

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) COMPETENCE LEVEL OF SCIENCE AND TECHNOLOGY TEACHER EDUCATORS IN COLLEGES OF EDUCATION

Nath Olinya

*Department of Computer Science Education,
Federal College of Education,
Eha-Amufu.*

Abstract

The purpose of the study is to determine the status of ICT competence level of science and technology teacher educators in colleges of education. The study adopted a survey research design. The population of the study consisted of 554 science and technology teacher educators in colleges of education within southeastern Nigeria. A sample of three hundred and twenty (320) science and technology teacher educators from two Federal, two States and two Private colleges of education was used for the study. A structured questionnaire was used for data collection. The instrument was subjected to face validation by three experts. The reliability co-efficient of the instrument for the study was 0.98 using Cronbach alpha reliability test. Research questions were answered using mean and standard deviation and hypothesis tested at 0.05 level of significance using chi-square and 2 x 2 ANOVA. Among the findings of the study, were that the level of ICT competence among science and technology teacher educators is low. Conclusions based on findings of the study and recommendations were made.

Information and communication technologies (ICTs) refers to a whole range of facilities or technologies involved in information processing and electronic communications, to be handled with skills and expertise for effective achievement and realization of its potentials in both education and socio-economic development of Nigeria society. ICTs have the potential to enhance access, quality, and effectiveness in education in general and to enable the development of more and better teachers in Nigeria in particular (Janssens, 2002). As computer hardware becomes available to an increasing number of schools, more attention needs to be given to the capacity building of the key transformers in the process, namely, teachers.

ICTs are one of the major contemporary factors shaping the economy and producing rapid changes in society. They have fundamentally changed the way people learn, communicate, and do business. They can transform the nature of education

where and how learning takes place and the roles of students and teachers in the learning process (Jansses, 2002). In order to function in the new world economy, students and their teachers have to learn to navigate large amounts of information, to analyze, and make decisions, and to master new knowledge and to accomplish complex tasks collaboratively. Overloaded with information, one key outcome of any learning experience should be for learners to critically challenge the material collected in order to decide whether it can be considered useful input in any educational activity. This is the basis for the construction of knowledge (Plomp, Brummelhuis, and Pelgrum, 1997).

Technology is not new to education. However, contemporary computer technologies such as the internet, allow new types of teaching and learning experiences to flourish. Many new technologies are interactive, making it easier to create environments in which students can learn by doing, receive feedback, and continually refine their understanding and build new knowledge. Access to the internet gives unprecedented opportunities in terms of the availability of research material and information in general. Consequently, all people employed as teachers need develop the competence and skills which will enable them maximize the use of the computer as a teaching resource to enable student learn and to prepare students to master high technology society.

Competence simply means the ability to do something well in a given task. Olakulehin (2007) identified two categories of teacher's ICT competence- general skills in understanding the computer basics and skills teachers acquire in other to enhance the quality of teaching and learning. It is worthy of note that emphasis on contemporary innovations revolves around science and technology. Science and technology encouraged students to think and act as responsible scientists and technologists by providing opportunities for them to acquire knowledge and understanding of relevant concepts. Science and technology teacher educators are individuals that are responsible for inculcating or imparting the scientific knowledge, idea, skills and so on, and applying and transmitting same to the society for the solution of problems in different human activities.

Preparing students for real life in our technological and diverse world requires teachers imbibe ICT in significant learning experiences (Braun and Kraft, 1995). However, research studies show that most teacher, science and technology teacher educators inclusive, do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly (Smeets, 2005). Harris (2002) conducted case studies in three primary and three secondary schools, which focused on innovative pedagogical practices involving ICT. Harris (2002) concludes that the benefits of ICT will be gained “ when

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confident teacher are willing to explore opportunities for changing their classroom practices by using ICT” (p. 458). As a consequence, the use of ICT will not only enhance learning environments but also prepare next generation for future lives and careers (wheeler, 2001). Also studies carried out on teachers’ ICT adoption, show teachers ICT compliance to be below expectation, (Yusuf, 2005, Olulube, Udogu and Ossai, 2006). On this premise, it becomes vital to investigate the level of ICT compliance of science and technology teacher educators in the colleges of education.

Statement of Problem

Information and communication technologies (ICT) are gradually occupying the centre stage in affairs of man. Hence, they have important tools having revolutionary impact on world vision and mission. Particularly, ICT is having a revolutionary effect on educational pedagogy ad methodology worldwide. Therefore the question is what is the nature and level of ICT competence attained by science and technology teacher educators in colleges of education? The purpose of the study is to determine the nature and level of ICT competence among science and Technology teacher Educators in colleges of education.

Research Questions

Two research questions were posed to guide investigation for the study. They are:

1. what are the nature and level of ICT competence attained by science and technology teacher educators in colleges of education in Urban and rural areas within southeastern Nigiera?
2. What are the nature and level of ICT competence by science and technology teacher educators in Federal, State and private colleges of education within south eastern Nigeria?

Research Hypotheses

Three research hypotheses were also posed for the study, and tested at 0.05 level of significance. They are as follows:

1. There is no significant difference in the nature and level of ICT competence attained by science and technology teacher educators in colleges of education located in Urban and rural areas within southeastern Nigeria.
2. There is no significant difference in the nature and level of ICT competence attained by science and technology teacher educators in federal, state and private colleges of education within southeastern Nigerian.
3. There is no significant difference in the nature and level of ICT competence attained by science and technology teacher educators in colleges of education within southeastern Nigerian due to location and ownership.

Research Method

The study adopted survey research design. A survey research design according to Maduabum (2007) is a design which data are collected from a relatively large number of people or item considered to be representative of the entire group. The study was carried out in southeastern Nigeria comprising five states namely- Enugu, Anambra, Imo, Abia and Ebonyi. The population of the study consists of all the science and technology teacher educators in colleges of education within southeastern Nigeria. The population of the study cut across Federal, state and private colleges of education located within the zone of study. The population is therefore, five hundred and fifty four (554) science and technology teacher educators (NCCE statistical digest, 2007) in twelve (12) colleges of education within southeastern Nigeria. The sample for the study consisted of science and technology teacher educators from six colleges of education within the zone under study. The sampling technique employed was multistage. Stage one, purposive sampling of states to be covered. Enugu, Anambra and Ebonyi states were sampled. Stage two was also, purposive sampling of colleges of education within states sampled. In this case, two Federal, two States and two Private colleges of education were sampled. The third stage, was random sampling of respondents using table of random numbers. A total of three hundred and twenty (320) respondents representing 58% of the population were sampled. Data collection instrument was structured questionnaire. The instrument was arranged in a 4-point rating scale of very high competence, high competence, low competence and very low competence. It consisted of 16 questionnaire items, originally developed by the researcher. The instrument was validated by three experts. The reliability index of 0.98 was obtained using cronbach alpha. Mean and standard deviation were used to answer the research questions. Chi-square test statistics and 2 x 2 ANOVA were used to test the null hypotheses at 0.05 level of significance. The decision rule was that mean rating less than 2.5 is regarded as low, otherwise high.

Results

Research Question 1

What are the nature and level of ICT competence by science and technology teacher educators in colleges of education located in Urban and rural areas within southeaster Nigeria?

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Table 1: Mean and Standard Deviation of Respondents in Urban and Rural Colleges of Education on the Level of ICT Competence by Science and Technology Teacher Educators in Colleges of Education Located in Urban and Rural Areas.

S/N	Questionnaire Items	Urban			Rural		
		Mean	Std	Remark	Mean	Std	Remark
1.	An understanding of the various Component of Computer	2.80	0.85	High	2.70	0.79	high
2	Use of generic application software e.g word processing etc	2.65	0.89	High	2.64	0.80	High
3	Information retrieval through the use of CD-Rom, Flash e.t.c	2.56	0.96	High	2.55	0.96	High
4	Use of graphic packages	2.07	0.96	Low	2.11	0.84	Low
5	Using ICT for co-operative learning and for peer interaction	2.02	0.82	Low	1.96	0.77	Low
6	Use of simulation packages	2.02	0.72	Low	2.04	0.80	Low
7	Use of multimedia presentation	2.09	0.93	Low	2.08	0.92	Low
8	The ability to use the internet	2.04	0.76	Low	1.98	0.78	Low
9	Use of computer managed instruction packages	2.03	0.06	Low	2.09	0.84	Low
10	Preparation of lesson using computer	2.42	0.90	Low	2.41	0.93	Low
11	Power point presentation	2.11	0.77	Low	2.22	0.95	Low
12	Use of computer Assisted instruction (CAI) software	2.09	0.80	Low	2.11	0.92	Low
13	Use of variety of software including SPSS and Aut CAD	2.07	0.83	Low	1.96	0.81	Low
14	Use of electronic spreadsheet package	2.36	0.82	Low	2.05	0.90	Low
15	Use of Microsoft Access	2.23	0.85	Low	2.44	0.93	Low
16	knowledge of Area Networking eg LAN	2.28	0.77	Low	2.36	0.82	Low

The data presented in Table I, reveals that only (3) Items out of sixteen (16) Items on ICT competence attained by the respondents in both Urban and rural colleges of education indicated a mean rating of 2.50 and above. Also, science and technology teacher educators in Urban area attained more ICT competence than their counterpart in rural area.

Research Question 2

What are the nature and level of ICT competence attained by science and technology teacher educators in federal, state and private colleges of education within southeastern Nigeria?

Table 2: Mean and Standard Deviation of Respondents in Federal, State and Private Colleges of Education on the Nature and Level of ICT Competence Attained

S/ N	Questionnaire items	FEDERAL			STATE			PRIVATE		
		Mean	Std	Remark	Remark	Std	Remark	Mean	Std	Remark
1	An understanding of the various component of computer	3.17	0.70	High	2.69	0.76	High	2.25	0.84	Low
2	Use of generic application software e.g word processing etc.	3.06	0.78	High	2.42	0.72	Low	2.18	0.87	Low
3	Information retrieval through the use of CD-ROM, Flash etc	3.03	0.89	High	2.32	0.85	Low	2.04	0.89	Low
4	Use of graphic packages	2.25	0.77	Low	2.09	0.77	Low	1.73	0.74	Low
5	Using ICT for cooperative learning and for peer interaction	2.15	0.70	Low	2.02	0.73	Low	1.79	0.84	Low
6	Use of simulation packages	2.20	0.82	Low	2.02	0.79	Low	1.67	0.74	Low
7	Use of multimedia for instruction	2.10	0.73	Low	1.96	0.70	Low	1.68	0.75	Low
8	The ability to use the internet	2.24	0.78	low	1.92	0.66	Low	1.68	0.71	Low
9	Use of computer managed instruction packages	2.73	0.82	High	2.36	0.86	Low	1.92	0.93	Low
10	Preparation of lesson using computer	2.30	0.83	Low	2.22	0.84	Low	1.75	0.77	Low
11	Power point presentation	2.25	0.84	Low	2.14	0.86	Low	1.73	0.78	Low
12	Use of computer Assisted instruction (CAI) software	2.10	0.73	Low	1.88	0.65	Low	1.65	0.67	Low
13	Use of variety of software including SPSS and Aut CAD	2.23	0.78	Low	1.90	0.77	Low	1.56	0.61	Low
14	Use of electronic spreadsheet package	2.76	0.71	High	2.13	0.92	Low	1.79	0.74	Low
15	Use of Microsoft Access	2.64	0.72	High	2.20	0.80	Low	1.79	0.74	Low
16	Knowledge of Area Networking eg LAN	2.28	0.69	Low	1.96	0.65	Low	1.75	0.61	Low

The data presented in Table 2, reveals that respondents in Federal colleges of education had mean ratings 2.50 and above in questionnaire items 1,2,3,9, 14 and 15. Respondents in State colleges of education had mean rating 2.50 and above in only questionnaire item 1 and none in private colleges of education. The result in the Table, shows that respondents in federal college of education attained more ICT

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competence when compared with their counterparts in state and private Colleges of education. This is followed by respondents in state colleges of education.

Test of Null Hypothesis

Null Hypothesis 1

H0₁: There is no significant difference in the nature and level of ICT competence attained by science and technology teacher educators in colleges of education located in Urban and rural areas within southeastern Nigeria.

Table 3: Chi-square Analysis of Ratings by Respondents on ICT Competence Attained Due to Location (Urban and Rural area)

Source	Mean	Std	N	Df	Fvalue	Sig
Urban	2.24	0.84	184	1	1.26	0.26
Rural	2.16	0.80	136			

From the result of analysis in table 3, it was observed that the calculated value of 0.26 is greater than the 0.05 level of significance. Therefore, the null hypothesis is accepted.

Null Hypothesis 2

H0₂: There is no significant difference in the nature and level of ICT competence attained by science and technology teacher educators in Federal, State and private colleges of education within southeastern Nigeria.

Table 4: Chi – square Analysis of Ratings by Respondents on ICT Competence Attained Due to Ownership (Federal, State and Private Colleges of Education)

Source	Mean	Std	N	Df	Fvalue	Sig
Federal	2.46	0.78	129	2	13.02	0.00
State	2.14	0.77	127			
Private	1.82	0.76	64			

The result in table 4, shows that the calculated value of 0.00 is less than the 0.05 level of significance. This shows that the hypothesis is highly significant at 0.00 for ownership. Therefore, the null hypothesis is rejected.

Null Hypothesis 3

H0₃: There is no significant difference in the nature and level of ICT competence attained by science and technology teacher educator in colleges of education within southeastern Nigeria due to location and ownership.

Table 5: 2 x 2 ANOVA analysis of ratings of respondents on ICT competence attained due to location and ownership.

Source	Sum of square	Df	Mean square	F	sig
Location	142.91	1	142.91	1.261	0.262
Ownership	2948.56	2	1474.28	13.02	0.000
Location x Ownership	142.67	1	142.67	1.26	0.263

Table 5: shows analysis of 2 x 2 ANOVA analysis of ratings of respondents. It was observed that the calculated F value of 1.26 is not significant at 0.262 for location. This is higher than the 0.05 probability level set for this study. Also, the calculated F value of 13.02 is highly significant at 0.00 for ownership. The interaction effect of location and ownership of calculated F value of 1.26 and df of 1 is not significant at 0.263. This is higher than the 0.05 confidence level which this study is based. Furthermore, the main effects are significant, the interaction effect is not. therefore, ownership is more significant factor than location judging from the sum of squares.

Discussions

It was found in the tables 1 and 2 that science and technology teacher education in colleges of education located in Urban areas attained more ICT competence than their counter parts in rural Areas. Also, science and technology teacher educations in federal college of education attain more ICT competence, followed by their counter parts in state and private college of education respectively. Generally, science and technology teacher educators ICT competence attained in colleges of education within southeastern Nigeria is low.

This is in agreement with the findings of Ezeugbor (2008), Nwagbo and Okoli (2008), Jegede (2009) and Yusuf (2005). Although, there exist low ICT compliance by science and technology teacher educators, it is interesting to note that the respondents are gradually adopting the technology as can be seen from the tables. Moreso, investigations in table 3,4 and 5 reveal that ICT competence among the respondents in Urban and Rural colleges of education is not significant and that due to ownership is highly significant.

Also, the interaction effects of location and ownership on ICT competence attained by the respondents is not significant.

Conclusion

Based on the findings of the study, the following conclusions were drawn that ICT competence attained by science and technology teacher educators in colleges of education within southeastern Nigeria is low. Science and technology teacher educators in federal colleges of education attain more ICT competence than their counterparts in state and private colleges of education. Also, respondents in Urban Colleges of education attain more ICT competence than their counterparts in Rural colleges of education.

Moreso, ICT competence attained by the respondents due to location is not significant and that due to ownership is highly significant. Finally, the interaction effect of location and ownership on the level of ICT competence attained by the respondents is not significant.

Recommendations

1. Management of institutions should help in organizing long term and short term intensive ICT training for science and technology teacher educators in colleges of education irrespective of location and ownership
2. Management of institutions should organize and sponsor ICT seminars, conferences and workshops in every colleges of education
3. Government at all level should help in providing ICT special grant to enable teacher educators undergo professional training courses.

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