

Nigeria

Introduction

The Federal Republic of Nigeria covers an area of 923 768 km². Located in West Africa, it is bordered by Benin to the west, Niger to the north, Cameroon to the east and the Atlantic Ocean. National census figures for 2005 described a population of 140 million people comprising members from the Hausa/Fulani, Yoruba, Igbo, Ijaw and some 250 ethnolinguistic groups. The capital city of Abuja, with a population of 6 million, is centrally located. Other major cities include Lagos (population 15 million), Ibadan (population 5 million) and at least eight others with a population of over 1 million. While English is the official language of Nigeria and the language of instruction at a tertiary level, Hausa, Yoruba and Igbo are also used in the National Assembly.

President Umaru Yar'Adua was inaugurated as head of state on 29 May 2007, taking over from former President Obasanjo who did not contest the elections. The current Vice-President is Jonathan Goodluck.

Nigeria is a founding member of the New Partnership for Africa's Development (Nepad) and a central member of both the Economic Community of West African States (ECOWAS) and the African Union (AU). In addition, Nigeria is a member of the United Nations (UN) where it aspires to a permanent seat on a reformed UN Security Council. Being the world's eighth largest exporter of oil, Nigeria is unsurprisingly a member of the Organisation for Petroleum Exporting Countries (OPEC).

Oil plays a dominant role in Nigeria's economy, accounting for 95 per cent of exports by value and contributing 80 per cent of government revenue. Oil outputs are projected to rise to 4 million barrels per day by 2010. Nigeria is also a producer of liquefied natural gas (LNG), and current output, at 10 million tonnes per annum, is set to quadruple to 40 million tonnes by 2010, with the commission of two further plants. With the largest known gas reserves in sub-Saharan Africa, revenue from LNG is expected to surpass that from oil in the next decade. Although Nigeria is set to earn US\$12 billion per annum from LNG by 2009, the oil-producing region, the Niger Delta, remains politically volatile (FCO, 2007).

Nigeria successfully negotiated with both the Paris and London Clubs and now has no major foreign debt. The US\$750 million fiscal space created by the debt deal with the Paris Club creditors has been allocated for the achievement of millennium development goals and poverty reduction (World Bank, 2007).

Education profile

The language of instruction in Nigerian educational institutions is English. The Ministry of Education is responsible for regulating procedures and maintaining education standards. Much of what follows is drawn from USDMN (n.d.).

Primary school

For the majority of Nigerians, primary education begins at the age of six. Students spend six years in primary school and graduate with a school-leaving certificate. Subjects taught at the primary level include mathematics, English language, bible knowledge, science and one of the three main native languages (Hausa, Yoruba and Igbo). Private schools would also offer computer science, French and art. Primary school students are required to take a common entrance examination to qualify for admission into the federal and state government schools.

Secondary education

Students spend six years in secondary school. At the end of three years, they take the Junior Secondary School Examination, which is necessary for graduation to senior secondary school. By class 2 of senior secondary school, most students take the General Certificate of Education (GCE) O-level Examination, which is not mandatory but helps prepare students for their Senior Secondary Certificate Examination, which is taken in the last year of high school. Each student registers for the examination in a maximum of nine and a minimum of seven subjects, with mathematics and English language being compulsory.

Credit grades and above are usually considered academically adequate for entry into any university in Nigeria; some study programmes may require higher admission grades. Secondary schools are managed by private organisations, the state government or the federal government.

Higher education overview

Higher education institutions (HEIs) are categorised as universities, polytechnics and colleges. The National Universities Commission (NUC) governs policies and the development of universities. Polytechnics are governed by the National Board for Vocational Colleges and Technical Education, while colleges are governed by the National Commission for Colleges of Education.

The first HEI in Nigeria was the Yaba Higher College, established in 1934. Since then, the number of institutions has increased into the hundreds in response to the demand for HE in a fast-developing world. With a population of over 140 million people, Nigeria has about 1 million students enrolled in about 200 HEIs. Most of these HEIs are funded by the government (Jibril, Teferra & Altbach, 2003). In keeping with a law established in 1977, undergraduate students do not pay tuition fees.

Inevitably, the growth in HEIs has resulted in a high number of graduates in the country. While the output may be commendable, most graduates do not get absorbed into the job market. The lack of jobs for graduates may be viewed as a result of the Nigerian economy not growing fast enough to absorb the skills generated by the HEIs, or it may be viewed as a sign that graduates do not possess market-relevant skills.

Polytechnic colleges

In addition to the universities, there are 13 federal and 14 state polytechnic colleges. These were established to train technical, middle-level workers. Some of the colleges are beginning to award degrees. Entry requirements include a minimum of three credits or the equivalent.

The university system

The government has majority control of university education, and the duration of undergraduate programmes at Nigerian universities depends largely on the programme of study. Nigeria's universities are generally grouped as follows:

- *First-generation universities.* The first-generation universities of Ibadan, Lagos, Nsukka, Zaria, Ife and Benin were established between 1948 and 1965 (Osita et al., 1995). These universities are fully funded by the federal government and were established primarily to meet the skills needs of Nigeria, and have set the basic standards for university education in the country. They have continued to play their role in terms of skills development and standards, which have helped to guide the subsequent establishment of other universities in Nigeria.
- *Second-generation universities.* With the increasing population of students qualified for university education in Nigeria and the growing need for scientific and technological development, setting up more universities became imperative. Between 1970 and 1985, 12 additional universities were established and located in various parts of the country. These included Jos, Ilorin, Sokoto, Maiduguri, Calabar, Kano and Port-Harcourt (Osita et al., 1995).
- *Third-generation universities.* The need to establish universities to address special areas of technological and agricultural demand prompted the setting up of ten additional universities between 1985 and 1999, including Bauchi, Yola, Owerri, Minna, Akure, Abeokuta and Makurdi. These have since been transformed into universities of agriculture (Osita et al., 1995).

- *State universities.* Pressure from qualified students who could not readily get admission to any of the federal universities continued to mount on state governments. It became imperative and urgent for some state governments to invest in the establishment of universities.
- *Private universities.* In recognition of the need to encourage private participation in the provision of university education, the federal government passed a law in 1993 allowing the private sector to establish universities following guidelines prescribed by the government.

The National Open University of Nigeria

The National Open University of Nigeria was initially established on 22 July 1983 as a springboard for open and distance learning in Nigeria, only to be suspended by the government on 25 April 1984. However, the tremendous role it could play in tackling the country's education problems, including access, equity and education for all, became so evident that its resuscitation was begun on 12 April 2001.

The National Open University is dedicated to preparing professionals in various disciplines through the distance learning mode. It offers a choice of qualifications from certificates and diplomas to postgraduate diplomas and degrees, and is designed to increase the access of all Nigerians to formal and non-formal education in a manner convenient to their circumstances. It also seeks to cater for the continuous educational development of professionals such as teachers, accountants, bankers, lawyers, doctors, engineers, politicians, the self-employed and businesspeople. The range of target clientele is elastic and continually reviewed to meet Nigeria's ever-changing needs.

The National Open University operates from administrative headquarters in Lagos, with study centres throughout the country.

Quality of higher education

The quality of an education system is judged by how relevant its programmes and training are to the labour market. Nigeria's National Policy on Education (NPE) states: 'Teacher education will continue to be given a major emphasis in all our educational planning because no education system can rise above the quality of its teachers' (FRN, 1981).

The number and variety of educational projects implemented over the years is a demonstration of the Nigerian government's commitment to higher education (Ajayi, 2002). Despite this, major disparities still exist throughout the education system. The most obvious disparity is the ratio of males to females, with the number of females at universities being significantly lower than that of males. Female numbers in science and engineering subjects are also very low, with most females taking arts and social sciences.

With regard to funding, university education, which falls under the NUC, is the best-financed of all the education sectors. Vocational and technical education, which fall under the National Board for Technical Education (NBTE), suffer from a public perception that this kind of education has a lower status than that obtained from universities. Studies suggest that this situation is aggravated by negative perceptions towards science and technology (World Bank, 1996). The NBTE categorises technical institutions into three groups: vocational schools, technical colleges and polytechnics. The grouping was intended to improve vocational technical education and the quality of education at these institutions. However, progress has been slow, due largely to sluggish implementation of NBTE policies. The problems besetting vocational technical education in Nigeria can be highlighted as follows:

- lack of well-trained technical teachers;
- exclusion of technical and vocational education from the mainstream curriculum of the universities;
- lack of guidance services;
- lack of teaching resources;
- the use of unqualified teachers; and
- loss of well-trained teachers to the private sector where they are paid more money (Moja, 2000).

Obstacles such as these leave education at vocational technical institutions wanting. Furthermore, it has been noted that graduates lack basic skills and are therefore unemployable (see Mac-Ikemenjima, 2005).

It has been noted that HEIs are unable to meet the demand for higher education in the country (see World Bank, 1996; Anugwom, 2002; Benjie, 2006). HE intake is much lower than national demand and it is estimated that universities can accommodate only 20 per cent of the more than 1.5 million applications per year (UN, 2005). At about 13 per cent, university admission percentages are even lower (Adeyemi, n.d.). The contradiction lies in the country's demographic structure. Of Nigeria's 140 million people, 25

per cent are of university-going age (Adeyemi, n.d.), which amounts to approximately 35 million possible applications. As a result, many of the institutions operate well beyond capacity. It is envisioned that the lack of capacity to accommodate HE demand will continue to increase despite the recent emergence of new universities (Kayode, n.d.). Overcapacity leads to a low teacher-student ratio (TSR), an index used by UNESCO to approximate quality of education. Indeed, the TSR declined from 1:15 in 1995 to 1:22 in 1999, with the UNESCO-recommended TSR being 1:10 (Adeya & Oyelaran-Oyeyinka, 2002).

Polytechnics have a much higher TSR of 1:31 (Adeyemi, n.d.). Statistics show that enrolment across Nigerian HEIs continues to increase (Adeyemi, n.d.; Adeya & Oyelaran-Oyeyinka, 2002). Even with the overcrowding found at universities throughout Nigeria, the current admission rates do not nearly meet the demands of the nation. It has been estimated that Nigeria needs about a hundred universities just to meet the present demand. Table 5.1 shows a breakdown of enrolment in HEIs.

Overcrowding is a major issue in Nigerian HEIs, having a direct and negative social impact on students and on teachers. It is suggested that the emergence of secret cults is a result of governmental and institutional failure to address the problem of overcrowding (Moja, 2000). Cult activities range from extortion to murder, and criminal activities such as rape, blackmail and inter-cult rivalry have emerged (Popoola & Alao, 2006). The government and institutions have responded through legislation and rules, respectively,

but due to failure of implementation, secret cults and criminal activities continue.

Under-funding of the education system means low salaries for teaching professionals at HEIs, which has led to many strikes in the past. It is argued that these strikes and disturbances to academic activity at universities have put in doubt the credibility of Nigerian tertiary qualifications (Tola, 2002). A full professor at a government university earns less than US\$1 000 per month, a figure even lower than is the case at many other African universities (Nwagwu, n.d.). Under-funding has resulted in an inability to upgrade critical facilities at HEIs (Anugwom, 2002). As a result, the institutions often suffer from dilapidated infrastructure and a decline in the morale of teachers (Nwagwu, n.d.; Benjie, 2006). In a bid to generate funding, institutions sometimes place greater emphasis on fundraising than on teaching (Tola, 2002).

Dissatisfaction with the prevailing working and learning conditions at government institutions has given rise to the development of private HEIs. There are three private universities, seven private polytechnics and four private colleges in Nigeria. The quality of education at private institutions is questionable, and the public is sceptical about them. On the whole, Nigeria is facing a continual loss of academic staff to First World countries, and many postgraduate students opt to study in First World countries. The migration of qualified personnel and good students has seen the quality of education at Nigerian universities decline over the years (Anugwom, 2002).

Table 5.1: Number of applicants and number of students admitted to HEIs in Nigeria,

	1996/97	1998/99	1999/00	2000/01
Universities				
Number of applicants	371 482	400 194	461 548	653 818
Number admitted	56 055	78 550	78 550	50 277
Polytechnics				
Number of applicants	168 981	123 231	110 831	198 850
Number admitted	28 091	33 168	37 005	38 145
Colleges of Education				
Number of applicants	16 546	27 916	n.a.	14 438
Number admitted	12 023	12 562	n.a.	6 672

2004

Source: Ojo & Olakulehin (2006)

National telecommunications infrastructure

The monopoly enjoyed by Nigerian Telecommunications Limited (NITEL) in this sector was first challenged by deregulation in 1992 with the establishment of a regulatory body, the Nigerian Communication Commission (NCC). This paved the way for the licensing of private telephone operators (PTOs) to roll out both fixed wireless telephone lines and analogue mobile phones. Seven fixed telephony providers have activated 90 000 lines, and 35 Internet service providers cater for a customer base of about 17 000 (NigeriaBusinessInfo, 2003). By 2001, GSM licenses had been granted to three service providers: MTN Nigeria, ECONET Wireless Nigeria and NITEL. In 2002, the NCC granted an SNO (Second National Operator) licence to Globacom, and NITEL's monopoly was effectively over, as Globacom was authorised to provide the following services:

- national carrier services;
- digital/mobile services;
- long-distance communications; and
- fixed wireless access (NigeriaBusinessInfo, 2003).

The privatisation of NITEL in 2006, and the galvanisation of the economy as both a direct and indirect consequence of enhanced telecommunications make Nigeria one of the biggest and fastest-growing telecom markets in Africa.

Following the Nigerian Communications Act of 2003, which granted greater autonomy to the NCC, a new unified licensing regime introduced in 2006 allowed all operators to provide both fixed and mobile services (Budde Comm, 2007a).

More than 50 companies are now licensed to provide fixed telephony services. Combined, these carriers provide almost three times as many fixed lines as NITEL (Budde Comm, 2007b). An ever-growing demand for Internet services and broadband capabilities is supporting the development of the fixed line sector, which (at a market penetration of just over 1 per cent) still has enormous growth potential. Most of these new lines are provided by fixed wireless systems. Several of the network operators have benefited from the new unified licensing regime in attracting substantial foreign investment (Budde Comm, 2007b). Increased competition between fixed and mobile services may lead to improved services for the consumer.

Indeed, intensified competition and the availability of wireless broadband access have spurred the licensing of over 400 Internet service providers (ISPs), as well as a number of data carriers and Internet exchange and gateway operators (Budde Comm, 2007c). Voice over Internet protocol (VOIP) is already carrying the bulk of Nigeria's international voice traffic. The current deployment of the country's first next-generation network (NGN) will drive further convergence of voice, data and video/TV, enabling the provision of triple-play services that ultimately will involve the country's already competitive broadcasting sector (Budde Comm, 2007c).

Table 5.2: Comparative infrastructure indicators

Indicators	Nigeria	Sub-Saharan Africa average	Low-income countries	OECD average
GNI per capita, Atlas method (current US\$)	390	973	411	33 470
Access to electricity (% of population)	40	24	25	n.a.
Electric power consumption (kWh per capita)	68	451	401	8 769
Improved water source (% of population with access)	60	64	64	99
Improved sanitation facilities (% of population with access)	38	37	38	n.a.
Total telephone subscribers per 100 inhabitants	8	12	8	n.a.

Source: World Bank (n.d.)

Table 5.3: Overview of Nigerian telecommunications

Telephones – main lines in use	1.688 million (2006)
Telephones – mobile cellular	32.322 million (2006)
Telephone system	<i>General assessment:</i> expansion and modernisation of the fixed line telephone network has been slow due to faltering efforts at privatisation <i>Domestic:</i> the addition of a second fixed line provider in 2002 resulted in faster growth of this service; wireless telephony has grown rapidly, in part responding to the shortcomings of the fixed line network; four wireless (GSM) service providers operate nationally; the combined growth resulted in a sharp increase in teledensity, reported to be over 18 per cent in March 2006 <i>International:</i> country code – 234; satellite earth stations – 3 Intelsat (2 Atlantic Ocean and 1 Indian Ocean); fibre-optic submarine cable (SAT-3/WASC) provides connectivity to Europe and Asia
Radio broadcast stations	AM 83, FM 36, short wave 11 (2001)
Radios	23.5 million (1997)
Television broadcast stations	3 (the government controls 2 of the broadcasting stations and 15 repeater stations) (2001)
Televisions	6.9 million (1997)
Internet country code	.ng
Internet hosts	1 968 (2007)
Internet service providers (ISPs)	11 (2000)
Internet users	8 million (2006)

Source: CIA (n.d.)

Infrastructure relevant to HE e-learning

Internet access is currently limited to the major cities. As a result, more than half of Nigeria's population does not have immediate access to the Internet (Ajayi, 2002). Indeed, the rural population is denied not only full participation in the information economy, but also access to ICT-related resources for e-learning.

The state of national infrastructure leaves much to be desired. To address the lack of sufficient infrastructure, the federal government of Nigeria has:

- launched a new national telecommunications policy (in September 2000) to further liberalise the sector;
 - declared ICTs to be a national priority project;
 - approved a national policy on information technology, and subsequently established the National Information Technology Development Agency (NITDA) as the implementing agency; and
 - launched a Nigerian satellite system programme through the National Space Research and Development Agency (Ajayi, 2002).
- ensuring that the entire country is linked by information network systems;
 - establishing a co-ordinated programme for the development of a national, state and local information infrastructure backbone by using emerging technologies including VSAT, fibre-optic networks, high-speed gateways and broadband/multimedia technologies;
 - providing adequate connectivity to the global information infrastructure;
 - addressing standards for further liberalisation and the fiscal measures, including incentives, necessary to improve teledensity and make IT more affordable to the citizenry;
 - establishing IT parks as incubation centres for the development of software applications at the national, state and local levels; and
 - restructuring the education system at all levels to respond effectively to the challenges and envisaged

impact of the information age, including the allocation of a special IT development fund to education at all levels.

It would appear that plans by the NCC to improve connectivity across the country will have a positive impact on infrastructure at HEIs. The NCC plans to increase teledensity by an additional 10 million subscribers (Esharenana, 2005). This will be achieved by:

- ensuring that ICT is given high priority in all sectors of government;
- ensuring that access is affordable;
- decreasing the duty rate on telecommunications products from the present 356 per cent to less than 5 per cent;
- encouraging operators to improve the transmission infrastructure across the country;
- opening up discussions with operating companies on how to reduce bandwidth charges for optical satellite links in the country;
- expanding the subscriber base in the fixed services area by moving towards market consolidation to reduce regulatory pressures and to ensure better utilisation of resources; and
- improving the public electricity supply in the country (wireless deployment has contributed to over 90 per cent of the new subscribers added to the network in the last three years and, in order to work efficiently, wireless systems require a reliable electricity supply to power the terminal equipment).

With all the goals and intentions of the federal government and the NUC, it is clear from the literature that much still has to be done to facilitate ICT infrastructure for HEIs. Lack of Internet access and lack of telephone lines still prevail in most parts of the country. To improve infrastructure capacity:

- teledensity will have to be increased;
- ICT facilities like fibre-optic networks and integrated services digital networks (ISDNs) must be made available to most of the population; and
- a network of VSAT stations in strategic locations will have to be created.

Towards a national ICT policy

On the international front, the Digital Opportunities Task Force (DOT Force) set up by the G8 has made several recommendations on regulatory ICT policies that are to be

used by African countries. In its report, the DOT Force noted that there is an opportunity to narrow the economic and social inequalities that exist in the world:

when wisely applied, ICT offer enormous opportunities to narrow social and economic inequalities and support sustainable wealth creation, and thus help to achieve the broader development goals that the international community has set. (Hart, 2004)

The DOT Force report then published a framework that proposed action in:

- fostering policy, regulatory and network readiness;
- improving connectivity, increasing access and lowering costs;
- building human capacity; and
- encouraging participation in global e-commerce and other e-networks.

From the framework provided, and possibly other international proposals, the NPE and the NUC have developed ICT policies that are intended to be implemented in Nigeria. While many African countries have moved to adopt policies that govern the deployment and use of ICT, by 2006 several African countries had national and institutional ICT policies in place.

USE IT

In 2001, the Nigerian Information and Communication Technology Agency (NICTA) produced an ICT development policy called the Nigerian National Policy for Information Technology, commonly known as USE IT (USE IT, n.d.), which was approved by the Federal Executive Council. One of the key strategies of the USE IT policy was to set up the NITDA in the same year to implement the policy (see NITDA, n.d.).

The NITDA has embarked on several projects to implement the USE IT policy, all of which have a direct impact on the development of ICT at HEIs. These include:

- establishing a public service network;
- building human capacity;
- establishing a mobile Internet unit;
- drawing up a national ICT inventory; and
- generating a strategic action plan for the IT policy.

USE IT was a result of an awareness of the rapidly changing global environment and its increasing dependence on IT. With its large population and an annual population growth

of 2.2 per cent (World Bank, 2005), Nigeria has the human resources needed to become a key global player in IT.

Education appears first on a list of goals in the USE IT mission statement. The strategy of the USE IT policy is to make IT education mandatory at all levels. By the time the USE IT policy was adopted, there was a need for IT curricula at all education levels, from primary to tertiary. At tertiary level, a virtual library and virtual university were part of the USE IT strategy for incorporating IT into HEIs. Recognising the need to reach educationally disadvantaged areas, the policy also aims to establish distance learning networks. As related to education, the general objectives of the USE IT policy are to:

- ensure that IT resources are readily available to promote efficient national development;
- empower Nigerians to participate in software and IT development;
- encourage local production and manufacture of IT components in a competitive manner;
- establish and develop IT infrastructure and maximise its use nationwide;
- empower children, women and the disabled by providing special programmes for the acquisition of IT skills;
- empower the youth with IT skills and prepare them for global competitiveness;
- integrate IT into the mainstream of education and training;
- establish new, multifaceted IT institutions as centres of excellence to ensure Nigeria's competitiveness in international markets;
- develop human capital, with an emphasis on creating and supporting a knowledge-based society; and
- set up advisory standards for education, working practices and industry.

In a bid to take full advantage of the enormous human resources that are available in Nigeria, the USE IT policy has objectives that endeavour to maximise utilisation of human resources. Four of the objectives that are related to HE are to:

- develop a pool of IT engineers, scientists, technicians and software developers;
- increase the availability of trained personnel;
- provide attractive career opportunities; and
- develop requisite skills in various aspects of IT.

To meet the outlined objectives for enhancing human resources, several strategies are adopted. Those related to HE are:

- making the use of IT mandatory at all educational institutions through adequate financial provision for tools and resources;
- developing relevant IT curricula (for primary, secondary and tertiary institutions) that are based on the appropriate national syllabus at the selected level and other global certification syllabi, to tie into key elements of the government's universal basic education policy, the proposed digital virtual library scheme and related educational initiatives, such as establishing a virtual university system;
- establishing facilities for electronic distance learning networks and ensuring effective Internet connectivity, which will provide opportunities for educationally disadvantaged areas to leapfrog into the modern era;
- encouraging IT companies with appropriate incentives to invest in education and training, through certification for tax rebates via existing government bodies that are experienced in such matters, such as the Industrial Training Fund and the Centre for Management Development;
- establishing study grants and scholarships for deserving Nigerians;
- empowering IT institutions and development centres to enhance IT capacities, initially at zone, state and local levels; and
- facilitating the growth of private and public sector dedicated primary, secondary and tertiary IT educational institutions.

Since the adoption of the USE IT policy, several milestones have been reached in regard to ICT development in the country, especially in HEIs. Fully implemented, the ICT policies for HEIs undoubtedly would revolutionise HEIs and bridge the digital divide between Nigeria and First World countries. However, implementation of USE IT has been painfully slow; and the policy has been said to be ambiguous, making it hard to implement (Benjie, 2006).

Institutional ICT policies

With education playing a major role in world economies, national ICT policies always make provision for ICT development in the education sector. Across the world, ICT

education in HE has changed from being a minor subject to being an integral component of tertiary education. In an article on ICT and educational reform, Kozma (2002) observes that the trend in ICT education has changed from ICT being a subject in itself to being used as an educational component in teaching other subjects, co-ordinating curriculum changes, teacher training, for assessment, and to prepare students for a lifelong learning process. While First World countries are able to realise these advances, developing countries are not benefiting fully from the ICT revolution. In the same article, it is also noted that a lack of ICT and educational reforms is hindering developing countries from bridging the digital divide. However, the Nigerian government is looking to follow the international trend in ICT by setting out a framework for ICT development in the education system.

Institutional ICT policies in HEIs and across the whole education spectrum are guided by the 1988 Nigerian Policy for Computer Education. However, institutional ICT policies that govern both the universities and technical colleges fall under different organisations.

ICT policies at universities

The NUC continues to establish computer literacy programmes in all federal universities. Computer literacy programmes have been aimed at the following:

- establishing and encouraging a computer culture that permeates all activities and all levels at the university;
- equipping all university graduates with computer literacy skills, irrespective of their course of study and major discipline;
- graduating computer science and engineering students who will make up the core of professionals in their practices and advance computer technology in the country;
- conducting research and developing hardware, firmware, software and courseware to enable Nigeria to generate its own modern computer technology capability; and
- developing the human and other resources required to meet the broad objectives of computer literacy at the tertiary, secondary and primary levels of education and at the societal level (Nigeria Congress, n.d.).

ICT policies at technical colleges

The National Board for Technical Education (NBTE), which is responsible for vocational technical schools, has

a computer programme adapted to the educational needs and skills of its students. The NBTE computer literacy programme is aimed at the following:

- integrating a computer literacy curriculum at secondary schools, polytechnics and technical colleges in Nigeria;
- overseeing the implementation and development of computer education programmes at colleges of education and polytechnics;
- monitoring the polytechnics and federal colleges of education (technical) to ensure that there are adequate facilities for efficient implementation of the computer literacy programmes;
- accelerating computer studies programmes at technical college level;
- developing a syllabus for a higher national diploma in computer science technology for immediate adoption by polytechnics, and encouraging the review of the polytechnics' computer science and technology programmes; and
- including management information systems (MISs) in the computer education programmes (Nigeria Congress, n.d.).

Challenges to implementing ICT policies

Though much progress has been made in integrating ICT in HEIs, based on the policies by the NUC and NBTE, much remains to be done in order for the policy vision be realised fully. The slow implementation of USE IT has been blamed on a lack of clear enforcement of the policy by the relevant institutions (Benjie, 2006).

In his assessment of Africa's potential for e-learning, Mutula (n.d.) notes that ICT development in Africa has been impeded by insufficient infrastructure, poor provision of telecommunication networks, lack of locally created content, lack of personal computers, technophobia and poor policy regimes:

The evidence of this can be found in education policies and strategies which are largely weak and ambiguous about the role of ICTs in education. Other problems relate to technophobia, lack of prerequisite skills to manipulate new technology, and personnel reluctance to switch from traditional methods of teaching to technology oriented approaches. The implementation of e-learning programs requires skills in content development to repackage existing programs and also design novel ones.

That the same is true of Nigeria is backed by Ajayi's (2002) case study, in which he points out that the impact of this challenging environment is that most Nigerians do not have basic computing skills. While the general ICT challenges faced by Nigeria are typical of most African countries, R.J. Hawkins (n.d.) notes that the rapid changes in technology have not been matched by a rapid transformation of the classroom. Although a national policy has been adopted in Nigeria, a concise policy outline is still absent, and implementation is slow. At the 1st Conference of the ICT Professionals of Nigerian Universities, a lack of adequate facilities and infrastructure was identified as a hindrance to the development ICT in Nigerian universities (Aginam, 2006). The challenges faced by Nigeria include:

- lack of adequate ICT infrastructure such as computer hardware and software, and high-speed Internet access;
- lack of skills to manage the available networks;
- inadequate training facilities for ICT education at the tertiary level;
- resistance to change from traditional methods to ICT-based teaching and learning methods;
- lack of adequate funding of the overall education system, leaving institutions to prioritise funding for survival needs;
- failure of HEIs to collaborate with the business community, leading to the over-dependence of educational institutions on the government;
- lack of co-ordination between the plethora of ICT initiatives in the country, which has led to inefficiency and slow progress;
- the high cost of Internet access; and
- lack of reliable and permanent sources of power (see Mac-Ikemenjima, 2005; Ajayi, 2002; Etim, 2006).

The challenge faced by Nigeria to integrate ICT adequately into its HEIs may be attributed, in part, to their number and varied governance structures.

National and institutional e-learning policy

E-learning policies are not clearly outlined in the NPE. However, many of the aims of the NPE obviously require ICT. Therefore, it may be said that the NPE indirectly implements ICT through its projects and goals.

With the effects of globalisation becoming more and more evident in all sectors of society, universities are beginning to change their methods of operation to remain competitive. Problems facing African universities are compelling the implementation of e-learning strategies (Nigeria Congress, n.d.). In a report on Nigeria's technical readiness for globalisation, it is argued that e-learning is a more cost-effective way to provide education, as well as enhancing competitiveness in what seems to be an emerging university market (Nigeria Congress, n.d.). The university market is thought to be the reason why most qualified lecturers are leaving Africa for more lucrative markets. Using ICT is a way of strengthening traditional means of education and of offering education on and off campus. E-learning is an especially important component for HEIs, and HEIs are focusing on transforming education to adopt an e-learning environment.

In order to facilitate the National Open University (NOU) initiative, as well as to complement resources at existing universities, the federal government implemented a distance learning initiative that was to be added to the NPE. The goal of this e-learning project was to ensure that education was available to students anywhere and at any time. In 2004, NPE e-learning details were revised with the intention of:

- promoting internationalisation, especially of tertiary education curricula; and
- lessening the effect of internal and external brain-drain in tertiary institutions by utilising Nigerian experts as teachers regardless of their location or place of work.

Higher education e-learning centres

Libraries are the most common e-learning centres in Africa. The literature shows that libraries are normally the first places that get connected to the Internet. The same is true in Nigeria. Libraries at HEIs are natural e-learning centres, since most students and staff use them. A survey of 29 Nigerian university libraries investigated how Nigerian universities are adopting ICT in their libraries (Ani, Esin & Edem, 2005). It was found that only four libraries were connected to the Internet, with most libraries planning to computerise their resources. The report argued that Internet connection of libraries across the country is of immense importance; sharing of resources greatly enhances the learning experience of the students, resulting in better education. However, the common 'evils' of unreliable electricity supply and lack of funds bedevil such an ideal. Although the report did not rank technophobia as a very serious restraint to ICT development in libraries, other studies show that only about 48 per cent of staff in libraries are ICT literate (see Adeyoyin, 2006). This suggests that

there is a correlation between ICT literacy of staff members and ICT deployment in a library.

While a lot of focus has been on integrating e-learning into all teaching at HEIs, some caution is urged in regard to initiatives in Africa. Uys, Nleya and Molelu (2004) indicate that e-learning initiatives must be cognisant of the context of the African environment and suggest that e-learning centres are a means of increasing the reach of HE education to those who are disadvantaged by their location.

An e-learning centre may be classified as an institution that allows for the remote access, by electronic means, of information for learning and/or for educational purposes. The NOU and the Virtual Institute for Higher Education Pedagogy (VIHEP) initiative may be classified as such, since e-learning is a vital mode of instruction. The NOU and VIHEP fall under the NUC.

Challenges facing e-learning in Nigeria are typical of those in Third World countries:

- poor telecommunication penetration hinders access to e-learning facilities in rural areas, small towns and certain areas in city centres;
- the cost of communication limits the duration of Internet access; and
- the cost of personal computers is a major hurdle for the majority of Nigerians.

Higher education ICT projects

The concept of e-learning existed in Nigeria before the term itself was coined. In 1987, the Ahmadu Bello University had what was called the 'University of the Air' programme, while in 1983, the Nigerian Television Authority ran electronic learning programmes. However, all this was before the revolution of the digital age. Several government initiatives have been implemented to fast-track ICT development at various levels of education. Initiatives at HEIs are:

- the Nigerian Universities Network (NUNet) project;
- the Polytechnics Network (PolyNet) project;
- the Nigerian Education, Academic and Research Network (NEARNet);
- the Teachers Network (TeachNet) project;
- the National Open University;
- the National Virtual (Digital) Library (Ministry of Education/ NUC);
- the National Virtual Library (Ministry of Science and Technology/NITDA);

- the National Information, Communication and Education programme of the Presidency;
- the Nigerian Universities Management Information System (NUMIS) by NUC; and
- the Virtual Institute for Higher Education in Africa (VIHEAF) by NUC (Mac-Ikemenjima, 2005).

Initiatives for HEIs have been introduced mainly by the government, while NGOs have started community-based programmes. Here, we discuss in some detail the projects listed above.

The Nigerian Universities Network

NUNet is intended to be an academic computer network for all universities in Nigeria, and is run by the NUC. The objectives of NUNet are to:

- end the seclusion of Nigerian academic staff and students from each other and from the global academic community;
- alleviate staff shortages arising from the brain-drain, by providing the ICT facilities required by Nigerian academic 'staff-in-diaspora' to make their contributions regardless of where they live or work;
- encourage the sharing of resources, foster academic and research collaboration among Nigerian universities, and with their counterparts throughout the world;
- provide universities with access to electronic databases, journals and books, many of which are increasingly available only in digital formats;
- serve as a vehicle to expand access to education at minimal capital building expenditure; and
- place Nigerian universities at the forefront of the information revolution, that they might serve their proper roles as foci for national development (see UN, 2005).

NUNet should provide a communication backbone to all universities, enabling them to have 24-hour access to the NUC server and information from other universities.

To establish such a project, the involvement of NITEL is inevitable, as it is responsible for all telecommunication in Nigeria. NITEL is a nationally owned telecommunications operator, with a significant monopoly. However, the corporate objectives of NITEL and the institutional objectives of NUNet are not compatible. While NITEL has agreed in principle to facilitate the connectivity of Nigerian universities, it has sought business opportunities (Russel & Dlamini, 2002). In many instances, NITEL disconnects universities that have not paid their bills, causing an 'Internet blackout'.

Internet connections at universities were still dial-up in 2002, with many universities having to have back up connections due to the unreliability of the system. However, progress has been made by installing a VSAT for real-time Internet connectivity, albeit only at the NUC headquarters. NUNet is designed to encourage universities to invest in digital communication and training; as a result, there is a major drive to institute IT training policies (Russel & Dlamini, 2002).

The Polytechnics Network

The PolyNet project falls under the NBTE. It is to technical colleges what NUNet is to universities, but little concerning the differences between the two projects is to be found in the literature.

National Open University

For the NOU to be successful, it depends largely on ICT-based administrative tools. The NOU was designed to increase access for all Nigerians to formal and non-formal education in convenient circumstances (Ajayi, 2002). Thus, it would encourage the population towards a culture of continuous learning, a worldwide trend (Modupe, 2006). NOU was created because of the need to:

- improve access to university education by reaching more students;
- help meet the demand for university education;
- improve the quality of education; and
- improve the quality of the graduates.

Courses are delivered via online Web-based modules, text-based materials, audio/video tapes and CD ROMS. In addition to online access to study materials, there are several study centres around the country. The centres are run by ICT companies, and NOU also employs ICT companies to provide Internet access using various means, including wireless communication systems such as microwave radios and VSATs at each centre. The downside of outsourcing learning centres is that the efficiency of the centres is only as good as the company running them.

The NOU faces several problems:

- staff shortages;
- inadequate funding from the government;
- outdated equipment;
- inability of staff to operate custom-made software with built-in security; and

- large numbers of students and management have resulted in very slow document processing for academic programmes.

National Virtual Library

The National Virtual Library is another initiative using e-learning across HEIs, especially when it comes to distance education offered by NOU and the National Virtual University/Laboratory. The National Virtual Library facilitates self-education and networking among students and teachers, and encourages lifelong education. The main advantage of a virtual library is its 24-hour availability, and having a much wider reach across the country. It also compensates for the shortcomings of national and institutional libraries, which lack up-to-date literature and are not easily accessible. The National Virtual Library allows for universities to have access to a large online database of journals. As a result, academic research is up-to-date and relevant. It is one of the major successes of the NUC. The National Virtual Library and the National Virtual University/Laboratory were initiatives of the National Library of Nigeria.

Virtual Institute for Higher Education Pedagogy

The VIHEP website (www.nucvihep.net) displays the intention of the initiative, which is to provide resources for e-learning. The website has links to virtual classrooms and resources, which include links to journals and various subject materials. However, several links to journals and materials are not available. A 24-hour helpline is available. The objectives of the VIHEP are to:

- provide HE academic staff with Internet-based training in modern methods of teaching and learning in HEIs;
- educate and equip academic staff in:
 - teaching of large classes,
 - efficient use of available resources,
 - modern methods of assessment and evaluation of student performance,
 - basic guidance and counselling techniques,
 - basic skills of curriculum development, and
 - techniques for writing proposals;
- network among academic staff on best practices in university teaching and how to deal with academic vices such as examination malpractice, cultism and plagiarism; and
- try out draft training modules for the National Higher Education Pedagogic Centre.

Nigerian Universities Management Information System

In a World Bank report (1996), details of a project to create software to improve administration are outlined. The project aims to reduce the complexity of handling data, develop a flexible system of handling data, and develop open-source software that will allow for rapid development:

- *Reducing data complexity.* It has been noted that a common mistake is for complex MISs to be developed as educational management systems (World Bank, 2001). This inevitably results in institutions not being able to sustain the MIS, since maintenance requires expensive expertise. The intention to develop simple data management systems to improve efficiency in delivery of distance education at the NOU is an example of how ICT is being used to improve HE in Nigeria.
- *Developing a flexible technological model for administration.* Use of a simple MIS should not negate the importance of maintaining flexibility in the way data are managed. Flexibility also implies that NOU centres must be able to use the MIS on different computer platforms – the intended MIS should be platform-independent.
- *Data warehousing.* The NUMIS system would require data warehousing. Data warehousing is an important aspect at HEIs, and more so for distance learning, to help in various decision-making processes. Data warehousing also helps in making the NUMIS system robust and more efficient.
- *Developing an open-source system.* Sustainability of systems is critical to the success of the NUMIS project. This can be achieved by way of an open-source system that can be developed by a large number of experts with no legal complications. Open-source systems should make it possible to ensure that a wide range of organisations and individuals are empowered to update and improve the platforms created, and that the systems become public property. Individual institutions can also more easily adapt and improve the base platforms provided to suit their needs.

Challenges to integrating ICT in HEIs

Apart from the general challenges, there are specific challenges that are faced by Nigerian HEIs in successfully implementing ICT. These challenges may be narrowed down to the teachers and the students. Teachers are challenged

to learn new ways of administering knowledge and, at the same time, to learn to use the technology. On the other hand, students are also challenged to adapt to the use of ICT for learning.

Teaching and learning challenges

For sustainable development, a nation must improve the quality of its teachers, since a nation can only rise to the quality of its education system (Modupe, 2006). The quality of the teachers, therefore, has a direct relation to the quality of the education system. The NPE has set out many ideals for the education system in Nigeria. These can be met only by well-trained teachers, of which there are few (Modupe, 2006; Nwagwu, n.d.). Nigerian HEIs still lack the basic capacity to retain the few qualified teachers they have. HEIs do not pay teachers internationally competitive salaries. In most of the literature, it is recommended that local salaries be aligned to a global salary scale structure.

The most commonly identified constraint to e-learning in Nigeria is the lack of well-qualified human resources able to handle new systems and technology. Kayode (n.d.) notes that the current teacher-training model did not meet the teaching challenges faced by HEIs. With this in mind, the NPE was revised in 2005, adding teacher-training objectives that:

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

Mutula (n.d.) and others observe that there is an acute shortage of online instruction for distance e-learning, and most staff members at HEIs do not possess basic computer literacy. This shortage may be attributed largely to the ongoing, traditional teacher-training programmes. Modupe (2006) proposes that teacher training should depart from traditional methods, since traditional means have failed so far to produce quality teachers. The transformation of the teaching curriculum should involve teachers in the ICT revolution that has impacted on the whole world. Teachers should be able to incorporate ICT into their academic and everyday activities (Modupe, 2006).

Language

Africa has a complex linguistic problem due to the many cultures that have different languages. Nigeria has the

following national languages: Edo, Efik, Adamawa Fulfulde, Hausa, Idoma, Igbo, Central Kanuri, Yoruba and English. English is the formal language of instruction at HEIs in Nigeria.

The digital divide

ICT has rapidly invaded the education systems of developed countries, with African countries, including Nigeria, making a very slow transition in adopting it. This slow adoption is due mainly to the lack of appropriate infrastructure in terms of facilities and staff. The use of ICT for education is seen as one of the most effective ways to bridge the digital divide and enhance the quality of Nigeria's human resources (Kayode, 2007). Lack of ICT-skilled personnel is made worse by technophobia, referred to as 'teacher-trainers technophobia' in Kayode (2007). The challenge of the digital divide is perhaps the most pressing for Nigeria, as it is for other African countries. The 2005 revised NPE makes room for the use of ICT in the education of teachers, although no specific outlines are given (Kayode, 2007). Benjie (2006) observes that technophobia is encountered mainly in the arts and humanities, which traditionally attract the most students.

The National Teachers' Institute in Nigeria is mandated with the training of teachers, but a survey has revealed poor availability of technology to the students, even though almost all students are willing to use ICT. It was found that:

- 80.4 per cent of students have access to a radio, 40.4 per cent to a tape recorder and 41.2 per cent to a television at home;
- access to new technologies (e.g. computers and the Internet) at home is poor, with only 5.8 per cent of students having access to a computer and 1.2 per cent to the Internet;
- radio and television are the technologies most frequently used to assist students in their studies; and
- 94.4 per cent of students would welcome training in the use of computers (Ukpo, 2005).

Nwagwu (n.d.) notes that teachers have to keep up with innovations in the educational system, due to the requirements of globalisation. These demand that the teacher also be a learner, in some respects, and continually remain abreast of the developments in education. Benjie (2006) observes that Nigeria is failing to integrate ICT education with teacher training, due to the 'traditional' problems of erratic power supply, inadequate provision and very high cost of ICT infrastructure, and low ICT and Internet access among the population.

Despite efforts to bridge it, the great digital divide between Africa and First World countries is still growing (Mutula, 2003). The digital divide has been observed to have several facets, including the following:

- the global divide, which refers to divergence of Internet access between industrialised and developing societies;
- the social divide, which is concerned with the gap between the information-rich and information-poor in each nation; and
- the democratic divide, which signifies the difference between those who do and those who do not use the panoply of digital resources to engage, mobilise and participate in public life (Ukpo, 2005).

ICT research and development trends

Major ongoing research and development (R&D) at tertiary institutions is typical of countries that are making significant strides in ICT development. In recent years, Nigeria has made significant progress in developing ICT in HEIs and the country as a whole (Benjie, 2006). The USE IT policy outlines several R&D objectives and strategies that may be followed by HEIs. The R&D objectives of USE IT are to:

- ensure Nigeria's contribution to IT development and the country's competitiveness in the international market;
- guarantee sustainability of IT in Nigeria and to use it to stimulate industrial growth;
- promote self-reliance in, and the export of, IT products and services;
- encourage joint R&D efforts, such as software development, between the private sector and the universities;
- identify key technological areas, as well as others, and provide fiscal support and incentives to encourage local technology development; and
- encourage the transfer of technology through exchange visits between expatriate IT experts and Nigerian IT 'experts-in-diaspora', on the one hand, and IT institutions and experts in Nigeria, on the other (funding to be co-ordinated via the National Information Technology Development Fund).

The strategies for realising the R&D objectives are:

- developing local expertise and resources through adaptation;
- developing market-oriented software for the local market and for export;

- cultivating/upgrading the maintenance culture;
- developing low-cost PCs, solutions, services and accessories, in order to increase PC accessibility to at least 30 per cent of the populace by 2003;
- encouraging and funding R&D at identified universities (industries, including those in the oil sector, are to be encouraged to set up R&D centres at university level, through faculty chairs, matching grants and focused joint projects);
- requesting that research projects be made open to both research institutes and universities in order to select good and innovative projects for national development;
- funding sabbaticals and visits by expatriate IT experts and educationists, in order to transfer knowledge and share their experiences;
- introducing 'innovative ideas competitions' on a countrywide basis, covering all levels (from primary schools to tertiary institutions), and using R&D centres to instil the spirit of innovation and excellence in our young professionals;
- stimulating the growth of local IT industries through government patronage of local IT industries, products and services; and
- establishing R&D institutions in IT in Abuja and in each of the six geo-political zones in Nigeria (with states being encouraged to establish similar institutions, which are to be properly funded).

Several universities are installing their own MIS systems. However, the MIS systems are isolated, and the NUNet project is working on linking all the separate MIS systems at the universities to a central database. The result will be a very rich source of information from all universities. The linking of separate MISs is a better alternative to the NUC's initial attempt to install an MIS on one single computer (Nwamarah, 2002)! At best, most universities only have Intranet access on their networks, mainly due to the cost of Internet access and poor infrastructure. Increasingly, though, many institutions are getting access to VSAT, thereby enabling more reliable Internet access. Nevertheless, cost is still a major problem.

The major constraint for ICT development at universities appears to be insufficient funds. Though many of the objectives and strategies of the projects are noble, projects fail to take off due to lack of funds. For example, the NUNet project at Nsukka University initially failed because all funds released to the project went to administration; as a result, no money was left for the project itself. Such challenges greatly affect the overall success of the NUNet project, since

its success depends largely on the ability of the individual universities to sustain a network and reliable Internet connection on campus. Nevertheless, universities are finding innovative ways of overcoming financial and other challenges. Nsukka University adopted a phased approach to tackle its financial difficulties. By installing Internet connectivity at certain high-priority buildings, costs could be broken down and small projects facilitated as funds became available.

Similar innovation has been shown by Obafemi Awolowo University, which has used its experience to help connect 27 other institutions in south-western Nigeria to the Internet (Adeya & Oyelaran-Oyeyinka, 2002). The Obafemi Awolowo University Network (OAUNET) was started in 1994/95 as a pilot project for an academic information network (Ajayi, 2002). The university liaised with the private sector to build Internet cafes on the campus, and embarked on human resources development by training personnel and developing infrastructure. As a result, by 2003, the Obafemi Awolowo University had the largest single collection of ICT experts in the country (Ajayi, 2002).

With funding and expertise being the main problems, universities will continue to:

- seek assistance from other institutions in order to exchange experiences and knowledge about building their ICT capacity;
- have an ongoing training programme for employees so as to keep up to date with technological developments in the ICT infrastructure; and
- use the phased approach towards enhancing ICT capacity, due to the inevitably limited funding.

The challenges notwithstanding, ICT is gradually becoming an integral part of student and staff life on and off campus. Results of a research survey carried out among students show that about 69.2 per cent of males and 46.8 per cent of females use e-mail to communicate with their colleagues on campus (Akinseinde & Adomi, 2004). The content of the communication can be about course material for a given course, academic discussions, lectures and other academic matters. As a result, students' learning does not stop during lectures, but continues even when not face to face with the lecturers or tutors.

Open-source software

It has been argued that the success of e-learning in Africa heavily depends on the availability of free and open-source software:

The notion of sharing ideas for the benefit of new knowledge production is a good fit for the FLOSS [Free Libre and Open Source Software] philosophy. Given this philosophical alignment, FLOSS for e-learning in the future could grow by an order of magnitude in the university sector. (Noronha, 2006)

Commercial software offers some of the best ICT solutions available. However, the licensing costs of these software packages are prohibitive. The main factor driving up costs is that fees are paid on a per-license basis; this implies that for every user at an HEI, a license must be provided. Some writers also argue that commercial software is not suitable for HEIs (see Noronha, 2006; Courant & Griffiths, 2006). Open-source software, therefore, is a welcome alternative. Open-source software is becoming an important component in many HEIs worldwide for services such as e-mail servers, web-servers, research simulation software and for administrative purposes (Noronha, 2006; Courant & Griffiths, 2006).

Besides the high cost involved in using commercial software, a user or administrator cannot upgrade the tool in use. This leaves the user completely dependent on the supplier to upgrade the product, for a price. However, with open-source software, source code for all products is readily available, and users can change the software to suit themselves at no cost. Herein lies the main advantage of open-source software, with all users able to adapt it to suit their own needs and to upgrade the software much faster than its commercial counterparts.

Noronha (2006) lists the advantages of using open-source software:

- cost savings;
- increased investment security, because advanced programmers can access the source code, and then maintain and/or improve the software;
- software quality is improved by peer-review;
- it contributes to education and the sharing of knowledge;
- superior security against malicious code, as the source code can be examined;
- it can be evaluated before deployment;
- reduced dependence on a product, less risk of 'locking-in' effects; and
- open standards and formats simplify interoperability.

However, there are several disadvantages to the use of open-source software:

- sometimes, it must be obtained from third parties;
- depending on the popularity of the open-source tool, qualified developers can be hard to find and support expensive;
- open-source license terms require careful study to ensure compliance; and
- documentation can be weak (Noronha, 2006).

Although open-source software presents major advantages from a Nigerian and indeed an African perspective, challenges persist. For FLOSS to be effective, a significant amount of time has to be invested in learning how the software works and how to modify the source code to suite the desired requirements. This requires a reliable source of electricity during the learning process, which is not the case in Nigeria. It has been noted that the cost of running generators, due to the lack of reliable electricity supply, is too high for many educational institutions (Noronha, 2006).

Mobile technology for teaching and learning

Across the world, mobile gadgets such as mobile phones, personal digital assistants (PDAs) and laptops are being connected to the Internet at an increasing rate, and can access almost all types of information available on a computer. Therefore, mobile devices are becoming major sources of information. In Nigeria, the NOU is using mobile phones to keep in touch with its students (Naidu, 2006). The NOU broadcasts the same message to all students and, in this way, ensures that students are not isolated. The university also has counsellors who keep in touch with their students and make sure that each student is reached at least once a month.

Conclusion

The use of ICT as a teaching and learning tool may not be new in Nigeria, but it has not been taken up widely at HE institutions. Traditional methods of teaching and learning are still the most prevalent means of education. The use of normal lecture halls, the taking of notes in lectures and the use of printed literature for teaching are still the norm. Libraries still lack basic ICT infrastructure and, therefore, rely mostly on the available textbooks, printed journals and conference proceedings, without access to the latest literature. Modupe (2006) notes that ICT has enormous implications for the school curriculum, implying death to the traditional curriculum:

The information technology revolution has enormous implications for school curriculum planning and implementation. The revolution in knowledge production, distribution and management perhaps implies the death of the traditional curriculum. School curricula must now embody the contemporary complexity and vibrancy of ICT. The

paradigm shift which globalisation with its attendant post-modernist tendencies in education entails in education may necessitate the emergence of curriculum models and education policies which emphasize interdisciplinary courses and open-ended systems.

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