



TOWARDS A DEVELOPMENT AND USE OF INTERNET WEB AND INFORMATION COMMUNICATION TECHNOLOGIES FOR VETERINARY MEDICINE EDUCATION IN NIGERIA.

Tayo Babalobi

Faculty of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria
E-mail: oo.babalobi@mail.ui.edu.ng; tayobabalobi@yahoo.com

ABSTRACT: Various professions, such as accountancy, medicine, engineering and law, have developed and utilized the potentials and capabilities of the Internet in professional education, training, research and practice. This is by utilizing Internet Web Communication Technologies (WCT), the computers/computer networks of various Information Communication Technologies (ICT), and the development of an electronic libraries/resource base.

The veterinary profession, over the past decade or so, has also utilized these facilities. However, the development and use of ICT/WCT and electronic libraries for veterinary medicine is mainly limited to the developed countries like the USA, UK and other European countries. It remains, largely an "African Dream". This could be ascribed to the low adaptability/affordability of the Internet culture and a low level of awareness of these electronic facilities in African countries. Nigeria has five officially recognized veterinary faculties, with three others in the offing. The availability of self-owned Internet links by these universities is a recent phenomenon.

However, many academics had utilized private commercial Internet facilities, a relatively expensive venture. Thus, none of the veterinary faculties in Nigeria is engaged in corporate utilization of the WCT/ICT facilities in veterinary education. Also, although the theme at the 2001 Congress of the Nigerian Veterinary Medical Association, was "Advances in Information Technology: Impact on the Veterinary Profession", apart from an invited speaker, only one paper, presented by this author, was strictly relevant on the theme.

Apart from the low adaptability/affordability and the apparent lack of awareness, there are three major limitations to the development and use of ICT/WCT/veterinary electronic libraries/ resource base in veterinary medicine in Nigeria. These are the need for training/ retraining of veterinary informatics personnel and acquisition of relevant hardware/software, poor power supply and the development of sufficient/relevant local veterinary electronic libraries.

The Faculty of Veterinary Medicine, University of Ibadan, which was recently designated a Nigerian Center of Excellence in Veterinary Public Health and Preventive Medicine by the Post-Graduate College of Veterinary Surgeons Nigeria, has the human and intellectual capacity for the application of ICT and WCT to veterinary education and ongoing research in trans-boundary and zoonotic tropical diseases. The Faculty eagerly looks forward to such international collaborative support to overcome existing limitations, in its mission for the application of ICT and WCT to veterinary education, research and practice in Nigeria.

Introduction

The Internet is arguably one of the most significant technological developments of the late 20th century. Initially conceived in the seventies to act as a nuclear attack resistant method for exchange of scientific information, the Internet was deployed for linking research agencies and universities. Its interactive potential as the Worldwide Web created new opportunities which enabled information communication worldwide. It is now being employed as a tool for learning, teaching and research in many professions at pre- and postgraduate levels in many universities, especially in the advanced countries of Europe and the Americas. Also, a number of websites are

dedicated to veterinary medicine research and education resources

Internet use in Africa

The use of the Internet facilities and opportunities in Africa is still at an abysmally low level. Comparing the performance of Africa with other regions of the world (Table 1), Africa has the poorest Internet performance; the performance is a factor of 30 below that of Europe, for example. Even Uganda (one of the better performing African countries) is at the same state that Europe was at in 1995, and the trends show Africa is falling behind other regions (Cottrell and Canessa, 2003).

TABLE 1: INTERNET USERS AND POPULATION STATISTICS FOR AFRICA

AFRICA REGION	Population (2005 Est.)	Pop. % in World	Internet Users, Latest Data	Use Growth (2000-2005)	Penetration (% Population)	% Users in World
Total for Africa	900,465,411	14.0 %	13,468,600	198.3 %	1.5 %	1.5 %
Rest of the World	5,511,601,774	86.0 %	875,212,531	145.5 %	15.9 %	98.5 %
WORLD TOTAL	6,412,067,185	100.0 %	888,681,131	146.2 %	13.9 %	100.0 %

Source: *internetworldstas.com* <http://www.internetworldstats.com/stats1.htm>. Upgraded March 28 2005.

Even within Africa, there are more than an order of magnitude differences in performance between different countries as shown in Table 2 below:

TABLE 2: INTERNET USAGE STATISTICS FOR AFRICA

AFRICA	Population (2005 Est.)	Internet Users Dec/2000	Internet Users, Latest Data	Use Growth (2000-2005)	% Population (Penetration)	(%) Users in Africa
<u>Algeria</u>	32,557,738	50,000	500,000	900.0 %	1.5 %	3.7 %
<u>Angola</u>	12,918,595	30,000	41,000	36.7 %	0.3 %	0.3 %
<u>Benin</u>	7,317,178	15,000	70,000	366.7 %	1.0 %	0.5 %
<u>Botswana</u>	1,820,498	15,000	60,000	300.0 %	3.3 %	0.4 %
<u>Burkina Faso</u>	11,998,145	10,000	48,000	380.0 %	0.4 %	0.4 %
<u>Burundi</u>	7,742,727	3,000	14,000	366.7 %	0.2 %	0.1 %
<u>Cameroon</u>	16,983,434	20,000	60,000	200.0 %	0.4 %	0.4 %
<u>Cape Verde</u>	469,489	8,000	20,400	155.0 %	4.3 %	0.2 %
<u>Central African Rep.</u>	4,072,248	1,500	6,000	300.0 %	0.1 %	0.0 %
<u>Chad</u>	8,528,506	1,000	15,000	1,400.0 %	0.2 %	0.1 %
<u>Comoros</u>	650,306	1,500	5,000	233.3 %	0.8 %	0.0 %
<u>Congo</u>	3,403,718	500	15,000	2,900.0 %	0.4 %	0.1 %
<u>Congo, Dem. Rep.</u>	57,261,205	500	50,000	9,900.0 %	0.1 %	0.4 %

<u>Cote d'Ivoire</u>	19,072,133	40,000	240,000	500.0 %	1.3 %	1.8 %
<u>Djibouti</u>	767,393	1,400	6,500	364.3 %	0.8 %	0.0 %
<u>Egypt</u>	69,954,717	450,000	3,000,000	566.7 %	4.3 %	22.3 %
<u>Equatorial Guinea</u>	1,085,278	500	1,800	260.0 %	0.2 %	0.0 %
<u>Eritrea</u>	4,125,942	5,000	30,000	500.0 %	0.7 %	0.2 %
<u>Ethiopia</u>	70,600,043	10,000	75,000	650.0 %	0.1 %	0.6 %
<u>Gabon</u>	1,398,521	15,000	35,000	133.3 %	2.5 %	0.3 %
<u>Gambia</u>	1,435,510	4,000	25,000	525.0 %	1.7 %	0.2 %
<u>Ghana</u>	20,916,973	30,000	170,000	466.7 %	0.8 %	1.3 %
<u>Guinea</u>	7,988,524	8,000	40,000	400.0 %	0.5 %	0.3 %
<u>Guinea-Bissau</u>	1,427,685	1,500	19,000	1,166.7 %	1.3 %	0.1 %
<u>Kenya</u>	33,393,408	200,000	400,000	100.0 %	1.2 %	3.0 %
<u>Lesotho</u>	2,307,137	4,000	30,000	650.0 %	1.3 %	0.2 %
<u>Liberia</u>	3,065,594	500	1,000	100.0 %	0.03 %	0.0 %
<u>Libya</u>	5,980,693	10,000	160,000	1,500.0 %	2.7 %	1.2 %
<u>Madagascar</u>	17,955,589	30,000	70,500	135.0 %	0.4 %	0.5 %
<u>Malawi</u>	11,166,595	15,000	36,000	140.0 %	0.3 %	0.3 %
<u>Mali</u>	10,587,269	18,800	25,000	33.0 %	0.2 %	0.2 %
<u>Mauritania</u>	2,836,848	5,000	12,000	140.0 %	0.4 %	0.1 %
<u>Mauritius</u>	1,268,044	87,000	150,000	72.4 %	11.8 %	1.1 %
<u>Mayotte (FR)</u>	182,075	-	-	-	-	n/a
<u>Morocco</u>	31,003,311	100,000	1,000,000	900.0 %	3.2 %	7.4 %
<u>Mozambique</u>	19,416,143	30,000	50,000	66.7 %	0.3 %	0.4 %
<u>Namibia</u>	1,994,816	30,000	65,000	116.7 %	3.3 %	0.5 %
<u>Niger</u>	11,925,511	5,000	15,000	200.0 %	0.1 %	0.1 %
<u>Nigeria</u>	156,468,571	200,000	750,000	275.0 %	0.5 %	5.6 %

<u>Reunion (FR)</u>	779,388	130,000	150,000	15.4 %	19.2 %	1.1 %
<u>Rwanda</u>	8,640,104	5,000	25,000	400.0 %	0.3 %	0.2 %
<u>Saint Helena (UK)</u>	5,110	-	500	n/a	9.8 %	0.0 %
<u>Sao Tome & Principe</u>	166,657	6,500	15,000	130.8 %	9.0 %	0.1 %
<u>Senegal</u>	10,694,222	40,000	225,000	462.5 %	2.1 %	1.7 %
<u>Seychelles</u>	82,494	6,000	11,700	95.0 %	14.2 %	0.1 %
<u>Sierra Leone</u>	5,182,225	5,000	8,000	60.0 %	0.2 %	0.1 %
<u>Somalia</u>	11,967,011	200	89,000	44,400.0 %	0.7 %	0.7 %
<u>South Africa</u>	48,051,581	2,400,000	3,523,000	46.8 %	7.3 %	26.2 %
<u>Sudan</u>	35,035,677	30,000	300,000	900.0 %	0.9 %	2.2 %
<u>Swaziland</u>	1,121,937	10,000	27,000	170.0 %	2.4 %	0.2 %
<u>Tanzania</u>	37,103,500	115,000	250,000	117.4 %	0.7 %	1.9 %
<u>Togo</u>	5,272,987	100,000	210,000	110.0 %	4.0 %	1.6 %
<u>Tunisia</u>	10,116,314	100,000	630,000	530.0 %	6.2 %	4.7 %
<u>Uganda</u>	26,987,700	40,000	125,000	212.5 %	0.5 %	0.9 %
<u>Western Sahara</u>	320,712	-	-	-	-	n/a
<u>Zambia</u>	11,015,072	20,000	68,200	241.0 %	0.6 %	0.5 %
<u>Zimbabwe</u>	13,874,610	50,000	500,000	900.0 %	3.6 %	3.7 %
TOTAL AFRICA	900,465,411	4,514,400	13,468,600	198.3 %	1.45 %	100.0 %

Source: *internetworldstats.com* <http://www.internetworldstats.com/stats1.htm>. Upgraded March 28 2005.

Problems of Internet use in Africa and Nigeria

Participants from Africa at the 2003 World Summit on the Information Society <http://www.itu.int/wsis> bemoaned the fact that their compatriots lacked computers, training and the economics essential to affording new technology. (Alden, 2004). Although Nigeria has one of the most advanced Internet frameworks in Africa, with a broad bandwidth of 512 kbps to the Internet, this service is one of the most costly and problematic in the world. The problems range from inadequate telephone facilities and connections for affordable Internet use, to the high cost of computers

and the related infrastructure that goes hand-in-hand with it (Oatway, 2004).

A number of problems still plague Internet connectivity and usage in the Nigerian University system. From an existing study result (using the Obafemi Awolowo University as study), it is apparent that Nigeria has poor to bad connectivity. In fact, sites appear to have fewer throughputs than many homes with DSL or dial-up modems in developed countries (Cottrell and Canessa, 2003). Poor social infrastructure, especially erratic power supply, is a major problem in Nigeria.

Internet usage in Nigerian universities

The level of utilization of the Internet for academic research in Nigerian universities has been evaluated in some Nigerian universities. At the Obafemi Awolowo University, Ile-Ife, Nigeria, questionnaires were administered to postgraduate students spanning art and science-based programmes. The results from the analysis of the responses showed that the use of the Internet ranked fourth (17.26 percent) among the sources of research materials. Even then, respondents who use the Internet ranked research materials (53.42 percent) second to e-mail (69.86 percent). The study concludes that the use of the Internet for academic research would significantly improve through the provision of more access points at departmental and faculty levels. (Jagboro, 2003 <http://portal.unesco.org/en/ev.php-URL>).

Veterinary education in Nigeria

There are five existing veterinary faculties in Nigeria

- University of Ibadan,
- Ahmadu Bello University Zaria,
- University of Nigeria Nsukka,
- University of Maiduguri and
- Othman Dan Fodio University Sokoto.

Three new ones at Abeokuta, Makurdi and Umudike are still at the pre-clinical phase.

Veterinary education at the University of Ibadan

Veterinary education at the University of Ibadan began in 1963, in cooperative training with ABU Zaria. It became a fully fledged faculty in 1971 and has so far produced 122 PhD, 15 MPhil, 122 MSc/MVSc, 38 MVPH, 45 MPVM, 8 MSc. (Epizootiology) and 1169 DVM graduates. Recently in 2005, the University of Ibadan Faculty of Veterinary Medicine was rated by the National University Commission of Nigeria as the best in terms of quality and number of teachers, infrastructure and graduates; and is designated a Nigerian Center of Excellence in Post-Graduate Veterinary Public Health and Preventive Medicine by the PostGraduate College of Veterinary Surgeons Nigeria.

Its department of Veterinary Public Health and Preventive Medicine was established in 1975, with responsibility for teaching/research in epizootiology, preventive medicine, biostatistics, jurisprudence, zoonoses, food and meat hygiene, organization of veterinary services, veterinary economics, ambulatory clinics; and has produced 38 MVPH, 45 MVPM, 8 MSc (Epizootiology) and 13 PhDs since 1983

ICT/WCT veterinary medicine education in Nigeria

The application of aspects of ICT/WCT to veterinary research and practice has recently been actively promoted in Nigeria (Babalobi, 2003, Babalobi and Cowen, 2001, Babalobi et al, 2004, Hassan et al, 2004, Libby et al, 2001). Despite this gradual imbibing of ICT and WCT technologies in university education, research and training in Nigeria, none of the five existing veterinary faculties in Nigeria is yet to effectively employ these technologies (especially WCT) in veterinary education.

However, a number of undergraduate and postgraduate students do employ technologies such as Geographic Information System, Global Positioning System and Remote Sensing in tropical disease research (Libby et al, 2001). Multilateral assistance/collaboration is needed to overcome these limitations and actualize this desirable need to develop and apply ICT/WCT and electronic libraries for veterinary medicine education, research and practice in Nigeria.

Collaborative partnership

Partnership with e-learning ICT/WCT facilities is required to develop the use of ICT/WCT for education and research in Nigerian universities. The Nigeria Project is an example of such educational partnership between Emporia State University's School of Library and Information Management (SLIM) in Emporia, Kansas, USA and three peer institutions in Nigeria: Bayero University, Kano; Ahmadu Bello University, Zaria; and the University of Maiduguri. The project was designed to foster communication and collaboration between the faculty and student bodies of partner institutions, thereby enhancing diverse and global perspectives in their programs. Participants on exchange study visits from Nigeria to collaborating partner institutions in the West were exposed to WCT technology and blackboard instructional software for online classes by lecturers, and monitored offline discussions and chats by students. The outreach component of the project entails strengthening the capacity of Nigerian institutions, and local public libraries to support development of civil society in their communities. (<http://nigeriaproject.emporia.edu/>, 2003). In 2002, UNESCO initiated a Japanese funds-in-trust cooperation plan to set up virtual libraries in Nigeria. Given the low capacity utilization of Nigerian university libraries to adequately stock relevant required books and literatures, the idea of the virtual library is to exploit the opportunities in ICT to provide solution to these problems (<http://portal.unesco.org/en/ev.php-URL>, 2003). The virtual library is an opportunity to address the paucity of teaching and research materials in the libraries of institutions of higher education in the country. It would also allow the institutions and local researchers to share their own research outputs with the global community Ya'u, (2003).

ICT/WCT status at the University of Ibadan

The University of Ibadan ICT recently received a boost as it benefited from a three year (2002-2005) Institutional Strengthening Grant of \$3,000,000.00 from the John D. and Catherine T. MacArthur Foundation. (Three other universities- Ahmadu Bello University Zaria, Bayero University Kano and University of Port Harcourt similarly benefited). A substantial part of the grant was devoted to improved Internet access at the university. In 2003, only 25 officers of the University had access to the Internet through a telephone dial-up service via an Internet Service Provider. With the MacArthur grant, a Campus Area Network, using wireless technology has now connected 650 networks

(of an estimated 820) to the network (The University of Ibadan MacArthur Foundation Grant. Newsletter. Special Edition, January 2005). Even then connectivity problems still occur recurrently at faculty, departmental and desktop outposts.

Also from the MacArthur grant, the University Library is converting its manual database format to electronic format and has acquired relevant hardware and software for electronic access. A VSAT Internet access facility has been installed at the University main campus and a second VSAT will be installed in the University College of Medicine, to meet the demand of the College and serve as back up for the main campus VSAT. The University College Hospital, Ibadan (UCH) has a functional medical library – the UCH Medical Library Resource Centre.

The grant was recently renewed for another three years, with effect from May 2005.

ICT/WCT applications in veterinary epidemiology education

A recent discussion on the epidemiology@LISTES.UMontreal.CA, an epidemiology e-mail discussion group, broached the issue of the use of the electronic forum WebCT (or similar technologies) for teaching epidemiology via class discussions/discussing a case study, the investigation of an epidemic event (Soubhi Hassan: Thu 10/2/2005 3:11 PM). Incidentally and impressively, an African university, the Department of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, has similarly advertised a 2005 WebCT Short Course in Community-Based Animal Health, as well as a Web-based MSc. and certificated online modules in tropical animal health, to support continuing professional development. With the collaboration of its partners, it seeks to use “*New technologies, such as the interactive potential of the World-wide Web, to create new opportunities which enable information to be shared more freely and to present educational information in a modern format*” (Gaum 2005).

African dream, vision and mission

At the Budapest 2003 4ICAHIS (4th International Conference of Animal Health Information Specialists), Antoinette Lourens referred to efforts to take the nightmare (Lor, 2001) out of retrieving E-information services for Africa and turn it into a colourful and viable ‘African Dream’ (Lourens, 2003). In this regard, the University of Pretoria’s Veterinary Science Library’s role model e-initiative has extended the learning horizon, making information available to users beyond the campus e.g. private practitioners needing information for continuing professional development purposes, post graduate students (including a disabled student) doing distance learning courses, as well as students in other African countries. (Lourens, 2003).

The Department of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, in collaboration with Western partners, has caught the vision by blazing the trail with its advertised WebCT Short Courses in Community-Based Animal Health, as

well as a Web-based MSc. and certificated online Continuing Professional Development modules in Tropical Animal Health.

The Faculty of Veterinary Medicine, University of Ibadan, which was recently designated a Nigerian Center of Excellence in Veterinary Public Health and Preventive Medicine by the PostGraduate College of Veterinary Surgeons Nigeria, has the human and intellectual capacity for the application of ICT and WCT to veterinary education and ongoing research in trans-boundary and zoonotic tropical diseases. The Faculty eagerly looks forward to such international collaborative support, in its mission for the application of ICT and WCT to veterinary education, research, and practice in Nigeria.

Conclusion

In his inaugural lecture of 1983, Professor Olu Longe, the 1st Professor of Computer Science at the University of Ibadan, illustrated some similar basic concepts of the native Yoruba Ifa Divination and computer science. He explained that the ancient Yoruba knowledge systems existed, were known and practiced before the 11th Century. The same ideas were rediscovered in the West in later centuries and packaged as computer (information) science. (Olu Longe, 1983).

According to Phillip Emegwali, the Nigerian born American scientist credited with designing the world’s fastest computer,

‘...We Africans were the first to enter the Agricultural Age, the first to build in stones, the first to pioneer in technology. The Greeks learned our technology and taught it to the western world. Two thousand years later, the West is leaving us behind as it prepares to enter the Information Age and the third millennium. We must hurry to enter the Information Age. Europeans learned our technology, used it to enter the Industrial Age and became more prosperous than we are. They learned to put capital together and mass-produce consumer goods. Unless Africa leapfrogs into the Information Age, the economic gap between Europe and Africa would widen because Europe is about to enter the age. In other words, to catch up, Africa must take two steps for every step Europe takes’.

(Emegwali, 1997
<http://www.emegwali.com/speeches/igbo/1.html>).

Promoting and implementing the active use of WCT and ICT technologies in the professions (including veterinary medicine) in Africa, with the active collaboration and assistance of our Western WCT/ICT colleagues, will certainly help Africa enter and benefit from the Information Age.

Acknowledgement

There are a number of international organizations actively involved in the promotion of veterinary informatics and the application of ICT and WCT to veterinary medicine in Africa. Among such organizations is the Animal Health Information Specialists AHIS (UK and Ireland) <http://www.ahis.org>.

The AHIS has as objectives:

1. To bring together all those who are employed or interested in the dissemination of animal health information
2. Foster cooperation and resource sharing
3. Stimulate interest in related matters

The AHIS promotes these objectives by the organization of meetings, discussions and conferences and by the collection and dissemination of information.

This plea/position paper, (and similar ones on this issue), have been presented at one of the international AHIS conferences- the 5th International Conference of Animal Health Information Specialists in South Africa, July 2005.

Another important role player is the Technical Centre for Agricultural and Rural Cooperation (CTA) (<http://www.cta.int/>) The CTA was established in 1983 under the Lomé Convention between the ACP (African, Caribbean and Pacific) Group of States and the European Union member states. CTA's tasks are to develop and provide services that improve access to information for agricultural and rural development, and to strengthen the capacity of ACP countries to produce, acquire, exchange and utilize information in this area.

CTA also produces *ICT Update* <http://ictupdate.cta.int/> (a bimonthly printed bulletin), a web magazine, and an accompanying e-mail newsletter. Each issue of *ICT Update* focuses on a specific theme relevant to ICTs for agricultural and rural development in African, Caribbean and Pacific (ACP) countries. Specific CTA ICT/WCT services through its Information and Capacity Development Department (ICDD) <http://www.cta.int/icdd/index.htm>, for strengthening the information and communication management capacities of ACP partners include:

1. Selective Dissemination of Information (SDI) (<http://www.cta.int/about/sdi.htm>)
2. CTA's CD-ROM Programme (<http://www.cta.int/about/cdrom.htm>)
3. Seminar Support Programme (<http://www.cta.int/about/ssp.htm>)
4. Support to non-CTA training schemes (http://www.cta.int/about/training_support.htm)

The presenter of this paper, with some other Africans, benefited from the Seminar Support Programme which is designed to enable ACP nationals to attend regional and international conferences on topics of relevance to their area of work. The programme also helps to ensure that ACP views are expressed at international conferences dealing with agriculture and rural development issues (<http://www.cta.int/about/ssp.htm>).

Finally, the Organizer of 5ICAHIS, the Academic Information Service, Veterinary Science Library,

University of Pretoria has succeeded not only in taking the nightmare out of retrieving e-information and turning it into a colourful and viable African dream, but has diligently and graciously hosted 5ICAHIS and facilitated this presentation.

References

1. Alden, Chris (2004). For most Africans, Internet access is little more than a pipe dream. Online Journal Review article. Annenberg School for Communication <http://ojr.org/ojr/workplace>. www.usc.edu.2004.10.28)
2. Babalobi, O.O. (2003). E-groups and the development of the veterinary profession in Nigeria. *40th Annual Congress of the Nigerian Veterinary Medical Association*. Ibadan, Nigeria. October 2003.
3. Babalobi, O.O. and Cowen, P. (2001). PROMED – mail: An electronic mail disease-reporting forum. *Proceedings of the 38th National Congress of the Nigerian Veterinary Medical Association (NVMA) Topo, Badagry, Lagos*. Nov. 2001: 206 –207.
4. Babalobi, O.O, Fabiyi, O. and Oguamanan Libby, (2002). Application of Geographical Information Systems to veterinary medicine: an overview. *Tropical Veterinarian*. 20 (2): 117— 125.
5. Babalobi, O.O, Ogundipe, G.A.T, and Okafor Libby (2004) Towards an increasing awareness and use of Geographical Information Systems (GIS), Remote Sensing (RS) And Global Positioning Systems (GPS) in veterinary medicine in Nigeria. *41st Annual Congress of the Nigerian Veterinary Medical Association*. Vom, Jos, Nigeria. November 2004. (<http://ieeexplore.ieee.org/iel5/9010/28604/01294646.pdf>) (Accessed 28 December 2006)
6. Cottrell, R.Les and Canessa, Enrique (2003) Internet performance to Africa. 2003 Round Table on developing countries access to scientific knowledge, The Abdus Salam ICTP, Trieste, Italy 73 www.ejds.org/meeting2003/ictp/papers/Cottrell-Canessa.pdf (Accessed 20 April 2007)
7. Emeagwali, Philip (1997) Can Nigeria leapfrog into the Information Age? <http://www.emegwali.com/speeches/igbo/1.html> (Accessed 20 April 2007)
8. Gaum, Inge (2005). Community-based animal health 1, Continuing Education, University of Pretoria/Web-based MSc and certificated online modules in Tropical Animal Health to support Continuing Professional Development. Presented by the Department of Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, and its partners. WebCT Marketing E-mail, April 2005. <http://www.ceatup.com> ; http://www.up.ac.za/academic/veterinary/depts_vtd.htm, http://www.up.ac.za/academic/veterinary/depts_vtd_msc

web/index.htm,
http://www.up.ac.za/academic/veterinary/depts_vtd_cpd
web/index.htm

9. Hassan, A.Z., Mohammed, I., Remi-Adewumi, B.D. and Umar, M.R (2004). Computer application in veterinary medicine. *Nigerian Veterinary Journal* 25(2) 1-12.

10. Internet World Stats: Usage and Population Statistics (2005).
<http://www.internetworldstats.com/links4.htm>

11. Jagboro, K.O. (2003) A study of Internet usage in Nigerian universities: A case study of Obafemi, Ile-Ife, Nigeria. <http://portal.unesco.org/en/ev.php-URL>

12. Lor, P J. (2001). From inter-library lending to instant universal access: First World utopia, Third World nightmare? *Paper presented at an Inter-library lending Conference of the Finnish Research Library Association, Helsinki*, www.nlsa.ac.za/docs/pjlpaper.pdf

13. Lourens, Antoinette (2003) An African dream? E-information services at the University of Pretoria's Veterinary Science Library (Service Unit: Veterinary Science, Academic Information Service). Paper delivered at the 4th International Conference of Animal Health Information Specialists (4ICAHIS), Budapest, Hungary.
<https://www.up.ac.za/dspace/bitstream/2263/1354/1/ICAHIS4p.pdf> (Accessed 20 April 2007)

14. Oatway, James (2004): Nigeria Web Report. African Media Debates Web Report. <http://journ.ru.ac.za/amd/>

15. Oguamanan Libby, Babalobi, O.O. and Fabiyi, O. (2001) Application of Geographical Information Systems to assess the risk of Trypanosomosis in Apete, Ibadan. *Proceedings of the 38th National Congress of the Nigerian Veterinary Medical Association (NVMA) Topo. Badagry, Lagos*. November 2001: 211-217.

16. Olu Longe (1983) Ifa divination and computer science. An inaugural lecture delivered at the University of Ibadan, Nigeria, 22nd December 1983. 50pp.

17. Soubhi Hassan (2005) epidemiol@LISTES.UMontreal.CA. An e-mail. Thu 10/2/2005 3:11 pm.
University of Ibadan MacArthur Foundation Grant. Newsletter. Special Edition. January 2005.
http://www.macfound.org/site/c.IkLXJ8MQKrH/b.1145501/apps/nl/content3.asp?content_id=%7BBAD3B401-917E-4427-9CF6-34715E645F51%7D¬oc=1
(Accessed 20 April 2007)

18. University of Ibadan, Faculty of Veterinary Medicine Prospectus (2002-2004). Issued by Dean's Office, Faculty of Veterinary Medicine. 188pp
<http://www.ui.edu.ng/facultyofvetmedicine.htm>

19. WWW Virtual Library Veterinary Medicine (URL: <http://netvet.wustl.edu/vetmed.htm>).

20. Ya'u, Y.Z.(2003). Towards a Virtual Library for Nigeria. http://portal.unesco.org/en/ev.php-URL_ID=16043&URL_DO=DO_TOPIC&URL_SECTION=201.html (Accessed 28 December 2006) (<http://nigeriaproject.emporia.edu/>)