

The Internet, Electronic Mail and the Academic Community in Ghana

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Ghana's Internet industry is developing quickly due to private participation. Early attempts by academic and research institutions with foreign assistance aimed at promoting the use of e-mail in information provision and resource sharing. Since 1995 three Internet Service Providers (ISPs) have been providing different Internet services at varying rates to over 6,000 customers. Due to the high tariffs charged by the ISPs for full Internet connectivity, many Ghanaian scholars subscribe only to e-mail to communicate and interact with peo-

ple. While full Internet access is preferable, the reality is that many academics and researchers in Ghana cannot meet the high cost. E-mail facilitates communication with colleagues, but can also be used as an interface to a range of Internet information retrieval utilities to obtain information and documents. This article describes briefly some Internet tools and services accessible by e-mail and to assist Ghanaian (and other) academics with only e-mail access in its use to retrieve information and documents from the Internet.

Introduction

The Internet is simply a worldwide network of networks that allows communication between computers interconnected with agreed protocols – Transmission Control Protocol/Internet Protocol (TCP/IP). This large international network of networks has as its member universities, other research institutions, government facilities, and many corporations (Internet Engineering Task Force 1991).

The Internet therefore provides rapid, seamless communication among millions of locations and makes finding information relatively easy. The technology also offers abundant opportunities and unlimited possibilities through tools such as the World Wide Web and file transfer protocol (ftp) to facilitate the exchange of information.

Electronic mail

Electronic mail (e-mail) is generally thought of as a means of communicating and interacting with other people, either one-to-one or one-to-few, by personal e-mail, or else by participation in elec-

tronic discussion groups. E-mail facilitates the exchange of messages with anyone who has access to the Internet and reaches people with any kind of Internet connectivity or UUCP (Unix to Unix Copy Protocol) link. It can traverse networks not directly connected to the Internet or networks which provide only e-mail service. E-mail can reach many places that ftp cannot. In addition, ftp cannot send a file to many recipients, but e-mail can (McMurdo 1995). E-mail can also be used as an interface to quite a comprehensive range of Internet information retrieval utilities. Tools and services accessible by e-mail include:

- i. searching and retrieval from e-mail list archives;
- ii. archie searches for files available at anonymous file-transfer protocol (FTP) sites;
- iii. file retrieval from anonymous FTP sites;
- iv. browsing of menus and retrieval from gopher menus;
- v. "veronica" index searches of gopher information;
- vi. retrieval of World Wide Web information;
- vii. searching and retrieval from WAIS (wide-area information servers) information sources;
- viii. reading and contribution to Usenet newsgroups;

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- ix. directory services such as "whois" and "finger" for locating people and their e-mail addresses (McMurdo 1995).

E-mail in Ghana

E-mail service has been in Ghana for a little over eight years. The earliest attempts to establish e-mail service, the Ghana Electronic Mail Project, in June, 1991, were supported by foreign institutions, such as the International Development Research Centre (IDRC) and the Pan African Development Information System (PADIS). A training workshop was organised by the Ghana National Scientific and Technological Information Network (GHASTINET) in collaboration with the American Association for the Advancement of Science (AAAS), the IDRC and PADIS to introduce and train 25 participants selected from libraries of academic and research institutions in the use of electronic mail in resource-sharing and information delivery (Osei-Bonsu 1998).

The project also aimed at developing a computerised network for the then three existing universities, the Ghana Standards Board (GSB), the GHASTINET, the Association of African Universities (AAU) and the Technology Transfer Centre (Anim-Dankwa 1998). Through this initiative the GSB, AAU, and the Friends of the Earth were connected to the national node, GHASTINET. The system used the FidoNet technology, and mails were sent and received twice a week via GreenNet in London. A number of papers have discussed numerous problems, including the poor telecommunication infrastructure in the country, which did not make the project successful (Viliars 1992, Status of e-mail in Ghana 1996, Amis-sah-Arthur 1992)

In 1993 the University of Ghana Medical School Library was connected to the International Health Telecommunication Network (HealthNet), a satellite-based communication system that facilitates the exchange of information among health professionals in the developed world. It provides e-mail service to the country's medical community (Addo 1994).

The CABECA project

There was yet another and more successful attempt to link the country's universities and the

Council for Scientific and Industrial Research (CSIR) with support from the IDRC/UNECA under the Capacity Building In Electronic Communication for Africa (CABECA) Project in 1994. The Balme Library, University of Ghana, served as the national node and the system used the FidoNet technology. Local hosts were set up at the University of Science and Technology (UST), Kumasi, University of Cape Coast and the CSIR and they served other users from public sector institutions and NGOs in all the nine regions of Ghana.

Mail was exchanged with the Internet by telephone calls to GreenNet in London averaging a cost of US\$300 per month (Quaynor 1998). The service was discontinued in December, 1998, due to huge telephone bills and the assistance the University of Ghana received from the USAID to enable it provide Internet services to the educational community in Ghana. This assistance included the provision and installation of hardware, and the payment of the fees associated with becoming an Internet Service Provider (ISP) with its own domain. The new service is an improvement on the previous one, since it offers full Internet connectivity.

Other initiatives

Other national and international agencies, including the US, World Bank, IDRC, USAID, International Telecommunication Union (ITU), UNDP, Physics Action Council, UNECA, UNESCO, and Africa Internet Forum (AIF) have also undertaken or participated in a number of initiatives to assist Ghana access the Internet.

InfoDev project

In February 1996, the InfoDev Project was launched. The Project aimed at assisting user institutions in education, research, health, libraries and public information centres, etc, which needed powerful telematics tools to access needed information (Proposal for InfoDev activity 1996). The Project is being developed in close consultation with the AIF and USAID's Leland Initiative to extend network access in Ghana. The principal immediate beneficiaries are the four universities, one university college and research institutions under the CSIR, which can take immediate ad-

vantage of improved access to electronic information sources and electronic communication with national and international partners, as well as large ministries such as Agriculture, Education and Health (Proposal for InfoDev activity 1996).

The Project's activities included among others:

- in-depth training for intermediaries and end-users in three development sectors in the use of telematics resources;
- a pilot Internet service for one year for 100 intermediaries and end-users in three priority fields in cooperation with the public telecommunication operator and private service suppliers;
- training 70 specialists in network management, information servers and telematics applications, and in network infrastructure (network engineering) (Proposal for InfoDev activity 1996).
- establishment of a permanent national Internet training and demonstration centre at the University of Ghana, Legon with the full support of the University and Network Computer Services (NCS).

100 pilot users who have received in-depth training in the project will be provided with Internet services and assisted for a period of one year to ensure that they can test and apply the acquired know-how in their work. Although two training programmes have been organised for selected user institutions the purchase of PCs and the provision of the Internet services for the 100 pilot users for one year have been unduly delayed.

All these attempts aimed at improving communication between libraries inside and outside the country with a view to improving information delivery services to the academic and research communities in Ghana.

Private initiative in Internet industry in Ghana

Ghana's Internet industry at the present time is dynamic, and includes three Internet Service Providers (ISPs) – NCS, AfricaOnline, and Internet Ghana. Different services are provided to over 6,000 customers at different rates, the highest providing 24-hour full Internet connectivity and browsing on the World Wide Web. The lowest subscription provides only e-mail service, and this constitutes 70% of the service to subscribers. Ghana became the fourth sub-Saharan African country to connect to the Internet in 1995, when

NCS applied for the top-level domain "gh" (InfoDev Project 1996). Most of the clients of these ISPs are private corporations, banks, mining companies, para-statal organisations, and government ministries, but some academics also use these facilities to enable them access the Internet inter-actively.

Effect on the academic community in Ghana

Electronic communication has undoubtedly made a great impact on the academic community in Ghana. Those who research, teach and learn in universities and colleges consciously or unconsciously modify their perception of the ways in which academic work impinges upon or is, in turn, influenced by information technology. Teaching and research staff now assesses ways in which the new communication technologies can either assist them in their present work or improve upon new research opportunities. Students are now taught to use, understand and accept computers in their everyday work.

For many academics and research personnel e-mail may be the only Internet service that they use, because they do not have full Internet connectivity. But it allows for efficient and economical access to information to promote their research and enhance their teaching. Access to computer networks has greatly facilitated communication between educational researchers in the developed world and their counterparts in Ghana, in a manner, that has strengthened and enhanced collaborative work in research in Ghanaian universities.

Interlibrary lending and document delivery

The growth of Internet usage directly impacts interlibrary loan demands. As users become aware of the existence of information, they are eager to access it. As Web-based library catalogues become more common, the notion of accessing items housed in a particular area is commonly giving way to the idea of accessing information regardless of location. Items accessed could either be downloaded or the document requested through interlibrary loan and document delivery services.

It is in this light that IFLA initiated a project, supported by DANIDA, in Interlending and Document Delivery (ILL/DD) in Ghana. A pre-

paratory training workshop organised in cooperation with the Balme Library, in April, 1996, enabled librarians and computer specialists from academic and research libraries and other organisations in Ghana to discuss the possibility of resource-sharing through modern information technology. The project also funded the training of six Ghanaian professional librarians in Manchester, London and Copenhagen, which provided basic and practical training in ILL/DD for these participants (Osei-Bonsu 1998). DANIDA provided funds and equipment that have made it possible for participating libraries to access the Internet.

The ILL/DD Project has enabled these libraries to obtain documents requested by Ghanaian academics and researchers very fast and free of charge. Particular mention should be made of the State & University Library in Aarhus, Denmark; the Danish National Library of Science and Medicine (DNLB) and the Danish Veterinary and Agricultural Library (DVJB), Copenhagen, who are supplying photocopies of journal articles that Ghanaian academic and research libraries request from them free of charge. Ghanaian academic and research libraries can also access the databases of these institutions and make direct online orders for photocopies of articles identified in their databases. It takes about nine days for such photocopies to be delivered, and this has tremendously helped academic and research libraries in Ghana in meeting document delivery requests.

DANIDA also paid the subscription fees for access to the OCLC service to enable Ghanaian participating libraries access its database FirstSearch and for access to CARL UnCover.

Assistance from DANIDA

With the assistance of DANIDA (Danish International Development Agency) and USAID, all the university libraries and the Institute of Scientific and Technological Information (INSTI) of the CSIR, now have access to the Internet; and users of these libraries can access databases elsewhere for required documents or information which can be downloaded on their PCs. Documents which could not be downloaded may be requested by e-mail from Danish academic and research libraries under the IFLA/DANIDA ILL/DD Project. Documents may also be ordered from

the Online Computer Library Center (OCLC) or via ARTE-mail from the British Library Document Supply Centre (BLDSC), Boston Spa (InfoDev Project 1996).

Document delivery

Document delivery has always posed a major problem for academic and research libraries in Ghana because of the high cost and undue delay in obtaining documents from overseas. In recent times the technology of e-mail has offered a fast and relatively inexpensive means of corresponding with the outside world. It has also facilitated resource sharing and provided means of obtaining scientific and technical information from the industrialised world with greater ease.

Many faculty members, especially at UST, have used the e-mail to obtain abstracts and full-texts of articles which have improved upon their teaching and research activities. The quality of research undertaken by faculty members has also improved tremendously, as they get access to current information. Many academics have used the e-mail in sending their papers for publication as periodical articles in refereed journals overseas. The authors have received, corrected and returned proofs of their papers to the publishers by e-mail.

The University of Ghana Medical School Library, Korle-Bu, prepares abstracts of publications on CD-ROM databases, and documents it has downloaded on the Internet and sends them by e-mail to health professionals in the country (Addo 1994). This has considerably enhanced their performance. Access to the Internet has also facilitated communication between libraries inside and outside Ghana, and this has improved information delivery services to the academic and research communities in Ghana.

Other uses of e-mail by academics in Ghana

E-mail is also used by Ghanaian academics and researchers in the following areas.

Searches by colleagues abroad

In a survey carried out by this writer in September, 1998, subscribers of the FidoNet e-mail service, including lecturers and researchers, indicated

that they used the e-mail as a means of sending mails quickly (58%). Others (17%) used the e-mail to get abstracts or full-text documents they needed for teaching and research. 15% of the population indicated that since they could not access the Internet they requested friends or colleagues in Europe who have direct access to the Internet, to do searches based on particular topics or on their profiles for them. Data retrieved is downloaded and sent to them as files by e-mail. 10% of the users also said they sent references obtained from abstracts to the Library for them to be obtained as photocopies for them. A majority of respondents (75%) indicated that they would like to access the Internet or browse the World Wide Web to find more current information on subject areas they were working on and suggested that the university authorities ensure that full Internet connectivity is installed for the university community.

Klobas also reported that many of the university staff in Australia used international network of colleagues who could advise them on where to locate data or files they wanted, and if necessary what commands to use to get them (Klobas 1995). They could also obtain the data or information for them as files sent by e-mail. Any word-processing program could read such files.

Sending dissertations to external referees

Faculty members of UST have used e-mail in sending dissertations, project reports and large volumes of data to external examiners or colleagues outside the country for assessment. This has reduced the need for external examiners to travel to Kumasi, Ghana, for this purpose.

Co-authoring and publication of articles

Ghanaian academics and researchers when co-authoring an article with a colleague overseas or in a different location send drafts of papers to be published as periodical articles by e-mail. The text can be downloaded, read and suggestions for revision entered and uploaded, and sent to the other collaborating colleague. He/she could then use his/her own word processor to accept or reject the corrections made and prepare a final copy ready to send to the editor or publisher. Electronic transmission is definitely the way to go for

getting this type of work done efficiently and fast. Using express mail or fax to send the text would still mean that corrections or changes would need to be re-keyed, besides the high cost charged for using these services.

Routing of memos, agendas, minutes

Memoranda that used to be routed by hand and might get lost in someone's in-tray can now be sent to everyone simultaneously, as is the practice in academic and other institutions in Ghana. Agendas for meetings are distributed to all, as are minutes of meetings. No one can therefore have excuse that he/she did not see a message or a memo. Everyone has the responsibility to read his or her e-mail. In this way time is saved and stationery use is also limited.

Committee work

Much committee work is being conducted via e-mail, and this has been the practice in Ghanaian universities. Drafts of reports are circulated and committee members send their suggested changes to other committee members. The person who is responsible for the final copy co-ordinates all the comments and then send out the revisions. The ability to download and upload documents from one's own PC makes it easy to incorporate corrections by using a word processing program which makes it unnecessary to type in the new version.

Subscription to discussion lists

Mailing lists are extremely valuable sources of information and provide a free current-awareness service to subscribers. Many faculty members use the e-mail service provided by Ghanaian academic libraries in subscribing to mailing lists in their respective subject areas. Through their subscription to discussion lists, many academics have had access to several experts from whom they could ask for help, information or collaborate in joint research projects.

Telnet

Telnet refers to the remote login that is possible on the Internet because of the TELNET Protocol.

The next most popular use of the Internet by scholars and academic libraries elsewhere is the ability to make TELNET connection to online databases or catalogues of distant libraries, to identify materials on one's research topic without having to travel a long journey to any of those libraries. Documents identified to be relevant and useful to one's research work could be downloaded onto one's own PC. Ghanaian academics who have access to the Internet have been using this facility to obtain current information and documents. All the university libraries and INIT now have access to Internet, and are therefore able to provide this service to their users.

Telnet is the only Internet tool that cannot be accessed by e-mail, but as indicated below ftpmail can be used to request and receive files from any ftp server on the Internet.

Internet services accessible by e-mail

As indicated above the majority of academics in Ghana has only e-mail. Some Internet tools and services are accessible by e-mail and brief description of these tools are provided below so that those academics with e-mail only may be able access them to retrieve information and documents.

File retrieval using e-mail

E-mail can be used to request and receive files from any ftp server on the Internet by using ftp application gateways called ftpmail and bitftp. Ftpmail is a facility which allows users of email who do not have direct access to the Internet or over a UUCP connection, to retrieve files from anonymous FTP sites by incorporating the FTP commands in mail messages to special server addresses (McMurdo 1995). One sends an e-mail message to this server, telling it which file to send. Upon receiving this message, the server makes an anonymous ftp, gets the file and sends it back to the user who requested it through e-mail. The initial response from the server will be to confirm receipt of the request, advise of the priority it has been assigned, and its place in the queue. Later – possibly some days later – the requested item will arrive in one's mailbox, possibly broken down into a number of messages if the sought file is large.

Using Archie via e-mail

Archie is a system that allows one to search through indexes of anonymous ftp servers for strings of regular expressions to locate files that are available on public servers. It is the place one should start if one is searching for programs, data or text files (McMurdo 1995). One asks it either to find filenames that contain certain search string or to suggest files whose description contains a certain word. It returns the actual filenames that meet the search criteria and the name of the servers on which those files reside. Currently, Archie indexes about 1200 servers and 2.5 million files. Although it is easy to access Archie through telnet, e-mail access is also quite effective. Many of the servers that Archie indexes provide access through ftpmail for those networks which cannot do ftp, or provide only e-mail access to the Internet (Krol 1994).

Gopher by e-mail

Gopher is a menu-driven text-based tool for browsing through files and directories across the Internet (Chapman and Zwicky 1995). On-line it allows the user to explore the Internet's data sources through easy-to-use visual "menu" (McMurdo 1995). It offers a convenient way of obtaining information when one knows what one wants, but does not know where to find it. Gopher sites permit access to library catalogues around the world, electronic journals and books, guides to the Internet and discussion lists, etc. There are more than 3,000 Internet Gopher servers, with estimated two to three million file and menu items.

Gopher information can however be accessed by e-mail, but not every file on every site is available by this method (@ ease with e-mail, 1995). "Gopher by e-mail" offers a useful off-line but slightly less user-friendly access to information, similar to "mail order" services. One sends an e-mail message to a GopherMail server (e.g. Gophermail@calvin.edu, or gopher@earn.net), but with its Subject: line containing the address of a known gopher site (e.g. bubl.bath.ac.uk). The computer then sends back the main menu for that gopher as an "order form", with instructions that sought items be prefixed with an 'x', and sent back to the same e-mail address. The in-

formation requested is sent back by e-mail by the computer (McMurdo 1995).

Veronica indexing

Veronica (Very Easy Rodent-Oriented Netwide Index to Computerised Archives) indexing enables keyword and string searching of titles of gopher items, returning results as a gopher menu. Veronica searching is case-sensitive, supports nesting Boolean AND, OR, NOT combinations and truncation. As Veronica is integrated with gopher, searches can also be submitted to veronica servers by the GopherMail technique.

When submitting a veronica search to a GopherMail server, the search string should be entered in the Subject: line. When GopherMail returns the results of a search, the search string is also returned appended to the Subject: line. Sought items can then be retrieved by further iterations of GopherMail messages, as they would from any other gopher menu (McMurdo 1995).

World Wide Web

The World Wide Web (WWW or Web) is a global hypertext information system. The basis of retrieval from WWW servers is the Universal Resource Locator (URL) or address. Almost every protocol type available on the Internet is accessible on the Web. This includes ftp, gopher, Telnet, Usenet, e-mail, etc. The Web has its own protocol: http – the hypertext transfer protocol. The Web provides a single interface for accessing all these protocols. Because of this feature and its ability to handle multimedia, the Web is the fastest growing component of the Internet.

Retrieving WWW documents through e-mail

The World Wide Web is probably the least appropriate Internet service to use by e-mail, since it negates the visual, multimedia, graphical user interface (GUI) of client browsers. One can however retrieve information from the World Wide Web by e-mail. WebMail servers (e.g. webmail@www.ucc.ie or www.mail@ceisin.org) allow users to request URLs which define the address of the document, and it can be retrieved by sending an e-mail to the server (@ ease with e-mail, 1995).

WebMail can also be used to retrieve hypertext documents, which enables the user to access new documents related to a word or phrase. If the required document is too large, the first 5,000 lines will be sent. (Internet Engineering Task Force, 1991).

Mailing lists

One of the more powerful uses of e-mail is electronic mailing list (Listservs®, often called “lists”). Mailing lists are extremely valuable sources of information.

- i. They provide lots of up-to-date information and discussion on topics of one's particular interest, thus providing a free current awareness service. It is often the place one gets to hear things first.
- ii. Lists give one immediate access to hundreds of experts and allow one to cast a net for help or information with a minimum of effort and often to find the exact answer one was looking for when conventional means proved useless (McMurdo 1995).

LISTSERV® archives can be searched and retrieved by e-mail. LISTSERV® database retrieval is, in principle, highly sophisticated compared to most Internet tools, and is a powerful information retrieval (IR) and list-analysis tool. It allows full Boolean expressions, which can include date specifications, reference fields in the message header, and searches whole message-bodies – rather than just individual lines. Full documentation is retrievable by e-mail (Liu et al. 1994).

Projects and plans

There are plans to install area networks on the campuses of the three universities, so that libraries, academic and research staff could directly access the Internet. The University of Ghana has gone far ahead, and the Balme Library has installed a LAN with seven workstations, so that users can access the Internet. The other libraries have only one stand-alone workstation with Internet connectivity. The libraries of the University of Science and Technology, Kumasi and the University of Development Studies (UDS), Tamale also have Short Wave Radios which enable them to access the Internet through the Balme server. DANIDA has plans to install the Short

Wave Radio equipment in the other two university libraries.

Information now comes in different formats, and libraries have the responsibility of making it easy for users to access and retrieve needed information, irrespective of the format in which it is presented. Ghanaian academic and research libraries can access relevant electronic information if they are in a position to pay for it.

Electronic journals are being published in a variety of subject areas, some of which may be accessed free of charge if one has access to the Internet. Users can also have access to and search several electronic journals simultaneously for the required information. They can also download needed full-text articles instantly. In view of the peculiar problems associated with subscribing to print journals – foreign exchange difficulties and delays in the delivery of issues of journals – the electronic journal seems to recommend itself to Ghanaian librarians because its delivery is fast. Some may also be accessed free of charge as indicated above.

African Virtual University

The World Bank Africa Region, InfoDev, the US Trade Development Agency and bilateral donors have provided various sums of money to finance an African Virtual University (AVU). Twelve higher educational institutions in Africa, including three Ghanaian universities, are involved in the project. Selected U.S. and European universities provide courses delivered by satellite and computer. The AVU decided to set up a digital library to support the programme because a lot of sites did not have good libraries. The AVU digital library facility is to ensure that AVU teaching programmes had a good back up of teaching and research materials. The library facilities are designed to deliver needed library resources to AVU students, faculty staff, universities and other tertiary educational institutions that participate in the AVU programmes (The African Virtual University at the URL <http://www.avu.org>).

The following facilities are available:

- UMI full-text electronic journals
- AVU Library card catalogue

- World Bank and IMF libraries
- World Bank reports.

It is possible for libraries in the participating institutions to provide users access to these facilities. Besides they could also access the Internet by satellite, and this opens up a wide avenue for users of such libraries, if only the facility would be extended to them.

Sustainability

All the projects described above have been set up or initiated by foreign institutions and are aimed at solving problems of infrastructure as well as providing access to information. These projects run for a given period and are designed to sensitise governments and educational institutions of their usefulness and how they can contribute to education and the development of the country. But donor funding will not flow forever, and there must be plans to sustain these projects when the funds dry up. The Implementation Sub-Committee of the IFLA/DANIDA ILL/DD Project has proposed the levying of prescribed fees to be paid by the beneficiary libraries to sustain the services when DANIDA funding ends.

Conclusion

The Internet is an electronic communication network that provides access to electronic mail and electronic resources (including computer files, library catalogues and databases) held in computers around the world. Those who have full Internet connectivity can browse the Web, do Telnet and access other services. E-mail facilitates communication with colleagues and for information, but it can also be used as an interface to a range of Internet information retrieval utilities, such as ftpmail,archie, Internet Gopher and World Wide Web to obtain documents or data needed for one's teaching or research work.

Because of the high cost of full Internet connectivity provided by ISPs, many Ghanaian academics and researchers subscribe to only the e-mail service. It is hoped that the information provided will enable academics and researchers in Ghana and elsewhere who have access to e-mail only to access some of the Internet via the utilities discussed in this paper.

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