e-Learning Technology: The Nigeria Experience

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Key Words: ICT, Internet, NigcomSat-1, e-learning

SUMMARY

E-learning technology is the convergence of learning process and the internet. Information technological improvement has turned the big world into a small global village. Communication is the live wire of today's business and means of livelihood. Communication is one of the oldest technologies but less attention was paid to it as regards the role it plays in the history and life of mankind.

This paper looks into what is e-learning as well as its technology. The advantage it has over the traditional method of classroom learning.

Since e-learning technology is one of the bi-products of Information and Communication Technology; the Information and Communication Technological (ICT) development in Nigeria as well as the future of ICT in Nigeria was critically examined as a sine qua non for the development of e-learning technology in Nigeria.

The Nigeria Communication Commission (NCC), National Space Research and Development Agency (NASRDA) as well as the private telecommunication operators are the key players in the area of ICT development in Nigeria. Their various activities towards enabling a sustainable e-learning environment were thoroughly examined as well as the future of ICT in Nigeria vis-à-vis e-learning technology.

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1. INTRODUCTION

Communication is the livelihood of today's business. Electronic data communication is becoming the industry standard of transaction media and widely used in such areas as education, payment of bills, video conferencing, and group work collaboration, etc.

Through tele-education and tele-medicine, as already practiced in many develop countries such as South Africa, India and china, education and health can be brought to the door step of the rural and deprived urban cities in all countries in Africa. For example, the United Nations Committee on Peaceful Uses of Outer Space (COPOUS), at the 46th Session of the Scientific and technical Subcommittee recognized the broad application of tele-medicine in epidemiology, tele-surgery, offsite radiology services, cardiac monitoring, medical consultations and specialist referrals, as well as tele-education in medicine and therapeutics education and Open University System.

The world is moving at an unimaginable speed in the area of information use and dissemination. The most vibrant sector of the national economy is the information technology industry as well as the educational sector.

Though, every nation has a price to pay for technological development. Science and Technology is the bedrock of this development. The Science & Technology sector in general and Information & Communications Technology (ICT), in particular, represent areas that must be addressed for sustainable technological growth. Three technological waves driving global economic development are; (i) Information Technology (ii) Material Science and (iii) Biotechnology

Technology is changing at an unprecedented rate and, without the proper machinery in place; one stands the risk of being left behind.

Through the use of Information technology, knowledge and information can be transferred and cross-fertilized in real time. Hence, the need to pay attention to the way information technology has revolutionalized the educational sector through the internet.

2. WHAT IS E-LEARNING

Quite simply, e-learning is all about learning that occurs at the computer. In this age, the learning at the computer simply means online knowledge acquisition through the internet or

offline through CD-ROM, etc. The online requires the use of browsers such as Internet Explorer or Netscape Navigator. It can come in form of Audio, Visual, and Audio/Visual. But in this paper, it means browsers-based technology.

The convergence of the Internet and learning, or Internet-enabled learning is called e-learning.

The uses of network technologies to create, foster, deliver, and facilitate learning, anytime and anywhere. It is also the delivery of individualized, comprehensive, dynamic learning content in real time, aiding the development of communities of knowledge, linking learners and practitioners with experts.

This is a phenomenon delivering accountability, accessibility, and opportunity to allow people and organizations to keep up with the rapid changes that define the Internet world which is a force that gives people and organizations the competitive edge to allow them to keep ahead of the rapidly changing global economy.

3. ADVANTAGES OF E-LEARNING

3.1 Benefits to Business

- Significant reduction or elimination of costs associated with instructor fees and materials.
- Reduction of learning time and the amount of time employees are away from their jobs.
- Increased retention by users and enhanced hands-on application to the job over traditional training methods.
- Instruction and progress are managed within the framework of a company web portal.
- Short videos or hands-on exercises offer practice and assessment activities designed to confirm that a learner has mastered the performance objectives of the course or lesson.
- A user's progress is automated and can be monitored by or shared with one's supervisor
- Interactivity engages users, pushing them rather than pulling them through training.
- Advanced learners may choose to speed through a course and bypass instruction that is redundant.
- Beginners or slower learners may determine their own pace and progress, eliminating frustration with themselves, their fellow learners, and the subject matter.
- Knowledge is cumulative; lessons build upon one another and may be taken in any order.
- Anytime-anywhere learning can greatly increase knowledge retention.
- Learners may also view or print simple, one-page "quick start" Job Aids that have step-by-step procedures and graphic workflow charts illustrating tasks to be performed.
- Testing is self-paced.

4. E-LEARNING TECHNOLOGY

Due to the fact that the volume of data the is been transferred during the process of on learning is high, hence the need for such a technology that could transferred high volume of multimedia files such as video, text, data, audio, images, etc. The technology that best fit is the Very Small Aperture Terminal (VSAT)

e-Learning through VSAT is convergence of technology, services and knowledge base. This provides a facility and framework for Tele-Education and enables the live classroom session to be broadcasted over the VSAT, WAN and Internet communication channels. It consists of a HUB station, which is a satellite earth station and a Studio for video broadcasting of the lectures. Apart from these, other related hardware and software are used to effectively deliver the contents across. The HUB will interconnect the VSATs all over the places where the colleges are present, establishing the communication link in Ku band. Virtual Tele ED™ is one such solution based on VSAT.

4.1 Virtual Tele ED™

Virtual Tele ED™ is a combination of learning services and technology, using VSAT to provide high value integrated learning at any time and any place. The Virtual Tele-Ed Agent acts as a Teacher unit for presentation of the subject over the on-line. The significant features are:

- Support educational organization with any number of remote students
- Platform independent and modular architecture
- Robust and secure Java Enabled Framework
- Distributed, reusable, and integrated learning and training
- Integrated audio, video and data presentation in a live broadcast
- Extensive multicasting capabilities through TCP/IP channels
- Extensive synchronous and asynchronous collaboration tools for knowledge sharing
- A user-friendly interface and powerful data manipulation
- Usable both in intranet and internet
- Comprehensive integrated support for richer communication and activities

5. DEVELOPMENT OF ICT IN NIGERIA

5.1 Overview of Communication in Nigeria

With the advent of Internet and mobile telecommunication in the world, much has changed in the way we live, work and interacts with each other. Although communication is as old as history, not so much has been seen of the aspect of human endeavour until technology changed the face of everything.

The fast development of the information technology viz a viz the Internet has been attributed to the ever dominant of globalization in to days economy. And to the fact that the founding fathers had a not-for–profit attitude when they were developing them. No wonder Berner lee;

the father of Internet was recently honoured with a prize for his invention. In his remark, he observed that, had he commercialized or patented his invention, it wouldn't have come this far. This is the recognition of the fact that, next to the three basic needs of man. Is the ability to communicate with one another.

Having defined internet, the bedrock of information society; as the brain child of science, the wizardry of God, made manifest by man. It will be pertinent to look at how Nigeria, as a country, and a society, has fared, in integration this ever-evolving culture into the main stream of its affairs.

In Nigeria, the story of ever evolving affairs has been the same. The development of telecommunications in Nigeria began in 1886 when a cable connection was established between Lagos and the colonial office in London. By 1893, government offices in Lagos were provided with telephone service, which was later extended to Ilorin and Jebba in the hinterland. A slow but steady process of development in the years that followed led to the gradual formation of the nucleus of a national telecommunications network.

With less than 30,000 telephone lines in the pre-independent period to 90,000 lines in the 60s and 1500 telex in the late 19th century to 2000 telex lines in the post independent era. The number of telephone line moved to 700,000. Though only 400,000 was in use during the late 90. The mobile sector, which started with just 10,000 lines in 1991, was upgraded to about 20,000 in 1994. While 14 Telex exchanges with total installed capacity of 12,800 and 20 voice frequency telegraph terminals has been installed. And with the commencement of GSM services, the number of phone lines jumped to a whooping figure of 4.2 million lines in 2004. The number of ISPs moved from 11 in 2000 to almost 30 in 2004. While internet user moved form 100,000 to more than 500,000 in 2004.

Hitherto, telephones especially cell, were seen as a symbol of status and achievement. The GSM revolution changed that. Before now, the average Nigerian hardly dream of owning a land phone, talk less of a cell. This was strictly reserved for the rich. Access to basic telephone services was hindered by high cost of acquisition and bureaucratic bottleneck. While Internet access was only used by NGOs, multinational and very few, highly educated individuals. With few people sharing one email address. This also changed as more people got on the net through public access point or café.

The 90s witnessed a change in the telecom and information sector. Government started its liberalization policy of the telecom industry. Private companies were giving licences to provide commercial telephone services. These companies complimented the state owned operator, NITEL. In spite of these achievements, the services rendered by the private operators were costly. Though with some advantage over the state own, in the ease of acquisitions.

The monopoly of NITEL was for the first time, in the history of Nigeria broken. Internet services grew remarkable also as more ISPs were licensed within this period. This lead to fall in prices, with increased subscription and usage. Nevertheless, the spread of services offered

by the PTOs was highly limited, as most of them concentrated in the big cities. Were there was an assumed assertion of profitability and viability. Going by this development, Nigeria still suffered a low tele-density, which averages around 0.68 in sub-Saharan Africa as at 1996. With 70% of the phone lines available in the cities.

The liberalization policy pursued by the federal government was heralded with the licensing of private companies to provide General System for Mobile services. Mtel (NITEL), Econet (Vmobile) and MTN were licensed. After the forth operator, Communication Investment Limited (CIL) had its license revoked on grounds of inability to pay up the prescribed license fee, before the deadline. However, the forth license was later reserved for the second national operator, of which Globacom Nigeria, won the bid.

Internet sector wasn't left out. As more companies were licensed to offer internet services in various towns and cities in the country. While many were empowered to provide VSAT solution and other telecom value added services.

With the commencement of service by the GSM operators with only 300,000 lines in august, 2001. The industry has experienced a spiral growth in terms of quality, services and volume. Leading to the attainment of over 4 million subscribers in just 3years of its inception. Averaging 120,000 subscribers per month, which is above the industry's average index. And above the recommended ITU standard of 1 telephone line per 100 persons.

At the same time, improved access to the Internet was recorded. With less than 11 ISPs in 2000, to more than 50 ISPs in 2004. While many more got connected to the information super-highway, through broadband VSAT connection see

These service providers provided the much-needed access to individuals, organizations and public access point (internet cafes). It will be difficult to estimate the number of Internet users in the country, as many Nigerians access the net through public access point.

Improved Internet diffusion has been achieved, due to increased awareness; access, skills, technical manpower and gradual fall in charges for access. With cafés providing cheaper alternatives to home based connection. It is also interesting to note that, the licensing of more ISP brought stiff competition to the market. Where companies with better technology and cheaper access has greater share of the market.

From Dial-up connection, through wireless access then the ubiquitous VSAT connection. Internet access has grown astronomically. Reducing the over dependency on telephone for dial-ups. More remote areas have also been linked too, to the world's largest network. Satellite options, has provided access to the hitherto unsaved areas. And Internet cafes have similarly migrated from dial-up connection to wireless and VSAT connection.

So much improvement has also been seen in the field of telephony. With the recent licensing of more fixed wireless operators, (some of which has started commercial service), basic telephone and Internet services are now been provided in more towns and villages. Cheaper

and more efficient services are now in the offer. Call rates has also dropped reasonable. Especially, with the introduction of Voice Over Internet Protocol (VOIP) and review of interconnectivity rate, among operators by NCC. More people are also been empowered with the ability to communicate, within and outside the country. The use of VOIP has benefited the average phone user, since routing a call through the Internet attracts less charge unlike the old Public Telephone Switch Network (PSTN). Remote villages, which depended solely on satellite phone, are now covered by mobile network. Leading to cheaper call rates in those areas.

In spite of all these enviable achievements, many still see communication as a jamboree and not a necessity. They wonder why they should spend money on communication where there is stomach to feed, body to cloth and heads to shelter. While many have been restrained by the above factors, the spirit of technophobia has kept some aback. This feeling of dislike for technology, has led to lower patronage for technology products and services. And if not well addressed my cause a limitation to the expected growth have out information society.

It is the aim of this paper to address this issue of technophobe. By discussing the various benefits of adopting a technology life style. With a view of addressing the dominant misconstrues about it, thus reversing the negative trends.

6. E-LEARNING IN NIGERIAN SCHOOLS

The e-learning techniques mostly adopted by most of the Nigerian institution are in form of prepared lectures on a CD-ROM that can be played as at when the need arises. This has limited advantage because of the number of students per computer system in which most of this facilities are not interactive enough as compare with when the lecture is been receive in real time over the internet. The intranet facilities adopted in most schools are not well maintained because of its high cost of running especially in the absence of adequate power supply. Mostly, the students took the challenges upon themselves to go to the public internet cafes where there exist diverse attentions because of people with diverse interest on the net at the same time. The bandwidth shared on various systems at the cafes is very low hence; a multimedia interactive lecture will not be obtainable because of low bandwidth. The population of student is enormous and the facilities are inadequate. Despite all the hindrances/threat faced by e-learning in Nigeria institution, institutions such as RECTAS, federal School of Surveying, Oyo, University of Ibadan and Obafemi Awolowo University (OAU) Ile-Ife among others has the facilities for e-learning. These statistics is very low as a result of the remoteness in the location of some of these institutions in term of ICT. Though, most of the institutions of higher learning in Nigeria have started building their ICT centres but the focus is mainly to put up an internet facility alone without considering other components that made up e-learning centre.

7. THE FUTURE OF ICT IN NIGERIA

Nigeria joins its counterpart in the space technology in 2003. The key players in Nigeria in the development of ICT in Nigeria are

- Nigeria Communication Commission (NCC)
- National Space Research and Development Agency (NASRDA)
- The private telecommunication companies/firm like MTN, Globacom, VMobile

i. The challenges posed to the Nigeria Communication Commission in 2001 of which some had been meet while some had not seen the light of the day. These challenges are as follows:

- Liberalize the telecommunication market through proactive policies which shall make telephone (fixed and mobile) available and affordable thereby boosting Tele-density from the present 0.006% to at least 1% by 2003 and 5% by 2007 and 10% by 2010.
- License more Internet Services Providers (ISPs) to use diverse facilities to connect to the Internet thereby boosting bandwidth, which is crucial to down stream information. License fees should not be prohibitive.
- Register registrars for the .ng domain name across the six geopolitical zones of Nigeria. Again, the cost of registration for the .ng name should be affordable, say N3, 000.00 for 2 years.
- Promote internet café across cities, town and villages by reducing drastically the cost of the permit which is presently on the high side.
- Evolve a website through which licensing/permit issue can, by and large, be managed thereby removing unnecessary bureaucracy, delays and wastages.
- Internet connectivity will become more popular through wireless access protocol (WAP) in the country, especially with the granting of license to VMobile, MTN, Globacom and some other mobile telecommunication operators in the country.

If these facilities and proposals are put in lace and the various institutions in the country acquire the relevant technology of e-learning, the prospect of e-learning will be bright in Nigeria.

ii. The challenges in the technological development towards an enhanced information and communication technology in the country has lead to the initiation of NigcomSat-1 project by the National Space Research and Development Agency (NASRDA).

Experience in some developing countries has shown how satellite-based communication accelerated development. Ineffective communication systems are usually one of the greatest drawbacks to the socio-economic development of the developing countries.

Consequent and as a follow up to the successful launching of NigeriaSat-1, the government of Nigeria has approved the implementation of a Nigerian Communication Satellite to be called NigcomSat-1. The project is intended to provide the bandwidth requirement to address the various aspects of communication needs of the country.

The key objectives of the Nigeria Communication Satellite are highlighted as follows;

- To enhance increase in telecommunication growth rate to an annual minimum of 13.5% such that 10% of the rural communities it served in the short term, 30% in medium terms and 60% in the long term.

- To achieve a tele-density of over 10% by 2010 according to ITU standard and a tele-distance of less than 5km per telephone.
- To enhance the capabilities of Nigerian engineers and scientist in the design, manufacture, operation and maintenance of communication satellite through strategic partnership with technical partners.
- To provide a platform for operation of a public services telecommunication networks in Africa providing linkages to educational institutions, regional organizations, and government in Africa, to facilitate developmental activities.
- To provide enabling environment for Africa ICT business industry to have their fair share of the world telecommunication market currently projected to hit $110 billion dollars by the year 2010.
- To provide platform for community and regional integration through social and cultural dissemination, promoting peace and stability in the Africa region.

The proposed band width and target coverage for the communication satellite is Ku, C, Ka and L bands. The steer-able Beams will permit the cross-connection of the West-African region with southern, Central, Northern and Eastern Africa as well as Europe and the Middle East.

The communication satellite is proposed to support both the broadcast satellite services (BSS) such as television and radio broadcasting and fixed satellite services (FSS) such as VSAT communications, telephone data communications and internet backbone. The satellite is expected to carry at least twenty (20) transponders and will be launched in 2006.

NASRDA is putting all resources together towards launching a communication satellite of the country late 2006/early 2007. The communication satellite will help enhance the provision of cheaper and good access to information as well as easy access for the e-learners.

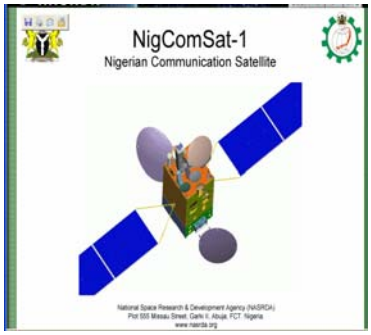

Fig. 1: NigcomSat-1 (www.nasrda.org)

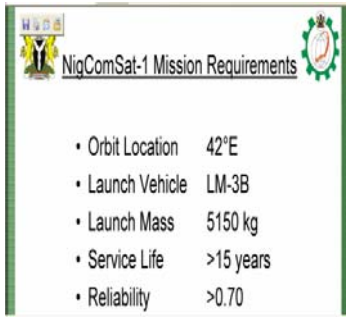

Fig. 2: Mission Requirement of NigcomSat-1 (www.nasrda.org)

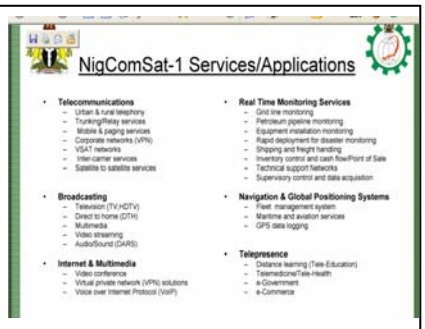

Fig. 3: Services/Application of NigcomSat-1 (www.nasrda.org)

iii. In 2001, Nigeria witness a greatest revolution in its information and communication technology sector with the grant of license of operation to private telecommunication companies like Econet (Vmobile), MTN, Globacom, etc. The main focus was on GSM phone until recently when most of them started data transfer service through the GPRS. The GPRS

is very expensive use. Recently, several telecommunication companies had started the installation of their optic fibre facilities that passes through some of the Nigerian highways which is efficient in the area of data transfer at a faster and cheaper rate.

8. PROBLEMS OF E-LEARNING IN NIGERIA

In spite of the bright prospect of e-learning in the country, there are some obstacles militating against the effective use of the technology in Nigeria. Some of these obstacles are;

- High cost of hardware in Africa, which are substantially higher than in the United States.
- High import tariffs and less price competition.
- Transmission cost is equally high in Africa.
- Internet access in Africa is through a foreign gateway.
- Shortage of skilled manpower.
- Companies and institutions are reluctant to invest in training of staff due to the likelihood that trained staff will be poached by other institutions and companies.
- Africa has the lowest number of telephone lines per capital in the world.
- Existing telecommunication infrastructure is in very poor condition.
- Computer technology illiteracy among the students from the primary school level.
- Cost of acquiring installing the gadget required for e-learning.
- Incessant Power Supply
- Lack of affordable dedicated/specialized e-learning centre.

9. RECOMMENDATIONS

- The accreditation team of the National University Commission (NUC) as well as the national Board for Technical Education (NBTE) should revise the syllabus of the Nigerian University/polytechnics to include virtual courses that will be internet based.
- The Government should provide adequate info-tech facilities to the institutions of higher learning in the country as well as primary and secondary school level.
- The schools should be properly financed so as to be able to compete with their other institutions abroad.
- Training of staff in the institution about the latest e-learning tools.
- Government should prioritize the removal/decrease in the tariff rate on info-tech hardware.
- Adequate power supply

10. CONCLUSION

There is no doubt that info-tech has come to stay in the world of ours. The need to apply it in all our daily life is imperative to our sustainable development. The educational sector which is the basis for the upbringing of the future professionals, leaders, researchers, scientists, etc has witnessed a great turn around which call for cross fertilization of ideas as well as knowledge about the recent development in the world in real time. The future is sure for Nigeria in term of information sharing as regards the launching of the NigComsat-1 – a

communication satellite that will enhance the information sharing and dissemination ability of the country.

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BIOGRAPHY

Olaniy Saheed Salawudeen born on 28th March 1981 in Lagos, Nigeria. He studied at the Federal School of Surveying, Oyo Nigeria where he obtained higher national diploma (HND) in Surveying and Geoinformatics in 2005. He is currently undergoing his professional diploma in surveying and geoinformatics at the federal school of surveying, Oyo, Nigeria. He was the immediate past National president of the Nigerian Institution of Surveying Students and also a Student representative at the Nigerian Institution of Surveyors (NIS) council between 2005 and 2006. He was the Students Union President at the Federal School of Surveying, Oyo. He has five years experience in the field of surveying and Geoinformatics.

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