

IMPROVED TEACHER EDUCATION PROGRAMME IN NIGERIA THROUGH INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

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Abstract

The importance of information and communication technology (ICT) knowledge and skills for successful living in the global environment cannot be over-emphasised. Teachers are critical to successful implementation of ICT related programmes and skills in Nigerian schools. This paper explores issue related to information and communication technology, information and communication technology contents for teacher education programme at pre-service, in-service and graduate levels. Recommendations were made on ways of integrating information and communication technology in the Nigerian teacher education programme.

Introduction

The compound concept, Information and Communication Technology (ICT) is one of the most frequently used terms in the contemporary world. The frequency of its usage has brought about myriad of perceptions of the meaning of the term. Thus, it is important to begin with its definition and then present issues within its purview. Information and communication technology is the eclectic application of computing, telecommunication and satellite technology. Hills (1983) defined it as the miscegenation of computer and telecommunication on the platform of electronics. Through information and communication technology, information is not merely stored and transmitted, but it is actively processed. It should be noted that the core hardware of information and communication technology, the digital revolution, is undoubtedly the computer technology. The influence of ICT is so pervasive that it has changed the structure of all facets of human societal existence (education, telecommunication, transportation, health, etc.)

As Galbreath (1999) noted, information and communication technology has led to general globalisation. This entails globalisation of economy, globalization of knowledge, redundancy in the present skills and the growth of knowledge economy. He concluded that ICT has brought to the fore new social, political and economic realities. Therefore, contemporary education must be such that produce workers who can adequately fit into the globalised economy. Galbreath (1999) further noted that the ICT skills are required of a typical 21st century worker. These are the skills of communications, innovation and creativity, teamwork and empowerment information management and information technology literacy. Others are visualnetics, problem solving, decision making, knowledge development and management, and business intelligence. These skills must necessarily be provided for students to acquire by the schools. That means the school should provide education, which can make students to be clear about the purpose of their education and work towards achieving success. Such education should develop in Nigerian children knowledge and skills necessary to fit into the world of work driven by information and communication technology. This type of education would furnish students with the knowledge and competencies to attend to emerging societal needs through increased differentiation and. Integration. Differentiation in this context deals with the ability to see interacting parts of a unitary object, while integration refers to the ability to see relationship among parts for the construction of a major complex whole (Chickering, Payne & Poitras, 2001).

The value of ICT is not limited to the learners. It affects the whole gamut of the school system. Teachers as managers of the learning environment must be able to model good use of ICT. The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2008a) had noted

inter alia:

New technologies require new teacher roles, new pedagogies, and new approaches to teacher training. The successful integration of ICT into the classroom will depend on the ability of teachers to structure the learning environment in non-traditional ways, to merge new technology with new pedagogy, to develop socially active classrooms, encouraging cooperative interaction, collaborative learning, and group work (p. 9).

Teachers within the Nigerian educational system require certain level of knowledge and skills in the integration of ICT. Educational institutions charged with the preparation of teachers at the pre-service or in-service levels need to redefine the approach to teacher education because ICT is both a field of study and an important element in modern teacher education programme. Teachers' professional development programme must provide on-going knowledge and skills on ICT application. Generally, the curriculum for teacher education needs to be in tune with contemporary developments in teacher education and ICT application in education.

The encompassing nature of information and communication technology has therefore presented new challenges for teacher education programme in Nigeria. With information and communication technology the teacher is no longer the primary source or organiser of learning for his students. Students need to be trained in such a way that they can fully husband the potentials of information and communication technology in their learning. This is because information and communication technology will not only provide teachers with marketable skills, it will assist them in the preparation and delivery of their lessons; administration and management of learning environment, and they can train their students to be consumers of information and communication technology potentials. Therefore, the benefits of information and communication technology can only be realised in Nigerian schools when the teachers have the requisite knowledge and skills for its integration. This can be acquired through learning experiences during their teacher education programme (pre-service, in-service and graduate), in the teacher preparation institutions. Therefore, information and communication technology will not only promote learning but it will also prepare learners for a future in which information and communication technology will play a dominant role.

At this juncture, certain questions are pertinent in the context of information and communication technology and the Nigerian education system. Does the present education in Nigeria adequately provide students with requisite knowledge-economy? Can, teachers in Nigerian schools adequately promote the integration of information and communication technology into the Nigerian education system? Does the present teacher education programme in Nigeria have the potentials to instil needed knowledge and skills of information and communication technology in trainee and serving teachers? Studies have revealed that training in Nigerian teacher educational institutions hardly included the use of ICT for instructional purposes (Jegede, 2009, Yusuf, 2005) in instruction. If the answers are in the negative, there is the need not only to reassess the teacher education programme in Nigeria, but there is also the urgent need to re-develop the teacher education programme.

Application of Information Technology in Education

Information and communication technology, particularly computer technology has had wide application in the field of education. Since the early 60's it has found applications in administrative, instructional, evaluation, research and development and in teacher education (Ali & Franklin, 2001; Collins, 1996; Hawkrigde, 1987). For administrative purposes computer has been used in several ways to improve the management and administration of schools' learning and teaching. These include: the management and keeping students' performance records, administration of information system administering and scoring tests, planning budget, accounting for expenditure, assigning tasks and classes to teachers, and so on. In the context of teaching and learning computers have also being used as a veritable tool for the production of

software (learning materials) such as print materials, demonstration materials, transparencies, slides and other multi-media materials (Harper, 1987; Collins, 1996).

The computer has also been used for learner-oriented tasks for instructional purposes at every level of education. Such learner oriented tasks include: drill, practice and testing, tutorial, educational games, simulation, problem solving and learning about the computer and its functions as goals in themselves. Others include microcomputer based laboratory material databases, expert systems and the use of facilities on World Wide Web (WWW) (Harper, 1987; Collins, 1996). Recent developments have led to the use of cognitive tools (such as cognitive mapping) programming environment, (particularly LOGO), calculation, projection, and statistical software, and so on (Collins, 1996). The application of the telecommunication potentials of information and communication technology is also widespread. This has brought about tremendous improvement in access to instructional information by both the teachers and students. The Internet has become a major tool for instruction. It not only provides access to current and up-to-date instructional content, it changes the approach of learning from the traditional teacher-centered instruction to the student centered learning environment, thereby encouraging active learning on the part of the students. It also gives opportunity for simulation of real world setting as it allows students to "visit" several places while in the class. Use of internet can also save time as instructors can post materials on line so that students can have access to them, thus the saved time can be used for others things (Ali & Franklin 2001). The internet also provides opportunity for interactive use of video, text and animation. The internet has also being of great benefit in educational research, in the area of topic and literature search, conduct of joint research studies across continents, distribution of questionnaire and research instrument. It is also a good avenue for the dissemination of results, and for presentation and delivery of results (Harper, 1987, Milheim & Harvey, 1998). These different applications of ICT in the field of education have engendered the inclusion of ICT contents or courses in the initial teacher training programme of advanced countries (Simmons & Wild, 1991; Summer, 1990).

Teachers' Competence and Attitude Towards Information Technology

Teachers are probably the important agents for the successful implementation of any educational programme. For creative teaching teachers must necessarily be conversant with educational innovations, new methodologies, new media and their application in learning process so as to assist learners' acquisition of concrete and rewarding school experiences. Teachers must develop awareness of how information technology can be used in education, and also have necessary skills in handling information technology hardware. Teachers must gain insight into how the context for the application of technologies affects the implementation of the information technology and how this influences students' learning (Collins, 1996).

Furthermore, if students are to derive benefits from the potentials of information technology, their teachers must be positive role models in their use of information technology. Since the ultimate decision to use or not to use information technology is dependent on teachers, successful implementation of information technology in Nigerian schools can only be assured through teachers who have acquired necessary ICT knowledge and skills. Teachers' competence and attitude are of particular concern when new subject, methodologies or media are introduced into schools, system since their experience, competence and attitude will form the bedrock of their ability and interest to implement the use of information technology. The importance of teachers in the successful implementation of information technology integration into the Nigerian school system cannot be over-emphasised. This brought about the introduction of Computer Education as a compulsory subject in the curriculum of secondary schools in Nigeria, for the junior secondary level (FRN, 2004).

Empirical studies have established that computer experience of teachers relate to a more positive attitude towards computer (Lloyd & Gressard, 1983) and that teachers' implementation is dependent on their level of proficiency in the use or computer. Yusuf (2005) in his survey

discovered that majority of secondary school teachers in Nigeria did not have needed experience and competence in the use of computer, nor in the use of computer software. In another study he reported that most secondary teachers sampled in Nigeria had positive attitude towards the use of computer in education (Yusuf, 1998). Also, Yusuf and Fakomogbon (2008) in their study on the availability, teachers' awareness and attitude towards the use of assistive technologies in special schools in Kwara State, Nigeria, established that most of the teachers have positive attitude towards the use of ICT for students with disability. The importance of teachers in the integration of computer is underscored in the statement of Collins (1996) that "In general, there is agreement that the meaningful implementation of computer in educational setting is a complex, difficult and time consuming process requiring much insight and support in which the teachers plays a critical and central role" (p. 406). For teachers to be able to play this role they must be provided with training which keep them competent and abreast of developments in information technology. Therefore, teacher training institutions have central role to play in successful implementation of information technology literacy programme in Nigerian schools.

Information and Communication Technology Competency Standards for Teachers

The issue of setting ICT competency standards for trainee and practicing teachers has always attracted the attention of stakeholders. This has eventuated in the development of standards for pre-service and professional development teacher education programmes. For instance, the North Carolina Department of Public Instruction (2001) outlined nine basic competencies and five advanced technology competencies. The nine basic competencies are: computer operation skills, setup, maintenance, and troubleshooting; word processing/introductory desktop publishing; spreadsheet/graphing; database, networking; telecommunications, media communications (including image and audio. processing), and multi-media integration. The competencies identified as advanced are curriculum; subject specific knowledge; design and management of learning environment resources; child development; learning and diversity; and social, legal and ethical issues.

The competencies required by teachers were developed by the International Society for Technology in Education (ISTE, 2008). The body noted that educational computing and technology is an emerging field, and that the purview of the field covers knowledge and skills about the use of computer and related technologies in delivery, development, prescription, and assessment of instruction, effective use of computers as an aid to problem solving, school and classroom management, educational research, electronic information access and exchange, personal and professional productivity, and computer science education. Furthermore, the Society identified four major levels of ICT training for teachers to be: educational computing and technology literacy endorsement; the secondary computer science education endorsement; the secondary computer science education initial degree program, and the advanced educational computing and technology leadership programme. The Society noted that all teachers should meet the following standards in five competencies domains: facilitate and inspire student learning and creativity, design and develop digital-age learning experiences and assessments, model digital-age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership. These domains have performance indicators for teachers to be able to develop competencies for them to be able to design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community (ISTE, 2008).

The UNESCO ICT Competency Standards for Teachers (UNESCO, 2008a, 2008b) identified the three approaches to education reform or change based on human capacity development outlined as technology literacy, knowledge deepening, and knowledge creation as bases for ICT competency development. These three approaches are further related to the six components of the educational system—policy, curriculum, pedagogy, ICT, organization, and teacher training. The resulting UNESCO curriculum framework created is as reflected in Figure 1. framework for ICT competency for teachers.

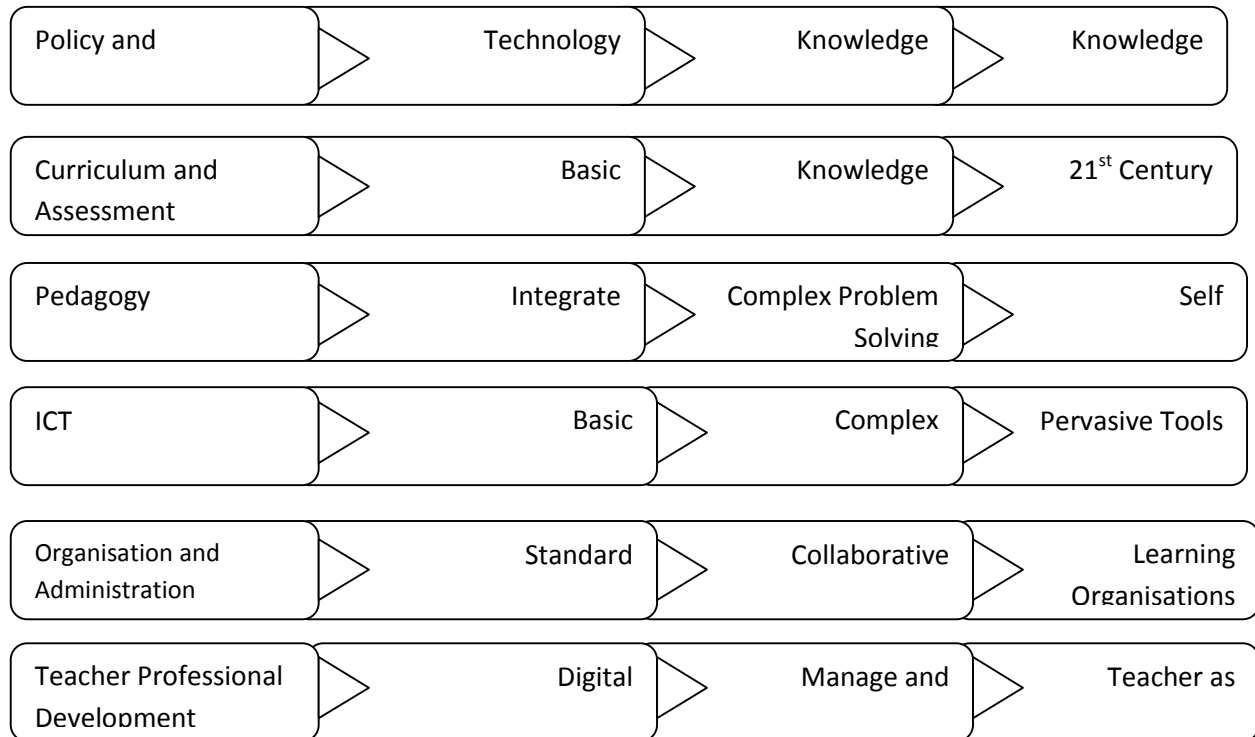


Figure 1: Matrix of UNESCO ICT competency standards for teachers

Source: UNESCO (2008b)

Each of these modules has specific curricular goals, objectives, detailed teacher competencies, and methods for each module. The policy goals are: technology literacy is to prepare learners, citizens, and a workforce that is capable of taking up new technologies so as to support social development and improve economic productivity; knowledge deepening to increase the ability of students, citizens, and the workforce to add value to society and the economy by applying the knowledge of school subjects to solve complex, high priority problems encountered in real world situations of work, society and life; while knowledge creation is to increase productivity by creating students, citizens, and a workforce that is continually engaged in and benefits from knowledge creation and innovation and life-long learning (UNESCO, 2008b).

Curriculum entailed by the technology literacy approach might include improving basic literacy skills through technology and adding the development of ICT skills into relevant curriculum contexts involving the incorporation of a range of relevant productivity tools and technology resources. The pedagogical practice entails the use of various technologies, tools, and e-content as part of whole class, group, and individual student activities. The knowledge deepening curriculum emphasizes depth of understanding over coverage of content and assessments that give emphasis to the application of understanding to real-world problems, focusing on complex problem solving and incorporating assessments into the ongoing activities of the class. The classroom pedagogy is student-centered focusing collaborative problem- and project-based learning in which students explore a subject deeply and bring their knowledge to bear on complex, every-day questions, issues, and problems. Teacher's role is to structure problem tasks, guide student understanding, and support student collaborative projects. The knowledge creation curriculum goes beyond knowledge of school subjects to include the 21st century skills necessary to create new knowledge. These skills include problem solving, communication, collaboration, experimentation, critical thinking, and creative expression. Pedagogical approach implies that teachers are themselves master learners and knowledge producers who are constantly engaged in educational experimentation and innovation in collaboration with their

colleagues and outside experts to produce new knowledge about learning and teaching practice (UNESCO, 2008b).

Teacher competencies covered under technology literacy approach include basic digital literacy skills dealing with the ability to select and use appropriate off-the-self educational tutorials, games, drill-and-practice, and web content in computer laboratories or with limited classroom facilities. It also includes ability to use ICT to manage classroom and support their professional development. Competencies in the area of knowledge deepening cover ability to manage information, structure problem tasks, and integrate open-ended software tools and subject-specific applications with student-centered teaching methods and collaborative projects. Competencies with the knowledge creation approach deal with ability to design ICT based learning resources and environments; use of ICT for the development of knowledge creation and critical thinking skills of students; support students' continuous, reflective learning; creation of knowledge communities for students and colleagues, and ability to play leadership role in training colleagues and in creating and implementing ICT vision of their school (UNESCO, 2008b).

Content and Organisation of Information Technology Component of Teacher Education Programme

Teacher education as du Boulay (1987) had noted deals with knowledge of subject content, skills necessary for teachers to teach the content (pedagogy) and learning about how children learn. Information and communication technology component of teacher education programme should be such that assists in the achievement of these ends.

Content should be organised to cover training of teachers at the pre-service (initial teacher training) and service levels. In Nigeria, teacher training is conducted in Colleges of Education, Faculties of Education, Institutes of Education, National Teachers' Institute and Schools of Education in Polytechnics (FRN, 2004). The minimum qualification for teaching in Nigeria is Nigeria Certificate in Education, offered in Colleges of Education and Polytechnics, and through the distance learning programme of the National Teachers' Institute (NTI). Teachers are also trained in Universities and few degrees awarded by Colleges of Education and Polytechnics through four-year (University Matriculation Examination, UME) or three-year (Direct) concurrent Bachelors with education programmes. Unqualified teachers with degree in the sciences, social sciences, arts, agriculture, and so on, are trained to be qualified teachers through one year Post Graduate diploma in Education Programme (PGDE) for the consecutive teacher education programme. These programmes are run on full time or part time basis. Universities also run postgraduate Masters and Ph.D. degree programmes in teacher education.

Information and communication technology courses for teachers should be structured for each of these levels of teacher education based on the expectation and job requirements of each of the programme (NCE, degree or postgraduate degree). Student teachers should be taught information and technology contents as separate newly developed courses and not subsumed as content under general educational technology or the traditional methodology courses. The contents should be balanced and developed based on established competency standards as discussed above within the Nigerian educational context. The contents of the information and communication technology courses should be such that imbibe in the student such basic skills which Galbreath (1999) had identified through the N.C.E. level to the PhD degree level. These are content areas in the use of database software, internet project management software, knowledge management software, decision support software, graphic software, statistical (including spreadsheet) software, and group ware. Others are remote collaboration software, data visualisation software, video production software, E-mail, desktop publishing, video conferencing and knowledge of network computers (Galbreath, 1999). The content for each level can be structured as follows.

The NCE programme should contain content area dealing with an introduction to computer

education, introduction to educational software, application software with emphasis on word processing, database and spreadsheet, and new information and communications technology. The three-year and four-year degree programmes should be structured to accommodate ICT course from the 200 to the 400 level. Content of degree programme should cover areas like programming language (LOGO and Basic), hardware topics, introduction to educational software, application software in the area of word processing, database, spreadsheet, desktop publishing, and presentation software. Others include computer ethics, future uses of computer; and new communications and information technologies (Collins, 1996). The same content taught at degree level should be taught at the one-year post graduate degree programme in education.

At graduate level, student teachers are assumed should have had prerequisite knowledge in the contents outlined earlier at the degree level. For those who had no prerequisite knowledge, they should be made to audit the degree level courses. In addition, advance courses in ICT should be part of certification requirement for Masters and PhD programmes. Contents should deal with new information and communications technologies, application software in the area of project management (e.g. Ms project), knowledge management software (e.g. Knowlix); decision support software (e.g. Cognos); video conferencing (e.g. picture Tell), group ware (e.g. Lotus Notes), remote collaboration software (e.g. Net Meeting) and Network computers. Apart from these programmes in initial teacher training programme (pre-service), serving teacher would need ICT knowledge and skill.

Training of teachers should not end with the pre-service training, thus opportunities should be provided for serving teachers to continually update and upgrade their knowledge and professional skills; particularly with emerging knowledge of information technology. In-service training can be organised for serving teacher through the sandwich programme as currently applied in most universities and Colleges of Education. For degree holders it should be structured along the post-graduate Diploma in Education (PGDE) where Post Graduate Diploma in Computer Education (PGDCE) is mounted for a one-year diploma courses. In a similar vein a one-year certificate programme on computer education can be mounted for NCE holders.

In addition, universities can conduct three to four months' intensive courses for practising teachers in the area information and communication technology. Using the cascade training approach teachers who would have attended these intensive course can also train others information technology skills and knowledge.

A major impediment in the success of teacher education programme in the area of ICT is the problem in training institution with educators' competence. Even the problem is noted in advanced countries. For instance, in the report of the Council of Europe's Standing Conference of European Ministers of Education it was observed that "Teacher training is no doubt affected by the fact that the trainer themselves do not possess sufficient knowledge or experience" (cited in Collins, 1996; p.535). This problem is much more critical in a developing nation like Nigeria. Therefore, the implication is that ICT component of teacher education programme should be undertaken by few teacher trainers who have the competence. Furthermore, ICT experts outside the mainstream teacher education field can assist in its implementation.

It should be emphasised that successful integration of ICT can only be achieved through the provision of necessary facilities, equipment and human resources in the teacher training institutions. Since a nation cannot rise about the level of its education investment in integrating ICT into the Nigerian education system is an investment in the nation's future.

Conclusions

The importance of information and communication technology to the development of any society cannot be over-emphasised. Nigeria as a nation cannot be indifferent to the potential of ICT not only in revolutionising instructional delivery and school administration, but also in providing

needed skills for survival in the contemporary world. Information and communication technology presents new challenges and opportunities for the development of teacher education programme in Nigeria. To achieve the integration of ICT in Nigerian teacher education, the following recommendations are made:

1. Government, private individuals, parent-teacher associations, companies and industries should provide necessary facilities and equipment for information and communication technology in teacher training institutions.
2. Teacher educators and trainers should acquire outlined competencies so that they can model good use of ICT for student-teachers, through professional development programmes, refresher courses, workshops, and dedicated ICT specific training for educational application.
3. Teacher education curriculum in training institution should be designed to include emerging information and communication technology contents.
4. There should be proper co-ordination between teacher training institutions and concerned individual and organisations (particularly information and communication technology experts) on the design and implementation of information and communication technology components of teacher education.

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