INFORMATION AND COMMUNICATION TECHNOLOGY COMPETENCE AMONG LECTURERS OF COLLEGES OF EDUCATION IN NORTH CENTRAL, NIGERIA

ANAZA, ABDULMUMUNI ONUYI[1], ABDULLAHI, MUH'D-JIMOH A[2].
& OHANADO, CLARA CHIBUZOR[3]
[1]Department of Curriculum and Instruction
[2]Department of Primary Education
[3]Department of Library
Federal College of Education, Okene, Kogi State, Nigeria
E-mail: anazaao@yahoo.com, claraohanado20@gmail.com,
Phone No: +234-816-581-8332, +234-803-572-5844

Abstract
Information and Communication Technology (ICT) is a major factor in shaping the new global economy and producing rapid changes in society. Education systems around the world are under increasing pressure to use ICT to teach students the knowledge and skills they need in the 21st century. This study was conducted to provide insights regarding Information and Communication Technology Competence among Lecturers of Colleges of Education in north central, Nigeria. The study is a descriptive research and employed questionnaire in gathering data. A total of 216 participated in the study. The study revealed that lecturers in colleges of education had low competence in the use of ICT software and use of computers with other ICT facilities; they are moderately competent in the use of ICT hardware, basic computer operations and the use of the internet. The study recommended that lecturers should be trained and retrained on the use of ICT to enable them integrate ICT into the teaching and learning process.

Keyword: *ICT, Competence, Use, Lecturers, Colleges of Education*

Introduction
Information and Communication Technology (ICT) is often perceived as a catalyst for change, change in teaching styles, and change in learning approaches and in access to information (Watson, 2005). ICT can help by providing alternative possibilities for education (Casal, 2007). As ICT becomes more ubiquitous in our society, educational settings are being transformed where educators and students are expected to teach and learn using this new technology (Lee, 2003). Educational institutions around the world are beginning to recognise the potential of ICT in pedagogy (Oblinger, 2004).

ICT has become a household term globally and has brought radical changes in the way people live, learn and work. It has become a very powerful tool in education and training by linking students to global information and inducing innovations for lecturers (Ezenwafor, 2011). The author went further to state that ICT are potentially powerful enabling tools for educational advancement and reform. When used appropriately, different ICTs help expand access to education, strengthen the relevance of education to the increasingly digital workplace and raise educational quality by helping to make teaching and learning into an engaging active process to real life. Therefore, the need for individuals of different ages, levels, and vocation to possess competencies and skills in ICT for success in whatever endeavour and can never be overemphasized.

Colleges of education, one of the tertiary institutions in Nigeria, is an institution saddled with the responsibility of training middle class teacher for the lower and upper basic schools. Colleges of education are aimed at producing high level manpower to cater for the lower and upper basic schools (Olumorin, 2008). Olumorin (2008) further noted that colleges of

education are expected to contribute to national development by intensifying and diversifying its programmes for the development of manpower needs of the nation and making professional course contents to reflect our national regiments. These objectives could be achieved through effective teaching, research and other allied academic activities.

For colleges of education lecturers to carry out their job efficiently and effectively especially in this age of knowledge-based technology and globalization, the use of ICT becomes imperative. Interestingly, tertiary institutions all over the world are rapidly incorporating ICT into all facets of teaching, research and management. Lecturers who succeed in making use of ICT in their work processes do not only contribute to improved learning outcomes in their students, but also benefit personally from enhanced work productivity (Carlson, 2002).

Colleges of education lecturers have various tasks to accomplish and these range from teaching, research and publications, marking of tests and examinations, supervising students' research activities, supporting students through advisory roles, attending conferences, providing community services and so on. In order for them to be effective and efficient, they need to acquire an appreciable level of ICT competence. This is necessary in order to meet up with the demands of their job (Yusuf, 2005). Daniel (2002) reported that overwhelming majority of teachers in Europe use ICT to plan lessons more effectively and efficiently. With the use of ICT, lecturers have also been able to communicate and collaborate with other lecturers and this enhances their job performance.

ICT involves a process of creating, processing, storage, retrieval and dissemination of information and data, using computers and telecommunications (Akpan, 2008). In education, it involves the application of digital equipment to all aspects of teaching and learning. Thus, ICT encompasses a combination of technologies for collecting, storing, processing, communicating and delivering of information related to teaching and learning processes (Johnson, 2007). Onuma (2007) reports that ICT can be used to enhance teaching effectiveness, prepare lesson plan, collect and analyze students' achievement. Thus, curriculum contents could be enriched through search in the internet. Akpan (2008) states that ICT can improve the quality of researches and publications in our tertiary institutions through the use of information and quality materials from the internet and to facilitate record-keeping by lecturers. Therefore, the importance of ICT in enhancing colleges of education lecturers' job cannot be overemphasized, hence the need for them to be competent in the use of ICT.

ICT competence is the ability of colleges of education lecturers to make use of the various ICT tools such as computers, the Internet, electronic delivery systems such as radios, televisions, projectors, e-mail, facsimile, World Wide Web, intranets, extranets, online databases and other networking technologies in the performance of their job (Kent & Facer, 2004). Radloff (2001) stated that ICT increases the skills and status of lecturers for job performance. The biggest challenge for promoting teaching effectiveness in the 21st century is the ability of lecturers to acquire ICT competencies and to apply instructional technology in their teaching (van Braak et al., 2004). Premised on this, this study investigated ICT competencies among lecturers of colleges of education.

Similarly, Marija and Palmira (2007) classified ICT competencies into two: basic and educational ICT competence. These competences are further elaborated in the ICT competency standards for teachers developed by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2011). Based on these documents, ICT competency is more comprehensive than mere focus on ICT skills. Rather, it is a comprehensive approach to education reform in six broad areas of policy, curriculum and assessment, pedagogy, the

use of technology, school organization and administration, and teacher professional development. The UNESCO (2011) standards for teachers are meant to improve teachers' practice in using ICT in an innovative way for teaching, collaborating with colleagues, and for school organization.

Lee (1997) found that a great number of lecturers are not equipped with basic computer operational skills; therefore, for lecturers to be able to integrate ICT into the school curriculum, groundwork must be done. It would, therefore, be interesting to investigate ICT competence among lecturers of colleges of education especially now that ICT is seen as not only crucial for the teaching and learning process but also for professional advancement.

Statement of the Problem

Lecturers are a vital link in the education chain, and for education to truly respond to the needs of 21st century, they must play a central role in leveraging technology, and in particular, using new and old (ICT) devices in teaching and learning. ICT competence among lecturers in colleges of education has been viewed as a prerequisite in adoption and integration of ICT in the school system. It has however been observed that in colleges of education, ICT usage among lecturers in the teaching and learning situation is still very minimal. This informed the researchers' decision to investigate ICT competence among lecturers of colleges of education in north central, Nigeria.

Objectives of the Study

The main objective of the study was to investigate ICT competence among lecturers of colleges of education in north central, Nigeria. Specifically, the study:

(i) Examined colleges of education lecturers' competence in using ICT hardware and software.
(ii) Assessed colleges of education lecturers' competence in basic computer operations.
(iii) Find out colleges of education lecturers' competence in using other ICT facilities with the computer.
(iv) Investigated colleges of education lecturers' competence in using the internet

Research Questions

The following research questions guided the study:

(i) Do colleges of education lecturers have the level of competence to use ICT hardware and software?
(ii) Do colleges of education lecturers have the level of competence to perform basic computer operations?
(iii) Do colleges of education lecturers have the level of competence to use other ICT facilities with the computer?
(iv) Do colleges of education lecturers have the level of competence to use the internet?

Methodology

This study is a descriptive research of the survey type. This is because information and findings obtained from this study can be used to describe other Colleges of Education in Nigeria. In this study, survey method was appropriate because of the size of the population

The population for this study was all lecturers in colleges of education in Nigeria while the target population were lecturers in colleges of education in north central, Nigeria. The sample was drawn from lecturers in the 10 colleges of education which consist of five Federal Colleges of Education and six State Colleges of Education. Purposive sampling technique was used to select the 10 colleges of education. Also, random sampling technique was used to select 24 lecturers from each college of education in view of NCCE's directives

that lecturers of colleges of education should be computer literate by 2005. A total of 240 lecturers were used for the study.

Survey Instrument

The research instrument used for this study was a questionnaire adapted from UNESCO's ICT-CFT (UNESCO, 2011). The survey instrument contained four sections. Section A focused on lecturers' level of competence on ICT hardware with 23 items and software with 12 items. The response modes for this section were Likert response mode of Highly Competent, Moderately Competent, Low Competent, and Cannot Use and were rated 4, 3, 2, and 1 respectively. Section B contained 13 items on lecturers' level of competence on basic computer operation with same response mode as in section A. Section C focused on lecturers' level of competence on using other ICT facilities with the computer with six items and response mode as in section A. While section D contained 16 items on lecturers' level of competence on the use of the internet with response mode as in section A.

The questionnaire was given to two Educational Technology lecturers at the University of Ilorin for face and content validity. Their corrections, comments and advices were effected before the final copy of the questionnaire was produced. The items on the questionnaire were pilot tested on 20 lecturers of the Kwara State College of Education, Ilorin. The internal consistency of the instrument for the actual study was calculated using Cronbach Alpha. A value of at 0.87 was recorded at 0.05 significant level. This showed that the items in the instrument had good reliability. Out of the 240 lecturers sampled for this study, 216 returned their questionnaires which were used for the analysis. There are 10% unreturned rate and 90% return rate of questionnaires. The responses from the respondents were arranged, tabulated and computed. Descriptive analysis using frequency and mean were employed to lecturers in colleges of education level of ICT competence. The clarification scheme used for the interpretation of the results are 0.50 – 1.49 for Cannot use, 1.50 – 2.49 for Low competent, 2.50 – 3.49 for Moderately competent, and 3.50 - 4.00 for Highly competent. In calculating the mean, F stands for the frequency while S stands frequency x response rating.

Results

Research Question One: Do colleges of education lecturers have the level of competence to use ICT hardware and software?

The results in Table 1 are on lecturers' level of competence to use ICT hardware

Table 1: Analysis of results on lecturers' level of competence to use ICT hardware

S/N	ICT facilities	LEVEL OF COMPETENCE								
		Highly competent		Moderately competent		Low competent		Cannot use		Mean
		F	S	F	S	F	S	F	S	
1	Desktop Computer	32	128	108	324	43	86	33	33	2.6
2	Laptop Computers	43	172	129	387	10	20	34	34	3.1
3	Palmtop Computers	32	128	76	228	32	64	76	76	2.3
4	Wireless Internet	32	128	86	258	32	64	66	66	2.4
5	Cable Internet	43	172	76	228	43	86	54	54	2.5
6	Digital camera	32	128	64	192	32	64	88	88	2.2
7	Scanner	21	84	21	63	32	64	142	142	2.1
8	Video equipment	54	216	43	129	43	86	76	76	2.3
9	Projector	10	40	54	162	21	42	131	131	1.7
10	Educational software	21	84	54	162	76	154	65	65	2.2
11	Television set	140	560	32	96	21	42	23	23	3.3

12	Interactive boards	54	216	43	129	32	64	87	87	2.3
13	Computer printer	32	128	97	291	54	108	33	33	2.6
14	Photocopiers	32	128	54	162	54	108	76	76	2.2
15	Virtual library	21	84	32	96	54	108	109	109	1.8
16	Electronic bulletin board	10	40	32	96	64	126	110	110	1.7
17	Electronic notice board	10	40	21	63	64	128	121	121	1.6
18	Radio	140	560	43	129	10	20	23	23	3.4
19	Tape recorder	118	472	43	129	21	42	34	34	3.1
20	CD player	108	432	64	192	10	20	34	34	3.1
21	Digital video disc player (DVD)	97	388	64	192	10	20	45	45	3.0
22	Smart phones	108	432	64	192	10	20	34	34	3.1
23	CD/DVD writers	43	172	64	192	32	64	77	77	2.3
	Grand Mean									2.6

Table 1 reveals that lecturers were highly competent in the use of laptop computers; moderately competent on the use of desktop computers, digital camera, interactive board, radio, tape recorder, CD player digital video disc player, smart phones; and low competent in the use of scanner, video equipment, projector, educational software, television, photocopiers, virtual library, electronic notice board and CD/DVD writer. The grand mean of 2.6 indicated that lecturers were moderately competence. This result underscores the need for lecturers to improve on their competence in the use of ICT hardware. The results in Table 2 are on lecturers' level of competence to use ICT software

Table 2: Analysis of results on lecturers' level of competence to use ICT software applications

S/N	Software applications	Level of Competence								Mean
		Highly competent		Moderately competent		Low competent		Cannot use		
1	Operating system	32	128	64	192	10	20	110	110	2.1
2	Word Processing Application (e.g MS Word)	43	172	86	258	43	86	44	44	2.6
3	Spread Sheet packages (e.g MS Excel)	21	84	64	192	43	86	88	88	1.7
4	Graphical software (e.g CorelDraw)	10	40	32	96	76	152	98	98	1.8
5	Presentation software (e.g power point)	10	40	54	162	76	152	76	76	2.0
6	Design tools (e.g paint brush)	21	84	10	30	76	152	81	81	1.6
7	Animation tools	10	40	43	129	32	64	131	131	1.7
8	Web browsing (e.g internet explorer)	43	172	86	258	32	64	98	98	2.7
9	Database Application	10	40	76	228	32	64	167	167	2.3
10	Multimedia Applications	10	40	43	129	43	86	120	120	1.7
11	Communication software e.g video conferences	10	40	32	96	64	128	110	110	1.7
12	Electronic Learning Management System (EMLS)	10	40	32	96	54	128	120	120	1.8
	Grand Mean									2.0

Table 2 shows that none of the lecturers were highly competent in the use of ICT software. However, they are moderately competent in the use of word processing application and web browsing. They are equally low competent in operating system, spread sheet application, graphical software, presentation software, design tools, animation tools, database application, multimedia application, communication software and electronic learning management system. The grand mean of 2.0 shows clearly that lecturers in colleges of education had low level of competence in the use of ICT software. Thus, lecturers need to be more competent on the use of ICT software.

Research Question Two: Do colleges of education lecturers have the level of competence in basic computer operations?

The results in Table 3 are on lecturers' level of competence in basic computer operations.

Table 3: Analysis of results on lecturers' level of competence in basic computer operations

S/N	Statements	Level Of Competence								Mean
		Highly competent		Moderately competent		Low competent		Cannot use		
1	Boot a computer	140	560	43	129	21	42	12	12	3.4
2	Identify icon on desktop	151	604	21	63	21	42	23	23	3.4
3	Select an application	129	516	54	162	10	20	23	23	3.3
4	Run application	118	472	32	96	43	86	23	23	3.1
5	Use the keyboard	129	516	54	162	21	42	12	12	3.4
6	Use the mouse	140	560	43	129	10	20	23	23	3.4
7	Search for a document	108	432	75	225	21	42	12	12	3.3
8	Insert and access CD	97	388	86	258	21	42	12	12	3.2
9	Save a document on CD/flash	86	344	86	258	21	42	23	23	2.0
10	Connect the computer with other devices using cables	54	216	97	291	43	86	22	22	2.5
11	Print a document	97	388	54	162	32	64	33	33	3.0
12	Close an application	108	432	64	192	21	42	23	23	3.2
13	Shut down the computer properly	151	604	32	96	21	42	12	12	3.5
	Grand Mean									3.1

Table 3 reveals that lecturers were highly competent in shutting down the computer properly; moderately competent in booting the computer, identify icon on the desktop, selecting an application, running application, using the keyboard and mouse, selecting document, inserting and accessing CD, connecting the computer with other devices using cables, printing documents and closing application. They are low competent in saving a document on a CD/flash. The grand mean of 3.1 indicated that lecturers were moderately competent in basic computer operations. Hence, the need for lecturers to acquire more training on basic computer operations.

Research Question Three: Do colleges of education lecturers have the level of competence to use other ICT facilities with the computer?

The results in Table 4 are on lecturers' level of competence to use other ICT facilities with the computer

Table 4: Analysis of results on lecturers' level of competence to use other ICT facilities with the computer

S/N	Statements	Level of Cpmpetence								Mean
		Highly competent		Moderately competent		Low competent		Cannot use		
1	Connect handset to the computer	64	256	75	225	43	86	34	34	2.8
2	Connect the digital camera to the computer	43	172	64	192	43	86	66	66	2.9
3	Use the interactive white board with the computer	21	84	64	192	54	108	77	77	2.1
4	Use web cam to capture images	43	172	43	129	64	128	66	66	2.3
5	Connect a multimedia projector to the computer	43	172	21	63	75	150	77	77	2.1
6	Use a scanner to create and copy images	32	128	21	63	64	128	99	99	1.9
	Grand Mean									2.4

Table 4 reveals that none of the lecturers was highly competent in using other ICT facilities with the computer but moderately competent in connecting digital camera and handsets to the computer and low competent in using interactive whiteboard with the computer, using web cam to capture image, connecting multimedia projector with the computer and using the scanner to create and copy images. Lecturers need to be competent on the use of computer with other ICT facilities in view of a grand mean of 2.4 recorded which indicated that lecturers had low competence.

Research Question Four: Do colleges of education lecturers have the level of competence to use the internet?

The results in Table 5 are on lecturers' level of competence to use the internet

Table 5: Analysis of results on lecturers' level of competence to use the internet

S/N	Statements	Level of Competence								Mean
		Highly competent		Moderately competent		Low competent		Cannot use		
1	Surf the internet using a computer	64	256	43	129	86	172	23	23	2.7
2	Surf the internet using a smart phones	75	300	43	129	64	128	34	34	2.7
3	Use a search engine such as Google, devilfinder etc.	86	344	54	162	43	86	33	33	2.9
4	Make a web book mark	43	172	43	129	43	86	87	87	2.2
5	Upload a file	75	300	86	258	21	42	34	34	2.9
6	Download information on the computer	97	388	64	192	10	20	45	45	3.0
7	Save downloaded information on computer	97	388	75	225	21	42	23	23	3.1
8	Use images from a web page	32	128	54	162	86	172	44	44	2.3
9	Modify an image or graphic with computer	21	84	32	96	64	128	99	99	1.9
10	Participate in an online	43	172	75	225	43	86	55	55	2.5

	discussion or newsgroup									
11	Create and upload a webpage	21	84	64	192	43	86	88	88	2.1
12	Send e-mail with an attachment	54	216	75	225	43	86	44	44	2.6
13	Use information from web for a project or assignment	64	256	86	258	32	64	34	34	2.8
14	Chat online using facebook, yahoo messenger, whatsapp, 2go, and so on	86	344	64	192	21	42	45	45	2.9
15	Copy information from a download	54	216	108	324	10	20	44	44	2.8
16	Paste copied information on a working page.	54	216	86	258	21	42	55	55	1.6
	Grand Mean									2.6

Table 5 reveals that none of the lecturers were highly competent in the use of the internet. However, they were moderately competent in surfing the internet using computers and smart phones, using search engines, uploading files, downloading information, saving downloaded information on the computer, participate in online discussion or newsgroup, sending e-mail with attachment, using information from the web for projects or assignment, chatting online using facebook, yahoo messenger, whatsapp, 2go, and copy information from download; low competent in using image from a web page, modifying image or graphics with computer, creating and uploading a web page and pasting copied information on a working page. Hence, lecturers should acquire more competence on area that they had low competence because, the grand mean of 2.6 indicated that lecturers were moderately competence.

Discussion

The potentials of ICT as an educational tool in teacher education had been well established by several studies. This study investigated ICT competence among lecturers in colleges of education in north central, Nigeria. Results from the self-report questionnaire used for this study revealed that lecturers of college of education lack skills in various ICT facilities and applications that support and enhance teaching, learning experiences and ICT integration in instruction. Generally, Lecturers in the colleges of education had low competence in the use of ICT software and the use of computers with other ICT facilities. Lecturers equally had moderately competence in the use of ICT hardware, basic computers and the use of internet.

This underscores the need for more emphasis to be placed on exposing lecturers to advanced training in the use of ICT in the teaching learning process. Lecturers in Nigerian colleges of education would need to improve on their ICT competence in line with the UNESCO ICT-CFT competency standards for teachers for them to meet up with the challenge of the information age.

The implication of the findings of this study is that some kinds of training and retraining programmes are needed by lecturers of colleges of education to effectively implement the ICT applications in teacher education programme.

Limitations of the Study

The questionnaire, a self-report, was used to gather data. The overall approach would have been strengthened by the use of classroom observation, interviews, and focus-groups. Observation would have been relevant in gathering data on lecturers' ICT skills and actual

use of ICT. Focus group would have been good for identifying and exploring pre-service teachers' views in-depth about ICT provision and their construction of meaning. Another major weakness is the fact that the sample included only lecturers who happened to be in office on the days when the questionnaire copies were administered. Despite these limitations, in the view of the researcher, the gains for the research far outweigh the limitations.

Conclusion and Recommendations

The results revealed that among the basic computer competency sub-divisions, lecturers indicated low competency in general. The findings underscore the need to introduce lecturers to more training on ICT with needed hand-on experiences so as to promote effective integration of ICT. In addition, it brings to the fore the need for teacher educators to model good use of ICT in their instruction.

One of the problems facing the development of ICT in colleges of education include the fact that there is limited infrastructural facilities, difficulties in infusing Internet use into the curriculum and also lack of appropriate lecturers' development. It is very important that these problems are addressed since it is lecturers who would produce highly teachers competent in future. Also, provisions should be made for lecturers to be able to integrate ICT-based methodology into their lectures; and also, all classrooms should be equipped with necessary infrastructure and, lastly, all students should be provided with access to media laboratories.

References

Ajzen, I. & Fishbein, M. (1980) *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice- Hall.

Akpan, C. P. (2008). *Enhancing quality in open & distance education through effective utilization of information &communication technology (ICT) in Nigeria.* Paper presented at the 2nd African Council for Distance Education(ACDE) Conference & General Assembly, Lagos, Nigeria.

Bebetsos, E. & Antoniou, P. (2008 October). University students' differences on attitudes towards computer use. Comparison with students' attitudes towards physical activity. *Interactive Educational Multimedia*, 17, 20-28. Retrieved 3 February 2009 from http://greav.ub.edu/iem/index.php?journal=iem&page=article&op=view&path[]=130&path[]=198

Carlson, S. (2002). The missing link in educational technology: Trained teachers. *TechKnowLogia,* Oct-Dec 2002 http://www.TechKnowLogia.org

Casal, R. C. (2007). ICT for education and development. *Info*, 9(4).

Chai, C. S., Hong, H., & Teo, T. (2008, October). Singaporean and Taiwanese pre-service teachers' beliefs and their attitude towards ICT: A comparative study. *Paper presented at the 16th International Conference on Computers in Education*. Retrieved from http://www.apsce.net/icce2008/papers/ICCE2008-paper19.pdf

Collis, B. & Monnen, J. (2001). *Flexible learning in a digital world: Experiences and expectations.* London*:* Kogan Page.

Daniels, J. S. (2002). *Forward in information and communication technology in eduction: A curriculum or schools and Programme for teacher development.* Paris: UNESCO.

Derbyshire, H. (2003). *Gender issues in the use of computers in education in Africa*. Retrieved from http://imfundo.digitalbrain.com/imfundo/web/learn/documents/Gender%20Report.pdf

Dyck, J. L. & Smither, J. A. (1995). Older adults' acquisition of word processing. The contribution of cognitive abilities and computer anxiety. *Computer in Human Behavior,* 12(1), 107 - 199.

Ezenwafor, J. I. (2011). *Adequacy of exposure to information and communication technology by graduating business education students of tertiary institutions in Anambra State.* Being a Paper Presented at the 23rd National and 2ndInternational conference of Association of Business Educators of Nigeria held at the University of Lagos on the 11th – 15th October, 2011

Idowu, B., Ogunbodede, E., & Idowu, B. (2003). Information and communication technology in Nigeria: The health sector experience. *Journal of Information Technology Impact,* 3(2), 69 - 76.

Jackson, L. A., Ervin, K. S., Gardner, P. D., & Schmitt, N. (2001). Gender and the internet: Women communication and men searching. *Sex Roles, 44* (5), 363-379.

Jegede, P. O. (2008). Attitudinal characteristics and use level of Nigerian teachers. *Issues in Informing Science and Information Technology, 5.* Retrieved from http://proceedings.informingscience.org/InSITE2008/IISITv5p261-266Jegede533.pdf

Jegede, P. O. & Owolabi, J. A. (2003). Computer education in Nigerian secondary schools. Gaps between policy and practice. *Meridian,* 6 (2). Retrieved from http://www.ncsu.edu/meridian/sum2003/nigeria/index.html

Kadel, R. (2005, February). How teacher attitude affect technology. *Learning and Leading with Technology, 39* (5), 34-47.

Kazu, I. Y. & Yavulzalp, N. (2008). An analysis of the primary school teachers' usage of instructional software. *International Journal of Emerging Technologies*, *3* (1), 45-53.

Kennewell, S. & Morgan, A. (2003, July). Student teachers' experiences and attitudes towards using interactive whiteboards in the teaching and learning of young children. *Presented at the IFIP Working Groups 3.5 Conference: Young Children and Learning Technologies.* UWS Parramatta. Retrieved from http://crpit.com/confpapers/CRPITV34Kennewell1.pdf

Khine, M. S. (2001). Attitudes toward computers among teacher education students' in Brunei Darussalam. *International Journal of Instructional Media, 28* (2), 147-153.

Kirschner, P. & Woperies, I. G. J. H. (2003). Pedagogic benchmarks for information and communication technology in teacher education. *Technology, Pedagogy and Education, 12* (1), 127 - 149.

Kumar, P. & Kumar A. (2003). Effect of a web-based project on preservice and inservice teachers' attitudes toward computers and technology skills. *Journal of Computing in Teacher Education,* 19(3), 87-92.

Kyriakidou, M., Chrisostomou, C., & Bank, F. (2000, September). Primary teachers' attitude to the use of ICT: A comparative study between Cyprus and the UK. *Paper presented at the European Conference on Educational Research.* Lahti, Finland.

Lee, D. (1997). Factors influencing the success of computer skills learning among in-service teachers. *British Journal of Educational Technology, 28,* 139-141.

Lee, A. C. K. (2003). Undergraduate students' gender difference in it skills and attitudes. *Journal of Computer Assisted Learning.* 19, 488-500.

Marija, B. & Palmira, P. (2007). Would-Be Teachers' Competence in Applying ICT: Exposition and Preconditions for Development. *Informatics in Education - An International Journal*, 6(2), 397-410.

Moursund, D. & Bielefeldt, T. (1999). *Will new teachers be prepared to teach in a digital age?* Santa Monica. Milken Family Foundation.

Oblinger, D. (2004). The Next Generation of Educational Engagement. *Journal of Interactive Media in Education,* 8. Retrieved December 5, 2007 from http://www-jime.open.ac.uk/2004/8/oblinger-2004-8.pdf

Ololube, N. P. (2007). The relationship between funding, ICT, selection processes, administration, planning and the standard of science teacher education in Nigeria.

Olumorin, C. O. (2008). *Tertiary institutions lecturers' attitudes to, competence in and use of computer in Kwara State. Nigeria.* Doctoral Dissertation. Department of Science of Education, University of Ilorin.

Onuma, N. (2007). Utilization of ICT in schools: Problems and suggestions. In J. B. Babalola, G. O Akpa, A. O. Ayeni & S. O. Adedeji, (Eds), *Access, equity and quality in higher education* (pp.487-496). Lagos: NAEAP.

Rajab, L. D. & Baqain, Z. H., (2005). Use of information and communication technology among dental students at the University of Jordan. *Journal of Dental Education, 69*(3), 387-398.

Robbins, V. (1998). The development of information technology skills in trainee teachers for further education sector. *Research in Post-Compulsory Education, 3* (2), 240-251.

Schaumburg, H. (2001). *Fostering girls' computer through laptop learning – Can mobile computers help to level out the gender difference*? Retrieved from http://www.notesys.com/Copies/necc01.pdf

Sefyrin, J. (2005). Understandings of gender and competence in ICT. *Paper presented at 6th International Women into Computing Conference.* University of Greenwich. Retrieved from http://www.miun.se/upload/Institutioner/ITM/IKS/SI/publikationer/sefyrin_WiC.pdf

Teo, T. (2008). Pre-service teachers' attitude towards computer use: A Singapore survey. *Australian Journal of Educational Technology, 23*(4), 413-424.

Townsend, M. (1997). Computer block – does it exist in the comprehensive secondary schools? *British Journal of Educational Technology, 28*, 219-221.

United Nations Educational, Scientific and Cultural Organization (2008). *ICT competency standards for teachers: Policy framework*. United Kingdom: Author. Retrieved from http://www.oei.es/tic/competencias_tic_docentes_marcos_politicas.pdf

United Nations Educational, Scientific and Cultural Organization (2011). *UNESCO ICT competency framework for teachers' version 2.0.* Paris: UNESCO

Watson, M. D. (2005). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies*, 6(4), 252-266.

Yusuf, M. O. (2005). An investigation into teachers' self-efficacy in implementing computer education in Nigerian secondary schools. Meridian: A Middle Sch. *Computer Technology Journal*, 8 (2) Retrieved from http://www.ncsu.edu/meridian/sum2005/ computer_ed_nigeria_schools/index.html