colleges do not have wireless or online services.

Table 6 provides responses to the question on, how often do trainees use the internet.

Table 6. *Internet Usage by Teacher Trainees.*

Responses	Frequency	Percent
Very Often	28	23.3
Often	37	30.8
Not Often	55	45.8
Total	120	100.0

Source: Field data, 2014

From Table 6, 55 (45.8%) of teacher trainees answered, “Not Often” to the question “How often do you use the internet”. Also 28 (23.3%) answered “Very Often” and 37 (30.8%) answered “Often”. The information on Table 6 clearly shows that significant percentage of teacher trainee’s usage of internet is not encouraging. This from the researcher’s checks in the colleges is due to the fact that the colleges lack online and wireless service.

Table 7 provides responses to the question on, how many hours a week do trainees spent on the internet.

Table 7. *Hours teacher trainees usually spent on the Internet.*

Responses	Frequency	Percent
No response	3	2.5
5 or few hours a week	80	66.7

6-10 hours a week	11	9.2
11- 15 hours a week	9	7.5
16 - 20 hours week	4	3.3
21 - 25 hours a week	4	3.3
26 - 30 hours a week	9	7.5
Total	**120**	**100.0**

Source: Field data, 2014

From Table 7, 80 (66.7%) of trainees indicated that they spend five or few hours a week on the internet. From the responses as indicated on Table 7, majority of teacher trainees spend less hours (i.e. 5 or few hour) on the internet than the average internet user who spends at least 13 hours a week (www.cnet.com/news/average-net-user-now-online-13-hours-per-week/).

To establish the level of awareness of ICT among teacher trainees, the researchers asked a series of questions on research questions - *What are the levels of awareness about ICT among male and female mentee teacher trainees?* and the responses are illustrated in Table 8, Table 9 and Table 10.

Table 8 shows if teacher trainees had any computer training before enrolling into the college of Education.

Table 8. *Computer Training before Enrolling into College.*

Gender	No Response	Yes	No	Total (100%)
Male	1 (1.7%)	34 (56.7%)	25 (41.6%)	60
Female	-	31 (51.7%)	29 (48.3%)	60

Source: Field data, 2014

The information in Table 8 indicates that 34 (56.7%) of male teacher trainees had computer training before enrolling into the college of education as against 31 (51.7%) of their male counterparts. Also, 29 (48.3%) of females answered No as against 25 (41.6 %) of their male counterparts. It is clear that most male trainees had training in computers before being enrolled into the Colleges of Education than their female counterparts. A study on Facilitating and inhibiting factors in student computer usage maintained that, male students are less anxious about ICT and make more frequent use of them than female [11].

Table 9, is a response to the question on how teacher trainees rate their experience with computers.

Table 9. *Male and Female Trainees Experience with Computers.*

Gender	No Response	Quite Good	Good	Very Good	Total (100%)
Male	2 (3.3%)	27 (45.1%)	23 (38.3%)	8 (13.3%)	60
Female	3 (5.0%)	19 (31.7%)	31 (51.7%)	7 (11.6%)	60

Source: Field data, 2014

From Table 9, 31 (51.7%) of female trainees indicated that they had good experience when it comes to working with computers as against 23 (38.3%) of their male counterparts. Also 27 (45.0%) of male trainees indicated they had average experience with computers as against 19 (31.7%) of their female counterparts. From information shown on Table 9, one can clearly say that when it comes to experience with computers, majority of females had good experience with computers. On the other hand, majority of male trainees had average experience with computers. When it comes to having very good experience with computers, males had 8 (13.3%) as

against 7 (11.6%) respondents. This also supports the stance that, there are no differences between the male and female students towards ICT usage [13]. Responses to the questions, should ICT be a stand - alone subject, need for more training and necessary skill in using computers in teaching are dealt with in Table 10.

Table 10. *Integrating ICT with other subjects.*

Item	Gender	No Response	S. A.	A	D	S. D.
ICT should be a standalone subject and not used in other classes.	Male	- -	35 (58.3%)	15 (25.0%)	7 (11.7%)	3 (5.0%)
	Female	1 (1.7%)	25 (41.7%)	9 (15.0%)	14 (23.3%)	11 (18.3%)
I have the necessary skills to use the computer / ICT tools in teaching my subject.	Male	- -	14 (23.3%)	27 (45.0%)	17 (28.3%)	2 (3.3%)
	Female	2 (3.3%)	9 (15.0%)	36 (60.0%)	10 (16.7%)	3 (5.0%)
I Feel That I need more training in computer.	Male	-	48 (80.0%)	12 (20.0%)	- -	- -
	Female	1 0.8%)	42 (70.0%)	17 (28.3%)	- -	- -

Source: Field data, 2014

When teacher trainees were asked whether ICT should be a stand-alone subject**,** from Table 10, 35 (58.3%) of male trainees strongly agreed that ICT should be a stand-alone subject while 25 (41.7%) of their female counterparts strongly agreed. Also 15 (25.0%) of male trainees agreed that ICT should be stand-alone subject while 9 (15.0%) of their female counterparts agreed. On the other hand, 14 (23.3%) of female trainees disagreed that ICT should be a stand-alone subject while 7 (11.7%) of their male counterparts also disagreed on the same issue. Also 11 (18.3%) of female trainees strongly disagreed that ICT should be a stand-alone subject while 3 (5.0%) of male trainees also strongly disagreed. It is, therefore, clear that when it comes to ICT integration into education, female teacher trainees have a positive attitude than their male counterparts. The data in Table 10 also show that 36 (60.0%) of female trainees agreed that they had the necessary skill to use the computer and other ICT tools in teaching their subjects while 27 (45.0%) of their male counterparts also agreed. On the other hand, 17 (28.3%) of male trainees disagreed that they had the necessary skill to use computer and ICT tools in their classes while 10 (16.7%) of the females also disagreed. From the information on Table 10, it is clear that female trainees believe they are well equipped to use ICT tools in their classes than their male counterparts. Again**,** from Table 10, 48 (80.0%) of the male trainees strongly agreed that they need more training in computer while 42 (70.0%) of the female respondents also strongly agreed to the statement. One can clearly see from the data in table 10 that none of the respondent disagreed when it comes to training in computers, this clearly shows that all trainees need computer.

4. Conclusions and Recommendations

In respect to the level of mentee teacher trainees' computer and internet skills, the study concluded that most mentee teacher trainees had computer training prior to enrolling into the colleges and can use the computer to type letters or document. Also

most teacher trainees surf the internet to do their work but the hours they spend per week is less than that of the average internet user. Also male mentees were more aware when it comes to the use of ICT tools.

It is recommended that all the teachers in the colleges of education should be given refresher courses in ICT use, at least once a year. This will boost teachers' confidence in the use of ICT facilities in their teaching so they can help their students to develop ICT skills. it is also recommended that the Colleges should set up online or wireless internet services on their campuses so that students can easily access internet.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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