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The Impact of Information and Communication Technology (ICT) on Teacher Education and its Implication for Professional Development in Nigeria

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Abstract

This study was designed to investigate the impact of Information and Communication Technology (ICT) on teacher education programme and professional development in Nigeria. The population comprised 825 lecturers of colleges of education. The sample of 206 lecturers were randomly selected using stratified sampling technique. Four research questions and four hypotheses were raised and tested at alpha level of 0.05 significance using Pearson Product Moment Correlation Statistics. Results of the research questions revealed that there is a relationship between ICT and research, effective student learning, access to information materials for teaching and professional development. This was because the mean ratings of lecturers responses were above 2.50 decision rule. The results of the hypotheses revealed that there is a significant relationship between ICT and lesson presentation, access to information on teaching materials, students' effective learning and professional development. It was therefore recommended that government should provide adequate ICT accessories and infrastructures in all colleges of education, fund and proper electricity. Refresher courses should also be organized for teacher trainers and trainees on the operation and usage of ICT.

Keywords: *Information, Communication, Technology, Teacher Education, Lecturers, Teacher Trainees, ICT Accessories, ICT Infrastructures*

INTRODUCTION

In Nigeria, teacher education is gaining prominence because of the need for qualified teachers with the necessary skills and knowledge needed to adequately carry out teaching jobs as well as for professional growth (Osunde and Omoruyi, 2004). Teacher education is the process of training that deals with the art of acquiring professional competencies and growth. It is an essential exercise that enhances the skills of teaching and learning. It is designed to produce highly motivated, sensitive, conscientious and successful classroom teachers who handle students effectively and professionally for better educational achievement (Ololube, 2005). Amedeker (2005) opined that inadequate teacher preparation programmes result in inability of most teachers to demonstrate adequate knowledge and understanding of the structure, function and the development of their disciplines. Therefore, an effective teacher

education programme is a prerequisite for a reliant education and creates some confidence in both the teacher and their students as learning is coordinated effectively and professionally and problems inherent in teacher education rectified and solved (Lawal, 2003). Teacher education programmes in Nigeria are under the supervision and control of government departments.

Information and Communication Technologies (ICTs) are key tools and have revolutionary impact on how we see the world and live in it. This phenomenon gave origin to contemporary advances in living standard. ICT is having a revolutionary impact on educational methodology globally. However, this revolution is not widespread and needs to be strengthened to reach a large percentage of the population. In a complex society like Nigeria, many factors affect the use of ICT and integration, so an interdisciplinary and integrated approach is very necessary to ensure the successful development of teacher education programmes (Maclkemenjima, 2005). The integration of Information and Communication Technologies in higher education has been a topic of debate. In Nigeria, the relationship between the development of ICTs and use in teacher education programmes and its diffusion into the programmes in colleges of education is dependent upon government policies (FRN, 2004). The pervasiveness of ICT has brought about rapid changes in technology and social, political and economic transformation globally and the field of education has not been unaffected by its penetrating influence. Undoubtedly, ICTs has qualitatively and quantitatively impacted on teaching, learning and research through teacher education. Therefore, ICT provides opportunities for student-teachers, academic and non-academic staff to communicate with one another effectively during formal and informal teaching and learning (Yusuf, 2005). In the same vein, teachers need training not only in computer literacy but also in the application of various kinds of educational software to teaching and learning (Ololube, 2006). Furthermore, they need to learn how to integrate ICTs into classroom activities. The quality of teachers is a key predictor of students learning (Ololube, 2005a, b), and teacher training is enhanced through the use of ICT accessories. ICTs are tools that can facilitate teacher training and help teachers take full advantage of the potentials of technology to enhance student learning (UNESCO, 2003).

ICT facilitates the acquisition and absorption of knowledge. If offers developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution and widen the range of opportunities for the poor (Ejedafiru and Akporhonor, 2011). Thus, ICT stands as a diverse set of technological tools and materials used to communicate, create, store, manage and disseminate information. These technologies include computers, internet broadcasting, television and telephone (Ejedafiru et al, 2011).

Information and Communication Technologies could be very useful. It helps to develop skills as it provides effective training programmes. It has capacity for stimulation, model-building and interactive adaptation. Its usage applies not only to the sciences and languages but also to various other of professional courses. ICTs could assist in the development of administrative skills related to students management, tutoring, course writing and pedagogic skills in education.

Information and Communication Technologies could be very effective in facilitating teacher education programmes. There are several benefits of introducing and using ICT as part of the teaching and learning process. Lafarriere, Breuleux and Bracewell (1999) argue that there are significant benefits in using ICT as part of the teaching and learning process as long as teachers recognize the relationship between the use of ICT and the overall curriculum. With reference to the Nigerian situation, ICT policy for education also stresses the importance of integrating ICT across the curriculum rather than teaching about ICT. Hence, there is need for thorough curriculum planning that will include integration of ICTs.

Haddad and Draxier (2005) claim that ICTs do make valuable contributions to educational development and effective learning by expanding access, promoting efficiency,

improving the quality of learning, enhancing the quality of teaching and improving management systems. Roberts (2000) looks at how the use of technology can enhance teaching and learning by improving students achievement and providing access to a variety of education materials. According to Obunadike (2010), ICT aids learning in the following ways: It helps breakdown the barriers between teachers and students, improves the socio-cultural behavioural patterns of students, improves ethical awareness of students to the norms and existing moralities of the immediate community, serves as an agent of change, and helps disseminate ideas, educational materials and instructional resources.

Nonetheless, all the potentials of ICT for education cannot be realized without an effective educational policy in place, without making concrete decisions about teaching with ICT, without making sure the necessary infrastructure is in place, without having more than enough relevant content, without prioritizing professional development and deciding on how it must be integrated.

Olakulehin (2007) says that pedagogic application of ICT involves effective learning with the aid of computers and other information technologies. It serves the purpose of learning aids which play complementary roles in teaching/learning situations, rather than supplements to the teacher/instructor/facilitator. Many teachers regard computers as add-on, rather than a replacement device. The pedagogic use of the computer necessitates the development of skills and attitudes related to effective use of information and communication technologies among teachers and students. Aside from literacy, ICT facilitates learning in subject areas and at home on one's own. It further leads to the use of new methods like modeling, simulation, use of data bases, guided discovery, closed-word exploration etc. The implications in terms of changes in teaching strategy, instructional content, role of the teachers and context of the curricula are obvious and inevitable.

Pedagogy through the application of information and communication technologies has the advantage of heightening motivation, helping to recall previous learning, providing new instructional stimuli, activating the learner's response, providing systematic and steady feedback, facilitating appropriate practice, sequencing learning appropriately and providing a viable source of information for enhanced learning. Teachers who use this system of instructional strategy would be able to kindle desirable attitudes towards information technology in the heart of the learner.

Many challenges confront the application of ICTs to teacher training and the educational system in general. These challenges include limited ICT infrastructure, lack of information, illiteracy of teachers and teacher trainers-technophobia, poor or non-existent internet connectivity, inadequate learning resources including related educational tools, course curriculum, lack lustre attitude of teacher-trainees and teacher-trainers, software license and high costs of maintenance and technical support as well as poor power supply.

Slow access to basic ICT equipments and inadequacies in the use of audiovisual materials and equipment including films, slides, transparencies, projectors, globes, charts, maps, bulletin boards, plus programmed materials, information retrieval systems and instructional television in teacher education programmes are barriers to the effective and professional development of teachers in Nigeria (Ololube, 2006).

STATEMENT OF PROBLEM

Efforts made by both federal and state governments to establish valuable and effective teacher education programmes in Nigeria have proved abortive. This is due to lack of adequate ICT infrastructures in teacher education programmes. The result is reduced access to ICT based instructional materials. Even at the school level, teachers hardly come in contact with ICT based instructional materials.

Many Nigerian teachers find it difficult to effectively use technology in the classrooms and other areas of teaching and learning. The possible reason for this is that teachers are not well trained on the use of ICTs for teaching (Ololube, 2006).

Therefore, the problem statement for this work is, how does Information and Communication Technology (ICT) influence teacher education and professional development in Nigeria?

RESEARCH QUESTIONS

(1) What is the relationship between ICT and access to information for teaching materials in teacher education programme?
(2) Is there any relationship between ICT and effective learning by students in teacher education programme?
(3) How does ICT influence professional development in teacher education programme?
(4) What is the relationship between ICT and research in teacher education programme?

HYPOTHESIS

The following hypotheses were formulated to guide the study and tested at 0.05 level of significance:

- There is no significant relationship between ICT and lesson presentation in teacher education programme.
- There is no significant relationship between ICT and access to information on teaching materials in teacher education programme.
- There is no significant relationship between ICT and effective learning by students in teacher education programme.
- There is no significant relationship between ICT and professional support in teacher education programme.

PURPOSE OF THE STUDY

The purpose of this study is to examine the impact of Information and Communication Technology (ICT) on teacher education programme and its implication for professional development in Nigeria. This study also intends to examine:

- How ICT influences lesson presentation.
- If there is a relationship between ICT and access to information on teaching materials.
- Whether there is a relationship between ICT and effective learning by students-teachers.
- The relationship between ICT and professional development.
- The impact of ICT on research in teacher education programme.

METHODS AND PROCEDURES

The survey method was adopted for the study. This study is correlational in nature because it sought to establish the relationship between dependent and independent variables. The population of the study comprises all the 825 teachers (lecturers) of Colleges of Education in Delta State of Nigeria.

The sample was made up of 206 lecturers which were selected using the stratified random sampling technique. The selection was restricted to only Master's degree (M.Ed.) and Doctorate degree (Ph.D.) holders in Education. A four point scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) was used to measure the 58 items in the instrument (questionnaire).

The face and content validity of the instrument was established after subjecting the instrument to scrutiny by experts in Educational Administration and Educational Measurement who read through the items and made useful suggestions which were incorporated into the final draft. The reliability of the instrument was tested using the test-re-test method and the (r)

value obtained was 0.72 as the coefficient of subject stability. The research questions were analyzed using the mean for lecturers responses with 2.50 and above acceptance level and below 2.50 rejection level. The hypotheses were analyzed using the Pearson product moment correlation coefficient statistics and tested at alpha level of significance of 0.05.

RESULTS

Research Question 1: What is the relationship between ICT and access to information for teaching materials in teacher education training programme?

In table 1, the lecturers responses indicated that ICT has a relationship with access to information for teaching materials. This is because, out of the twelve (12) items, eleven (11) have their mean ratings are above 2.50 which is the level of acceptance, while item seven has mean rating below 2.50. The grand mean of these means is 3.38 which is a proof that lecturers agreed that there is a relationship between ICT and access to information for teaching materials in teacher education programme.

Research Question 2: Is there any relationship between ICT and effective learning by students in teacher education programme?

Table 2 reveals that all the items yielded mean ratings above the decision rule of 2.50. These mean ratings show that lecturers agreed that there is a relationship between ICT and student effective learning in teacher education programme. The table also indicated a grand mean of 3.90 which is above the decision rule of 2.50. This supports the lecturers' responses about ICT and student-teachers effective learning.

Research Question 3: How does ICT influence professional development in teacher education programme?

In table 3, lecturers responses showed that each of all the thirteen (13) items produced mean ratings above the decision rule of 2.50. These mean ratings show that lecturers agreed that there is a relationship between ICT and professional development in teacher education programme. The table also indicated a grand mean of 3.87 which is above the decision rule of 2.50. It supports the lecturers' responses about ICT and professional development.

Research Question 4: What is the relationship between ICT and research in teacher education programme?

Table 4 reveals that each of the ten (10) items yielded mean ratings above the decision rule of 2.50. These mean ratings show that lecturers agreed that there is a relationship between ICT and research in teacher education programme. The table also indicated a grand mean of 3.82 which is above the decision rule of 2.50.

Hypothesis 1: There is no significant relationship between ICT and lesson presentation in teacher education programme.

In table 5, the r-calculated value of 0.68 is less than the r-critical value of 0.1946. Hence, the null hypothesis was rejected. This shows that there is a significant relationship between ICT and lesson presentation of lecturers in teacher education.

Hypothesis 2: There is no significant relationship between ICT and access to information on teaching materials in teacher education programme.

Table 6 shows that the r-calculated value of 0.62 is greater than the r-critical value of 0.1946. Hence, the null hypothesis is rejected. This indicates that there is a significant relationship between ICT and access to information on teaching materials in teacher education.

Hypothesis 3: There is no significant relationship between ICT and effective learning by students in teacher education programme.

Table 7 shows that the r-calculated value of 0.29 is greater than the r-critical value of 0.1946. Hence, the null hypothesis is rejected. This shows that there is a significant relationship between ICT and effective learning by students in teacher education.

Hypothesis 4: There is no significant relationship between ICT and professional support.

In table 8, the r-calculated value of 0.68 is greater than the r-critical value of 0.1946. Hence, the null hypothesis is rejected. This shows a significant relationship between ICT and professional support in teacher education and professional development.

DISCUSSION OF FINDINGS

This study answered four research questions and tested four hypotheses on the impact of Information and Communication Technology (ICT) on teacher education programme and its implication for professional development. The results in tables one, two, three and four revealed that lecturers agreed that there is a relationship between ICT and access to information for teaching materials, effective learning by students, professional development and research respectively, in teacher education programme. This is because the mean ratings of lecturers responses were above the decision rule of 2.50.

Results on hypothesis one in the study revealed that there is a significant relationship between ICT and lesson presentation. This could be due to the fact that there are ICT infrastructural facilities in the teacher training institutions that were used in this study. This finding agrees with Maclkemenjima (2005) who said that in a complex society like Nigeria, many factors affect the use and integration of ICT; so an interdisciplinary and integrated approach is very necessary to ensure the successful development of teacher education programmes.

Results on hypothesis two showed that there is a significant relationship between ICT and access to information on teaching materials. This finding is in line with Lafarriere et al. (1999) who opined that there are significant benefits in using ICT as part of the teaching and learning process including accessibility to information materials in all parts of the world.

Hypothesis three's results showed that there is a significant relationship between ICT and effective learning by students. The plausible reason for this finding is that there are ICT based instructional and infrastructural facilities/equipment in the teacher education institutions that were used for this study. This finding agrees with that of Roberts (2000) who is of the view that the use of ICT enhances teaching and learning.

Hypothesis four's results revealed that there is a significant relationship between ICT and professional support on teacher training and professional development. This finding is in agreement with Haddad and Draxier (2005) who observed that ICT makes valuable contributions to various parts of educational development and effective learning by expanding access, promoting efficiency, improving the quality of learning, enhancing the quality of teaching and improving management systems.

CONCLUSION

There is a significant relationship between ICT and lesson presentation. The reason could be that teacher trainers in these institution have up-to-date information on the desired motives behind ICT. A significant relationship also exists between ICT and access to information on teaching materials. This may not be unconnected with the fact that there are infrastructural facilities and equipment available in the institutions used for the study.

Finally, there is a significant relationship between ICT and students (teacher trainees) effective learning as well as with professional development.

RECOMMENDATIONS

The following recommendations are made:

- Government should provide computers, internet and other ICT infrastructures in all the Colleges of Education so as to encourage lecturers to use them.
- Teacher training and professional development oriented policies should support ICT-related teaching models that encourage both students and lecturers to play

active roles in teaching and learning activities. Emphasis should be placed on the pedagogy behind the use of ICT for teaching and learning.

- Parents should encourage their children and wards to take advantage of the numerous benefits provided by ICT by making computers and other information communication tools available to enhance their learning.
- Refresher courses in form of workshops, conferences and seminars should be organized for teacher trainers and trainees on the operation and use of ICT.
- Adequate fund should be provided for Colleges of Education for proper management of available ICT accessories.
- There should also be constant supply of electricity.

Table 1: *Mean Responses of Lecturers on ICT and Access to Information for Teaching Materials*

S/N	ITEMS	N	Mean	SD	Decision
1.	ICT creates access to good and current information for teaching.	206	3.50	0.98	Agreed
2.	ICT helps in having access to databases that are not feasible in the immediate library.	206	3.92	0.74	Agreed
3.	Facilitates easy transfer of information from the	206	3.46	1.02	Agreed
4.	internet.	206	3.64	0.87	Agreed
5.	ICT expands access to information.	206	3.75	0.76	Agreed
6.	ICT eases accessibility to all kinds of information and				
	data.	206	3.53	1.05	Agreed
7.	ICT eases sending and receiving of information to and				
8.	from colleagues, students and management.	206	2.46	1.17	Disagreed
9.	Internet fraud hampers sending and receiving	206	3.91	0.88	Agreed
	information.	206	3.63	1.21	Agreed
10.	Lecturers should have unlimited access to the internet.	206	3.58	0.57	Agreed
11.	Every lecturer and student-teacher should own a computer to use in teaching and learning.	206	2.58	0.69	Agreed
12.	ICT should be used for sending and receiving information by lecturers.	206	2.64	0.95	Agreed
	ICT should not be used to access information because of internet fraud.				
	ICT should not be used to access information because it is very expensive.				
	Grand Mean $(\overline{X})$	**3.38**			

Table 2: *Mean Responses of Lecturers on ICT and Student-Teachers Effective Learning*

S/N	ITEMS	N	Mean	SD	Decision
1.	ICT make lessons more interesting to students.	206	3.75	0.88	Agreed
2.	ICT makes lessons easier and more motivating for students.	206	4.22	0.52	Agreed
3.	ICT helps in quick access to study materials in various subject areas.	206	3.63	0.94	Agreed
4.	ICT enhances learning and improves students achievement.	206	3.77	0.98	Agreed
5.	ICT provides prompt feedback to students.	206	3.95	0.73	Agreed
6.	ICT promotes interactive learning.	206	3.91	0.85	Agreed
7.	ICT accessories (computer) should be made available to students during classroom instruction for use.	206	3.94	0.52	Agreed
8.	ICT leads to the development of database for students.	206	4.02	0.85	Agreed
9.	ICT facilitates the acquisition of basic skills and potentials such as inquiry and expository skills.	206	4.05	0.94	Agreed
10.	ICT helps students to develop functional skills.	206	3.73	0.74	Agreed
	Grand Mean $(\overline{X})$	**3.90**			

Table 3: *Mean Responses of Lecturers on ICT and Professional Development*

S/N	ITEMS	N	Mean	SD	Decision
1.	ICT makes teachers' administration more efficient.	206	3.82	0.82	Agreed
2.	ICT gives the teacher more prestige.	206	4.24	0.43	Agreed
3.	ICT provides knowledge and use application packages for teaching.	206	3.62	0.87	Agreed
4.		206	3.83	0.89	Agreed
5.	ICT brings about positive changes to teaching practice.	206	3.94	0.77	Agreed
6.	ICT facilitates the knowledge and use of animation software.	206	3.93	0.86	Agreed
7.	ICT provides professional support for teachers through the internet.	206	3.96	0.54	Agreed
8.	ICT should be used for teachers administration and management.	206	4.00	0.83	Agreed
9.		206	4.01	0.91	Agreed
10.	ICT aid application, registration and evaluation of students.	206	3.71	0.67	Agreed
11.	ICT provides motivation for staff and supports teachers instructional planning.	206	3.20	1.12	Agreed
12.		206	3.60	0.87	Agreed
13.	ICT should be used to create databases for students record.	206	4.49	0.63	Agreed
	Lecturers should have unlimited access to the internet.				
	ICT improves quality of teaching.				
	ICT usage improves professional advancement and development of lecturers.				
	Grand Mean $(\overline{X})$	**3.87**			

Table 4: *Mean Responses of Lecturers on ICT and Research*

S/N	ITEMS	N	Mean	SD	Decision
1.	ICT makes research undertaking easier through various websites.	206	3.69	0.93	Agreed
2.		206	4.17	0.54	Agreed
3.	ICT helps in having current information materials for research.	206	3.54	1.03	Agreed
4.	ICT is a fast means of communication and a quick method in	206	3.68	1.00	Agreed
5.	research.	206	3.86	0.78	Agreed
6.		206	3.85	0.80	Agreed
	Using ICT for research is very beneficial to users.				
7.	ICT is used to access current information during research.	206	3.88	0.41	Agreed
8.	ICT is used to get help from distant places during research	206	3.92	0.96	Agreed
9.	undertaking.	206	3.94	1.03	Agreed
10.	ICT is used for research despite the cost.	206	3.63	0.69	Agreed
	ICT encourages the conduct of research through internet.				
	ICT ensures accuracy of work and eliminate drudgery during research.				
	ICT creates and provides access to good and current references during research.				
	Grand Mean $(\overline{X})$	**3.82**			

Table 5: *Pearson product moment correlation coefficient of ICT and lesson presentation*

Variables	N	X	SD	r-cal.	r-crit.	Level of Sig.	Decision
ICT	206	1.47	0.86				Significant
Lesson presentation	206	1.18	0.89	0.68	0.1946	0.05	(Rejected)

Table 6: *Pearson product moment correlation of ICT and access to information on teaching materials*

Variables	N	X	SD	r-cal.	r-crit.	Level of Sig.	Decision
ICT	206	0.51	0.18				Significant
Access to information	206	0.20	0.13	0.62	0.1946	0.05	(Rejected)

Table 7: *Pearson product moment correlation coefficient of ICT and effective learning by students*

Variables	N	X	SD	r-cal.	r-crit.	Level of Sig.	Decision
ICT	206	0.57	0.21				Significant
Students learning	206	0.52	0.19	0.29	0.1946	0.05	(Rejected)

Table 8: *Pearson product moment correlation coefficient of ICT and professional support*

Variables	N	X	SD	r-cal.	r-crit.	Level of Sig.	Decision
ICT	206	0.67	0.36				Significant
Professional Development	206	0.43	0.30	-0.68	0.1946	0.05	(Rejected)

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