ENHANCING THE STATUS OF ICT KNOWLEDGE AND SKILLS OF TEACHERS AT THE BASIC AND POST BASIC EDUCATION LEVELS IN NIGERIA

A MEMORIAL LECTURE

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BY

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The aim of this paper is to discuss the following;

- What is ICT?
- Merits of using ICT for Training Teachers in Nigeria
- The Status of ICT in Teacher Training in Nigeria
- The Knowledge Society
- The National Policy in Education
- Qualities of an ICT Literate Teacher
- Popularization of ICT among Teachers in Nigeria and
- Challenges
- Recommendation
- Conclusion

Introduction

The world is now a global village. This globalization experienced in the world today has been linked to the growth and development in technology and information dissemination. The technological revolution that has fast-tracked globalization is the brain child of the industrialized world but its effect is being felt everywhere in the world, no matter how remote.

A major aspect of these new technologies that has impacted on all is information and communication technologies, ICT. ICT has changed how people live, work and even play (Berenfeld, 1999). It has made knowledge a very important factor of production.

In the history of civilization, no work of science has so comprehensively impacted on the course of human development as ICT. It is changing every aspect of human life; communication, trade, manufacturing, services, culture, education, entertainment, research and development, national defence and global security. This phenomenon has given rise to the contemporary and advances in our ways of life. .Information and communication technologies (ICT) have become key tools. They have revolutionary impact on how we see the world and how we live in it. Iseun (2003) remarks that ICT is breaking old barriers and building new interconnections in the emerging global village.

There is a great potential for significant improvement in our individual and national life as a result of the new technologies but our ability to benefit from technological advancement will depend on the rate at which it is popularized in our society and used meaningfully in the education of our youths.

The education process involves the learner developing the ability to purposefully access information from a variety of sources, analyze and evaluate the information and integrate it to construct personal knowledge base from which he/she makes intelligent decisions.

In our present world which could aptly be described as an information age, this process cannot be undertaken effectively without the use of ICT especially in the area of Science, Technology and Mathematics that require the acquisition of special skills and competences. ICT is having a revolutionary impact on educational methodology globally. The challenge for school systems throughout the world is that of providing an effective education for all children and young people which will prepare them for inclusive participation in the workplace, social environment, and political sphere and sports arenas etc. Currently over 70 million children worldwide are not in school (UNESCO 2010).

Countless millions more are dropping out of school systems due to the seeming irrelevance of education to their lives (Ainscow and Miles 2008). The major focus in any educational system is to ensure that the products at all levels are functional and productive contributing to the development of the society.

ICTs have introduced a new era in traditional methods of teaching and offering new teaching and learning experiences to both teachers and students.

Hence, the 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. However, in our nation today it is obvious that this revolution in the educational system is not widespread and need to be strengthened to reach a larger percentage of the education system.

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What is ICT?

Information and communication technologies (ICT) in its application consist of hardware, software, networks and media for collection, storage, processing, transmission and presentation of information (voice, data, text and images) (World Bank, 2002). According to Cox (1999), it is the design, study and use of process representing physical, hypothetical or human relationships, employing collection, creation, storing, retrieving, manipulation, presentation, sending and receiving of information.

- He also remarked that it refers to electronic and/or computerized devices and associated human interactive materials that enable the user to employ them for a wide range of teaching and learning processes in addition to personal use. According to FME (2009) ICT is the art and applied sciences that deal with data and information. It encompasses all (equipment including, computational machinery, computers, hardware, software, tools, methods, practices. Processes, procedures, concepts, principles and the sciences) that come into play in the conduct of information activities: acquisition, representation, processing, presentation, security, interchange, transfer, management, organization, storage and retrieval of data and information.

- This therefore shows that ICT is an indispensible part of the contemporary world. ICT has been with us but its application has been a matter of concern especially in developing countries. Advanced nations of the world have used ICT to a great advantage. In education some of the technologies that are being used to enhance teaching and learning include the following;
- Radio sets
- Television
- Video discs
- Computers
- Smart phones
- Virtual library

- Virtual classroom
- Virtual laboratory
- Podcast/webcast etc

The use of these new technologies requires skills and competences which must be acquired by both the teacher and learner. The application of ICT in education will continue to grow and recent advances are likely to also increase their range and applications dramatically. Access to these tools thus becomes a matter of critical importance for the schools and the science teacher that seeks to become viable and effective in teaching his/her students, and providing them with adequate skills and capacity to live in a technological oriented world.

Merits of Using ICT for Training Teachers in Nigeria

The history of the utilization of media materials in human communication started as far back as the Stone Age era where the surfaces of rocks and stones served as the medium for communicating visual information. This later developed to the use of the blackboard, chalkboard and later printed materials which were combined with verbal communication. These were effective then because the teacher was the only source of knowledge and information. As new technologies were developed in the area of entertainment and information dissemination there were distractions in the classroom as students became restless so much that educators were challenged to research into other media of disseminating information (Shabani, Okebukola and Obanya, 2011).

They remarked that the outcome of research to make learning interesting brought about technologies in the classroom.

There is no gain saying that ICT has had great impact on every facet of human existence in our world today. Education as a field of endeavour has certainly been influenced by information and communication technology especially in developed countries. The application of ICT in education has made significant impact on the quality and quantity of teaching, learning and research in the traditional and/or distance educational institutions using it. (Kwache, 2011) Institutions that encourage their teachers and learners to use ICT are more efficient and productive.

ICT enhances teaching and learning as it involves the usage of a variety of tools to enhance and facilitate teachers' pedagogical activities through its dynamic, interactive, flexible and engaging content.

Mohammed and Ekpunobi (2003), Otuka (2010) and Kwache (2012) state the uses of ICT in teacher training as follows:-It promotes the competence of the teacher.

- The teacher develops interest and confidence in his/her work.
- It improves the teachers handling of large classes.
- Teachers studying by distance or long vacation programmes have access to information from their lecturers or other sources e.g. the internet.

- It enhances the quality of teacher education by exposing pre-service and in-service teachers to resources and information beyond their immediate horizon.
- It provides opportunities for teachers who might want to combine work and learning to do so at their own pace.
- It sustains life long learning.
- As a social process it enhances interaction and collaboration not only among institutions but also teachers either trainees or serving.
- Trained ICT school heads and managers will appreciate ICT requirements and support their provision.

- It promotes the teachers' capability to carryout meaningful research
- Trainees have the option to select learning materials that meet the level of their knowledge and interest.
- It helps the teacher to develop computer and other interest skills that are transferable to other facets of the trainees' lives.
- It promotes effective and efficient education administration.

The Status of ICT in Teacher Training In Nigeria

The Teachers

In Nigeria the teacher in the 21st Century faces a challenge of having to update his/her knowledge to be able to use ICT either as one who uses ICT in the classroom or as an e-facilitator or e-moderator of open and distance learning.

Teacher educators and teachers are concerned more with efficiency rather than effectiveness when they adopt ICT in education. Thus, ICT is used to make their jobs easier instead of making learning more effective. As a result, the teaching/learning process has not embraced current educational paradigm which emphasizes student-centred instruction with the teacher as the facilitator rather than teacher as the source of knowledge (FME 2010).

Offiah and Essinah (2010) in a study in Awka Educational Zone showed that less than 15.5% of the teachers are computer literate. The story is not different in most of the other educational zones; in some cases it might be worse.

At all levels in Nigeria, lecturers/teachers have generally been polarized in their acceptance of the new technologies, while some have enthusiastically integrated technologies into their classrooms, others have totally rejected it. Also Adams (2000) showed that many beginning teachers do not feel adequately prepared to use ICT in the classroom. Otuka (2010) has observed that over 80% of teachers at the Post-basic and Basic levels who attended the Science Teachers Association ICT Annual Workshops (2004-2010) had no knowledge of the

basic applications of the computer. No wonder (Bates, 2009) stated that teachers act as roadblocks against the implementation of new technologies and often not ready to accept any changes in their role.

The Universal Basic Education (UBEC) and the National Teachers Institute (NTI) carryout teacher's workshop development workshop for over 300,000 basic education teachers every year. Acquisition of ICT skills has never being a major part of the training. The exposure of these teachers even to computer appreciation only will make a lot of difference as it will at least arouse their interest.

Curriculum:

The Colleges of Education run Computer Science programmes with the combinations: Mathematics/Computer Science or Physics/Computer Science. All NCE students take a compulsory course in computer titled "Introduction to Computer Studies". At the University level, only very few Universities like Nnamdi Azikiwe University run B.Sc. Ed in Computer Science. The application of other ICT items is learnt through; Instructional Technology or the newly introduced Entrepreneurial Studies. A similar compulsory General Computer course is offered at the Universities.

The NCE Computer Science programme has an approved curriculum (syllabus) for all the Colleges of Education running the programme.

- The Universities design their own curriculum and implement them as the National Universities Commission is yet to provide a benchmark or minimum standard for the programme. This surely raises doubt to the quality of the products of these institutions since the course content is yet to be properly developed and evaluated.

Equipments and Facilities

While the policy and standards with regards to ICT in Education are the responsibilities of Federal Government, the implementation rests heavily on Federal, States and Local Governments. Therefore provision of computers, projectors, television, radio-sets, GSM, clocks, camera, and other hardware and software etc in the institutions depends on the priority placed on them by the funding body. There is hardly any of these tertiary institutions that does not have a computer laboratory, the size, equipment and other items notwithstanding. There is dearth of ICT infrastructure in the education sector.

Science Teachers Association of Nigeria (STAN) Annual ICT Workshops (2004-2010)

Between 2004 and 2010 STAN workshops were held in six (6) states namely, Kaduna, Awka, Makurdi, Benin, Abakiliki and Lafia (twice).

During these workshop the following were accomplished: use of Television, Radio, Cell phone, Overhead projector etc in science teaching. Much emphasis however was on the use of the Computer and the following topics were treated:

Computer Appreciation

- Word Processing
- PowerPoint
- Excel
- The Internet- e-mail
- Browsing Search Engines, Internet Chart, Compact Disks (use) etc

At Asaba 2004 myself and Dr. Sander from University of Bremen Germany held a workshop on modeling and Analyses of learning processes in teaching physics.

One common feature of the workshops was that over 80% of those who attended had never use the computer before. Participants showed a lot of interest and some sent mails to me to inform me of their progress after-wards. Some

acquired their own computers. The major problem was getting Computer Laboratories or enough computers for hands-on exercises. At a stage I decided to go to the workshop with not less than six computers, projector, screen and other accessories from my centre. Workshop participants were always introduced to Secrete Guide to Computers a Learn Computer Yourself at your will textbook. Those from rural areas that could not readily have trainers found the book very helpful in their resolve to be computer literate. I am grateful to STAN for giving me the opportunity to be part of providing this important service to its members for a period of seven (7) years. It was surely an exciting experience.

The Knowledge Society

It is commonly thought that knowledge has replaced industrial organization and production as the major source of productivity. The term ‘knowledge society’ generally refers to a society where knowledge is the primary production resource instead of capital and labour. It may also refer to the use a certain society gives to information: a knowledge society ‘creates shares and uses knowledge for the prosperity and well-being of its people.

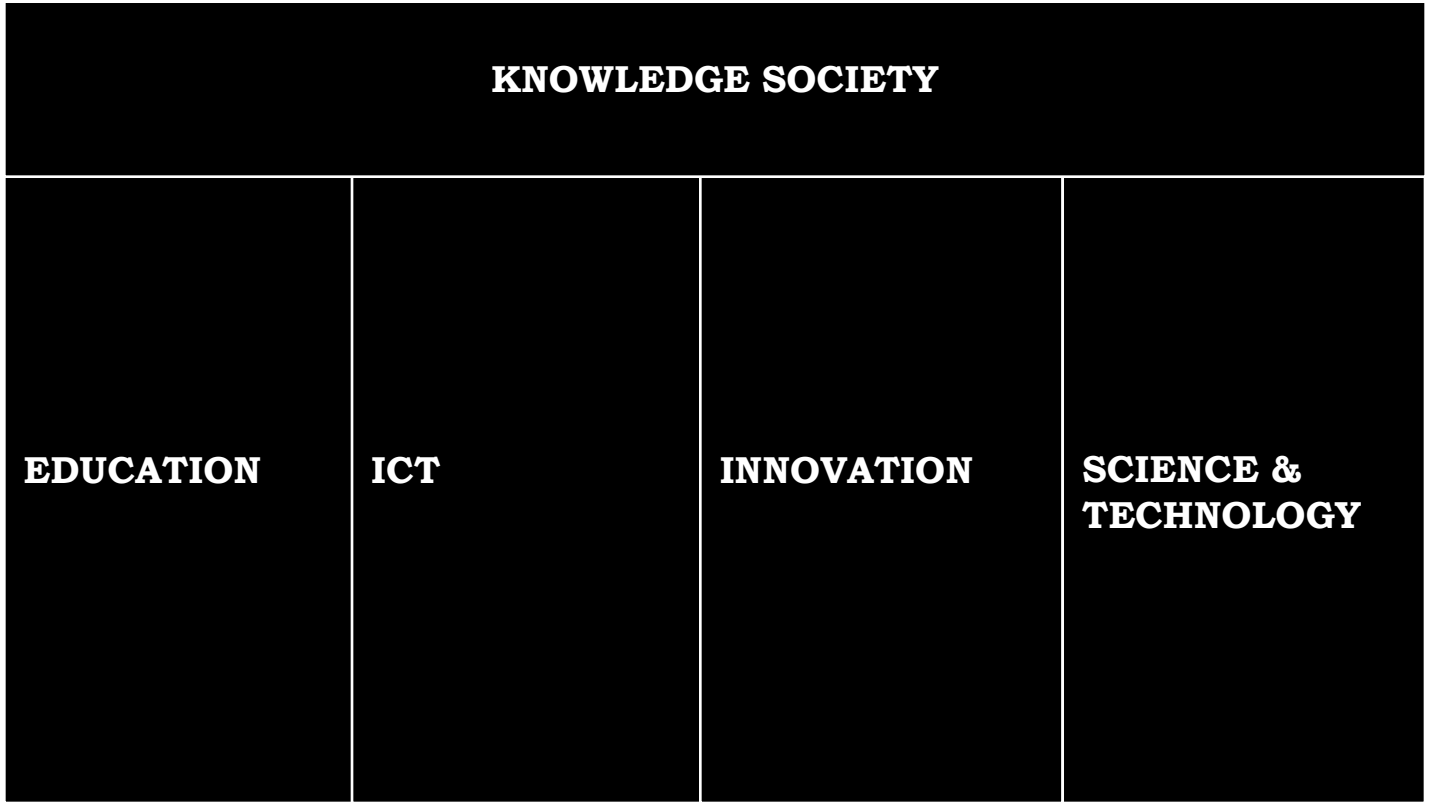
Globalization and the changing world economy are driving a transition to knowledge-based economies in particular; developing countries need knowledge-based economies not only to build more efficient domestic economies, but to take advantage of economic opportunities outside their own borders.

According to Evers (2000), characteristics of knowledge society are:

- Its members have attained a higher average standard of education in comparison to other societies and a growing proportion of its labour force are employed as knowledge workers i.e. researchers scientists, information specialists, knowledge managers and related workers;
- Its industry produces products with integrated artificial intelligence;
- Its organizations-private, government and civil society –are transformed into intelligent, learning organizations;
- There is increased organized knowledge in the form of digitized expertise, store in data banks, expert systems, organizational plans, and other media;

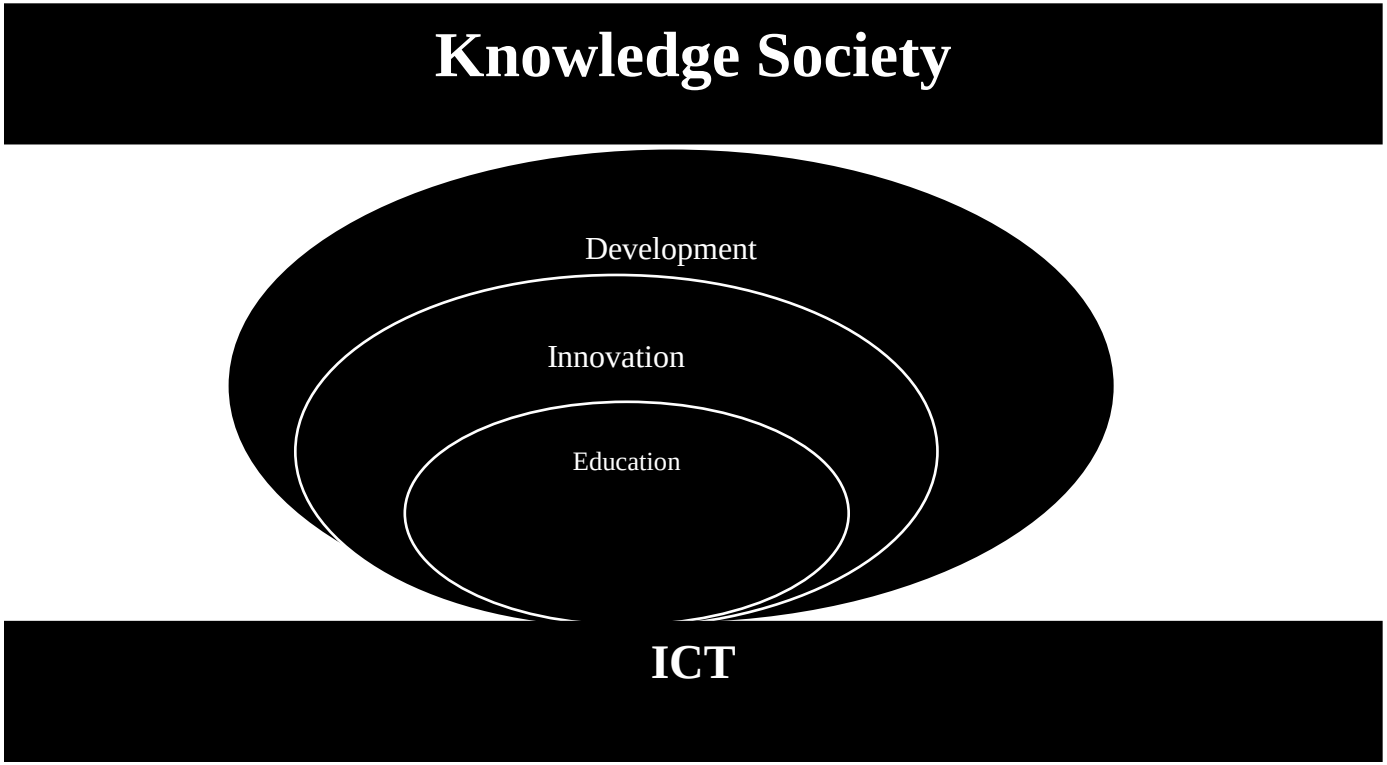
- There are multiple centres of expertise and poly-centric production of knowledge: and
- There is a distinct epistemic culture of knowledge production and knowledge utilization.
- The African Leaders in ICT (ALICT) outlines four main pillars of a knowledge society: Education, ICT, Science and Technology, and Innovation.

- **Figure 1**: ALICT's pillars of the knowledge society



- At the 2007 continent-wide African Knowledge Economy Forum on Utilizing Knowledge for Development, the pillars of Innovation and Science & Technology were considered to present a single pillar, which was referred to as Innovation (incorporating Science & Technology). With regard to education, lifelong learning is regarded as a requirement to keep pace with constantly changing global job markets and technologies.

- **Figure 2**: ICT as an enabler of the innovation and education required for development and sustenance of a knowledge society.



It is important to note that ICT use in education and development to build a knowledge society is not simply about ‘ICT literacy’ – i.e. learning to operate the technology – but also about building higher order skills, such as knowing and understanding what it means to live in a digitized and networked society and use digital technology in everyday life.

The growth of ICT networks alone will not build a knowledge society. Thus, ICT is a facilitator for major education and development reforms, but not a sufficient condition.

- If societies are to harness ICT effectively to build knowledge societies, the implications are that there will be changing skill requirements for students and employees, as well as changing roles for educators and employers. For example, the growing importance of ICT has placed increasing emphasis on the need to ensure that learners and workers are information literate (including having higher order skills). Likewise, universities and employers are faced with a need to provide formal instruction in information, visual, and technological literacy, as well as in how to create meaningful content with today's tool. This requires education institutions to develop and establish methods for teaching and evaluating these critical litreacies at all levels of education.

It also requires employers to continue to engage in training, mentoring, and professional development practices that achieve similar aims, but within the workplace.

As learners learn the skills of using ICT in education, the professional role of academics as mentors able to impact the wisdom that only experience can provide – will grow in importance.

Seen within this context of social transitions towards a knowledge society, UNESCO outlines the following as broad reasons for growth in use of ICT within education systems:

- Development of knowledge-society attributes in students, including higher order thinking skills, lifelong learning habits, and the ability to think critically, communicate, and collaborate, as well as to access, evaluate, and synthesize information.
- Development of ICT skills and competencies in students, as preparation for operating in an ICT-rich workplace and society.
- Resolution of structural problems and deficits in education systems. This can include using ICT to enhance administrative and teaching efficiency, alleviate under-resourcing in specific areas (for example, a lack of textbooks or learning support materials), address equity issues through enabling equality of access to knowledge, resources and expertise, or support teachers who may be under-equipped to deal with new teaching challenges.

- The potential of ICT to tackle some of the challenges facing education, and thereby impact on development, has led many countries to invest heavily in ICT, placing it at the centre of their development strategies. ICT integration programmes benefit from a strong association with system-wide changes such as improved service delivery, curriculum changes, or new quality assurance and production processes in business. In the formal education context, this may include moves towards decentralization, school-based management, and learner-centred philosophies. However, developing countries generally face challenges in terms of capacity, capability, and resources (human and financial) to harness the potential of ICT successfully and effectively.

They thus require sustained investments in education, innovation systems, infrastructure (including ICT itself), and implementation of policies that support such knowledge-based economic transformation in order to transform their economies.

This means that any country that neglects meaningful investment in the development of ICT is its educational system may never move from the developing to developed one.

Teachers' ICT Material Utilization Competencies

Teachers like any other professional workers need essential tools to do their work most excellently. Certainly, it is true that the central figures in any learning situation are always the students and then teachers. But it is equally true that learning may be greatly enhanced by the utilization of the resources available in the school and through various school agencies. Nevertheless, teacher's planning of effective learning activities will be easier, less time consuming and often vastly expanded in potential scope when teachers know precisely what type of ICT materials are available to them and when to draw

upon them regularly to affect their teaching ability. Therefore, it is essentially important then that teachers be thoroughly acquainted to the teaching resources and services available to them and that they have a clear understanding of the essentials of a functional materials-selection programme. Thus, many of the materials needed for effective teaching are used often enough to warrant their being part of every classroom's basic equipment. However, some at the other extreme are material—often relatively expensive and needed in individual classes rarely and for short periods—which serves the basic need of an educational system. As a result, teachers are concerned about the ready availability of appropriate instructional materials because they know how much such tools influence teaching and the quality of learning in the classroom.

Fundamentally, educational technology introduces teachers to the evaluation, selection, and 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 during teaching and learning processes (Ololube, 1997). Nonetheless, one important difference between some educational practices today and those of a generation ago is the relative emphasis teachers put upon doing as a means of

teaching and learning. Today's schools give more attention to realistic, lifelike learning situations, which go well beyond word-of-mouth" explanations by the teacher or word-in-print explanation of books. One means of developing this realism is through classroom instruction activities, which challenge students to solve instructional problems in many fields of study by transforming simple, inexpensive instructional materials into forms which help them and other people to learn (Brown, Lewis & Harcleroad, 2009).

This means that if the teacher is to remain relevant in the classroom the selection and use of appropriate technology is quite imperative.

- **The National Policy on ICT in Education**
- Some of the general statements of the policy that are relevant to teachers and teacher training are stated below.
- The teachers/trainers are offered access to a vast and diverse collection of educational materials, enabling them to design curricula that best meet the needs of the students/learners; and enhancing the efficiency and effectiveness of educational administration and policy as new technologies can help improve the quality of administration including human resource management, student registration and monitoring of student enrollment and achievement.

It is understandable therefore, that Government considers qualitative education a key component of the Seven-Point Agenda. The development of the human capital for realizing the national vision needs to be furthered by a new set of knowledge, skills and attitude, and the individual citizen needs to be fully equipped to be competitive as well as meet the challenges of the emergent environment. This impels a strong consideration for the introduction of ICT in the learning environment.

The Federal Ministry of Education is the organ of Government charged with policy formulation, monitoring of implementation and setting and maintaining of standards within Nigeria's education sector. However, the Constitution places education on the Concurrent list, making education a shared responsibility of the Federal, State and Local Governments. Thus, while the policy and standards with regards to ICT in education are the responsibilities of the Federal Government, the implementation of ICT in education rests heavily on the States and Local Governments.

- ICT occupies a very strategic place in Education in the country. This is encapsulated in the Roadmap for the Education Sector and in series of initiatives and strategies targeted at integrating ICT into education.
- The National Policy on Information and Communication Technology in Education (2010) provided some highlights on issues that affect the teachers directly as shown below:

- Massive provision of ICT infrastructure at the institutional level. All institutions under the purview of the Federal Government have requisite ICT infrastructure including access to the Internet. In the States, similar efforts are going on. However, Private Schools appear to be at the forefront in this regard.
- ICT capacity-building for teachers and educational administrators through internationally recognized certifications with International Computer Driving License.
- The articulation of policies that drive the development and deployment of ICT in Education. Such policies include the compulsory Computer Education for all levels of education in the country.

- The development of the curriculum for Computer Education for all levels of education which would prepare students/learners from the onset to adapt to the rapidly changing knowledge requirements and skills necessary to function in and contribute effectively to the contemporary society.
- Introduction of e-learning to facilitate teaching and learning.
- The establishment and strengthening of the Computer Professional Registration Council of Nigeria (CPN) for the regulation, control and supervision of the computing profession and practice in Nigeria.

- Government shall build and encourage the development and sustenance of the ICT manpower required to achieve an ICT-furthered education.
- Ensure appropriate continuous ICT training including content development and delivery for all staff.
- Ensure ICT Education remains compulsory at all levels.
- Support equitable access to ICT resources by ensuring adequate supply of ICT systems for access to software and local content at all educational and other relevant institutions.

- Public awareness of ICT in education is necessary; therefore it is important for government to engage in periodic public awareness campaign and sensitization. This would ensure effective participation of stakeholders in the execution of ICT in education policies and strategies.

Status of ICT in Education in Some African Countries

- **Algeria**
- All secondary schools were equipped with Computer Laboratories (15 Computers for students, 5 for teachers) connected to the internet.
- Half of the middle schools have adopted ICT as an integral part of the educational programme.
- At primary school level existence of computer laboratories are subject to local contribution and donation by parents and community members.
- All Universities have computer laboratories and digital libraries
- Each University has its own ICT policy
- Programme of ICT training for teachers has been limited to basic information with most reviewing 30-60 hours of training.

- **Benin Republic**
- ICT acquisition and usage costs are out of the reach of most public schools
- Majority of secondary schools do not have ICT but those that have would have acquired them through external sources.
- At the tertiary level before the introduction of DDSK only two institutions provided permanent internet access to students
- ICT is yet to have an impact on open distant learning
- Only very few teacher training institutions have computer laboratories without internet connection
- Low level of ICT literacy in the general and teaching population
- No ICT policy at the ministerial level.

- **Botswana**
- Has computer science as a school subject
- Has a national ICT policy with a section on education
- Has a section of the Ministry of Education with staff dedicated to ICT service delivery?
- Has well developed ICT infrastructure
- The Ministry of Education has dedicated financial resources to the roll out of ICTs in schools.
- Government has demonstrated positive attitude to the promotion of ICT in education.

- **Ghana**
- Many secondary schools are equipped with computers
- Many tertiary institutions are equipped with computers
- A large pool of training institution is able to provide the training needs of teachers.
- No structured ICT in school content is available
- Positive attitude to ICT
- ICT in education policy has been finalized and set to be released by 2007

- **South Africa**
- Has well designed policy framework for the schools
- No policy for higher education that is encompassing
- No material budget for ICT
- Much support from donor agencies
- Positive attitude to ICT development

Source: Africa's ICT Infrastructure,
Building on the Mobile Revolution (2011).

ICT Literate Teacher

- In order to train teachers effectively, it is necessary to determine an ICT literate teacher. It is for this reason that effort has been made to put together qualities of an ICT literate teacher. Your clear understanding of the definition of ICT will enable you to follow this adequately. Some aspects are drawn from the Intentional Society for Technology in Education document (David, 2006).

An ICT literate teacher should be able to:

- design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners;
- plan for the management of technology resources within the context of learning activities;
- plan strategies to manage student learning in a technology-enhanced environment.
- use technology to support learner-centered strategies that address the diverse needs of students;

- apply technology to develop students' higher order skills and creativity;
- manage student learning activities in a technology-enhanced environment.
- apply technology in assessing student learning of subject matter using a variety of assessment techniques
- use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning;
- apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.
- select and organize materials, equipment, and technologies needed to teach a unit of instruction;

- plan for student use of ICT in a way that is consistent with educational theory and research.
- ensure appropriate use of ICT hardware, software, and telecommunications facilities.
- makes effective use of ICT -based aids to instruction and learning.
- help students to make effective use of ICT in doing and presenting their own work.
- develop and implement authentic assessment for multimedia projects and other ICT-using student activities.
- facilitate-students use of ICT in developing portfolios of their work.

- communicate effectively and dependably with students, colleagues, administrators, supervisors, educational assistants, and parents using e-mail and other electronic aids.
- make use of ICT as an aid to doing one's own work and remaining current in educational research, curriculum content, and effective educational practices.

Surely the extent to which a teacher should exhibit these depends at the level she/he is teaching.

Popularizing ICT in Nigerian Schools

- The FME recognizes the need for popularizing the use of ICT in our Schools and States clearly in the ICT NPE that public awareness of ICT in Education is necessary.

Some ways of making ICT application effective and popular in Nigeria schools are as follows:

- Considering the importance of ICT in National development, Science Teachers Association of Nigeria should continue its ICT annual workshop that problems notwithstanding.

- As a matter of policy, schools from primary, secondary, and tertiary whether private or public should be equipped with minimum specified number of computers in an ICT laboratory and be put into effective use for both teachers and students.
- Government should take an active role in organizing awareness through media workshops and seminars.

- Study tours and field trips at the national, state and local levels can assist educational administrators on how ICT can support education administration and how it can impact to classroom teaching and learning process.
- Government should collaborate with private sectors and NGOs to fund ICT in Nigerian schools.
- ICT should be combined with more traditional technologies such as books and radio and be more extensively applied to the training of teachers.

- Create ICT awareness and ensure universal access in promoting ICT diffusion in all sectors of national life.
- Create an enabling environment and facilitate private sector (national and multinational) investment in the ICT sector.
- Encourage government and private sector joint venture collaboration
- Develop human capital with emphasis on creating and supporting a knowledge-based society.
- Build a mass pool of ICT literate manpower using the NYSC, NDE, and other platforms as a train-the-trainer scheme for capacity-building.

Challenges

- The major challenges identified in the Teacher ICT training are:
- Internet users' penetration is still low at all levels of teachers' education. The available bandwidth is low and because of heavy reliance on private providers using satellites, the cost of access to the internet is high.
- Interrupted electricity supply or nor supply at all.
- Dumping of obsolete hardware and software in institutions as donations.
- Low percentage of teachers who have ICT skills and the task of massive ICT training to correct and develop the huge human kind resources base at national and instructional levels.

- Poor funding from Governments, Federal, State and Local Governments.
- Lack of monitoring and evaluation.
- Phobia for technology on the part of teachers resulting in the poor utilization of existing facility.
- Most of the bodies that provide in-service training for teachers at Basic and Post-basic levels do not include ICT.
- ICT policy on Education not accompanied by a detailed implementation plan or commitment from governments to implement the policies. (Aspect of this are available in the Roadmap).

- Shortage of ICT professionals and lack of educators with ICT skills.
- ICT Equipment: Equipping schools and colleges with ICT equipment is very expensive due to hardware and software purchases as well as the recurrent costs associated with maintenance and support.
- Near absence or complete absence of ICT facilities in the rural areas.
- Management's attitudes. The attitudes of various managements in and outside institutions towards the development of **ICT** related facilities such as the Internet and procurement of computers is rather slow in some instances, and in others there are no aids or support by the government at all (Albirini, 2006).

The Federal Ministry of Education in its Roadmap for Nigerian Education Sector (2009) has suggested some strategies for turn-around of some of these challenges as follows:

Turn around Strategies and Deliverables:

- The turn around strategies and deliverables which have been articulated to address the foregoing challenges are highlighted below:

Table 1: Turn around Strategies and Deliverables for ICT in Nigeria

Provide ICT laboratories in all schools with requisite ICT infrastructure and services to also accommodate children with special needs. Restructure the teaching/learning environment and administration of Basic Education to be ICT-driven Introduce e-learning to expand access to quality	Functional ICT laboratories with a minimum of 10 computers each and Internet connectivity in 20% of Primary and Junior Secondary Schools in place	2011
Establish a coordinated programme for mandatory development of competencies in ICT among teachers and educational administrators	50% of teachers at the Basic Education level attain computer literacy	2011

Implement the policy on compulsory computer education at all levels		
Facilitate and support the Computer Acquisition Scheme for teachers and educational administrators	40% of teachers own computer	2011
Review the computer Education curriculum every three years to reflect emerging society needs and global trends	Computer Education curriculum reviewed	2011
Initiate short-term conversion courses to produce ICT teachers Implement the provision of additional incentives for ICT professionals in education	Number of ICT teachers increased 20%	2011
Increase budgetary provision for ICT		2010

Increase collaboration with the private Sector and IDPs for necessary interventions on ICT in Basic Education Funding of ICT deployment increased by 40%		
Establish national ICT awareness machinery for Basic Education such as National ICT competitions, ICT Week, ICT clubs. Etc	Calendar of activities	2010

Recommendations

Based on discussion so far, the following suggestions are proffered:

- Africa is now on its way to be connected to the rest of the world through submarine optic fiber cables. I hope this will improve internet services and reduce cost. When this happens, teachers should be encouraged to make appropriate use of internet facilities.
- There should be awareness campaign at all levels as teachers' interest in ICT is low.

- Education Resource Centres in the state should be provided with ICT facilities that will be accessible to all teachers within the zone for practice.
- Intensive well planned in-service training for Basic and Post Basic teachers on ICT. This should be carried out in phases at local government, state and federal levels.
- NUC should design and provide the curriculum for B.Sc/B.Ed Computer science and the NCCE should revise the one for colleges of Education. ICT change fast.

- The policy should be specific on the minimum ICT qualification for teaching. The issue of International Computer Driving License as the basic minimum certification for literacy is not clear.
- Teachers may be more willing to participate in professional development activities if they become an important factor in their promotion exercise.
- ICT should not be restricted to a single course but should permeate all courses in the teacher training programmes.

- Government should ensure that costs of connectivity, equipment maintenance and support are affordable for individual, institutions or ensure that there is provision to cover the costs centrally.
- Make ICT literacy a requirement for employees to the teaching profession and set deadline within which those already in the field should obtain the minimum ICT literacy certificate.
- Teacher trainees at all levels and their trainers should be directed to possess computers by the institutions authorities. (Loans could be arranged for them through the banks).

- The adoption of ICT international standards and its inclusion in the Nigeria curriculum and particular in the teachers' education curriculum.
- Continuous and periodic training of teachers on computers and **ICT** skills acquisition.
- Funding government at all levels should make ICT a matter of priority, provide the funds specifically needed for the training of teachers in computer education who shall in turn be equipped with **ICT** knowledge and skills to teach pupils/students computer and/or **ICT** basics.

- Above all, there should be an attitudinal reorientation of expected users of the ICT related facilities so that society will be in a better position to adopt new ICT innovations such as new pedagogical methods, access to remote resources, collaboration between individuals and groups of people in more widely diverse geographic locations, online experts and mentors, virtual learning communities, home/school communities. This is because cultural perceptions seemingly have a significant impact on a teacher's adoption of **ICT** (UNESCO, 2000; Albirini, 2006).

Centre for Computer Modeling and Analysis of Learning Processes (CCMALP)

- Nasarawa State University, Keffi has a Centre for Computer Modeling and Analysis of Learning Processes run jointly by Nasarawa State University and University of Bremen, Germany. Prof. J.O.E. Otuka is the Director of the Centre. It provides students opportunity to use the computer as a tool for theory and practice in students activities during laboratory work. Also students are guided to make abstract concepts real and meaningful through modeling and simulation.

- We use Microcomputer Based Labs (MBL) for data collection and processing and dynamic Model Building System (MBS) software for our programmes. Students can explore such phenomena as damped simple harmonic motion or the Boltzmann distribution etc.

  You are welcome to the centre.

Conclusion

- Though the country has made some progress as far as ICT in teacher education is concerned, Nigeria is still very slow when compared with most of other countries in African.

I urge the governments – Federal, State and Local to come up with roadmaps (blueprint) that will clearly spell out our ICT teacher training plans between now and the magic year 20-2020, so that the country can join the community of knowledge societies (Nations).

Thank you for listening.