ICT Competencies and Teacher Education Programme in Colleges of Education

(A Case Study of FCT College of Education, Zuba)

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Abstract

This study was aimed at ascertaining the ICT competencies required in teacher education programme in Nigerian Colleges of Education. The study adopted a descriptive survey design. The population of the study was 181 lecturers and students drawn from three different departments. This includes 30 lecturers and 151 students from the departments of computer science education, mathematics education, and vocational/technical education of the FCT College of Education, Zuba. One hundred and twenty (120) students were randomly selected from 3 departments (40 from each department), while all the thirty (30) lecturers were sampled for the study. Copies of structured questionnaire were administered to a total of 150 respondents that constituted the study sample. Only 120 questionnaire copies were successfully completed and returned, giving a return rate of 80.0%. Respondents' mean scores were used to analyze research questions, while the null hypothesis was tested using t-test statistics at significant level of 0.05. The study revealed that the present ICT competency level of the teachers needed to be improved upon and sustained in order to enhance teaching and learning; that both students and teachers require a high level of internet surfing competency in order to make success of their chosen careers; and that for them to effectively keep records of data and information, they require a great deal of competence in word processing softwares. It was recommended that lecturers and students should endeavour to acquire various IT professional certifications such as CCNA, CISCO, C++, etc. Also, a more focused and teacher-targeted ICT training content should be provided for lecturers in the Colleges of Education. Finally, the government should ensure compulsory ICT training for teacher education programmes at teacher training institutions. It was suggested that further study be carried out on teachers' perception of the impact of computer education on teaching profession.

Introduction

Today's fast-paced world is becoming increasingly characterized by technology-driven communication, which has transformed the world into a large global connected community with ever-increasing outreach of information and communication technology (ICT). ICT refers to the range of technologies that are applied in the process of collecting, storing, editing, retrieving, and transfer of information in various forms (Olakulehin, 2007). The Federal Ministry of Education, Nigeria (2010) defines ICT as encompassing all equipment and tools (inclusive of traditional technologies of radio, video, and television to the newer technologies of computers, hardware, firm-ware, etc.), as well as the methods, practices, processes, procedures, concepts, and principles that come into play in the conduct of the information and communication activities. The importance of technology in people's lives is unimaginable and it is envisaged that technological literacy will soon become a functional requirement for people's work, social, and even personal lives. For both social and economic reasons students will need computer and communication technology skills to live successfully in a knowledge-based society.

Education is the first and best key area for ICT applications. 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). ICTs can help by providing alternative possibilities for education (Casal, 2007). Use of different information communication technologies has become inevitable for students in learning. By using modern information communication technologies, students can retrieve required information within a short time. They can access and disseminate electronic information such as e-books and e-journals and can improve their learning by using different modern ICTs in form of wireless networks, internet, search engines, databases, websites, and web technologies. Teachers 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 Information and Communication Technology (ICT) devices in teaching and learning. What kind of skills will teachers need to acquire in order to be effective in an ICT based learning environment? This study will address this issue by highlighting the experiences of teachers and students using ICT in Nigeria, and offering some further examples of established ICT teaching and learning applications in other developing and developed countries.

It has been found that knowledge of ICT usage improves human capacity in every field of human endeavour, including business transactions, industrial operations, educational programmes and life in general. In the field of education, Radloff (2001) highlights the opportunities that ICT presents for enhancing the quality of teaching and learning to include: providing encouragement for teachers to reflect on how they teach and learn; applying theory and research on learning and principles of good instruction to designing online learning environments; making teaching and learning more visible and public; encouraging collaboration and teamwork among teachers (and students); offer greater access to learning for more people. In Africa there is the OER24schools initiative that is investing in applied pedagogy, including ICTs in mathematics and sciences (Hennesy et al., 2015).

Teacher training related to ICT in education is thus also related to existing infrastructure, as also highlighted by (Twining, 2013). In other words, one anticipates a directly proportional relationship between ICT infrastructure and teacher training whereby as there is more and new infrastructure, training should increase. Some literatures suggest that not only teachers need to be trained but also school administrators since they play a critical role to ensure ICTs are to be used in schools (Infodev, 2015).

Understanding the complex evolving nature of ICT in general, additional clarity regarding the concepts "ICT-qualified" and "trained to teach subjects using ICT facilities" is needed. Consistent with this need for further reflection, Twining and Henry (2014) in an article entitled "Enhancing ICT Teaching in English Schools: Vital Lessons" argue that the term

ICT has changed its focus over time and refers to several specific aspects of the use of technology within schools, encompassing the specialist subjects, the use of technology to support learning across the curriculum, as well as digital technology itself.
However, how prepared are the teachers in Nigerian classrooms to deliver 21st century education? The challenge in Nigeria today is not only shortage in the availability of teachers who are ICT-competent, but the need to move from learning to use ICT to using ICT to learn.
The need for training in the use of ICT applications for teachers has been given top priority by government in the developed world. For instance, all British teachers were expected to have undergone training in the use of ICT by 2002. Teachers were equally supported in the purchase of personal home computers. Through these initiatives it is envisaged that many more teachers will be encouraged to explore the possibilities of ICT and increase their confidence in the use of computers (Department for Education and Employment (DfEE), (2000). The use of ICT in teacher education has been widely studied and documented especially the positive influence of ICT in teacher education, and the use of ICT as instructional tool. Very few studies have been carried out in Nigeria on the use of ICT in education (Jegede, 2009; Ololube, 2007).

Statement of the Problem

ICT literacy among students and teachers in Nigerian Colleges of Education has been viewed as prerequisite in adoption and integration of ICT in teacher education programme. It has been observed that in Colleges of Education in Nigeria, ICT usage, especially among teachers is still very minimal as most students are technologically savvy than their teachers. This in turn affects NCE graduates' ICT competence and general classroom efficiency in ever-growing world of digital technology.

Purpose of the Study

The major purpose of this study is to investigate the ICT competencies required in teacher education programme in colleges of education. Specifically, this study would:

1. Ascertain the competency level of COE teachers in the use of ICT
2. Find out the computing skills NCE students require for their programme.
3. Highlight whether teachers need database management skills in NCE programmes.
4. Determine whether teachers require basic knowledge of word processing software for NCE programme.
5. Investigate the internet surfing competence of NCE students and teachers.

Significance of the Study

For students, this study would help them acquire the necessary skills they require to compete favourably in the labour market after their graduation. It would also help them in carrying out independent research in their programmes of studies. The study would enhance research into related problems by relevant bodies/authorities and teachers, facilitate capacity building to improve and update the quality of the existing teaching force, and ensure that NCE programme integrate pedagogy and technology for optimum efficiency and effectiveness of the programme in Nigeria

Role of ICT in Teaching and Learning

Information and communication technology (ICT) refers to the eclectic application of computing, communication, telecommunication and satellite technology in reference (Yusuf, 2005). Many countries in the world (Nigeria inclusive) recognize the importance of ICT. They are training teachers to use technology as tools for enhancement of teaching and learning. Ajoku (2000) remarked that the use of ICT enhances problem-solving skills and attitude as well as to develop knowledge and manipulative skills. Also, Jung (2005) pointed

out that teachers can be trained to learn how to use ICT and teachers can be trained via ICT. The following are the importance of ICT as enumerated by the Nigeria Teachers Institute (NTI, 2004):

i. It can be used to support conventional classroom works.
ii. To design and develop learning materials.
iii. Students can exchange electronic materials like journals, books etc.
iv. Some libraries store electronic versions of books and journals through which ICT teachers can have access, store and analyze information in electronic forms.
v. ICT is useful in research activities.
vi. ICT can be useful in administration, recording students' data, personal administration, purchasing/supplies and advertisement.
vii. Gives room for individualized and independent learning.
viii. ICTs make learning more vivid and engaging.
ix. ICTs have broken teachers-centered instruction
x. It also provides a two-way channel of communication for exchange between teachers and students with peers for feedback.

Methodology

The study adopted a descriptive survey design. The study was conducted in FCT College of Education, Zuba. A total number of one hundred and eighty-one (181) lecturers and students drawn from three different departments constituted the population. This includes thirty (30) lecturers and one hundred and fifty-one (151) 200 level students from the departments of computer science education, mathematics education, and vocational/technical education of the FCT College of Education, Zuba.

Table 1: Population of the Study

	Category	No. of Persons	Remark
Population	Lecturers	30	
	Students of Comp. Sc. Edu Dept.	56	
	Students of Maths Edu. Dept.	45	
	Students of Voc/Tech Edu. Dept.	50	

Table 2: Sample of the Study

	Category	No. of Persons	Remark
Sample	Lecturers	30	
	Students of Comp. Sc. Edu Dept.	40	
	Students of Maths Edu. Dept.	40	
	Students of Voc/Tech Edu. Dept.	40	

The instrument for data collection was a close-ended questionnaire using the 4-point likert rating scale. Values were attached to the variables namely: highly required (HR) = 4; required (R) = 3; somewhat required (SR) = 2; and not-required (N) = 1. This method is

easier to collect opinions in-between the two extremes of highly required and not-required. The instrument was subjected to face validation by three experts; two from the Department of Computer Science, and one from the Department of Vocational and Technical Education, FCT College of Education, Zuba. The experts' suggestions were taken into consideration in the final draft of the questionnaire. The researcher personally administered the structured questionnaire and collected same after completion. The researcher used mean scores to analyze the data obtained from the research questions using the likert rating scale. Values were attached to each response that was obtained under each questionnaire item. Meanwhile, the null hypothesis was tested using t-test statistics at significant level of 0.05.

Results and Discussion

Research Question 1: What is the ICT competency level need for COE teachers?

Table 3: Mean responses on the ICT competency level needed of COE teachers.

S/N	Variables	HR	R	SR	N	$\overline{X}$	Remark
1.	Teachers need to know how to use a projector for presentations.	60	30	20	10	3.16	Required
2.	Teachers should possess various IT professional certifications such as CCNA, CISCO, C++, etc.	40	60	10	10	3.08	Required
3.	Teachers should be able to communicate with their students via various multimedia channels viz; text, audio, video, etc.	50	50	20	0	3.25	Required
4.	Teachers should be able to operate gadgets, viz, mobile phones, tablets, ipads.	70	10	20	20	3.08	Required

The data in table 3 above shows the mean ratings on the needed ICT competency level for COE teachers. The responses obtained from the respondents indicated that they agreed with the three (4) items drawn to answer research question one. They agreed that teachers should know how to use a projector for presentations (mean = 3.16). The respondents also agreed that teachers should possess various IT professional certifications such as CCNA, CISCO, C++, etc (mean = 3.08); and that teachers should be able to communicate with their students via various multimedia channels (mean = 3.25).
In view of the above, the study revealed that the present ICT competency level of the teachers needs to be improved upon and sustained in order to enhance teaching and learning.

Research Question 2: What are the computing skills NCE students require?

Table 4: Mean responses on the computing skills NCE students require.

S/N	Variables	HR	R	SR	N	$\overline{X}$	Remark
5.	Students are required to be able to perform calculations using Ms excel.	70	10	20	20	3.08	Required
6.	Students should know how to compute figures using matlab.	20	10	20	70	1.83	Not Required
7.	Students require working knowledge of mathematical/statistical softwares such as SPSS, mathtype, mathematica, etc.	0	20	30	70	1.58	Not Required
8.	Students require in-depth knowledge of how to use a scientific calculator.	60	30	20	10	3.16	Required

The data in table 4 consists of the mean ratings of the computing skills NCE students require. The respondents agreed with two of the four items drawn up for the study. In other words, they agreed that students require the ability to perform calculations using Ms excel (mean = 3.08), and that students require in-depth knowledge of how to use a scientific calculator (mean = 3.16). However, the respondents disagreed on the other two items. They argued that if students can perform basic calculations using excel, that will be enough; and that they don't necessarily need to know matlab, SPSS, mathematica, etc. The mean ratings for the items are (1.83 and 1.58) respectively as can be seen on the table.

Research Question 3: What are the database management skills required by COE teachers?

Table 5: Mean responses on the database management skills required by COE teachers.

S/N	Variables	HR	R	SR	N	$\overline{X}$	Remark
9.	Teachers should be able to create queries and generate report using Ms access.	40	50	10	20	2.91	Required
10.	Teachers should be able to sort and filter data effectively.	80	40	0	0	3.66	Required
11.	Teachers require a good e-record management skill/ability.	60	20	20	20	3.00	Required
12.	Teachers should know how to process data and information.	40	70	10	0	3.25	Required

Table 5 above shows the mean ratings on the database management skills required by COE teachers. The table shows that of the four items drawn for the study, none of them was rated 'not required'. The respondents agreed that teachers require the ability to create queries and generate report using Ms access (mean = 2.91), should be able to sort and filter data effectively (mean = 3.66), that teachers require a good e-record management skill/ability (mean = 3.00), and that teachers should know how to process data and information (mean = 3.25).

Research Question 4: What are the word processing softwares teachers need to know?

Table 6: Mean responses on the word processing softwares teachers need to know.

S/N	Variables	HR	R	SR	N	$\overline{X}$	Remark
13.	Teachers are required to know how to use Ms word efficiently.	20	80	10	10	2.91	Required
14.	Teachers should be able to effectively manipulate Ms excel.	40	70	10	0	3.25	Required
15.	Teachers should have a working knowledge of Ms powerpoint.	70	10	20	20	3.08	Required
16.	Teachers should have a working knowledge of word pad.	40	60	10	10	3.08	required

The data in table 6 shows the mean ratings on the word processing softwares teachers need to know. The responses obtained from the respondents indicated that they all agreed with the four (4) items drawn for the study. They agreed that teachers are required to know how to use Ms word efficiently (mean = 2.91). The respondents also agreed that the ability to effectively manipulate Ms excel is vital (mean = 3.25); that teachers should have a working knowledge of Ms powerpoint (mean = 3.08); and that teachers should have a working knowledge of word pad (mean = 3.08). In line with the above therefore, the study revealed

that for teachers to effectively keep records of data and/or information, they require a great deal of competence in word processing softwares.

Research Question 5: What is the needed level of internet surfing competency of NCE students and teachers?

Table 7: Mean responses on the needed level of internet surfing competency of NCE students and teachers.

S/N	Variables	HR	R	SR	N	$\overline{X}$	Remark
17.	Students and teachers should be able to search for information using various internet search engines such as google, yahoo, mamma, etc.	90	20	0	10	3.58	Required
18.	Students and teachers should be able to effectively navigate webpages.	70	30	10	10	3.33	Required
19.	Teachers and students should be able to upload/download documents, pictures, files/folders on the web.	80	5	15	20	3.20	Required
20.	Teachers and students should be able to create and manage their own e-mail accounts.	20	80	10	10	2.91	Required

The data in table 7 shows the mean ratings on the needed level of internet surfing competency of NCE students and teachers. The mean responses obtained from the respondents indicated that they agreed with all the items drawn up for the study. It can therefore be said that both students and teachers require a high level of internet surfing competency in order to make success of their chosen careers.

Test of Hypothesis

The research hypothesis states that there is no significant difference between the opinions of NCE students and that of their teachers on the ICT competencies required in teacher education programme in Colleges of Education.

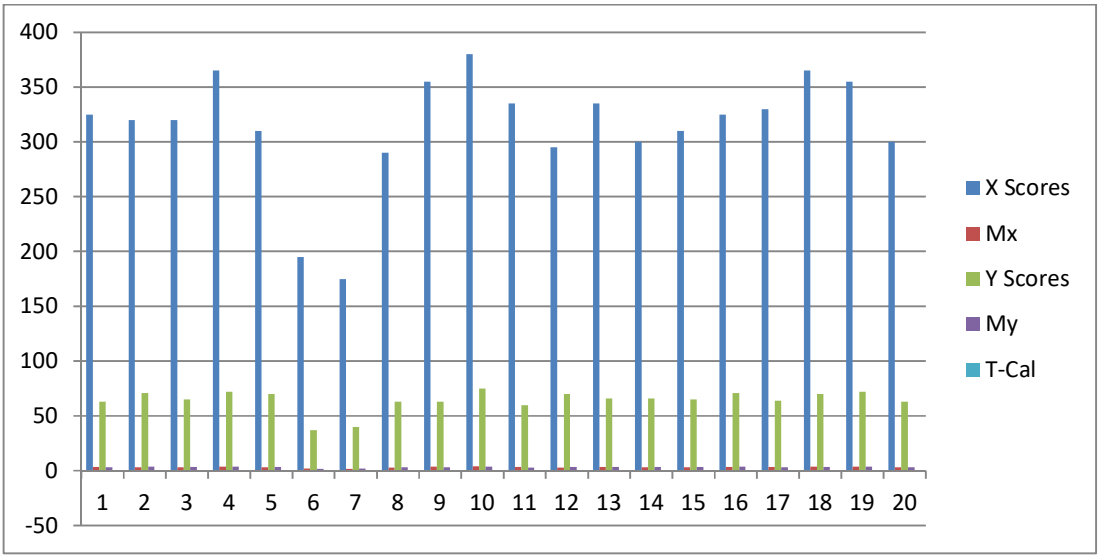

Figure 1: *Graphical representation of t-test of difference between the opinions of NCE students and that of their teachers on the ICT competencies required in teacher education programme.*

Table 8: T-test of difference between the opinions of NCE students and that of their teachers on the ICT competencies required in teacher education programme in Colleges of Education.

S/N	Students		Teachers		T-Cal	Decision
	X	Mx	Y	My		
1	325	3.25	63	3.15	0.10	Accepted
2	320	3.20	71	3.55	-0.35	Accepted
3	320	3.20	65	3.25	-0.05	Accepted
4	365	3.65	72	3.60	0.05	Accepted
5	310	3.10	70	3.50	-0.40	Accepted
6	195	1.95	37	1.85	0.10	Accepted
7	175	1.75	40	2.00	-0.25	Accepted
8	290	2.90	63	3.15	-0.25	Accepted
9	355	3.55	63	3.15	0.40	Accepted
10	380	3.80	75	3.75	0.05	Accepted
11	335	3.35	60	2.90	0.45	Accepted
12	295	2.95	70	3.50	-0.55	Accepted
13	335	3.35	66	3.30	0.05	Accepted
14	300	3.00	66	3.30	-0.30	Accepted
15	310	3.10	65	3.25	-0.15	Accepted
16	325	3.25	71	3.55	-0.30	Accepted
17	330	3.30	64	3.20	0.10	Accepted
18	365	3.65	70	3.50	0.15	Accepted
19	355	3.55	72	3.60	-0.05	Accepted
20	300	3.00	63	3.15	-0.15	Accepted

Table t-value = 1.98; Df. (Degree of Freedom) = 118; Nx = 100; Ny = 20

It can be seen from fig. 1 and table 8 above that the stated null hypothesis of no significant difference between the opinions of NCE students and that of their teachers on the ICT competencies required in teacher education programme in colleges of education is accepted.

Conclusion

This study highlights the needed ICT competencies in teacher education programme in Colleges of Education. The findings show that competency in the following areas are very vital for an enhanced teacher education programme, viz; information technology, computing, database management, word processing softwares, internet surfing, among others. Students and teachers alike do not only need ICT infrastructure available, but also the personal skills in order to use it. It is evident from the literature that unless the issue of ICT competency is addressed, it can itself be a barrier to students' learning.

Recommendations

On the basis of the findings of this study, the researcher recommends that special funds be created to revamp the e-learning support centres in our Colleges of Education for students' and lecturers' use. Lecturers and students should endeavour to acquire various IT professional certifications such as CCNA, CISCO, C++, etc. A more focused and teacher-targeted ICT training content should be provided for lecturers in the Colleges of Education. Finally, Government should ensure compulsory ICT training for teacher education programmes at teacher training institutions.

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