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The Application of Internet as an Indispensable Tool for Effective Teaching, Learning and Research in Higher Education in Nigeria

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----------***ABSTRACT***----------
The Internet holds great potentials in education. It has the capacity to innovate the school/educational system and make it more productive and efficient. In teaching, first, the Internet can be used to stimulate learners to learn actively and independently in a self directed way and/or in collaboration with others. Second, teaching/learning materials (syllabi, course outline, lecture notes, seminars, etc.) can be provided for students on the net and thus allow all to have easy access to such materials. Third, the Internet encourages the democratization of education, that is, access to education by all. Every learner (able/disabled, adult/young, employed/unemployed, etc.) has access to education, anywhere (home, school, offices, etc), any time (24 hours/day and seven day/week). Easy communication between teacher-student and student-student on teaching content is also possible. This paper exposes the importance of the Internet in education and research in our contemporary world, especially in Nigeria. It examines the different ways by which the Internet can be used to enhance teaching, learning and research in higher institutions. It also explores the educational resources in the Internet, Internet search strategies, and ways of evaluating Internet resources. Finally the paper stresses the need for lecturers to develop cognate skills and competence in the use of the Internet so as to be able to exploit its potentials for teaching, learning and research.

KEYWORDS: *Internet, World Wide Web, Search Engine, Education, Research.*

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I. INTRODUCTION

The Internet, regarded by Rosenberg (2001) as the most remarkable technological breakthrough of the 1990s, is defined by Wikipedia (2014), as a global system of interconnected computer networks…that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless, and optical networking technologies. In their own view, Leiner et al (2003) described the Internet as a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location.According to UNESCO (2003), the Internet has become not only the hugest information resource in the world, but – what is even more important – the most rapid means of communication. The Internet has thus become an indispensable tool for effective teaching, learning and research. Its impact on education has been massive, thereby engendering such terms like e-teaching, e-learning, virtual teaching/learning, e-training, and so forth, thus affecting in a positive way the "tri-personality" of a lecturer; as a teacher, a lifelong learner and a researcher. Within seconds, a lecturer can retrieve information through the Internet to: update his/her knowledge, prepare his/her lecture, give assignments to students, mark their assignments, and also work with colleagues and specialists (Scholastic, 2003).

In spite of the plethora of resources on the Internet, only an Internet literate individual can use the resources for enriching teaching, learning, and research. It is important, therefore, to acquire basic abilities and skills in internet usage because of its importance to finding information in the contemporary knowledge based society, and failure to acquire the abilities would define a new type of illiteracy and alienation from the society (Monereo, Fuentes & Sanchez, 2000).

THE BRIEF HISTORY OF THE INTERNET : According to Leiner et al (2003), the Internet started in the 1960s as a way for government researchers to share information. Computers in the 1960s were large and

immobile, and in order to make use of information stored in any one computer, one had to either travel to the site of the computer or have magnetic computer tapes sent through the conventional postal system.

Another catalyst in the formation of the Internet was the heating up of the Cold War (Leiner et al, 2003). The Soviet Union's launch of the Sputnik satellite spurred the U.S. Defense Department to consider ways information could still be disseminated even after a nuclear attack. This eventually led to the formation of the ARPANET (Advanced Research Projects Agency Network), the network that ultimately evolved into what we now know as the Internet. ARPANET was a great success but membership was limited to certain academic and research organizations who had contracts with the Defense Department. In response to this, other networks were created to provide information sharing. According to Leiner et al (2003), January 1, 1983 is considered the official birthday of the Internet. Prior to this, the various computer networks did not have a standard way to communicate with each other. A new communications protocol was established called Transfer Control Protocol/Internetwork Protocol (TCP/IP). This allowed different kinds of computers on different networks to "talk" to each other. ARPANET and the Defense Data Network officially changed to the TCP/IP standard on January 1, 1983, hence the birth of the Internet. All networks could now be connected by a universal language.

II. THE APPLICATION OF INTERNET IN EDUCATION

The Internet holds great potentials in education. It has the capacity to innovate the school/educational system and make it more productive and efficient. In teaching, first, the Internet can be used to stimulate learners to learn actively and independently in a self directed way and/or in collaboration with others. Second, teaching/learning materials (syllabi, course outline, lecture notes, seminars, etc.) can be provided for students on the net and thus allow all to have easy access to such materials. Third, the Internet encourages the democratization of education, that is, access to education by all. Every learner (able/disabled, adult/young, employed/unemployed, etc.) has access to education, anywhere (home, school, offices, etc), any time (24 hours/day and seven day/week). Easy communication between teacher-student and student-student on teaching content is also possible. Furthermore, instructional content can be gotten by a teacher through the internet and it provides opportunities for sophisticated repertoire of teaching strategies (Go 2000 and Kirschner & Woperies, 2003). The relevancies for teaching are not exhaustive but a teacher's ability will determine how efficiently the Internet can be exploited to enhance teaching.

In life-long learning, the internet provides opportunities for acquiring the four major forms of learning outlined by UNESCO (Neuwied et al, 1999). These are learning to know, learning to do, learning to live together and learning to be. *Learning to know* deals with the acquisition of broad knowledge relevant to several areas of human endeavour and the opportunity to work in-depth on a small number of subjects. *Learning to do* refers to knowledge and skills acquired not only in occupational skills but also the competence to deal with many situations. *Learning to live together* entails developing an understanding of other people and appreciation of the interdependence of human beings. Finally, *learning to be* relates to the development of one's personality and being able to act with even greater autonomy, judgment and personal responsibility (Neuwied et al, 1999). The Internet provides for all these through on-line courses and materials, and through them, a lecturer's knowledge, skills and competences can be updated.

In research, the Internet provides wide opportunities for quicker access to relevant and current literatures, access to wide range of instruments, online opportunity for validation of instrument, simulation of an on-going research, and on-line statistical analysis. Furthermore, collaboration in research (trans-institutional, trans-national and trans-continental) is possible, and wide range of opportunities exist for the dissemination of research findings (journals, personal web page, foundations/organizations' web pages, etc.) (University Libraries, 2003d).

III. THE DANGERS IN THE USE OF INTERNET

At this juncture, it is necessary to note the dangers that are associated with the use Internet in education. Being aware of these dangers can prompt a user to be watchful, focused and disciplined, when using the Internet, to avoid being drowned in the boundless sea of information called Internet. Some of these dangers are listed and discussed as follows:

- Plagiarism – The materials on the Internet are abundant and easy to access and, therefore, tempt users to copy out other people's work and present them as theirs. This is a great offence in academia;

- Although it is assumed that pieces of information on the internet are permanent, they are changed, updated; web sites appear and disappear and they move and mutate daily (Monereo et al, 2000; NMSU Library 2003 and UCB Library, 2004a);
- Because of the dynamic and volatile nature of the internet, locating and evaluating information on it often requires a degree of specialization on the part of users. Thus, it is difficult to search well, particularly by novice/non-expert users (Monereo et al, 2000 and NMSU Library, 2003);
- Not every information on the Internet is useful for educational purposes. At times information comes from unknown and sometimes unreliable sources. The materials on the Internet are sometimes not regulated or monitored, that is, there is no quality control. Thus, the useful and the useless co-habit on the internet (Monereo et al, 2000 and Paris, 2003);
- The internet is an unregulated information superhighway, thus information is not systematically organized, and there is sometimes clear bias in favor of certain subjects and to the detriment of others (Monereo et al, 2000);
- There are too many distractions while the Internet is being used. Users may be distracted to other things which have no relevance to intellectual development.

Nonetheless, despite the dangers associated with the use of the Internet, members of the academia are encouraged to explore and harness the Internet to stay informed, productive and relevant in our contemporary world driven by information and technology.

THE EDUCATIONAL RESOURCES ON THE INTERNET : The Internet is a heterogeneous channel with vast electronic resources and services. These include: e-mail, chat groups, file Transfer protocol, and so on. Each of these resources has its own set of rules, but they relate to one another in several ways (Monereo et al, 2000). Some of these, though not exhaustive, are discussed as follows:

Electronic Mail (e-mail) : This is an instantaneous electronic message from a sender to recipient(s). It is the most used application on the internet. Another variant of the e-mail is the ***listserve***, through which a subscriber receives and participates in a discussion group through e-mail. Each user has a mail box address to which messages are sent (Griffith, 2002; UCB Library, 2004c; University Libraries, 2003 and Steinger, 2001). The e-mail is relevant for communication between teachers and students, peers (teacher-teacher, student-student), and with parents.

Newsgroup : Another type of discussion group found on the internet that is devoted to the discussion of a specific topic, is the newsgroup which operates like a bulletin board. Members post and read messages at the newsgroup site rather than having messages sent to their mail box, as in listserves. Another variant is the ***Usenet***, which is a network featuring thousands of newsgroups (UCB Library, 2004d; University Libraries, 2003 and Steinger, 2001).

Chat Rooms and Instant Messaging : Chat allows users on the Internet to communicate with each other by typing in real time, and the messages will appear on the users' monitors. Chat rooms usually have a topical focus. Instant messaging is another variant of chat as it allows a user on the web to contact another user who is currently logged in and type in a conversation (University Libraries, 2003 and Steinger, 2001). Yahoo and MSN Messenger are commonly used in Nigeria for instant messaging.

File Transfer Protocol (FTP) : This allows a computer to rapidly retrieve complex files intact from a remote computer and view and safe such files on your computer (UCB Library, 2004d).

Telnet or Remote Login : This permits a computer user to log on to another computer and use it as if the user were there. Through Telnet, users including lecturers and students can access and log in onto their institution's computer from any other computer connected to the Internet anywhere in the world. Files can be downloaded; even common computer operation like rebooting can be accomplished (UCB Library, 2004c&d). To use Telnet on a computer, you must know the computer's address which can be words (mail.yahoo.com) or numbers (216.109.127.28).

Gopher : This is one of the earliest resources on the internet. It is a text only method for assessing internet documents. Some gopher texts may still be found linked on the web page, but they are more or less subsumed in the World Wide Web (Griffith, 2002 and UCB Library, 2004d).

The World Wide Web (WWW) : This is the largest and the fastest growing activity on the Internet, in fact, over 75 percent of all information searches on the Internet are handled through the WWW (UCB Library, 2004d and University Libraries, 2003). The WWW incorporates almost every protocol available on the internet (e-mail, FTP, Telnet, Usenet, etc.). The WWW, also called the Web, consists of files called pages or home pages containing links to documents and resources on the internet. The web provides opportunities for retrieving text documents, viewing images, animation, and video, listen to sound, speak and hear voices, provided one's computer has the capacity and software (UCB library, 2004a&d and University Libraries, 2003). The web relies on hypertext as its means of information retrieval. Hypertext is a document that connects to other documents, that is, the ability to have web pages containing links, which are areas on pages or button or graphic which can be clicked to retrieve another file unto the user's computer. The hypertext link is the unique and revolutionary feature of the web. Hypertext for the web is accomplished by creating documents with a language called HyperText Markup Language (HTML). Hypertext files can be retrieved and searched through a special protocol known as HyperText Transfer Protocol (HTTP) which simplifies the writing of addresses, which are searched on the Internet and called up for viewing (Griffith, 2002; UCB Library, 2004d and University Libraries, 2003). The WWW documents are viewed using Internet Browsers, which are software programs that allow an Internet user to view documents. Examples are Microsoft Internet Explorer (IE), the most popular and prevalent in our environment, FireFox, Netscape, Lynx (text only documents), Mosaic, Macweb, NetCruiser, and so forth. They translate HTML encoded files into sounds, text, image, sound and other web features (Griffith, 2003 and UCB Library, 2003d).

Through these resources, a lecturer has access to instructional and research materials, professional group membership, communication tools with peers and students, interactive collaboration and other developmental benefits.

THE SEARCH STRATEGIES FOR INTERNET RESOURCES : Given the vast resources available on the Internet and its non-centralized nature, searching or surfing for information can be tasking and frustrating. Accessing information is an important and essential skill in the use of the Internet. The Internet itself offers several search tools/ applications that can assist a user to look for particular document or particular information on a given topic (Monereo, et al, 2000). There are several search tools/applications, usually classified differently by authors. For our convenience, the following classifications include- search engines, meta search engines, subject directories, invisible web pages, and on-line scholarly communication.

Search Engines : These are systems that can search the web using software robots/programs for sites, read entire texts of the sites on the web, index them based on occurrence of the key words for each site, and enter them in database. Search engines results are not organized by subject categories and are usually large, and in most cases, unevaluated (Monereo et al, 2000 and UCB Library, 2004c). A search term/phrase entered in their search boxes will return several results. Examples of search engines include: Google - (http://www.google.com), AltaVista - (http://www.altavista.com), Lycos - (http://www.lycos.com), etc.

Meta Search Engines : These are search engines that submit queries to several search engines and directories and then compile the results in sometimes convenient display. Since they search through multiple search engines, they are usually slower. Examples of meta search engines are Vivisimo - (http://www.vivisimo.com), Ixquick - (http://www.ixquick.com), HotBot - (http://www.hotbot.com), etc. They are used like the search engines (Monereo et al, 2000 and UCB Library, 2004c).

Subject Directories : These are links to Internet addresses similar to a gigantic phone book, which provides a listing of sites on the Internet organized by subject matter or geographical areas. They are built by human selection, at times specialized, small or large but usually smaller than search engines. They are good for educational purposes because they are often carefully evaluated (Monereo et al, 2000 and UCB Library, 2004c). Examples include: Librarian Index (http://lii.org),
Infomine (http://infomine.edu), AcademicInfo (http://www.academicinfo.net),
Yahoo (http://dir.yahoo.com), etc.

The Invisible Web Pages : These are web pages that cannot be found in search engines and rarely in subject directories. They are invisible because search engines cannot access such pages because the computer robots that build them cannot type the searches needed to generate the pages. They are estimated to contain two to three times as many pages as the visible web (UCB Library, 2004c). They are even estimated to contain around 90% of www pages (Gil, n.d.). The invisible web page is sometimes called Deep Web, because it is available for those willing to dig for information. Deep Web can be located by looking for it in good subject directories, like Librarian Index, Yahoo, or Academic Info. For the databases, enter the name of interest in a search engine, and type either database or bibliography (Griffith, 2003). Special search tools for them include: invisible web catalogue (http://invisible.com),
Search Pdf (http://searchpdf.adobe.com), Direct Search (http://www.freepint.com/gary/direct/htm), Internets (http://internets.com), Incy Wincy (http://www.incywincy.com), Complete Planet (http://www.complete.planet.com), Statistical Resources on the Web (http://www.lib.umich.edu/govdocs/statisnew.htm).

Other On-Line Scholarly Communication : Some of these are sometimes referenced under directories. They provide good sources for educational purposes. In fact, they are mostly for educational uses and include the following:

- *Electronic Journals and Catalogues*: These are useful educational sites. Some of them include:

✓ Electronic Journals at NMSU Library (http://lib.nmsu.edu/journals/index.shtml)
✓ Electronic Journal Miner (http://ejournal.coalliance.org/)
✓ World Cat (http://catalog2.nmsu.edu.2048/login?=http://lib.nmsu.edu/resources/dbwc.html)

AERA SIG Communication of Research – education (http://aera-cr.asu.edu/links.htm).

- *Electronic Lists:* These contain scholarly and professional conference papers. Example is the Directory of Scholarly and Professional E- Conference http://www.kovacs.com/directory/).
- *Electronic Reference Virtual Libraries*: These provide on-line reference materials for users. Examples are Ready Reference Collection (http://www.ipl.org/ref/RR), the Internet Public Library Reference Centre (http://www.ipl.org/ref/), Langenberg.com (http://www.langenberg.com), etc.

THE EVALUATION TECHNIQUES FOR INTERNET MATERIALS : For effective education, a mere access to Internet information resources is not enough. The enormity of resources on the Internet makes it imperative for the evaluation of documents which are to be used for educational purposes. Lecturers need valid and reliable information for their teaching, learning and research. Therefore, lecturers need evaluative techniques when using internet resources. The most important among them is the ability of a lecturer to work with information. It is not that simple, because it demands the ability to use different kinds of intellectual skills, which many do not possess. Ability to work with information is being able to analyze information, select the facts and data adequate to the problem being investigated. The lecturer must be able to find arguments to prove his/her point of view.

A lot of educational materials do not undergo any examination. This fact produces a lot of difficulties even for a teacher to select the material for educational purposes. To solve this problem one must be competent in his professional field. The user should be able to analyze the material and recommend it to his/her students, and the students selecting the information should be also able to decide if this or that material is flawless to be used for the cognitive purposes (UNESCO, 2003). Thus, for effective education a mere access to Internet information resources is not enough. It is necessary to develop critical thinking. This must be the goal of every education system. So, this is the first factor, which influences the efficiency of the Internet in education (UNESCO, 2003). It is necessary to keep in mind that reading electronic texts in the Internet is not like reading printed texts. We have to look at it through rather than read it thoroughly, and make decision if it is worth downloading for more attentive reading later or not. In this respect, we can mention some recommendations given by Stephen Pickles from the Institute of Education, University of London. He advises the user to ask several key questions about every new Internet resource he finds: 1. Who? 2. When? 3. Where?

Knowing who has provided the information you are looking at it is vital if you are going to evaluate fully what you are seeing – the Who question is key. Who provided this information or opinion – a teacher, a researcher, a government department or agency, a commercial company, a pressure group, an individual or an

organization? Are details provided about the authors and the publishers? Are they qualified or reputable? Can you find information about the author on the web site? Or is it not clear at all who the author and publisher are? Are they one and the same? Very closely related to Who? is Why? So ask yourself, why are they providing this information? Can you detect 'spin', bias or propaganda? Are they trying to sell a book or some other product? Are they promoting a particular point of view? They are funded or sponsored by who? Are they reporting research or investigations of some sort or merely asserting opinions? Is the information evidence based? Who is it aimed at?

When was the information provided? This question enables the lecturer to determine when a material was first published on the Internet. Is there a publication date? Check the copyright notice, it might be there. If you are looking at statistical or other data, what time span is covered? How far back do they go? Are the latest figures included? Which version of a document are you looking at? Is it a draft, or the interim or final report? For example, is it the most recent of the report, or an older one? Is it a consultative paper, a *White Paper*, or the eventual legislation? Are superseded documents archived for research purposes? Are they marked as such with links provided to the current version?"

Where was the information published? Locating an answer to this question can be of much help in the evaluation of Internet materials. In some places, information is properly censored before it published for public consumption, whereas in some other places, the reverse is the case.Obviously, the use of information resources located in the Internet is not such a simple affair. It requires not only the ability to search for it in the huge sea of the Internet, but to process it and use it effectively for the cognitive goals.

IV. CONCLUSION

The Internet is a powerful and useful tool for teaching, learning, and research. Through the Internet, exciting materials in forms of lesson materials, simulation, virtual field trip, tutorials, and so on, relevant to a lecture can be gotten (Scholastic, 2003). A wide range of research materials (literature, instruments, validation) is accessible. Furthermore, collaborative research efforts through communication and information sharing with colleagues and specialists become possible through e-mail, newsgroup, chartroom, and so on. It is, therefore, imperative for lecturers to find and use the resources on the internet to enhance their productivity. The Internet, by itself cannot assure good teaching, learning or research, but its potentials can be exploited by resourceful lecturers to ensure effective and efficient teaching, learning and research.

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