Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol 3, No 10, 2012

Integration of Information and Communication Technology (ICT) in Teacher Education for Capacity Building.

NYENWE, JOY. Ph. D[1] DR. (MRS.) EUNICE. C. ISHIKAKU[2]
1,Women Eduction Centre, Rumuji Emolga Rivers State jnyenwe@yahoo.com 08032655001
2. P.O. BOX 15 University of Education Rumuolumeni, Port Harcourt Rivers State eunice@yahoo.com 08038718886

Abstract
Education is the key that unlocks the development of any nation but Information and Communication Technology (ICT) integration into teacher education is the key to equipping and producing professional development backing for teachers. This necessitates the inclusion of ICT in the National Policy on Education (NPE, 2004). Meaning that with the integration of ICT in teacher education, Nigeria, will be able to produce the human resources that will build her economy as to measure up with other developed nations. The onus of this paper therefore, is to discuss the integration of Information and Communication Technology (ICT) in teacher education for capacity building. Areas of concern are integration of ICT in teacher education for capacity building, modalities for ICT integration, challenges of ICT in teacher education, and approaches to ICT integration. The paper concludes and recommends that to build human resources that will build the nation, ICT must be integrated into teacher education and ICT education should be a compulsory subject or course for all students in teacher training institutions.

Introduction
No Nation can grow above the quality of her teachers' and the level of educational development achieved. This is because the knowledge and skills acquired by the teachers' through the education system is what they contribute to the growth of the nation. Therefore, for teachers to be equipped in the realization of the lofty responsibility ascribed to them especially in this technology age, ICT training and skill development is imperative. To actualize this, integration of ICT education into teacher training is compulsory.

The use of modern technologies as solution to human problems in education cannot be over emphasized. This innovation most be learnt and mastered before it can be used as a tool for solving educational problems. So, teachers whose responsibility is to build the nation through their transfer of knowledge and skills acquired through education and training must be ICT competent. Integration of ICT in teacher education is a key to providing professional development for teachers who are the facilitators of education process. So, to promote genuine change in the classroom and produce competent and effective teachers', teacher education must alter its tools, methods and strategies and adopt modern ones that has been proved to be more efficacious than previous ones. Although, with coherent and detailed policy and careful planning, ICT in education is a complex and protracted process (Ng, Mlao and Lee 2010, p.21).

Introduction of ICT and computer education in Nigeria is dated back to the mid 1960s, when 1BM assisted Universities of Lagos, Ibadan, Ahmada Bellow, Nsukka and Ife to set up computer centres which became manpower development centres. The growth of these centres were affected by the Civil war, military takeover and structural adjustment programme (SAP) as a result of poor funding. Although Nigeria conceived the introduction of computer education in secondary education in her thirty second National Council on education (NCF) meeting in 1987 and same was incorporated into her National Policy on education (2004), other measures in this direction were the implementation of ICT Policy in April 18th 2001, establishment of National Information Technology Development Agency (NITDA), production of Nigerian Policy for Information Technology (IT) Agency by Nigeria information technology (NICTA) that was approved in March 2001 and lunched in May 24th, 2001 by the federal government. That led to the establishment of National Technology Development Fund (NITDEF), and Inauguration of National Information and Communication Technologies Strategic Action Plan Committee in Adjust 7th, 2004. These measures were adopted by the federal government as a way to harness the benefits of ICT in national development and as well build her human capacity (Uwadi 2003, Jegede and Owalabi, 2003). These initiatives are supported by Dolphin (2005), that the ability to use computer has became an essential part of everyone's education.

Globalization and shift to a knowledge based economy require that educational institutions develop in the individual the ability to transfer information into knowledge and to apply the knowledge in dynamic cross-cultural contexts (Ng-Mlao and Lee 2010). This can only be achieved if ICT is integrated into teacher education that will in turn develop the human capacity or the human resources. For this reason, United Nations Education Scientific and Cultural Organization (UNESCO) in January 2008 lunched ICT competency standards

for Teachers (ICT-CST). To provide a common set of guidelines that professional development providers can use to identify, develop or evaluate learning materials or teacher training programs in the use of ICT in teaching and learning, and a basic set of qualifications that allows teachers to integrate ICT into their teaching and learning, to advance students learning, and to improve other professional duties. The ICT-CST is also aimed at extending teachers' professional development as to enable them learn the use of ICT in the development of skills in pedagogy, collaboration, leadership and innovative school management and to harmonise different views and vocabulary regarding the use of ICT in teacher education.

Theoretical Framework

The paper is anchored on socio cultural theory of ICT propounded by Burbulus and Smith (2005), Smayers and Marshall (1998), in Hammond (2008, p.3). Which emphasis that the roles that govern behaivour can only be understood "from the inside" (example classroom), we learn the rules by "learning how to go on". It also states that to understand social practice we need to find out "what rules are at work and how they are being followed". This agrees with Kompf (2005), Chaos theory which states that "ICT is an innovation that is happening spontaneously and has its own order".

The roles of ICT as presented in this contribution translate into governed rules and learning skills in the use of new tools (technology tools). Where the teacher or would be teacher learn to use these tools to enhance his teaching capacity and be better equipped in the discharge of his duties. This reason led Paul (2004, p.4) to state that ICT is a powerful tool in addressing educational problems, support learning activities that are difficult to perform, and enhances difficult thinking skills.

Conceptual Definition of ICT, Teacher Education and Human Capacity Building

Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is "an equipment or interconnected system of equipment that is used in the automatic acquisition, storage, manipulating, management, control, display, switching and transmission of information (National Policy for Information Technology (FRN 2004, p.9). ICT is described as a generic term referring to technologies which are being used for collecting, storing, editing and passing of information in various forms (Ser 1988 in Jager and Lokman 1999). ICT is also defined as:

> *Advances in technology that provides a rich global resources and collaborative environment for dissemination of ICT literacy materials, interactive discussions, research information and international exchange of ideas, which are critical for advancing meaningful education initiative, training high skilled labour force and understanding issues related to economic development (Ololube, Ubgu and Ossai 2006, p.649)*

Teacher Education

Teacher education refers to the policies and procedures designed to equip teachers with knowledge, attitude, behaviour and skills that are required to perform their task effectively in the school and classroom (Kamath 2009, p.29). Teacher education is neither mere pedagogy nor acquisition of a training qualification. It is shaping of persons for multisided development of the younger generation. A systematic process of unearthing the treasures within each and every teacher, and subsequently every learner in each and every learning situation. It is a continuous process which makes the individual to realize the magnitude and potentials…(Vijayalashhmi 2009, p.1).

Okafor (1998) in Onyemerekeya (2002, p.8) saw teacher education as a form of education which is properly planned and systematically tailored and applied for the cultivation of those who teach or will teach, particularly, but not exclusively in primary and post primary levels of education.

Human Capital Building

This is the development of skills and knowledge in the human resource through education and trainings aimed at enhancing and increasing workers performance and output. Agabi (1999; p.250), Saw human capital building as the development of the human resources in skills needed to improve their working capital, to increase their working capacity, and to increase their level of productivity outcome. It is a conscious process of improving on the productive capacity of human resource through programmes of education and training….

Integration of ICT in Teacher Education for Capacity Building

Capacity building is the equipping of the human resources with skills and knowledge that will enable them increase their productivity. Teacher capacity building therefore, is the training of teachers as to equip them with the skills and knowledge required for enhancing of their teaching output. Capacity building for teachers through ICT integration will enable and equip teachers that are ill-equipped in the use of ICT tools for teaching and learning to be able to do so. The integration process will entail planning, curriculum review patterned to suit ICT integration, development of software that is compatible with the curriculum designed, training of curriculum

experts, training of ICT resource person's, training of lecturers in teacher training institutes in the use of ICT, creation of awareness to all the stakeholders of education.

The first step to take for successful integration of ICT in teacher education is the critical examination and assessment of the teacher training institutions. Policy planners must asses the activities of the institution, if required facilities are available; ascertain their staff strength, staff qualifications, number of students the ICT equipment present can accommodate, and other necessary information. Also to be ascertained is what the institution seeks to achieve and efforts made to achieving them. This will be done because the school personnel (academics and non-academic) will be used, ascertaining this will determine the extend to which the aim of the programme can be achieved. In other words, the vision of the institution must be known. To ascertain as well is the course and various discipline covered b y the institution. The course contents have to be evaluated if it can accommodate ICT integration and if it is such that can equip the students and teacher to be able to face the challenges in the discharge of the duties. Methods used in teaching and learning are also important to be verified. This will be done to know how relevant the teaching methods used can be compatible with the technology to be introduced, if the method(s) are suitable for ICT tools. If found otherwise, it is important that teachers in these school be equipped with ICT skills and knowledge used in teaching and learning. This is because if they are, they can be used as resource persons in the instruction of ICT use in teaching and learning. Moreso, the extent of the institutions achievement or their level of contribution to the develop of the individual, society and the nation at large will be considered. It will involve ascertaining outstanding achievement records, in terms of school achievement, achievement of staff and students.

Curriculum Development: Secondly, teacher training curriculum as to b e reviewed by curriculum designers. This process will be done to ascertain if the curriculum is suitable to achieve the desired result. if not, it will be restructured in a way that the out come of the ICT integration will solve the problem it is aimed at solving.

ICT Software Development: Instructional aid designers and computer software designers has to work together to development software's that will be compatible with ICT tools to be introduced. This is because, teacher ability to link technology and curriculum is important in attending effective ICT integration. Teachers must be able to appreciate and see the usefulness of ICT use in their everyday work. So, development of ICT software's that will be compatible with the curriculum is important. This must be developed in a way that teachers can interpret and apply same in the teaching and learning process. This task is quite enormous and challenging therefore, workshops for school heads and teachers on how curriculum can be used with ICT tools and the importance of using ICT in teaching and learning must be done.

Funding: Oil companies and Non-governmental organizations (NGO) that contribute to the development of the nation has role to play in achieving this venture. They can contribute their quota by donating computers to teacher training institutions and schools. As well as organize ICT professional skill training from school heads and teachers. All these had to be done because; it is believed that when teachers perceive ICT as a tool to meet curriculum goals, they are more likely to integrate ICT in their lessons. Therefore, to achieve effective ICT integration in teacher education, training in ICT must involve skills and knowledge learnt in school setting (classroom) (UNSCO Bangkok 2004,p.104).

Creation of Awareness: School heads and teachers must be sensitized and trained on the use of ICT in effective teaching and learning This process can be done on local government (L. G. A) bases.

Sensitization and Training for Lecturers in Teaching Institutions: The lecturers to be used as resource persons in the ICT integration programme must be trained on the ICT tools to be used and how these tools can be used with the curriculum of different discipline and how the knowledge acquired can be transferred to the students.

Incentives and Motivating Environment: Effective ICT integration also requires introduction of incentives and provision of motivating environment. Every individual like to be motivated to perform better or bring out the best in him. In the same way, teachers require motivation and incentives like allowances, recognition and award of prizes for out standing performance, creativity and innovativeness. Government and well meaning individual can do this to spur teachers' commitment in the training. Moreso, conducive and motivating environment is important in ICT integration success. ICT laboratories must be constructed to be teaching - learning friendly and all facilities needed for the training must be available. Moreso, outstanding students can be made resource assistants to help the resource person's, this will be a strong motivation. In line with the above statement, Carlson and Gadio (2002, p.22) said that to foster an environment that is supportive in learning how to teacher effectively with technology, implementing an incentive system and motivational strategies are important. Because teachers are usually reluctant to change their teaching style. In other words, good number of teachers refuses change, they require additional motivation and incentives to participate actively in professional development activities specially if they have been in the field of teaching for long. The scholar further suggest that these motivation strategies and incentives can be used in successful integration of ICT in teacher education.

i. Make teachers have access to technology resources. All that is required in the practical aspect of the training must be available. Teachers must have computer in the teacher training institution and in their teaching schools.
ii. Make them work in team. Teachers should be made to work in team with their colleagues when solving assignments especially in assignment that has to do with technology instruction support design. Learning in teams will encourage contribution of ideas from different students that will make for clearer understanding of what is taught.
iii. Give time and recognize innovation. New knowledge requires time to be understood. Time allowance must be considered during training and innovation from students with outstanding performance in the understanding of new knowledge need to be recognized and rewarded.

Furthermore, teacher capacity building in ICT must include pedagogical capacity building and capacity building in the use of education technology. Missing out either of them in the training will ill-equip the teachers' and make them incapable in the use of ICT tools. The training must include training on the use of ICT tools in effective teaching and learning as well as to equip them with the knowledge and skill to appropriate ICT tools and instructional aids.

Integration Modalities: ICT can be integrated into teacher education through pre-service and in-service integration

The process of integrating ICT in teacher education will be achieved through the various teacher training institutions. The aim is to equip the student's under-taking teacher training course with the knowledge and skills of ICT before graduation. To realize this, computer education must be integration into the course work and made compulsory for all student. The course should be designed in a way that theory and practical will be involved, but more time will be allocated to the practical aspect of the course. The practical should be designed to include both personal and teamwork as this will help create confidence in the use of ICT and better understanding in the part of the students. Computers, ICT teachers, ICT laboratory attendants and technicians must be available to enhance learning.

In-service ICT training can also be organized for serving teachers as a way of integrating ICT into the education system. This type of integration will require intensive classes during the holidays and some weekend and should be organized by the existing teacher training institutions, so that theirs personnel and facilities can be used. This approach will create opportunity for every teacher to partake in the training. Its effectiveness will depend on award of certificate and making it compulsory for all teachers. Course involvement should also include both theory and practical done personally and in groups. In-service training should go beyond ordinary certificate for attendance. The training should be up to degree for teachers who are willing to bag the degree beside their teacher qualification. Those who choose to continue to degree level should be promoted and elevated and even be used as resource person in the schools.

Challenges of ICT Integration in Teacher Education

Every innovation comes with some challenges that must be handled before any success is achieved. Some of the challenges in the integration of ICT in teacher education are:

i. **Accommodation:** A major challenge in effective ICT integration is suitable accommodation in teacher training institutions were the equipment will be kept and use. Where there is none-one has to be built and properly electrified. In case of existing structures, its electrification fitting has to be ascertained, because safety is important.
ii. **Population:** The number of students in the institutions, serving teacher and head-teachers are much. Providing all with computers will be quit challenging because of its cost involvement.
iii. **Power Situation in Nigeria:** Adequate power supply to run the equipment is important. Power situation in Nigeria will poss. a serious challenge. So alternative (solar or generator) source must be provided.
iv. Lack of ICT skilled manpower (technicians) who will help train the teachers. This caliber of personnel is needed in the maintenance of the equipment. There services are important in success of the integration.
v. **Lack of ICT Pedagogy Professional:** Nigeria lack manpower in this aspect, professional that can effectively train teachers on the use of ICT for teaching and learning. As well as develop soft ware that are compatible with the various curriculum.
vi. **Interest on the part of School-heads:** School heads interest is important in the actualization of this programme. In that they will make the teachers take serious the training and implement what is learnt. Where they are not interested, the programme might face serious problem.

Approaches to ICT Integration in Teacher Education

These are different methods in which ICT can be integrated into teacher education, which is determined by the level of technological development attained or the level of technological development a nation intend to achieve. Each of these approaches also requires different educational policy directives, models and practice. These approaches according to Ng, Mlao and Lee (2010) are:

i. The technology literacy approach. This is the simplest, its policy goals is to prepare students, citizens and the workforce that is capable of using ICT to support social development and improve economic productivity. The programs that are coordinated with this policy aim is to develop teachers skills in the used of ICT tools in delivering the standard schools curriculum. Such teacher would know how, where and when (and when not) to use technology for classroom activities and presentations for management tasks, to acquire additional subject matter and pedagogical knowledge in support of their own professional developments.

ii. The knowledge creation approach. It is the most complex approach. The policy goal is to increase civic participation, cultural creativity and a workforce that is continually engaged in knowledge creation, innovation and participation in the learning society. Thus, the curriculum goes beyond a focus on knowledge of school subjects to explicitly include the 21st century skills that are needed to create new knowledge and engage in life long learning ie the ability to collaborate, communicate, create, innovate and think critically. The programme under this approach would coordinate the teachers increasingly sophisticated professional skills with the pervasive use of technology to support students who are creating knowledge products and who are engaged and managing their own learning goals and activities. This takes place within a school. That is, the school itself, becomes a continuously improving learning organization. In this context, teachers both model the learning process for students and serves as model learner through their own ongoing professional development.

iii. The knowledge Deeping approach. This has impact on learning. its policy goals is to increase the ability of learners, citizens and the workforce to knowledge ,to add value to society and the economy by applying knowledge to solve complex, real-world problem, such as those related to the environment, for security, health and conflict resolution. This policy goals requires curriculum change to emphasize depth of subject matter understanding and application. Under this approach, teachers will need to develop skills in the use of more sophisticated methodologies and technologies that will enable them to serve as a guide and manager of learning environment and enable students to engage in extended, collaborative project-based learning activities.

Conclusion

Levels of development attained by any nation determine if the nation is developed, developing and or under-developed. For Nigeria to advance to be addressed as developed nation, technology development of her workforce especially the teachers is required. This is because teachers are known the world over as nation builders; therefore, ICT integration into teacher education is imperative. To achieve this, all education stakeholders are required to collaborate with government to proffer solution on how best this important national development need can be met.

Recommendations

i. There should be curriculum review as to integrate ICT into teacher education curriculum
ii. Compulsorily, teachers should be trained in the use of ICT in teaching.
iii. Leaders at all levels of education should be trained in the use of ICT.
iv. There should be collaboration between all the education stakeholders in the provision of ICT.
v. There is need for urgent improvement of power supply.
vi. ICT education should be incorporated into teacher training institutions.

Reference

Agabi, O.G (1999), *Introducing educational planning*, Port Harcourt. International Centre for educational services

Capacity Building for ICT in Education (2010) *ICT in secondary education in the pacific region: status, trends and prospects*. Retrieved 24 August 2011, from http://www.digital-review.org/uploads/files/pdf/2009-2010/capacity-building. pdf.

Carlson, S & Gadio, C. (2002). *Teacher professional development in the use of technology.* Retrieved 24 August, 2011 from http://porte.unsco.org/ic/en/ev/phi-URI.ID=22984&URI.DO=DO.

Dolphin, R. R.(2005). *Internet communication: todays strategic imperative*, Journal of Marketing Communication 11 (3); 171-190.

Gadio C. T. & Carlson, S.(2002). *Teacher professional development in the use of technology.* Retrieved 24 August 2011 from http://www.dujital-review.org/upload/files/pdf/2009-2010/capacity-building.pdf. http://www.unescobck.org/index.phpzids1793.

Hammond,M.(2008).*ICT theory*. Retrieved August 2011 from http//www.google.com.ng Integrating ICT in teacher education through Pre-service education

Jager, A. K. of Lokman, A. A (1999). *Impacts of ICT in education. The role of the teacher and teacher training*. Paper presented at the European Conference on Education Research, Lahti, Finland, 22-25 September.

Jegede, P. O & Owolabi, J.A. (2003). *Computer education in secondary schools*: gaps between policy and practice in median 6(2).

Kamath, K. V. D. (2009). *Internship in Pre-service teacher education* in V. venkatish & P. M. Visvar dyalayam (eds) *Teacher Education* New Delhi: A. P. A. Publishing Corporation.

Kompf,S.(2005), *Chaos theory of ICT*. Retrieved August 2011 from http//www.google.com.ng.

Federal of Republic of Nigeria (FRM, 2004*) National policy for technology* Lagos: NERDX Press.

UNISCO Bangkok. (2004). *Integrating ICTs into education.* Lessons learned. Retrieved August 2011

Ng Wai-kong, Fengchun Mlao & Molly Lee (2010). *Capacity building for ICT integration in education* http://digitla .review.org/uplands/files/pdf/2009-DON/Capacipty-building.Pdf.

Ololube A. C. Ubogu, A and Ossai, A.G. (2006). *ICT and distance education in Nigeria: A Review of literature and accounts*. International Open and Distance (IODL) Symposium. 2.643-655.Retrived 2nd of August, 2011.http//www.iodl.uk/public/itbook/kintns.htm.

Onyemerekeya (2002). *Teacher education in Nigeria*. Owerri: Vantage Publications Ltd.

Paul C, (2002), *The Impact of ICT on learning and teaching.* NewHouse fro the Western Australia Department of Education. Retrieved 2nd of August, 2011.

Uwadia, C. O. (2003). *Information and technology education in Nigeria: challenges and opportunities*. A paper presented at the 2nd global NCS/NITPA IT conference. Washington DC: March 11th - 15th.

Vijayelashmi, G. (2009). *Process and problems of teacher education* in V. Venkataiah & P. M. Visvavid yalayam (eds) Teacher Education. New Delhi: A.P. H publish corporation.