INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHER TRAINING AND PROFESSIONAL DEVELOPMENT IN NIGERIA

Felix Kayode OLAKULEHIN
**Centre for Continuing Education &
Workplace Training**
National Open University of Nigeria
Victoria Island, Lagos NIGERIA

ABSTRACT

This paper examined the contemporary teacher training and professional development in Nigeria as an example of the experiences in developing countries of the world. Against the background of the ascendancy of information and communications technologies in all aspects of human life this study attempted to situate the concept of Information and Communication technology at the centre of the pre-service training and continuing professional development of the Nigerian teacher. A review of some of the major challenges confronting the nation in terms of adopting a technology driven teacher education model was carried out. It also explored the potentials of ICTs for and in teachers' professional development in Nigeria and developing countries of the world. Consequently, proposing a model of a sustainable teacher training and professional development for Nigeria and other developing countries, within the functional framework of the Information and Communication Technologies was developed to indicate how ICTs could be gradually introduced into the school systems. The study conclude by further highlighting the benefits that Nigeria and other developing countries stand to gain
by adopting an ICT driven approach for the pre-service and in-service training and professional development of teachers.

Keywords: Information and communication technologies, pre-service and in-service
      training, professional development, teacher education.

INTRODUCTION

Education is generally acknowledged as one of the crucial allies of the development process. Thus, Nigerian educational policy makers and social planners, in recognition of its potentials for leveraging existing social stratifications, have placed a huge premium on the development of the education sector. This is reflected in the emphatic resonance in the National Policy on Education (NPE 1977, revised 1998, (2005) that 'no nation can rise above the quality of its education system'. Based on this self evident truth, the national policy formulators recommend, as a priority, the training of those responsible for facilitating the education of Nigerians in the development planning process. As a result the National Policy on Education unequivocally stated that 'teacher education will continue to be given attention in all our education planning, because no education system can rise above the quality of its teachers'. This view was crystallized by Lassa (2000) who noted that the importance of teachers and the roles that they play in the educative process is central to [basic] education, particularly in third world countries. However, the challenge of teacher training appears to be the most daunting challenge facing the education system in general. This has been observed by researchers who have reiterated that out of all the educational problems that beset the African continent today, none is as persistent or as compelling as the one relating to the training of competent teachers who directly and indirectly is bound to influence the quality and quantity of services provided by all other teachers and professors, as poor teachers tend to produce their own kind (Fafunwa 1967; Afe, 1999) in Afe 2002).

This observation is also corroborated by Perratton and Potashnik (1997) who indicated that teacher education has been severely criticized on the grounds of quantity and quality. Despite this, education systems in sub-Saharan Africa and the south Asia are still characterized by too few teachers, and for some subjects, there are none at all. In terms of quality of teachers in Nigeria, experts have submitted that there is only modest evidence of the effectiveness of the Nigerian teacher education system. The curriculum has been criticized as often not well matched with students' own background and culture of the society that the would-be teachers are expected to teach (Afemikhe, 2004; Afe 2002 & Obanya 1999). From time immemorial, the training of teachers has been an issue of concern to researchers and lay members of society alike. Fafunwa (1974) argued that teacher education continues to be the key to educational development, here [in Nigeria] and elsewhere, for without adequately trained teaching cadre Nigeria cannot hope to expand her educational facilities. However, till date the pre-service training and in-service professional development of Nigerian teachers has not reflected the attention and focus of these observers of our education system. As observed by Jegede (2002), the teacher training system in Nigeria, has failed to adhere to the provisions of the National Policy on education that teacher education shall continue to take cognizance of changes in methodology and in the curriculum, and that teachers shall be regularly exposed to innovations in their professions. Contributing to this debate, Okebukola (2002) opined that 'in times past the teacher as well as his/her education did enjoy some pride of place…but teacher education in Nigeria and indeed education generally in the last two decades had been characterized by incessant instability, not unconnected with attempts by practitioners in the field to better their lot. Afemikhe (2004) quoting Taiwo (2002) added that 'teacher education suffered some setbacks as greater emphasis was then laid on how to teach rather than on what to teach.

The foregoing suggests a two-pronged challenge that may be aptly dubbed: *the problem of numbers and the problem of relevance*. These are the two most deluging challenges confronting the education system in Nigeria today. The problem of numbers implies that there is an insufficiency in the quantity of teachers that are available for the various levels of the education system in Nigeria. This has resulted in a situation where the carrying capacities of classes/teachers have been exceeded due to the exponential rise in student population in the last two decades (NUC, 2005). The problem of relevance, on the other hand, means that the extant quality and relevance of the knowledge and competence of the teaching cadre at all levels of the education system leaves a great deal to be desired. This consequently suggests that the existing teacher training model does not reflect the contemporary social needs as well as economic challenges confronting the nation as a whole. This kind of model would necessarily produce an inadequate teaching force and thus reinforce the caution that had been expressed by Afemikhe (2004) that, 'good teachers would beget good students from which the system can get a replenishment of its teaching stock. In the same token, poor teachers will beget poor students and consequently poorer future teachers. Thus, the teacher training process in Nigeria must be regarded as the foundation of quality and relevance of education at all levels of the nation's education system, if Nigeria is to meet the Education for All Targets as well as the national goals and objectives.

TEACHER TRAINING IN NIGERIA

The initial teacher training process and the continuing professional development of Nigerian teachers is currently besotted by a number of challenges. These are directly connected with the incessant modification of the planning policies several times before such policies have been appropriately implemented in its original form. These problems have been further accentuated by the parlous state of economic development, which has made 'teaching' a less desirable profession for many youth.

The NPE (1977, revised 1998, 2005) provided the objectives of teacher education in Nigeria as follows:

- to provide highly motivated, conscientious and efficient classroom teachers;
- to encourage further the spirit of enquiry and creativity in teachers;
- to help teachers to fit into the social life of the community and society at large;
- to enhance teachers commitment to the teaching profession.

However, many researchers have noted that these 'lofty' objectives have scarcely been met (Okebukola, 2002; Isyaku, 2002; Ukeje, 2002; Jegede, 2002 &Afemikhe, 2004). For instance, the same policy document provided that the Nigerian Certificate of Education (NCE) shall be the minimum qualification of teachers in any level of education system (NPE, 1997, revised1998, 2005; p.33), but the reality is completely at variance with this provision. According to the Situational and Policy Analysis jointly published by the UNICEFand the Federal Government of Nigeria (1993) the Teachers Grade II certificate is still found among the qualifications of teachers in Nigerian Primary schools, in many states in Nigeria. Also, with the launching of the Universal Basic Education (UBE) scheme in 1999, when it was found that there exists an inadequacy in the number of available teachers for the compulsory basic education scheme for Nigerian school children.

The National Teachers Institute (NTI) was required to introduce the Pivotal Teachers Training Programme (PTTP) to train a cadre of teachers for qualifications much lower than the NCE and the Teachers Grade II Certificate to cater for the shortage in supply of primary school teachers needed to meet the demands of the UBE scheme (NTI, 2004; Tahir, 2001). Amidst this obvious inadequacy of teachers in sufficient number and quality, Ukeje (2002) echoed the fact that teachers are the foundation of quality in the school; it is upon their number, their quality, their effectiveness, their efficiency, and their education, that depend the quality of the educative process and the education system.

Whatever is needed in the society is always made a central part of the school curriculum, so that learners can jointly and severally proffer potent and innovative solutions to social challenges. But this can only be meaningful and successful if we have the right caliber of teachers. All existing teacher education programmes in Nigeria, Diploma in Education, Bachelor of Education, Postgraduate Diploma in Education, Postgraduate Diploma in Technical Education and the Nigerian Certificate in Education, all have three major components (Afemikhe, 2004).

These are, to wit, the Foundations of Education (Historical, Psychological, Sociological, Philosophical and Religious Foundations); Pedagogy courses (Classroom Management, Curriculum Design & Development, General and Special Teaching Methodology, Measurement & Evaluation, Counselling, Design & Construction of Instructional Aids, etc.); and Teaching Subjects under the broad categorizations-science, arts, social sciences. In addition, there is usually a teaching practice exercise whose duration varies across institutions. This is what the teacher training model looks like in a Nigerian Teacher education institution. This model is rather restrictive in the sense that it fails to take into cognizance the burgeoning possibilities of information and communication technologies in the teacher production process.Compounding the issues related to teacher training as discussed above is the changing social context of the 21st century that has placed a huge demand on teachers to become facilitators of knowledge acquisition in remote fields which do not have direct link with their primary professional training. The convergence of information and communication technologies (ICTs) has turned the whole world into a global village, making it possible to foster interaction with people in remote geographical locations of the world at previously unimaginable speed.

This phenomenon has also shortened the turn around period of knowledge such that 'knowledge becomes obsolete almost as soon as it is acquired or learnt'.The result of this development is that teachers are now challenged to be at the cutting-edge of knowledge production, modification and application. A view which has been further emphasized by the ubiquitous forces of globalization that has made it necessary to interact with diverse socio-cultural practices, sometimes at the expense of local cultural influences. More than ever before, the knowledge and capability for information and communication technologies have become a common denominator in all human interactions. However, the school system in Nigeria, at all levels, seems to have been left behind in this interactivity. The entire school curriculum require urgent overhauling and/or enrichment, to equip participants in the education system with the knowledge, skills and attitude for understanding and appreciating the content and structure of ICTs. This responsibility for this social reorientation lies heavily on the shoulders of the members of the teaching cadre. UNESCO (2002) also indicated that keeping pace with technological development and the changing competencies required of both students and their teachers requires a state-of-the-art curriculum and appropriate teacher development. Consequently, the teaching force in Nigeria would need to be imbued with the rudimentary skills for applying ICTs and products of technology in their teaching assignments to foster greater intellectual understanding.

THE CHALLENGE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

According to Daniels (2002) ICTs have become within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy. However, there appears to be a misconception that ICTs generally refers to 'computers and computing related activities'. This is fortunately not the case, although computers and their application play a significant role in modern information management, other technologies and/or systems also comprise of the phenomenon that is commonly regarded as ICTs. According to UNESCO (2002) information and communication technology (ICT) may be regarded as the combination of 'Informatics technology' with other related technology, specifically communication technology.

Informatics refers to the science dealing with the design, realization, evaluation, use and maintenance of information processing systems, including hardware, software, organizational and human aspects, and the industrial, commercial, governmental and political implications of these. *Informatics Technology* on the other hand is defined as the technological applications (artifacts) of informatics in society. From a less technical viewpoint the term information and communication technology (ICT) refers to the range of technologies that are applied in the process of collecting, storing, editing, retrieving and transfer of information in various forms. The foregoing definition implies that a broad range of technological equipment such as computers, mobile telephones, MP3/MP4/WMA storage devices, file transfer protocols, listservs, satellites, world wide web etc are used for information exchange among people for different purposes. These devices are capable of both synchronous and asynchronous communication formats, and the most advanced of these technological applications is the concept of multimedia, which refers to teaching and learning devices that include a combination of data manipulators e.g. video, CD ROMs, floppy disks etc which facilitates interactive communication between and among individuals. Given these descriptions of the components of ICTs, it should be clear why ICTs are considered a more robust and all encompassing phenomenon than the popular narrowly held conception of mere application of computers in human activities. According to Chen & Kee (2005) information and communication technologies are the backbone of the knowledge economy and in recent years have been recognized as an effective tool for promoting economic growth and sustainable development.

The fact is that the advancement of ICTs is both an opportunity – to overcome inherent and historical disabilities in the economics and a challenge – to ensure that developing countries like Nigeria does not get left even further behind the developed world. According to Liverpool (2002) while ICT has already invaded and dominated education in the developed world, its invasion into the system in most developing world and in Africa in particular has been painfully slow. But the fact is that ICT represents an opportunity to those who can respond to the new paradigm and a threat to those who cannot. Manjulika & Reddy (2002) reported that access to ICT varies enormously from continent to continent and from country to country. This is particularly evident when comparing developed and developing countries – representing a stark digital divide.

Across Africa and most developing countries of the world, Nigeria inclusive there are a deluge of challenges confronting the application of ICTs in teacher training and in the educative process in general. These challenges include limited ICT infrastructures (in terms of facilities and competent staff); lack of information and information illiteracy in teachers and teacher trainers-technophobia; poor or nonexistent internet connectivity; inadequate learning resources including related educational tools, course curriculum and other learning materials; attitudes of teacher-trainees and teacher trainers which indicates a gross lacking in independent learning skills and reluctance to take responsibility for their own learning; software license and highly prohibitive costs associated with the; maintenance and technical support as well as poor power supply in most parts the developing regions of the world, a problem that is peculiar to Nigeria in particular. Countries must be able to benefit from technological developments. To be able to do so, a cadre of professionals has to be educated with sound ICT backgrounds, independent of specific computer platforms or software environments. From the foregoing it is distressing to observe that Nigeria and many other countries in sub-Saharan Africa fall below expectations regarding the use of ICTs in general and particularly in instructional/ learning activities. The disparity in access to information and communications technology in Africa is occasioned by many and diverse problems, including, low bandwidth for internet access, lack of funds to embark on full scale computerization, irregular supply of power, inadequate functional telephone lines and other infrastructural facilities needed to support the efficient and effective introduction and development of the technology. Nigeria is also short of manpower for effective utilization of software and for maintenance. Qualified programmers, engineers and technicians are equally difficult to find and when they are found, the (public) education sector cannot afford to retain them, as competition from the private sector is fierce. This lack of manpower breeds a compendium of other problems. Teachers can only pass on skills and ideas to the learners, if they are masters of their trade, and they are at the cutting-edge of knowledge and developments in their disciplines. This is, unfortunately not the case here in Nigeria, most teachers at all sectors of the education system have minimal or no ICT skills and hardly use existing opportunities to develop them. But this generation cannot survive the challenges posited by the contemporary social realities with this level of ignorance, technophobia and information paranoia of the teaching force. This development, therefore calls for a re-thinking of the strategies that are adopted for teacher production in order to enhance the drive towards sustainable development.

ICTS IN AND FOR EDUCATION

The idea that teaching and learning can successfully take place through the application of electronic communication facilities between teachers and students is one which had generated, sometimes, hope and dismay and at other times, excitement and fear. Hope that many more learners can be reached at a more convenient pace that had erstwhile been the case, dismay that the infrastructures necessary for deploying an effective ICT platform is lacking in low-income countries like Nigeria.

However, the use of information and communication technologies in the educative process has been divided into two broad categories: ICTs for Education and ICTs in Education. ICTs for education refers to the development of information and communications technology specifically for teaching/learning purposes, while the ICTs in Education in education involves the adoption of general components of information and communication technologies in the teaching learning process. Generally, however, the educational relevance of computers and other components of information technology cannot be overemphasized. From the period when skinner applied programmed instructions to teaching machines, through Brunner's experiment with computers in instruction, to the current wave of information transmission and exchange via the worldwide web, we have seen different applications of ICTs in enhancing cognitive development.

In a classification by Thomas & Ranga (2000), the application of computers and other communication technologies in education was divided into three broad categories: Pedagogy, Training and Continuing Education. The pedagogical applicability of the ICTs is concerned, essentially, with the more effective learning with the aid of the various components of ICTs. Almost all subjects ranging from mathematics (the most structured) to music (the least structured) can be learnt with the help of computers. It should be emphasized that pedagogic application of ICTs, involves effective learning with the aid of computers and other information technologies, serving the purpose of learning aids, which plays complementary roles in teaching/learning situations, rather than supplements to the teacher/instructor/facilitator.

In fact, the computer is regarded as add-on rather than a replacing device. The pedagogic uses of the computer necessitate the development, among teachers as well as students, of skills and attitude related to effective use of information and communications technologies. Besides literacy, ICTs also facilitates learning to programme, learning in subject areas and learning at home on one's own, and these necessitate the use of new methods like modeling, simulation, use of data bases, guided discovery, closed-word exploration etc. The implications in terms of changes in the teaching strategy, instructional content, role of the teachers and context of the curricula are obvious as well as inevitable.

Pedagogy through the application of information and communications technologies has the advantage of heightening the motivation; helping recall previous learning; providing new instructional stimuli; activating the learner's response; providing systematic and steady feedback; facilitating appropriate practice; sequencing learning appropriately; and providing a viable source of information for enhanced learning. Teachers who are trained with this system of instructional strategy would be able to kindle in the hearts of the learners a desirable attitude towards information technology tools in their entire way of life. The concept of training refers to the development of skills and a skill as we know, is a well coordinated psychomotor activity.

Any training programme is thus concerned with improved ways of doing things, of carrying out various activities in a professional manner. The contribution of the information and communications technologies can be very useful tool for the development of skills as it provides effective training programmes which can be attributed to its capacity for stimulation, model-building and interactive adaptation. This usage applies not only to subjects like sciences and languages, but also to various aspects of professional courses like engineering and teacher training. ICTs could assist in development of administrative skills related to student management, tutoring, course writing and pedagogic skills in education. The concept of lifelong education is associated with a learning society, in the contemporary society; the end of formal education does not mean the end of one's learning.

The pace at which new knowledge is being generated and old knowledge is becoming outdated, demands that an individual should continue to learn throughout one's life. Information and communications technologies can be very effective for facilitating lifelong education, both as a tutor and as a tool. The concept of lifelong education is based on post formal education and it assumes learners to be adults or near adults who can manage their learning on their own.

A MODEL OF ICT APPLICATION FOR TEACHERS' PROFESSIONAL DEVELOPMENT IN NIGERIA

From the broad categorizations of the applications of ICTs defined above, the relevance of ICTs for and in education with specific reference to the professional development of teachers in Nigeria can be easily understood. There are general ICT competencies, common to all users in education, regardless of the subject area. There are also specific competencies and skills which find expression more in specific subjects areas and specialization of teachers and trainee-teachers.

The general ICT competencies include the general understanding of the basic building blocks of the computer systems, literacy in operating the computer and using the windows interface called windows explorer and other similar interfaces (e.g. Mackintosh or Apple).

The understanding of word processing activity, usage of PowerPoint slides to enunciate aspects of their teaching activities, through to the application of basic features of spreadsheet packages or excel sheets and using facilities like Microsoft access to create databases for their students' records, would comprise the general skills and abilities required of would-be teachers. This is the more popular view of what computer education portends in the existing teacher training process. All teacher trainees are expected to have all these rudimentary skills in computer application irrespective of whether they specialize in the arts, sciences, or the social sciences.

The specific ICT competencies refer to the special skills a teacher trainee acquires in other to enhance the quality of the teaching and learning that takes place in the school. The special skills cannot be acquired without the general abilities, and the general abilities are not of much benefit if a teacher does not possess specific skills for applying ICTs in his teaching activities. Studies in ICT development in both developed and developing countries identify at least four broad approaches through which ICTs could be adopted for teacher training and professional development.

EMERGING	*APPLYING*	*INFUSING*	*TRANSFORMING*

Figure: 1
Model depicting a continuum of approaches to ICT application for Teacher training and development

The continuum model above indicates that the skills of teacher trainees flows from the emerging to the applying into the infusing and then culminates in the transforming processes of the educative activities which takes place in schools. The Emerging approach is the first stage of ICTs skills development in teachers, here the focus is on appreciation of technical functions, components and general uses of ICTs, especially for education and training. This approach tends to be theoretical and the practical components involves the personal use of ICT such as the use of word processing to prepare worksheets, locating information on CD-ROMs or on the internet, or communicating with friends and family via e-mail. The emphasis here is

on training of teachers in a range of tools and applications, and increasing teachers' awareness of the opportunities for applying ICT to their teaching in the future.

The next level of the continuum model emphasizes the application of ICTs to teachers' subject areas. In the applying approach, teachers use ICT for professional purposes, focusing on improving their subject teaching in order to enrich how they teach with a range of ICT applications. This approach often involves teachers in integrating ICT to teach specific subject skills and knowledge; beginning to change their methodology in the classroom; and using ICT to support their training and professional development. The infusing approach involves the inclusion of ICT in all aspects of teacher's professional lives in such ways as to improve student learning and the management of learning processes. The approach supports active and creative teachers who are able to stimulate and manage the learning of students, integrating a range of preferred learning styles and uses of ICT in achieving their goals. The infusing approach often involves teacher easily integrating different knowledge and skills from other subjects into project based curricula.

Transforming teaching through ICTs involves teachers and other support staff in the school system regarding ICT as a natural part of everyday life of the system that they begin to look at the processes of teaching and learning in new ways. The emphasis changes from a teacher-centric to a learner-centric system where the teacher is seen as a 'guide by the side, rather than the sage on the stage', helping students as the facilitator of their learning experiences to construct new learning paradigms out of the various offerings that the school makes available to them. This shift in emphasis in learners needs also calls for new training needs on the part of the teachers, where they would be imbued with such components of knowledge that prepares them to annex the potentials of ICTs in sourcing and disseminating information to their students.

CONCLUSIONS AND RECOMMENDATIONS

Taking a critical look at the continuum model proposed above, teacher trainees in most developing countries are hardly introduced to the emerging approach, and where it is done, is only exists in a peripheral basis neglecting the more sophisticated and practical levels of infusing and applying. This creates a concern for the plight of learners in these societies, considering the fact that the ascendancy of ICTs has turned it into an invariable constant in everyday life. The importance of an ICT oriented learning system is captured by Moore (1999), thus:

> *"...in what has already become known as the information age, economic advantage will accrue to countries in which the population acquires competence in processing information into knowledge and applying it in work and everyday life. They must be skillful in using the devices and procedures that give access to information and learn the processes of searching for and manipulating information. Skillfully transforming information into knowledge is the profession of the educator. Educational systems will be, in the information age, a national resource as important as the traditional factors of production-land, labour and capital. In the information age, educators can expect their work to become more important, their productivity and their wages increase, but they can also expect the nature of their jobs to change with a great deal of specialization and therefore differentiation in incomes".*

From the foregoing it is easy to glean the importance of information and communication technologies in education and training in future, therefore countries like Nigeria can ill afford to do away with ICTs in the training of teachers. It is important that teachers in the training institutions are imbued with the skills and abilities of ICT literacy and sensibilities so that the knowledge and attitude acquired will cascade onto the learners that they come in contact with in the classrooms when they begin to practice.

Moreover, the use of ICTs for professional development of teachers who had already completed their training but need to be introduced to new methodologies and innovations in their subject areas must be seriously explored. Since it may be impractical to resend all teachers that are currently teaching in the classrooms back to the institutes for retooling and re-skilling in the new emerging fields of knowledge, distance learning through the use of modern ICT tools may well be the only means of retraining the corps of teachers in the field who are in need of serious retraining. Consequently, the government, non-governmental and international agencies could set policy agenda for introducing an ICT driven teacher education curricular for developing countries such as Nigeria and they would do well if they are guided by the continuum model which is depicted in this study. The advantage of the convergence of information and communication technologies are being brought into many aspects of human life by the industries, therefore it behooves of the teaching force to also buy into this development, since teachers are the custodians of knowledge in this knowledge driven era.

This buy-in calls for a system where teachers, especially in a country will have no choice but to embrace ICT as a style of teaching and learning. However it also places a huge responsibility on the establishment, defined by –government, policy makers, institutional and individual stakeholders etc. who must make sure that teacher trainees have all that they need in terms of resources for learning, during their professional training. This have been addressed under the challenges, but for emphasis – highly trained professional have to be included in the teacher training process in order to ensure maximum access to cutting-edge knowledge on ICTs. As a matter of policy, government should ensure a national internet broadband connectivity policy such that it would be easy to reach remote locations easily via the internet. ICT related equipment should attract little or no tariffs in importation and local software developers should be encouraged. Most importantly, teachers' remuneration should be made equitable, this issue underscores ALL efforts at improving the quality of education provided by an institution. If the teachers are well remunerated and motivated for their work is most likely that they will embrace all innovations with minimum resistance. To wit: happy teachers are likely to produce excellent students. The palpable benefits to derived from a full scale deployment of ICTs in the education and training of teachers include exposure to different technologies for teachers and learners; enhancement of teaching and learning effectiveness; Enhancement of varieties of teaching and learning methods; Flexibility and the provision of self-directed learning; increased participation through online communication, access to information; management of large classes; increased lifelong learning skills for teachers and students alike; access to a wider student body in different learning centres across the country; personal development of teachers standardized content.

BIODATA and CONTACT ADDRESSES of AUTHOR

OLAKULEHIN, Felix Kayode is an Assistant Course Coordinator at the Centre for Continuing Education & Workplace Training, National Open University of Nigeria, Victoria Island, Lagos. He holds a Masters degree in Educational Management from the University of Ibadan in addition he holds a Postgraduate Diploma in Distance Education from the Indira Ghandi National Open University. He is currently on scholarship for a Master of Arts in Distance Education at the Indira Ghandi National Open University, New Delhi, India.

Felix Kayode OLAKULEHIN
Centre for Continuing Education & Workplace Training
National Open University of Nigeria, 14/16 Ahmadu Bello Way, Victoria Island, Lagos, NIGERIA
Email: felixkayman@yahoo.co.uk

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