Study on Digital Library

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Abstract—**Digital libraries promise new societal benefits, especially for e-learning in digital or mobile times, starting with the elimination of the time and space constraints of traditional bricks-and-mortar libraries. The library and information professionals are required to acquire such knowledge and skills as the library is one of the highly IT influenced service profession. This paper gives an overview of current trends in digital library research consists of digital library characteristic, advantage, disadvantages and function. This paper also highlights on the impact of information technology on the traditional library**

Index Terms—**Digital library**

I. LIBRARY

Library is a place where the collection of information resources in print or in other forms that is organized and made accessible for reading or study is kept. International Organization for Standardization has defined library as irrespective of the title, any organized collection of printed books and periodicals or of any other graphic or audio-visual materials, and the services of a staff to provide and facilitate the use of such materials as are required to meet the informational, research, educational or recreational needs of its users.

Advances in Information Communication Technology (ICT), particularly the World Wide Web (WWW) have seen the evolution of the automated library, electronic library, digital library, virtual library, Hybrid library etc.
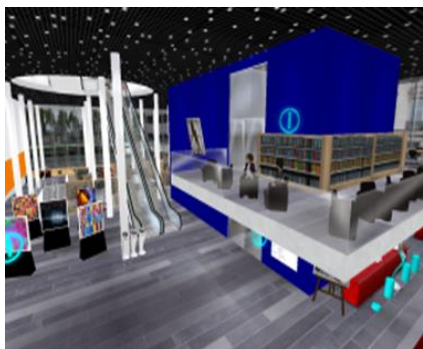

Fig. 1. Library

II. DIGITAL LIBRARY

A. Traditional Library

Traditionally, libraries were collections of books, manuscripts, journals, and other sources of recorded information. The collection of the traditional libraries are mostly print media, manuscripts etc. and are not well organized.

The documents are deteriorating at a rapid rate, the collected information is not easy to locate and procure. Such information does not reach the user of the libraries on time. It is difficult to get such publications in the absence of personal influence and contacts. There are certain restricted publications containing highly informative materials but may not be easily available. Sometimes the information is published after many years. By the time it is published, the information becomes obsolete and then abandoned. Since it is not properly indexed or listed, the researcher is forced to go through long and tedious process to ascertain whether any material of his/her interest is available or not. Here the collections are not well organized and some reports are deteriorating at a rapid rate. Preserving them in their original form is difficult and it is not cost effective. Again the traditional libraries are confined itself within a physical boundary.

B. Automated Library

A library with machine-readable catalog, computerized acquisition, circulation and OPAC are called as automated library. The holdings of such types of libraries are same as that of traditional libraries.

C. Electronic Library

When automated libraries go for LAN (Local Area Networking) and CD-ROM networking and started procuring E-journals and other similar kinds of publications then it is known as electronic library. The resources of the electronic libraries are in both print and electronic form. The electronic media are used for storage, retrieval and delivery of information.

D. Digital Library

It is a later stage of electronic library. In digital library high speed optical fiber are used for LAN and the access is over WAN and provide a wide range of Internet based services i.e. audio and video conferencing and like other. The majority of the holding of a digital library is in the computer readable form and also acts as a point of access to other online sources.

E. Virtual Library

It is a companion term to digital library, brought forth by the National Science Foundation. The concept of virtual library also emerged simultaneously with electronic library and digital library. This emergence is perhaps because all the information uses are at present through networked libraries at the desktop which is quite virtual (practical) without the physical existence

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of books on shelves. A virtual library can be simply defined as the internet-based digital library or a library without walls. The concept of virtual library is that any person who has a computer and connection to the library networks can access not only the resources of that library but also a variety of information available through national and international networks like internet and intranet without being physically present in the library.

F. Hybrid Library

It was designed to bring a range of technologies from different sources together in the context of a working library and to explore integrated systems and services in electronic and printed environments. It reflects the transitional state of the library, which today can neither be fully printed nor fully digital.

Fig. 2. National digital library of India

This article describes lessons learned by libraries engaged in a joint educational Master of Science (MSc.) programme between organizations located in Ghana and the Netherlands.

Access to information and knowledge are fundamental for education and development as well as being an essential requirement for improving the quality of life for people living in regions where the population has not yet reached a high level of economic and social development. Libraries play an important role in the educational and research process. A digital library can provide access to many of the knowledge networks around the world, which is a necessary component of any research experience.

In this article, a brief introduction to the International Institute for Geo-Information Science and Earth Observation (ITC) and Kwame Nkrumah University of Science and Technology (KNUST) is followed by an explanation of the setup of the joint educational MSc. programme that has been developed by these two institutes.

The digital library support in this joint programme will be described and the positive and negative experiences of the programme are summarized.

The article also provides general comments on the importance of building digital partnerships between libraries in joint educational programmes between developed and less technologically advanced countries.

G. ITC and KNUST

The International Institute for Geo-Information Science and Earth Observation (ITC) is the largest institute for international higher education in the Netherlands. It provides international education, research and project services in the field of geo-

information science and earth observation using Geographic Information Systems (GIS) and Remote Sensing (RS). The aim of ITC's activities is the international exchange of knowledge, focusing on capacity building and institutional development in emerging countries and countries that are economically and/or technologically less advanced.

ITC has a scientific library with a specialized collection in the field of Geosciences. Its mission is supporting the primary processes (education and research) of ITC by ensuring adequate provision of, and efficient end-use access to, useful scientific material. This includes supporting e-learning, distance education and joint educational programmes.

The Kwame Nkrumah University of Science and Technology (KNUST) is located in Kumasi, Ghana. It was established in August 1961 and is one of the major independent universities in Ghana.

KNUST currently has over 10.000 students who follow a course of study at the diploma, undergraduate, graduate or postgraduate level. The University has a spacious campus with ample accommodation for national and international students.

Within KNUST, two colleges are involved in the cooperation with ITC:

- College of Agriculture and Natural Resources (CANR)
- College of Engineering (CoE).

H. Joint Master of Science Degree Programme: GISNATUREM

The ITC has entered into partnerships with reputable qualified educational organizations for the purpose of providing joint educational courses in several countries. Under this arrangement, part of an educational course leading to a recognized ITC academic degree (Master, Master of Science) can be conducted in the student's home country. Currently, ITC offers joint educational courses involving several countries, including Ghana.

In many African countries, uncontrolled human activities often have a drastic impact on the state of the natural resources. Sound management of natural resources is a major challenge for planners and decision makers at all levels. This requires a planning and work force with a good understanding of the complexity of all the factors involved. To meet this demand, KNUST in Kumasi, Ghana, and the ITC in Enschede, the Netherlands, have jointly developed a Master of Science (MSc.) degree programme called MSc. GISNATUREM.

The programme provides knowledge and technical skills needed for the collection, interpretation and management of spatial information, using Geo-information science (GIS) and remote sensing (RS), to support planning and decision-making processes in the broad field of natural resource management.

Starting from environmental problems, the programme of study addresses approaches to assessing the state of the resources base, and the changes therein, then progresses towards the assessment of impact, and finally, societal response.

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The course is structured in modules, each of three weeks' duration. Currently, the course lasts for eighteen months: six and a half months at ITC in Enschede and eleven and a half months at KNUST in Kumasi.

I. The Role of the ITC Digital Library in the Joint Educational Programme

All students enrolled in ITC's educational programmes have access to the ITC Digital Library. This is also the case for students enrolled in joint educational programmes.

When a student is registered in ITC, he or she automatically is issued an e-mail address, which is needed for accessing the Digital Library. The same e-mail address and password is used for ITC Web mail. Therefore, no special login procedures need to be created for accessing the Digital Library.

A proxy server at ITC controls usernames and passwords and allows access to the Digital Library. When they begin the joint GISNATUREM courses, all students in Kumasi therefore have access to ITC's Digital Library. (Ironically, the programme staff located in Ghana/Kumasi do not have access to the ITC Digital Library, because the license agreements between publishers and ITC only grant ITC staff and students access to the digital resources covered by those agreements, i.e., since KNUST staff are not also ITC staff, they cannot have the same access to the resources as the students located at KNUST and ITC.)

The importance of having a scientific library for the use of staff and students is recognized by parties in the ITC/KNUST partnership. In the joint educational MSc. programme between ITC and KNUST, two colleges within KNUST are involved: the College of Agriculture and Natural Resources (CANR) and the College of Engineering (CoE). The Department of Geomatic Engineering under the CoE handles the theoretical and practical principles of surveying, GIS and RS (i.e., the spatial aspects) and the Institute of Renewable and Natural Resources (IRNR) under the CANR handles the natural resources management principles of the joint MSc. programme. Each of these colleges has a library of its own apart from the main KNUST library.

Within the framework of the joint MSc. programme, a partnership between the two college libraries at KNUST and the one at ITC was established. Four possible areas of cooperation were identified: Collection Development; Technological Infrastructure; Library Automation, and Human Resources Development. From the beginning it was clear that the libraries wanted the partnership to be small-scale with direct contact between partners. Of course, the main library of KNUST was informed and involved in the process as well.

J. Collection Development

It became clear very early in the programme that the collections of the KNUST libraries were outdated within the field of GIS, RS, and Natural Resource Management. However, some financial resources were allocated for buying more recent books in these topics to update the KNUST libraries.

In addition, agreements for information exchange were created: all ITC Ph.D. thesis were sent to the KNUST libraries, and the ITC library sends one scientific ISI journal (the International journal of applied earth observation and geoinformation) to the KNUST libraries as well. KNUST, in turn, sends the Journal of Science and Technology to the ITC Library. The ITC Library uses its digital library environment to expose these materials.

All the materials used by the students and staff involved in the joint programme were added to the collections of the KNUST college libraries. This has been standard procedure for the ITC library so that continuing students can have access to the materials used by former students.

Donation programmes were identified and contacts were established to facilitate donations. However, the donations programme sometimes garnered complaints, because the partner libraries do not always receive what they ask for but rather receive only what the donating organization does not need itself. This problem has sometimes elicited the comment: "donation programmes make African libraries grow but not develop".

To solve the problem of collection development in a more structured way, commitments from higher levels within the organization are necessary. The librarians' role here is to press collection development issues with those at the organization's higher management levels.

An observation concerning collection development is that the partnership should not only focus on sending and receiving printed documents from each other, but also on training and guidance regarding access and retrieval of online information sources.

Another observation is that, within the KNUST libraries, the sharing of research results such as undergraduate and postgraduate theses is a problem. Library partnerships between the two KNUST libraries of the CoE and CANR do not exist. This influences the smooth operation of the joint educational MSc. programme with regard to information flow. In other words, the lack of a digital partnership between the KNUST college libraries compels students, staff and researchers to travel some distance to obtain information, which prevents them from doing proper literature searches and delays their accessing even local research information.

III. TECHNOLOGY INFRASTRUCTURE

The technological environment for students studying at ITC and at KNUST is not equal. Students at Kumasi do not always have easy access to resources like online scientific databases and journals. Joining international students at ITC for course work in application domain, research skills and methods, and proposal writing for six months exposes GISNATUREM students to online scientific journals and other electronic databases. The KNUST college libraries are not yet fully developed to handle digital information. Although the main library at KNUST has some online journals and databases, they are so heavily used that students have to queue up to access the

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online information held there.

And although the students of the joint MSc. programme who are located in Kumasi have access to the ITC Digital Library, they do not have access to courses that teach them information skills, such as the students located at the ITC have. Students located in the Netherlands can take advantage of class modules with lectures on how to use the digital environment, including the electronic learning environment, but since students at KNUST do not have those classes available, they rarely use the ITC Digital Library during the first months of their study.
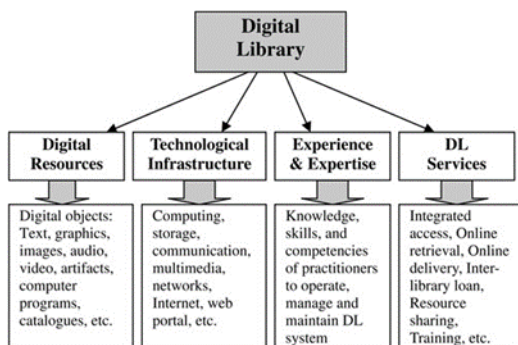

Fig. 3. Technological infrastructure

Developing an information skills curriculum is planned as a part of the cooperation between ITC and KNUST. The ITC Library will soon offer a distance education module on information skills adapted to the local situation in Kumasi. This should be very useful for students who start their studies there. In addition, the introduction of one or two networked computers in the two KNUST college libraries for students to use can help them to access both KNUST facilities and ITC facilities.

IV. LIBRARY AUTOMATION

The KNUST College libraries involved in the joint programme do not have an automated library system, whereas the ITC library does use integrated library software. At this time, a free version of library automation software (of course a limited version) is available, and some research is being done to see whether the software can be used at the KNUST.

Research reports resulting from relevant research conducted in the past within the two KNUST colleges are available only in analogue format. Since these reports are only catalogued via a physical card catalogue, awareness of the existence of the reports is very limited. When not in one of the college libraries, it is almost impossible for students to find these reports. To solve this problem, the reports could be added to the library database software at the college level and later integrated into the database software the main library is going to use.

At the KNUST college libraries there is no computerized system for accessing electronic information, although many of the more recent research reports (including the MSc. thesis of the joint programs) are available in digital form. One observation is that digitization in and of itself does not solve the problem of providing access to information; it is simply a tool

to make things easier to access and retrieve by those with computers and network connections.

Fig. 4. Library automation system

Another problem is that currently it is not possible to determine what information students are accessing or trying to access. This is of concern for the programme supervisors who are located at a distance from their students. An automated library system installed and in use at the KNUST College libraries could help solve this problem.

Through the ideas developed from the joint digital library partnership, the local setup of the two KNUST college libraries will be strengthened. That does not mean that western strategies will be forced upon the Kumasi college libraries. The intention of the joint digital library partnership is not to transfer the whole ITC technology structure to KNUST but rather to help support the KNUST libraries to meet international needs through local means.

A. Human Resources Development

The training of librarians and information professionals is needed so they can meet the challenge of providing information services in the new era. The critical need for libraries in developing countries is to understand how research practices are changing and what is required (with regard to infrastructure and skills) to improve and strengthen library support for research. The latter issue is of particular importance in the partnership between the ITC Library and the KNUST libraries. Within the cooperation, locally tailored short courses and training will be developed, as well as seminars created with the assistance of the ITC Library.

B. General Comments about the role of Digital Libraries in Joint Education Projects

Investment in knowledge is more than training and education. Up-to-date knowledge is the most basic condition for intellectual development and human development in general. It implies access to knowledge networks throughout the world. Libraries can play an important role in this process. Libraries can give access to these knowledge networks in the world:

"Libraries provide access to information, ideas and works of imagination in any medium and regardless of frontiers. They serve as gateways to knowledge, thought and culture, offering essential support for independent decision-making, cultural development, research and lifelong learning by both individuals and groups. Libraries and information services contribute to the development and maintenance of intellectual freedom and help

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to safeguard democratic values and universal civil rights. Consequently, they are committed to offering their clients access to relevant resources and services without restriction and to opposing any form of censorship" (IFLANET, 2004)

For strengthening the educational capacity and building research capacity in less advanced countries, access to relevant information is of great importance. Levels of access to information and communication technologies vary from individual to individual, community to community, and country to country; this is referred to as the "digital divide". As the pace of the technological revolution increases, so does the digital divide. The majority of the more than 6 billion people who inhabit our planet have been completely shut out of the digital revolution and the promise it holds. Some figures to support that assertion:

- "In 2004, fewer than 3 out of every 100 Africans use the Internet, compared with an average of 1 out of every 2 inhabitants of the G8 countries (Canada, France, Germany, Italy, Japan, Russia, the UK and the US).
- The entire African continent - home to over 50 countries - has fewer Internet users than France alone.
- The high cost of international bandwidth is often a major constraint, with developing countries often having to pay the full cost of a link to a hub in a developed country. More than 40 countries have less than 10Mbps of international Internet bandwidth, whereas in Belgium, a 9Mbps ADSL high-speed Internet package is available for just EUR 60 a month.
- Ghana has an Internet usage penetration of 2.8 % where the total for African is 5.3% and for the rest of the world 24.7%". (Internet World Stats, 2008) (WSIS World Summit on the Information Society, 2005).

Of equal importance is the teaching of students and staff to identify, locate and evaluate information. The scientific libraries play a role in this. The current state of information overload requires people to be information literate. Information Literacy Skills emphasize the problem-solving, critical and creative thinking, decision making, and cooperative learning that prepare students for the challenges in society.

Literacy lectures and workshops should provide students with knowledge and experience for exploiting the library and its information resources and various other tools. Information literacy and lifelong learning are critical to the success of every individual in the global information society. That's why it is so important that attention is paid to this issue during the educational life of students.

The following Information Literacy Competency Standards were defined by the Association of College and Research Libraries and adopted by the ALA American Library Association:

1. The information literate student determines the nature and extent of the information needed.
2. The information literate student accesses needed information effectively and efficiently.
3. The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.
4. The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.
5. The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally. (ACRL Association of College and Research Libraries, 2007)

These standards have been adopted by many other international organizations as well, e.g., the International Federation of Library Associations and Institutions (IFLA). IFLA has grouped the standards under three headings:

- Access; the user accesses information effectively and efficiently.
- Evaluation; the user evaluates information critically and competently.
- Use; the user applies information accurately and creatively.

V. CONCLUSION

Building partnerships is always a two-way effort. The danger could be that one partner becomes dependent upon the other partner; in the case of the joint programme described in this article, a dependency upon the ITC library could very easily be created, with the result that there might be less local investment in the scientific libraries at KNUST.

"Twinning" or "sistering" between the KNUST and ITC libraries must be mutually beneficial. Collaboration is possible in many ways, e.g., locally tailor-made short courses and training for the librarians at both locations.

The ITC Digital Library is only accessible for the joint MSc. students and not to the local supervisors in Kumasi; this can cause conflicts when students have access to more information than their supervisors do. On the other hand, it could also strengthen the idea that a well-equipped library is necessary for doing research.

The final aim of building joint education partnerships between organizations in developed and developing countries should be that the quality of education and research will be moved forward. A digital library can facilitate reaching that goal, but it depends on availability and maintenance of a network of computing services. It cannot be taken for granted that every student will have access to a personal computer with a connection to the Internet.

Digital partnerships between libraries involved in joint educational programmes, such as the one described in this article, can remove barriers to information resource sharing and ensure easier access to the world's knowledge resources for staff and students involved in these programmes.

REFERENCES

[1] ACRL Association of College and Research Libraries (2007) *Information Literacy Competency Standards for Higher Education*. ALA American Library Association. http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm

[2] IFLANET (2004) Promoting the global information commons: IFLA response to the WSIS Declaration of Principles from the library and information sector. IFLA, International Federation of Library Associations and Institutions. http://archive.ifla.org/III/wsis070604.html

[3] Internet World Stats (2008) *Internet Usage Statistics for Africa: Africa Internet Usage and Population Stats* Miniwatts Marketing Group. http://www.internetworldstats.com/stats1.htm

[4] WSIS World Summit on the Information Society (2005) *what's the state of ICT access around the world: The Digital Divide at a glance*. Geneva - Tunis, United Nations. http://www.itu.int/wsis/tunis/newsroom/stats/