# Scientific Content Creation and Dissemination: Opportunities for African Universities in Electronic Publishing

## Elisha R.T. Chiware

## Abstract

Africa has made some strides in accessing the Internet over the last decade or so and it has managed to upload considerable information on to the Internet in the areas of business, information technology, connectivity and politics. But there is a missing link in scientific and technological information content creation and dissemination. Several proposals have been made to narrow the gap between developed countries and Africa in terms of uploading information on to the Internet. Besides the growing public information and the presence of commercial web, content generated from African universities is expanding. Internet connectivity in Africa and most of the developing world initially took root mainly in academic institutions and among academics. In some parts of Africa, universities were pioneer users of e-mail and Internet access and there is very little evidence that their interest in ICTs has waned; rather, it is growing. Most African universities with full Internet connectivity have the potential of playing a critical role in content creation and dissemination through electronic publishing because of their research interests. This paper will address the problems that Africa currently faces in developing content for the Internet and in disseminating that information. The paper will look at institutions that have the potential for creating content for the Internet. It will focus mainly on universities and research institutions' capacities to take on this role. The paper also addresses other issues of access like limited bandwidth, unreliable electricity and communication transmission services, lack of technical expertise, high costs, etc.

## Résumé

L'Afrique a fait certains progrès dans le domaine de l'accès à l'Internet au cours de la dernière décennie, et elle a réussi à transférer des informations considérables

* Lecturer, Department of Information and Communication Studies University of Namibia, Windhoek, Namibia.

sur Internet dans le domaine des affaires, de la technologie de l'information, de la connectivité et de la politique. Cependant, il y'a un chainon manquant dans la création et la diffusion du contenu informatif scientifique et technologique. Plusieurs propositions ont été faites pour réduire l'écart entre les pays développés et l'Afrique en termes de transfert d'informations sur Internet. Outre l'information publique croissante et la présence de Web commerciaux, le contenu généré par les universités africaines est en expansion. La connectivité de l'Internet en Afrique et dans la plupart des pays en voie de développement a initialement pris racine principalement dans des institutions universitaires et chez les universitaires. Dans certaines parties de l'Afrique, les universités ont été les utilisateurs pionniers du courrier électronique et de l'accès à Internet, et il ya très peu de preuves que leur intérêt pour les TIC a diminué, il a plutôt augmenté. La plupart des universités africaines, avec une connectivité complète à Internet ont le potentiel de jouer un rôle crucial dans la création et la diffusion de contenu informatif par le biais de l'édition électronique en raison de leurs intérêts en matière de recherche. Ce document traitera des problèmes auxquels l'Afrique est actuellement confronté dans l'élaboration de contenu pour Internet et dans la diffusion de ces informations. Le document se penchera sur les institutions qui ont le potentiel pour la création de contenu pour Internet. Il mettra principalement l'accent sur les capacités des universités et les instituts de recherche d'assumer ce rôle. Le document aborde également d'autres problèmes d'accès comme celui de la bande passante limitée, les services d'électricité et de transmission de la communication peu fiables, le manque d'expertise technique, les coûts élevés, etc.

## Background

The creation of scientific and technological content and its dissemination has been one of the greatest challenges in the strides that African countries have made in accessing the Internet. Research generated in African universities and research institutions could dominate current output in electronic publishing, which is made possible by the existence of the Internet and other forms of electronic information dissemination. The Internet has provided opportunities and infrastructure for publishing and distribution of all types of information in various formats and at the shortest possible time and the lowest cost (Chisenga 1999). The number of African websites is growing rapidly and almost all African countries have local or internationally hosted web servers (Jensen 1998).

While the Internet abounds with current news on Africa, business information, tourism, etc., the African scientific and technological information is still missing. The research communities in Africa still face a number of challenges in using the Internet, generating relevant research, retaining experienced academics, and many other problems which affect the creation and dissemination of scientific material or any other related research

content. Currently, a number of initiatives on electronic information dissemination are currently underway. When fully implemented, they will see an increase of African research being disseminated through the Internet. Although questions are still being asked about the number of Africans who have access to electronic resources on the continent, yet it is important that these efforts continue.

## Status of African scholarly information on the Internet

The opportunities and obstacles for producing scholarly journals vary considerably in Africa due to the diverse and complex conditions within different African countries (Hussein and Priestly 2002). A growing number of African journals, including scientific and technological ones, are now available online through a number of collaborative international as well as national projects.

Scientists and publishers in many countries face problems both in accessing the world's research information and in gaining high visibility for their own publications and national research output. The cost of printing and distributing journals contributes to low circulation levels which, in turn, leads to a reluctance by scientists to publish. This results in the loss of much important scientific information which either remains unavailable to the international scientific community or suffers long delays in publication. The transfer of e-publishing technology and online distribution of such journals can greatly increase visibility and enrich the global knowledge base (see http://dspace.dial.pipex.com/bioline)

The following are some of the collaborative efforts in electronic publishing and dissemination in Africa.

i. The Electronic Publishing Trust pioneered access to full-text articles in African journals in 1996 for Development (EPT-http://www.epublishing.org) in collaboration with Bioline to facilitate open access to the world's scholarly literature and to support the electronic publication of reviewed bioscience journals from countries experiencing difficulties with traditional publication;

ii The Programme for the Enhancement of Research Information (PERI), coordinated by the International Network for the Availability of Scientific Publications (**INASP**), is another effort of activities in twenty countries (mainly in Africa) that strengthens research capacities by reinforcing local efforts to produce, disseminate and gain access to scholarly information and knowledge. It does this by bringing affordable global information to researchers in developing countries, by stimulating and supporting the publication and dissemination of in-country research findings, and by

providing information and communication skills training for researchers, practitioners, librarians and publishers (Ballantyne 2004).

The PERI programme includes the following components:

- Delivery of research and scholarly information. Libraries participating in PERI have access to more than 11,000, full-text journals and several biblio-graphic databases. Libraries in participating countries can access journals from 19 publishers. INASP pays the subscriptions for its primary targets, namely, researchers, university libraries and information managers in development research institutes and universities. Access is also available to other non-profit organisations because of the countrywide nature of the licences that INASP pays for.

- Disseminating national research. Activities in this programme aim to increase the visibility and accessibility of research carried out in developing countries. The main activity being the African Journals Online that provides a web platform of tables of contents and abstracts from more than 180 African published peer-reviewed journals with links to the full text, if available.

- Enhancing ICT skills. Activities in this area aim to enhance the skills of information professionals, researchers and academics in developing countries to make effective use of electronic information resources and tools (Ballantyne 2004)

The challenge that INASP's programme of African Journals Online faces is how to extend the contents from being an African journals indexing tool to becoming an African journals publishing platform. The challenge is to encourage as many journal editors as possible to move their production to an electronic platform (Ballantyne 2004). African universities and research institutions are home to a good number of scholarly journals and could play a leading role in this challenge.

iii. Database of African Theses and Dissertations (DATAD). The Association of African Universities (AAU) found it necessary to initiate and support efforts towards putting Africa's research output onto the mainstream of world knowledge. The initiative was born out of a project in 2000 following a positive recommendation of a feasibility study carried out for a pilot project to index, abstract, and distribute theses and dissertations completed in African universities.

The Database of African Theses and Dissertations is a programme to improve management and access to African scholarly work. Theses and dissertations represent a significant proportion of Africa's research activity. However, access to this research output is not easy, even within the

institutions where they are submitted. Months, years, and, in many cases, longer periods may elapse before papers or other forms of publications describing aspects of the research in these documents can be published. In Africa particularly, they are an underutilised information resource. By their very nature, they are produced in very limited quantities and the only copy available for public access is usually in print and can only be consulted physically in a university library.

The programme's long-term objectives include:

- Working with participating institutions to build a regional database of theses and dissertations;

- Contributing towards the creation of an environment that is conducive for research and publication in African universities and the region as a whole;

- Creating capacity in African universities for the collection, management and dissemination of theses and dissertations electronically;

- Providing visibility and improving accessibility to the work of African scholars both within and outside the continent;

- Facilitating the development of relevant copyright procedures and regulations which will promote the protection of the intellectual property rights of African University researchers and scholars; and

- Providing support for AAU programmes which aim at capacity building in research, promotion of cooperation among member universities and the networking of institutions.

iv. The American Association for the Advancement of Science (AAAS) Africa project. The AAAS Africa Programme was inaugurated in 1987, representing a concerned response on the part of US scientists and educators to the institutional crisis that their African colleagues were facing, and a commitment on the part of US scientific societies and donors to work with African institutions to address that crisis. To date, activities developed and implemented in partnership with African institutions have centred on improving access for African researchers to scientific and technical information, encouraging other aspects of scientific capacity-building, articulating research and policy agendas for critical issues facing African science and society, and promoting productive collaborative ties between US and African scientists and their institutions. This body has long been involved in projects to improve information access for scientists in Africa.

Many other collaborative efforts are underway and will certainly lead to significant increase in African content on the Internet within the next five years.

## The role of African universities and research institutions

Africa has large number of universities (both private and public), research institutions, and national agricultural research systems (NARS) that could play a leading role in scientific content development and dissemination. African universities are pioneers in the use of the Internet in most countries and still can take this pioneering role a step further in content development. The Internet offers possibilities never before seen in publishing since the advent of the Guttenberg printing press and desktop publishing combined (Adebowale 2000). Research generated from these institutions can be the basis for content creation on the Internet. While a limited amount of this research is published in African scientific journals, most which are now accessible through African Journals Online, there is still a lot more that could be peer reviewed and be made available through the global information highways.

A visit to the websites of a number of African universities will reveal that much information has been made available through the Internet. Some common examples are examination papers, conference papers and workshop proceedings and many other guides that would not have been easy to make available to the outside world without the Internet.

Globalisation represents a significant threat as well as a substantial opportunity to the economies and educational systems of Africa and other areas of the developing world. If used wisely information technology has the power to help create powerful and synergistic educational partnerships at local, regional and global scale. Such new and large scale partnerships, only possible because of the existence of the Internet, have the potential to allow educational institutions to respond positively to globalisation and help promote development if enough partnerships can be created and sustained (Keats 2003).

Another emerging area for African universities is that of collaborative development of open content. Given the cost of content, under-resourcing of universities and the scattered nature of expertise in Africa, the collaborative development of open content seems like a useful way to get high quality, locally relevant content to enhance teaching and learning. However, while there are currently no published operational models to guide institutions or individuals in creating collaborative open content projects many models are now being suggested and experience from open soft-

ware development are now being used to build the foundations of a process model for African universities (Keats 2003).

According to Keats (2003) and Keats and Shuttleworth (2003), the economic benefits of collaborative model of open content development stem from two inter-related processes, namely, collaboration and reuse. When people with a common interest in different institutions collaborate in the creation of content, it is obvious that as more people collaborate the costs per institution will be reduced.

For African editors willing to provide open access to their content, INASP has been encouraging them to use a new indexing and publishing system that uses the open source Open Journals System software developed by the Public Knowledge Project in Canada. INASP reports however that some editors in Africa are not yet convinced of the open access publishing revenue model, hence they are assisted to explore how they can also publish in full-text using commercial services such as Ingenta or Extenza (Ballantyne 2004). More training and publicity is still required to make sure that African editors are fully aware of the economic and legal implications on their revenues if they choose publishing electronically.

The African Education Research Network (AERN) is working on a project to determine and develop the conditions under which the uses of computer networking will greatly enhance communication between educational researchers (professors and graduate students) in 'Northern' universities and their counterparts in African universities in a manner and to a degree that will strengthen research capacities in African universities. Further objectives of the project include determining the conditions necessary for sustainability of the electronic network. The development of appropriate strategies to extend network access to an increasing number of African educational researchers to contribute to the increase in trans-African communication is necessary and most welcome.

These various collaborative efforts will certainly lead to the dissemination of more African scientific content through the Internet. The challenges remain in the area of sustainability, i.e., whether they can continue beyond the collaborative relationship and stand on their own. Experience with donor funding in African development over the last four or five decades shows that such projects end once the donor community pulls out.

## Constraints to content development

There are several challenges that African universities and research institutions are facing in their quest to create content for the Internet.

These vary from problems of access, government policy, and limited research capacities to limited resources.

The major challenge that African universities face is that of funding. The greater part of ICT projects in African universities has been achieved through donor funding. We have cause to fear that when this funding ceases so might the sponsored projects. Until the question of funding in African universities and research institutions is clearly addressed their capacity to publish both in print and electronically will remain very limited. Universities in other regions like southern Africa are building IT infrastructure from their own funding which largely comes from government. Universities in countries like South Africa, Botswana, Namibia, Zimbabwe, Lesotho and Swaziland have achieved a certain level of IT development that compares well with other international universities.

The second challenge facing African universities is their Internet capacity, i.e., bandwidth. Bandwidth is the scarcest resource in African ICT development. Most universities still connect to the Internet through a system of lease payments to national telecommunications authorities. These leases are often very expensive and do not deliver reliable services. For long-term development that will allow the creation of sustainable content development, national telecommunications authorities need to lower the cost of bandwidth for universities. The long-term national development benefits of expanded in-cooperation into the global information network and production of highly skilled young people far outweigh the short-term benefits of monthly lease payments. There is need for better management of ITC resources and infrastructure in order to maximise the limited bandwidth in Africa.

The third challenge facing African scientific and technological community in electronic publishing is the crisis in their research capacities. African scholars, and those from the North who specialise in African educational development observe a continuing crisis in African universities' capacity to create and sustain the quality of educational research that are essential to national development and autonomy. Factors that contribute to this crisis include isolation of aspiring researchers whose institutions lack the means to support their research interests or participation in regional and international conferences and seminars where studies in progress and completed studies are considered.

It is, estimated that research capacities of African universities have declined by as much as 50 per cent in the past decade. The emergence of a virile community of African scholars is essential to the future of African

universities' capacity to create, develop and disseminate scientific and technological information through the Internet.

A fourth challenge is that the regulatory environment for African universities to freely publish on the Internet. Many governments are still to come up with ICT policies that guide their countries in the development of IT. Where there is creativity there are delays in obtaining the required licensing to link to the Internet. For example, the existing laws may also be in conflict with those of the development of the Internet. African countries generally lack the legal and intellectual property rights laws for local innovation and cultural development. There are also inadequate policies to balance between public and private ownership, local resources and foreign direct investment, monopoly and competition in communication and value added services (ECA 1999).

## Conclusions

While opportunities exist for Africa to develop and disseminate scientific and technological information through the Internet, challenges must be addressed adequately. More studies should be carried out to determine the current technical constraints and come up with suitable solutions that fit in within what is currently affordable in Africa. While Africans may want to duplicate the developments of the West in ICTs in reality, this is not achievable in the short term given all the problems that the continent currently faces and has to address. Africa needs feasible solutions and the capacity to find those solutions is there.

Producers of African scholarly journals face many challenges in the coming years, particularly with the ever-expanding digital technology. Africans need to show commitment to their goals, share experiences and resources, work closely with partner organisations and develop appropriate models that suit each country. Appropriate digital technology should be used to enhance efforts in reducing printing costs and in disseminating journals. Continuous efforts must be made to improve the quality of journals, research reports and related information that is of academic value. Furthermore, for a good quality of scientific content creation to be achieved in African universities and research institutions, governments must create the enabling environment through legal and policy frameworks to protect intellectual rights, security and copyright ownership, and must encourage accessibility and competition at affordable prices (ECA 1999). Pricing mechanism should also be developed to reward contributors and ensure that they continue publishing.

# References

Adam, L., 1998, 'Giving the Internet an African Voice: Expanding African Content is as Important as Widening Access', *Africa Recovery*, Vol.12, No.3, December.

Adebowale, S., 2000, 'Disseminating the Electronic Publishing Philosophy in Developing Countries', *Electronic Journal Publishing: A Reader,* Oxford, UK: International Network for the Availability of Scientific Publications, Available online at http://www.inasp.info/psi/ejp/adebowale.html.

Ballantyne, 2004, 'Enhancing Access to Information in Higher Education and Research', *New Review of Information Networking,* Vol. 10, No.1, pp. 107-114.

Chisenga, J., 1999, 'Global Information Infrastructure and the Question of African Content', Sixty-fifth IFLA Council and General Conference, Bangkok, Thailand, 20-28 August .

Economic Commission for Africa, 1999, 'Content Creation and Dissemination', First Meeting of the Committee on Development Information (CODI), Addis Ababa, Ethiopia, 28 June -2 July.

Hussein, J. and Priestly, C., 2002, 'Current Status and Challenges Ahead for Scholarly Journal Publishing in Africa', Seminar on Strengthening Scholarly Publishing in Africa, Zanzibar, 1-4 July.

Jensen, M., 1998, 'Status of Information and Communication Technologies in Africa: The Regulatory Environment, (http://www.uneca.org/aisi/nici/documents/statusofinformationandcommun.htm).

Keats, D. W., 2003, 'Collaborative Development of Open Content: A Process Model to Unlock Potential for African Universities', *First Monday*, Vol. 8, No. 2, February, (http://firstmonday.org/issues8_2keats/index.html).

Keats, D.W., 2003, 'Open Content Licensing: A Challenge and Opportunity for African Governments and the UN System', Electronic Commerce Strategies for Development: Promoting an International Dialogue, Regional High Level Conference for Africa, Tunis, 19-21 June.

Keats, D.W., Beebe, M. and Kullenberg, G., 2003, 'Using the Internet to Enable Developing Country Universities to Meet the Challenges of Globalisation through Collaborative Virtual Programmes', *First Monday*, Vol. 8, No. 10, October. (http://firstmonday.org/issues8_10/keats/index.html).

Mutula, S., 2004, IT Diffusion in Sub Saharan Africa: Implications for Developing and Managing Digital Libraries, Keynote Address to the IFLA Africa Section Workshop Held in Gaborone, Botswana, 23-27 February.