

## **Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy**

**Nwachukwu Prince Ololube**  
**University of Helsinki, Finland**

### **ABSTRACT**

In this study, the author presents a relatively detailed analysis of a research survey conducted on the impact and uses of information and communication technology (ICT) and the issues that underlie the integration of ICT in teacher education programs in Nigeria. The theme (ICT) is one of the variables tested on a study conducted by the researcher on “the relationships between funding, ICT, selection processes, administration and planning and the standard of teacher education in Nigeria.” The data for the study were gathered through a two page questionnaire administered to 180 respondents who were accessible in the Faculties of Education and School of Education of the selected institutions. In total, 154 questionnaires were retrieved which represents 86% return rate. At the same time, the data were analyzed quantitatively using SPSS. The results of the survey on universities and College of Education staff perception of the impact of ICT on teacher education in Nigeria suggested that the respondents were disgruntled with the sluggish use and integration of ICT in both the states and federal government owned institutions of higher education in general and into teacher education programs in particular.

**Keywords:** *ICT; Standard; Teacher education programs; Pre-service teachers; Sustainability; Nigeria*

### **INTRODUCTION**

Improving the quality of education through the diversification of contents and methods and promoting experimentation, innovation, the diffusion and sharing of information and best practices as well as policy dialogue are UNESCO's strategic objectives in Education (UNESCO, 2002). This is because information and communication technologies (ICTs) have become key tools and had a revolutionary impact of how we see the world and how we live in it. This phenomenon has given origin to the contemporary and advances in our ways of life. ICT is having a revolutionary impact on educational methodology globally. However, this revolution is not widespread and need to be strengthened to reach a large percentage of the population. In a complex society like Nigeria, many factors affect its ICTs use and integration, so an interdisciplinary and integrated approach is very necessary to ensure the successful development of Nigeria's economy and society (Mac-Ikemenjima, 2005).

The academic landscape in Nigeria includes the teaching and learning process, along with the educational programs and courses and the pedagogy or methodology of teaching; the research process, including dissemination and publication; libraries and information services; including higher education administration and management (Beebe, 2004). The integration of Information and Communication Technologies (ICTs) in higher education programs has been the topic of a good deal of debate. In Nigeria, the relationship between the development of ICTs penetration and use in teacher education programs and its diffusion into the programs in Faculties of Education and Schools of Education is dependent upon governmental policies.

Information and communication technologies (ICTs) are indispensable and have been accepted as part of the contemporary world especially in the industrialized societies. In fact, cultures and societies have adjusted to meet the challenges of the knowledge age. The pervasiveness of ICT has brought about rapid changes in technology, social, political, and global economic transformation. However, the field of education has not been unaffected by the penetrating influence of information and communication technology. Unquestionably, ICTs has impacted on the quality and quantity of teaching, learning, and research in teacher education. Therefore, ICT provides opportunities for student teachers, academic and non-academic staff to communicate with one another more effectively during formal and informal teaching and learning (Yusuf, 2005b, pp. 316-321). In the same vein, teachers need training not only in computer literacy but also in the application of various kinds of educational software in teaching and learning (Ololube, 2006). Furthermore, they need to learn how to integrate ICTs into their classroom activities and school structure. The quality of teachers is known in virtually all countries to be a key predictor of student learning (Ololube, 2005a; 2005b). Therefore, teacher training is crucial using ICTs, because ICTs are tools that on the one hand can facilitate teacher training and on the other hand help them to take full advantage of the potential of technology to enhance student learning (UNESCO, 2003). Correspondingly, ICTs have introduced a new era in traditional methods of teaching and offering new teaching and learning experiences to both teachers and students. Hence, Nigerian education environment should take advantage of this capability to provide easy access of information, since technologies enable the visualization of educational materials in an innovative and realistic manner.

## **PURPOSE OF THE STUDY**

In a complex society like Nigeria, we recognize that several factors affect the integration and approach to successful development of teacher education programs. Since this is the case, it is quite impossible to consider all the factors. For that reason, the purpose of this study is not to look into such factors but to address ICTs in relation to teacher education and relate it to sustainable development of education in Nigeria. The key assertion of this paper is that the effective use of ICTs for teacher education addresses both the problem and solution to technology based learning, seeking synergistic results that benefit pre-service teachers as they graduate and carry out their duties as teachers. Accordingly, there is the need to better design teacher education curricular and infrastructure as well as organization of programs so that pre-service teachers can better plan for unanticipated and unintended results that confront them in the classroom. Because ICTs play a key role as enabler to help us better manage the complex information flow and to integrate such information towards effective policy formulation and planning towards the utmost maximization of human capital and potential in society. Thus, it involves the development of effective and integrated tools as well as training modules to enable their application through effective teacher education agenda (Mac-Ikemenjima, 2005).

It is practical that despite efforts by both the federal and state government to establish valuable and effective teacher education programs in Nigeria to help in the preparation of competent teachers, it has a fundamental problem which has incapacitated its development. This problem is the lack of adequate ICTs infrastructure available in the Universities and Colleges of Education, this has reduced access to ICT instructional material to faculty and students. Even at the school level, teachers hardly come in contact with ICT aided instructional materials. For example, Yusuf's (2005a) study which investigated teachers' self-efficacy in implementing of computer education in Nigerian secondary school found that:

1. Most teachers in Federal Government Colleges in Nigeria do not have the needed experience and competence in the use of computers either for educational or industrial purposes.
2. A majority of male and female teachers in Federal Government Colleges do not have needed competence in basic computer operations.
3. Most of the teachers in Federal Government Colleges do not have needed skills and knowledge in the use of common computer software.
4. There is no significant difference between male and female teachers in their experience in using computers, their levels of proficiency in computer operations, and in their use of common software. This is reflected in the establishment of no statistically significant difference for 15 out of a total of 16 questionnaire items.

Consequently, the keenness to carry out this research was inspired by the desire to examine the effectiveness of teacher education programs in Nigerian institutions in relation to the role and usage of ICTs; it also looks at the prospect, which is built on the theoretical structure of this study. In addition, the overall purpose of this study therefore is to verify the research hypothesis in this study as a basis for encouraging Nigerian institutions of higher education towards maintaining or improving the quality of their teacher education programs, and to provide resources that might help administrators, educational planners and policy makers who need empirical model to come to terms with the reality on ground and effectively apply ICTs to teacher education programs. The research hypotheses and objectives of this research study paid attention to the study of Nigerian teacher education programs which is aimed at theoretically and empirically ascertaining the degree to which ICTs impact on their development. In particular, this study addressed two statistically testable research hypotheses:

- There is no significant relationship between ICT usage and integration and the standard of teacher education programs in Nigeria;
- There is no significant difference between the variables tested and respondents' demographic profile.

## **NIGERIAN TEACHER EDUCATION PROGRAMS**

In Nigeria the need for well qualified teachers has gained pre-eminence because it is considered that teacher education is a means of not only providing teachers with the necessary skills and knowledge needed to adequately carry out their teaching jobs as well as for professional growth (Osunde & Omoruyi, 2004, pp. 405-409). Teacher education is the process of training that deals with the art of acquiring professional competencies and professional growth. It is an essential exercise that enhances the skills of learning and teaching. Teacher education is designed to produce highly motivated, sensitive, conscientious and successful classroom teachers who will handle students effectively and professionally for better educational achievement (Ololube, 2005a, pp. 17-37; 2005b, pp. 17-31). According to Amedeker (2005, pp. 99-110), inadequate teacher preparation programs results in majority of teachers' inability to demonstrate adequate knowledge and understanding of the structure, function and the development of their disciplines. Therefore, an effective teacher education program is a prerequisite for a reliant education which leads to a good level of confidence to both the teachers and their students as a result of which learning is coordinated effectively and professionally, and problems inherent in the teacher education rectified and solved (Lawal, 2003).

Teacher education programs in Nigeria are under the supervision and control of governmental organizations. The National Commission for Colleges of Education (NCCE) has responsibility for teacher education in Nigeria with respect to Colleges of Education. At present there are 61 Colleges of Education, of which 20 are controlled and funded by the Federal Government, 38 by state governments, and three are owned by private agencies. The National Commission for Colleges of Education was established in 1990 to lay down minimum standards for all programs of teacher education and accredit their certificates and other academic awards after obtaining the prior approval of the minister. The Commission is also given the responsibility to approve guidelines and setting out criteria for accreditation of all Colleges of Education in Nigeria. While the universities are under the National Universities commission (NUC), as the Polytechnics are under the National Board for Vocational Colleges and Technical Education (NABTECH), off which 9 of the total number of Polytechnics run NCE programs (JAMB, 2006/2007; Mac-Ikemenjima, 2005).

**Table 1.** List of Institutions that Run Teacher Education Programs in Nigeria

Institutions	Numbers
Federal Colleges of Education (Regular)	11
Federal Colleges of Education (Technical)	8
Federal Colleges of Education (Special)	1
State Collages of Education	38
Private Collages of Education	3
Polytechnics with NCE Programs	9
Universities with Teacher Education Programs	43

Three levels of pre-service teacher training have been established in Nigeria:

- National Teachers Institute (NTI) was established to provide refresher and upgrading courses for teaching personnel, organize workshops, seminars and conferences and among other formulate policies and initiate programs that would lead to the improvement in the quality and content of education in the country. In pursuit of these responsibly, the Institute has initiated training and training programs for helping unqualified primary school teachers and also refresher courses in the teacher training colleges. Recently, the Institute also embarked on the Nigeria Certificate in Education (NCE) program through a Distance Learning System (DLS). The Institute also provides training for the Pivotal Teachers Training Program (PTTP) by means of a distance learning system. The PTTP was introduced in 2002 as a means of producing teachers to fill the gap in teacher supply for the newly introduced Universal Basic Education (UNBE) program of the Federal Government (Osunde & Omoruyi, 2004, pp. 405-409).
- Colleges of Education offer post-secondary National Certificate in Education (NCE) training programs. The NCE is also the qualification required for teaching in junior secondary schools and technical colleges. Colleges of Education use to train teachers for junior secondary school, but now they also train primary teachers. The NCE has become the minimum qualification for primary school teaching as from 1998. Some of the colleges also offer NCE pre-primary courses in order to produce teachers for the pre-primary level of education (Moja, 2000, p. 26).

- Universities in Nigeria offer the Bachelor of Education degree programs to both senior secondary school graduates and senior secondary school teachers who already have NCE qualifications. They also offer Master's and Doctorate degree programs to bachelor and master's degree holders respectively.

The requirements for admission to teacher training differ from one level to the other in terms of academic qualifications. For admission into Colleges of Education, prospective candidates must have at least three credits in the senior school and two other passes. At the university level, the entry requirement is five credits which must include the chosen major teaching subjects. Prospective Colleges of Education and Polytechnic students are required to sit for and pass the Polytechnic/College of Education Matriculation Examination, while prospective university students are required to pass the Joint Admission and Matriculation Board Examination (Ibid).

### **ICTs AND TEACHER EDUCATION**

Many Nigerian teachers have been unable to find effective ways to use technology in their classrooms or any other aspect of their teaching and learning life. The possible explanation for this lack of success by teachers is that the use of technology in the classroom has not been encouraging and teachers are not well trained in using ICTs in teaching as a means for educational sustainability (Ololube, 2006), notwithstanding the specifications in the National Policy of Education by the Federal Government of Nigeria (1998, 2004). Nigeria as a nation came late and slowly into the use of ICT in all sectors of the nation's existence more especially in teacher education. This is as a result of chronic limitations brought about by economic disadvantages and government policies. These factors have direct consequences on the nation's educational development.

In a recent study conducted by the Global Information Technology (2005), the report used the Networked Readiness Index (NRI), covering a total of 115 economies in 2005-2006, to measure the degree of preparation of a nation or community to participate in and benefit from ICT developments. Nigeria was ranked 90<sup>th</sup> out of the 115 countries surveyed. United States of America topped the list, followed by Singapore, Denmark, Iceland, Finland, Canada, Taiwan, Sweden, Switzerland and the United Kingdom and so on. Also, Nigeria was ranked 86<sup>th</sup> out of 104 countries surveyed in 2004 (Global Information Technology, 2004). This shows a decline in Nigeria's preparedness to participate in and from ICT development globally. Fundamentally, the slow access to basic ICT equipments, low internet connectivity and computers, and the inadequacies in the use of audiovisual materials and equipments including films, slides, transparencies, projectors, globes, charts, maps, bulletin boards, plus programmed materials, information retrieval systems, and instructional television in teacher education programs are barrier to the effective and professional development of teachers in Nigeria (Ololube, 2006). Therefore, administrators and trainers need to make educational technology an integral part of teaching and learning to provide a clear demonstration of how the use of instructional technology tools can address the personal and general concerns of teaching and learning in Nigeria.

Nonetheless, in recent times the integration of information and communication technologies (ICTs) in university teaching and particularly in teacher training programs has been the topic of much debate (Larose et al., 1999), because educational systems around the world are under increased pressure to use the new information and communication technologies (ICTs) to teach students knowledge and skills they need in the 21<sup>st</sup> century. Teacher education institutions are faced with the challenges of preparing a new generation of teachers to effectively use the new learning tools in their teaching practices (UNESCO, 2002). As a result, teacher education programs has not been unaffected by the penetrating influence of information and communication

technology (ICT). Certainly, ICT has impacted on the quality and quantity of teaching, learning, and research in traditional and distance education institutions around the world. In concrete terms, ICT literacy has enhanced teaching and learning through its dynamic, interactive, and engaging content; and has provided real opportunities for individualized instruction (Newhouse, 2002a). Information and communication technology has the potential to accelerate, enrich, and deepen skills; motivate and engage students in learning; helps to relate school experiences to work practices; helps to create economic viability for tomorrow's workers; contributes to radical changes in school; strengthens teaching, and provides opportunities for connection between the institutions and the world. Information and communication technology can make education more *efficient and productive*, thereby engendering a variety of tools to enhance and facilitate teachers' professional activities (Yusuf, 2005b). To Newhouse (2002b) technology has been developed to solve problems, improve living standards and to increase productivity. Therefore, it is reasonable that we should expect educational technology to be developed with similar objectives. That is educational technology should influence educational outcomes and costs. Because if a teacher selects the most appropriate educational technology, that means student learning can be optimized, which means an increase in the value of the outcomes. Within the educational context these objectives becomes to:

- Increase productivity
- Solve problems in teaching/learning programs

Newhouse explains educational productivity as a concept most happily found in economics textbooks where the productivity of a worker or economic unit is defined by dividing the output (revenue) by the input (costs). This is more difficult to define for the education industry since the output is not easily measured, particularly not in monetary terms to compare with the costs. Nevertheless, he defined it in the education context by stating that output is largely the quality and quantity of learning demonstrated by students, or learning outcomes (as shown in the equation below).

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}} = \frac{\text{Educational Outcomes}}{\text{Costs}}$$

Outcomes: Quality and quantity of student learning.

Costs: Teacher and student time, classroom materials, equipment, etc.

The concept of teachers ICT literacy is theoretically unclear and changing in that the definition of the concept is more or less precise depending on whether it occurs at the level of the definition of operational abilities or at other levels. As most contemporary authors do, they tend to center the definition of ICT literacy on a few competencies or abilities, which might characterize that teachers' know how to use ICTs instructional material. Thus, it goes beyond that to include the ability to prepare and use, the selection of appropriate and operation of ICTs materials and to identify and affect efficiently on students specific purposes in order to build knowledge, develop critical and creative thinking in students. Thus, teacher education and training is a means for professional updating, which deals with all developmental functions, directed at the maintenance and enhancement of one's professional competence and literacy. Teacher's professional growth supports the idea that ICT in teacher education and training is an important factor in teachers' job effectiveness and development. This is so because teachers' education and training is generally considered to be essential for school effectiveness and improvement (Larose et al., 1999). It was argued (Creemers, 1994) that teachers who are bent on improving their competence are likely to contribute, directly or indirectly to the growth of student's achievement. Similarly, studies concerning staff training and education clearly demonstrated the need to offer teachers better opportunity to educate and develop themselves in order to create understanding between their

job and their effectiveness (Javis, 1983; Keen, 1991; Kautto-Koivula, 1996). To make this work, teachers need effective techniques, tools and assistance that can help them develop ICT based projects and activities especially designed to raise the level of teaching in required subjects to be able to improve student learning and academic achievement (Aduwa-Ogiegbaen & Iyamu, 2005). Realistically, the inclusion of ICT materials in secondary schools is not valuable if first of all in-service and pre-service teachers are not conversant with the traditional teachings necessary for adequate and effective teaching involvement. It then follows that teachers should initially be trained and developed professionally to be able to assist students in their ICT material utilization competencies (Ololube, 2006).

On the other hand, Larose et al. (1999) argue that regardless of the quality of ICT equipment available to teachers in the school environment and independently of the quantities of courses which they have taken during their undergraduate studies, the level of transfer of acquired competencies and learning to practice is very weak. However, the major impact of education on the educated remains at the level of the “private” use of these technologies and not in their integration into daily teaching practices. Larose and colleagues further pointed out that many of the educated, no matter the level of education, have minimal computer literacy but do not use it in their pedagogy because of the fear that the rapidity of obsolescence of the hardware and of the software will make their task more complex and interminable. They supplementary asserted that other writers explain this trend by pointing to the low level of computer literacy of students teachers at the time of their insertion in pre-service education. However, Newhouse (2002b) has identified significantly the impacts of the use of ICT on students, learning environments, teachers and pedagogy, schools provision of ICT capacity, and school and system organization, policy and practice. Newhouse presented these in five dimensions:

- Students [ICT Capability, Engagement, Achievement of Learning Outcomes]
- Learning Environments Attributes [Learner-centered, Knowledge-centered, Assessment-centered, Community-centered]
- Teacher Professional ICT Attributes [Vision & Contribution, Integration & Use, Capabilities & Feelings]
- School ICT Capacity [Hardware, Connectivity, Software, Technical Support, Digital Resource Materials]
- School Environment [Leadership & Planning, Curriculum Organization, Curriculum Support, Community Connections, Accountability]

The relationships of these dimensions to each other are represented in the diagram in Figure 1 below but modified by the researcher to suit the purpose of his study.

Source: Adapted from Newhouse (2002b, p. 4) with permission, but modified by the researcher to suit the purpose of this study

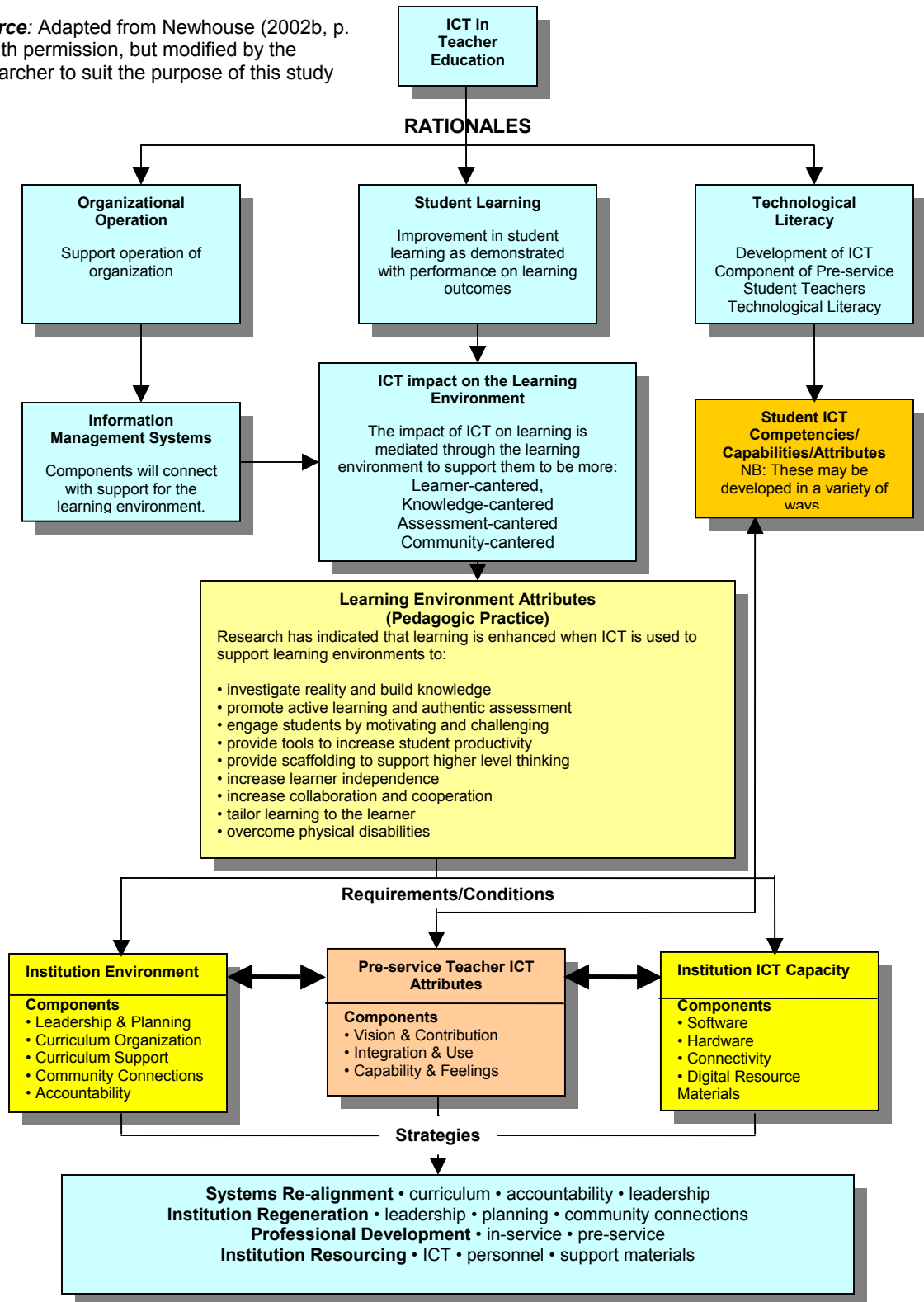


Figure 1: Schematic diagram representing the relationships between the dimensions of impact of ICT in teacher education



## RESEARCH METHODOLOGY AND RESULTS

### Instruments for Data Collection and Procedures

This empirical study is exploratory in nature as a two-paged structured questionnaire with a 4 point likert scale where 1 equal to the lowest and 4 equal to the highest was used to collect data. The questionnaire included two major sections: "A" Demographic profile, and "B" Teacher education programs emphasis scale. Section "A" required the respondents to check the boxes as it applied to them, which included their gender, age, status, qualifications and length of service. Section "B", the core of the questionnaire required respondents to rate a list of items on ICT usage and integration. The questionnaire's design was adapted from some questionnaires used by researchers for ICT and teacher education program study. The original questionnaires were however modified to suit the researcher's purpose of study. A research assistant who is a graduate of a measurement and evaluation program was employed to administer the questionnaires to 180 respondents who were accessible in the faculties or school of education in the selected institutions. In total, 154 questionnaires were retrieved. This represented approximately 86% return rate.

The respondents used in this study were staff of three institutions that offer teacher education programs (two universities, and one College of Education). The gender disparities in this study showed that Female were (64 = 41.6%) while male were (90 = 58.4%). The age differentiations showed that the respondents aged between 25-40 years were (79 = 51.3%) and those aged 41-above years were (75 = 48.4%). In this study, respondents were classified into two groups, namely, academic (62 = 40.3%) and non-academic (92 = 59.7%). The respondents that comprised the non-academic staff were senior personnel officers of the selected institutions. Based on their qualifications, (53 = 34.4%) were first degree holders as (101 = 65.6%) were postgraduate degree holders. Regarding their length of service, (81 = 52.6%) had served between 5-15 years, whereas (73 = 43.4%) had earned work tenure of 16-above years. See table 2; simple table showing the demographic profile of respondents, and figure 2; radar presentation of demographic profile of respondents.

**Table 2:** Simple Table Showing the Demographic Profile of Respondents

Demographic profile		Number (N)	Percent (%)
Gender	Female	64	41.6
	Male	90	58.4
Age	25-40 years	79	51.3
	41-Above years	75	48.7
Status	Academic Staff	62	40.3
	Non-academic Staff	92	59.7
Qualifications	First Degree	53	34.4
	Post-graduate Degree	101	65.6
Length of service	5-15 years	81	52.6
	16-Above years	73	47.4

In spite of the fact that part of the questionnaire's design was adapted and modified from some questionnaires used by researchers for teacher education program study, the questionnaire for this study was test-piloted by 9 academic staff, and 2 non-academic but senior staff from an institution that offer's teacher education program not selected for the study. Their comments

assisted the researcher improve on the quality of the final instrument administered. The respondents were however assured of confidentiality as they are willing to answer the questions.

### Consistency of the Study

To test the quality of measurement used in this study, or test the “consistency” or “repeatability” of the measures. A quantitative analysis of inquiry was performed using the SPSS version 13.5 of a computer program to statistically test the reliability of the research instrument. In the analysis, the sum variables were used because its reliability was very high compared to a single variable. The reliability estimates for the sum variables were computed by the following: Mean square variance between subjects – residual variance / mean square variance between subjects (Kautto-Koivula, 1993). As a result, the alpha reliability of (0.910) was obtained which shows a strong reliability of the research instrument (Saunders, Lewis & Thornhill, 2000).

### Data Analysis Technique

After data collection stage, all the structured items of the questionnaires were keyed into the computer and were analyzed using the Statistical Package for Social Sciences (SPSS) version 13.5 of program of a computer. The core of the questionnaire was analyzed using *Pearson Correlation Coefficient* statistical tool to determine the significant relationship between ICT usage and integration, and the standard of teacher education programs in Nigeria. One-way-analysis of variance ANOVA was employed to test the relationships between variables and respondents’ demographic profile (gender, age, status, qualifications and length of service). The statistical significance was set at  $p < 0.05$ .

### Pearson Correlation Coefficient Analysis

The findings from the analysis for ICT integration in teacher education programs in Nigeria and the effectiveness of teachers showed that there is a significant relationship between the poor provision and uses of ICT instructional materials during pre-service teacher training and their performances after graduation (correlation value at  $r = 0,511$ ,  $p < 0,000$ ). The implication is that respondents were dissatisfied with the level of weak integration of ICT into teacher education programs because most pre-service and service teachers do not have the needed skills and knowledge required of them to effectively carry out their teaching assignments. Therefore, this hypothesis was rejected. This is so because the slow access to basic ICT equipment, low Internet connectivity and computers, and the inadequacies in the use of audiovisual materials and equipments in teacher education programs are barriers to the effective and professional development of teachers in Nigeria (c.f., Ololube, 2006). Refer to table 3 for detail.

**Table 3: Pearson Correlation Coefficient of Respondents Answers**

		ICT	Standard of Teacher Education
ICT	Pearson Correlation	1	,511(**)
	Sig. (2-tailed)		,000
	N	154	154
Standard of Teacher Education	Pearson Correlation	,511(**)	1
	Sig. (2-tailed)	,000	
	N	154	154

\*\* Correlation is significant at the 0.01 level (2-tailed).

## ANOVA Analysis

**Table 4:** One-way Analysis of Variance (ANOVA) of the Relationships between Variables and Respondents' Demographic Profile

		Sum of Squares	df	Mean Square	F	Sig.
Gender	Between Groups	,255	3	,085	,343	,794
	Within Groups	37,148	150	,248		
	Total	37,403	153			
Age	Between Groups	,182	3	,061	,238	,870
	Within Groups	38,292	150	,255		
	Total	38,474	153			
Status	Between Groups	,465	3	,155	,636	,593
	Within Groups	36,574	150	,244		
	Total	37,039	153			
Qualification	Between Groups	,518	3	,173	,757	,520
	Within Groups	34,241	150	,228		
	Total	34,760	153			
L. of Service	Between Groups	,275	3	,092	,360	,782
	Within Groups	38,121	150	,254		
	Total	38,396	153			

Table 4 above shows that there is no significant difference in the overall ANOVA analysis based on the respondents' demographic profile. Gender showed ( $F = .343$ ; and  $p > .794$ ). Results of the analysis of variance for age indicated no significant differences on the variables tested. The value of F is: ( $F = 238$ ;  $p > .870$ ). For status, ( $F = 636$ ;  $p > .593$ ). Whereas, based on respondents qualification, ( $F = .757$  and  $p > .520$ ) while for respondents length of service ( $F = .360$  with  $p > .782$ ).

## DISCUSSION OF RESULTS

To start with, on the basis of the findings of this study reported here as indicated above in table 4, there were no significant differences in the overall ANOVA analysis based on the respondents' demographic information. Neither did gender, age, status, qualification and length of service prove otherwise on the variables tested.

An analysis of the core of the questionnaire and the result obtained shows that the teacher training programs provided by Nigerian institutions of higher education is hindered by the lack of effective use and provision of ICT instructional materials. Thus, there is a statistically significant relationship between ICT integration and usage and the poor standard of teacher education

programs which invariably affects the standard of pre-service and in-service teachers performances, the correlation value of  $r = 0,511$ ,  $p < ,000$  obtained brought this to bear. In the same way, it is evident in Yusuf's, (c.f., 2005a) study, where he found that most teachers in Nigeria do not have the needed experience and competence in the use of computers either for educational or industrial purposes. Neither do they have the needed competence in basic computer operations, skills and knowledge in the use of common computer software. Yusuf concluded that there was no significant difference between male and female teachers in their experience in using computers, their levels of proficiency in computer operations, and in their use of common software. Furthermore, Computer education introduced into the Nigerian secondary school since 1988 has largely been unsuccessful as a result of teachers' incompetence because empirical studies (e.g., Yusuf, 2005b) have recognized that teachers' ability and willingness to use ICT and integrate it into their teaching is largely dependent on the poor quality of professional ICT development they receive. Thus they have been unable to find effective ways to use technology in their classrooms or any other aspect of their teaching and learning life (c.f., Ololube, 2006),

Therefore, since the qualities of teachers trained through these programs are not well equipped technologically to be able to face the challenges of carry out their duties effectively. That is meeting the global transformations in science and technologies. It demonstrates that the existing curriculum designed for the training of pre-service teachers in Nigeria does not include the practical usage of ICT materials such as computers and their software, slides, overhead projectors etc. Even if it is included, it is only based on theoretical paradigms. Student teachers hardly come in contact with ICT instructional materials, including those who are in the department of educational technology proper. Besides, the institutions responsible for the provision of teacher education programs, provides programs within the confines of the mandate given to them by the federal and state government through various bodies that coordinate their activities like the National Commission for Colleges of Education (NCCE), National Universities commission (NUC), and the National Board for Vocational Colleges and Technical Education (NABTECH). However, their ability to be effective is dependent for the most part on the availability of fund provided for them to be able to purchase the needed ICT equipments.

It is equally possible that the hardship faced by these institution and their inability to meet the demand to develop effective and proficient ICT literate teaching cadre is as a result of corrupt practices by both the federal and state government officials on the one hand, and the regulatory bodies and officials of the teacher education institutions on the other hand. According to Osunde and Omoruyi (2004), the greatest problem faced by the teacher education institutions is inadequate funding or finance coupled with lack of library facilities and inadequate teaching/learning materials. This probably accounts for the limitations to the effectiveness of the institutions training programs. However, the results of the analysis of the responses obtained showed that the teacher preparation programs have slightly impacted on the level of performance of the Nigerian teachers but not to the extents of meet the UNESCO's (2005) millennium goal of educational for sustainable development 2005-2014.

## **CONCLUSION AND RECOMENDATIONS**

Social, economic, and technological changes of the past decades are making education and training for all more crucial than ever. Yet, educational systems to different degrees worldwide are struggling to afford educational opportunities for all, to provide their graduates with the necessary knowledge and skills for evolving marketplaces and sophisticated living environments, and to prepare citizens for lifelong learning. To meet these challenges, countries have to focus concurrently on expanding access, improving internal efficiency, promoting the quality of teaching and learning, and improving system management (Haddad & Jurich, [n.d]). Accordingly, quality

education is regarded as the main instrument for social, political and economic development of a nation. Thus the strength, security and well being of Nigeria rest squarely on the quality of education provided for its citizens. Education has therefore continued to be a great asset to many as well as a steady source of manpower supply for the national economy especially in the west where education is seen and accepted as an effective instrument for success. Therefore, it is very essential that we recognize that teachers are indispensable for successful learning about ICTs, and learning and teaching through ICTs to improve the standard of education in Nigeria. In the same vein, Newhouse (c.f., 2002b) made clear that a good balance between discovery learning and personal exploration on one hand, and systematic instruction and guidance on the other characterizes a powerful ICT learning environment.

In view of the fact that ICT is an influential instrument for the development of quality teaching and learning in educational systems around the world, as well as a means for fundamental transformation into the existing school principles and practices for the preparation of students in meeting the innovations in the global arena. Achievements in the ICT penetration and usage in Nigeria teacher education programs is dependent on the recognition of the importance of ICT application to education for sustainable development by the federal and state government by making useful policies and providing enough fund to the institutions on the one hand and the implementation of policies by the coordinating bodies and the institutions themselves on the other hand. It is evident that secondary school students in Nigeria are already farther behind their peers in developed countries, thus widening the global digital divide (Aduwa-Ogiegbaen & Iyamu 2005). Therefore, the federal and state governments through The National Universities commission (NUC), National Commission for Colleges of Education (NCCE) and National Board for Vocational Colleges and Technical Education (NABTECH) need to invest heavily on the institutions that offer teacher education programs. An effort towards this will create an enabling environment for teacher education programs to strive toward producing highly qualified ICT literate teachers that would assist in making the integration and usage of ICT in secondary schools a success.

Finally, the evidence from this study is in line with Newhouse (2002a, 2002b) and UNESCO's (2002) view when they made clear that with the emerging new technologies, the teaching profession is evolving from emphasis on teacher-centered, lecture-centered instruction to student-centered interactive learning environments. Therefore, designing and implementing successful ICT-enabled teacher education program is the key to fundamental, wide-ranging educational reforms. Consequently, teacher education institutions in Nigeria should either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological changes. Accordingly, for Nigerian education to reap the full benefits of ICTs in learning, it is essential that pre-service and in-service teachers are able to effectively use these tools for learning. Teacher education institutions and programs must provide the leadership for pre-service and in-service teachers and model the new pedagogies and tools for learning through effective strategic plan. That is, leadership in higher education should be visionary about conceiving a desired future state, which includes the picturing of where and what the teacher education program should be in the future, without being constrained by such factors as funding and resources, and then working backward to develop action plan to get to where they want to get to (Anyamele, 2004). However, a successful and effective strategic plan depends to the extent to which proper implementation and monitoring are carried out. Thus, the schematic diagram (Figure 1) representing the relationships between the dimensions of impact of ICT in teacher education is a handy tool for analysis towards ICT planning and implementation in teacher education.

This research endeavor might have made a considerable stride in the understanding of the impact of ICTs on teacher preparation towards producing a new caliber of teachers whose

professional ability are very essential in a developing economy. However, it would be very useful to further probe some of the findings that have emerged in this study. First, ICTs usage and integration in Nigerian teacher education programs on more institutions other than the number used in this study is highly recommended. Second, it is equally important to understand whether and why the used research design for this study was well focused an approach to be adopted in the contexts of this research.

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